Appendix C
National Hydrography Requirements and Benefits Study
State Summary Reports

Alabama

The State of Alabama continually supports the efforts of USGS and USDA to improve the National Hydrography Dataset (NHD). Ten organizations participated in the online survey and/or workshop. The organizations included state agencies, regional groups, local government, academia, and private citizens. The initial HRBS online survey for two organizations were incomplete. The HRBS workshop and follow-up conversations were extremely beneficial in clarifying the Mission Critical Activities (MCAs) and Business Uses (BUs).

The State's future benefits include more accurate and enhanced NHD data; cost savings to the government; increased information sharing opportunities; better quality and improved data access; and market competitiveness. As the quality, usages, and requirements of the NHD evolve, there will be an increasing demand for database updates and accuracy. Additional funding is required for the State NHD Stewardship Program to properly maintain the state NHD database. Assistance from USGS in the form of grants and tool development would greatly improve NHD stakeholder efforts.

The Alabama Department of Economic and Community Affairs Development (ADECA) is tasked to monitor and protect Alabama's water resources. ADECA manages the State NHD Stewardship Program. ADECA - Office of Water Resources administers programs for river basin management, river assessment, water supply assistance, water conservation, floodplain management, drought planning, hydrologic modeling of rivers/reservoirs, and water resources development. Each program is a mission-critical activity for ADECA. Better-quality NHD data are crucial in monitoring and protecting water resources.

The Geological Survey of Alabama's (GSA's) Geologic Investigations Program uses hydrography data for karst research and mapping. Mapping relationships between surface water and groundwater can help identify where surface contamination may impact cave systems and water wells. Hydrography data also help GSA identify spring, sinkhole, and cave pattern development in northern Alabama and as well as depression marsh density in south Alabama. Higher resolution is always welcome.

GSA's Mapping and Hazards Section also uses hydrography data to analyze geologic hazards such as faults and landslides. Stream network patterns can help identify geologic structures such as faults that would be hidden on the surface by vegetation or sediment/soil; stream drainage patterns can also help identify historic landslides, landslide development, and susceptibility of slope failure. Streams, ponds, and coastlines help identify ancient flood plains, which can indicate areas that may magnify shaking intensities during an earthquake. NHD data are also essential in interpreting the geologic history in the coastal plain; stream incising and meandering can help explain uplift and ancient shoreline delineation for paleogeographic studies. GSA's Ecosystems Investigations Program uses hydrography data for watershed assessments in strategic habitat units supporting imperiled freshwater species and also employs hydrography data for non-point-source vulnerability studies.

The University of Alabama (UA) conducts research involving climate and climate change impacts on streamflow, paleo reconstructions (using tree rings) of streamflow, forecasting streamflow, flood preparation/response, and drought frequency. UA designs decision-support systems to assist public water distribution system operators and decision makers in protecting and recovering their water systems. UA also preforms analysis on environmental informatics, transport of contaminants in the environment, global water, sanitation/hygiene hydrologic and frequency modeling, and water resource capacity development. Better-quality NHD data are crucial in all NHD research and development projects.

The Alabama Department of Conservation and Natural Resources' NHD critical activities include fisheries management, watershed protection, coastal zone management/protection, river and streamflow management, and water resource policy.

The Alabama Department of Environmental Management (ADEM) administers water permitting, compliance, and enforcement programs; conducts water quality and biological monitoring and assessments; maintains a water quality and biological database; and coordinates a statewide stakeholder and public education and outreach effort focusing on water quality. ADEM's NHD critical activities include water quality assessment; and evaluation of waters for 303(d) list, 305(b) categorization, TMDL development, and water quality restoration.

Regional organization (Tri-River Waterway Development Association) critical activities include economic development, streamflow, and environmental protection. Local government (Madison County and City of Huntsville) critical activities include stormwater, flood/hazard mapping, and watershed projection. Some economically depressed areas in the State have limited resources and are unable to acquire hydrographic data and maintain adequate staff/tools. Their only source of hydrographic data is the NHD.

The State of Alabama supports the efforts of USGS and USDA to improve the NHD and to develop geospatial hydrologic tools.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		

Data Types Required for Hydrography Data Access

Vector Data	Raster Data	

OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required

Data Type	Elevation Data Integration	Requirement
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

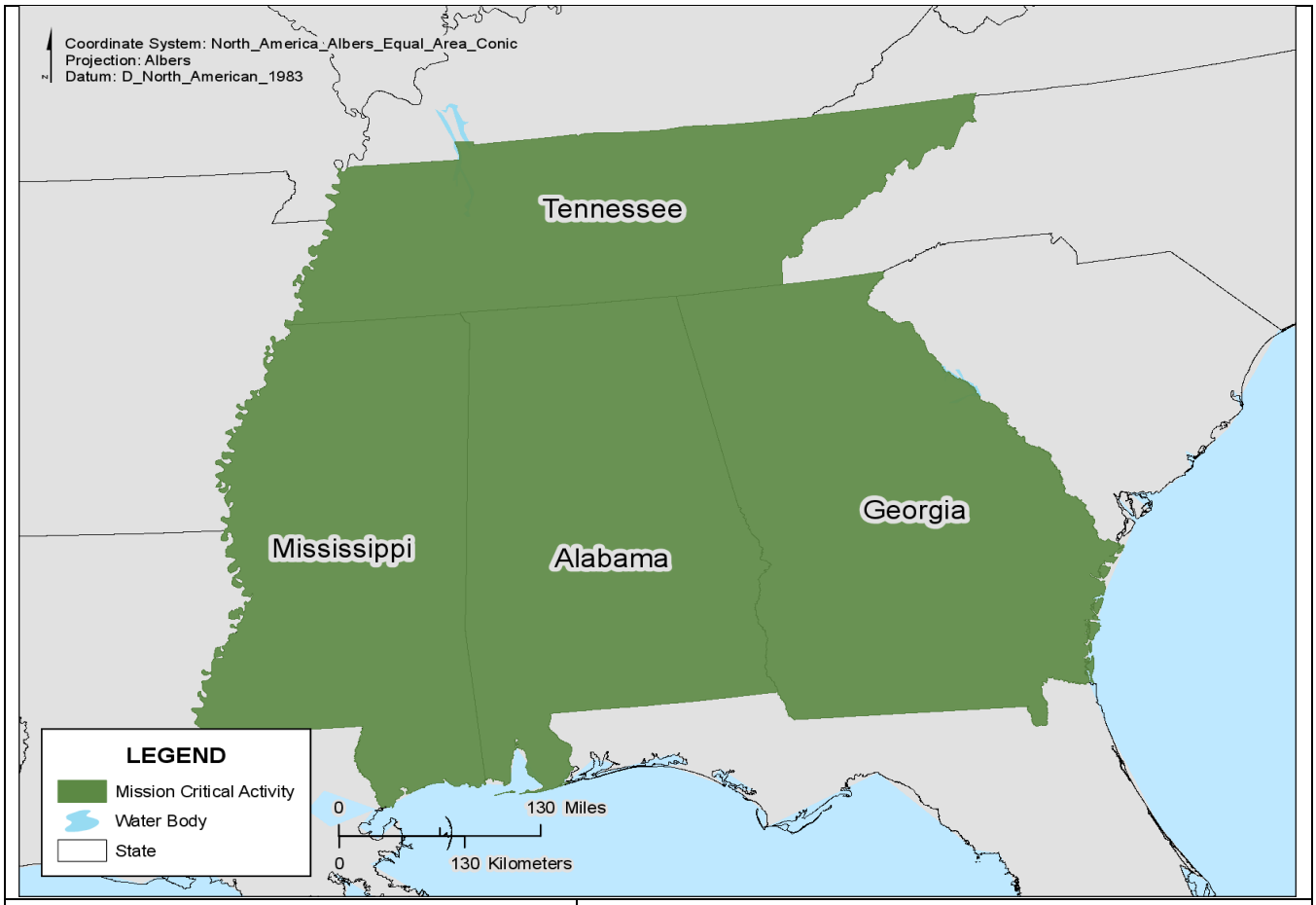
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major Problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Alabama managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Climate Change Impact



Mission Critical Activity Title:	Climate change impact
Mission Critical Activity Description:	Climate & Climate Change Impacts, Environmental Informatics & Decision Support, Fate & Transport of Contaminants in the Environment, Global Water, Sanitation and Hygiene, Hydrologic & Frequency Modeling, Stormwater & Emerging Contaminants, Water & Wastewater Treatment.
MCA_ID:	3802392343_1
Organization Type:	Not for Profit
Organization Name:	The University of Alabama
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5 million
Future Benefits Description:	Market competitiveness.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

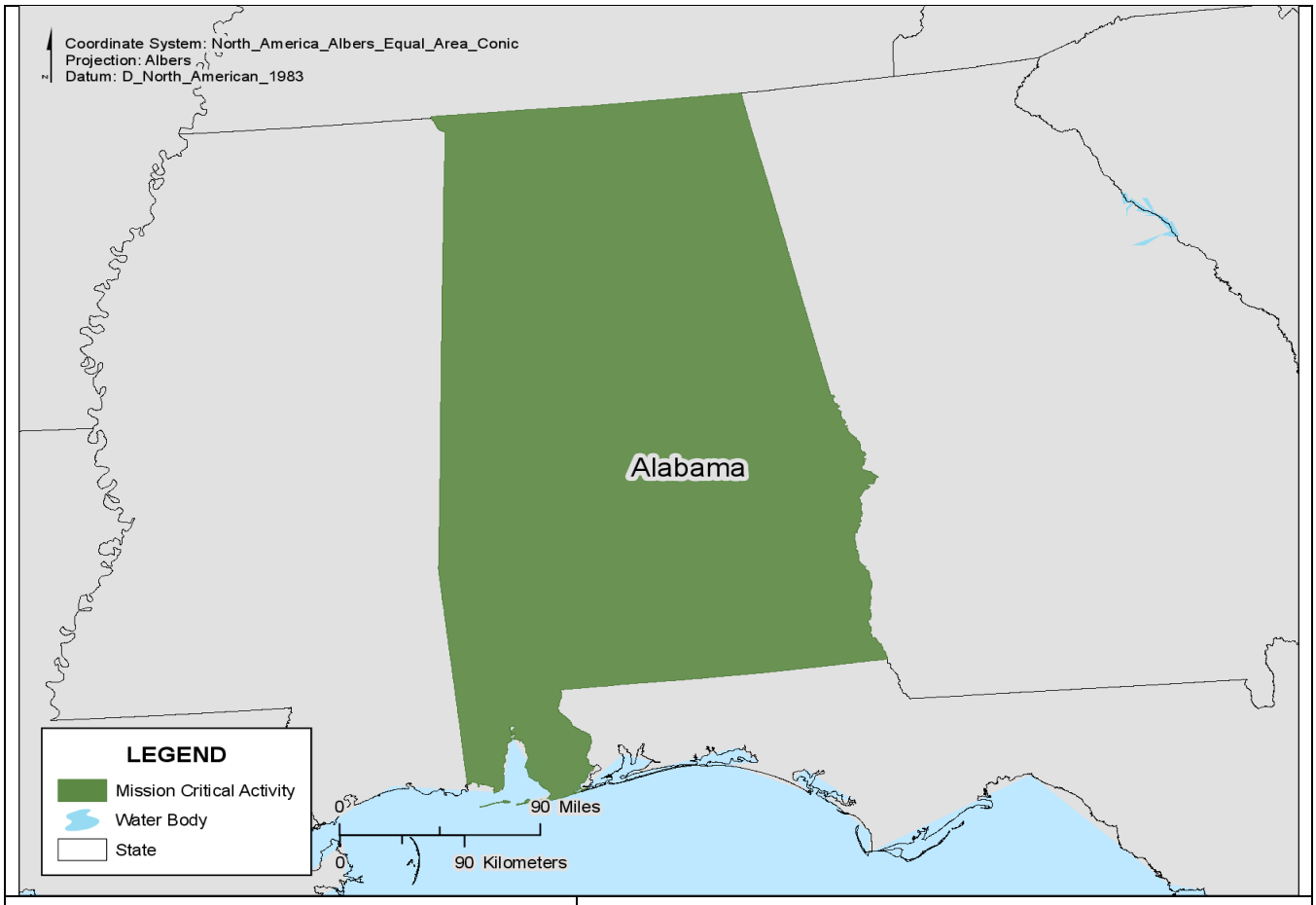
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Flood Risk



Mission Critical Activity Title:	Flood risk
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3797756227_1
Organization Type:	State Government
Organization Name:	Alabama Office of Water Resources (ADECA-OWR)
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Data that are provided by communities that are included in RiskMAP program areas.

Current Benefits	
Total Annual Program Budget:	$1.7 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	An enhanced NHD could potentially reduce the additional calculations or GIS editing necessary to perform flood risk mapping, producing a better end product with less effort and resources.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

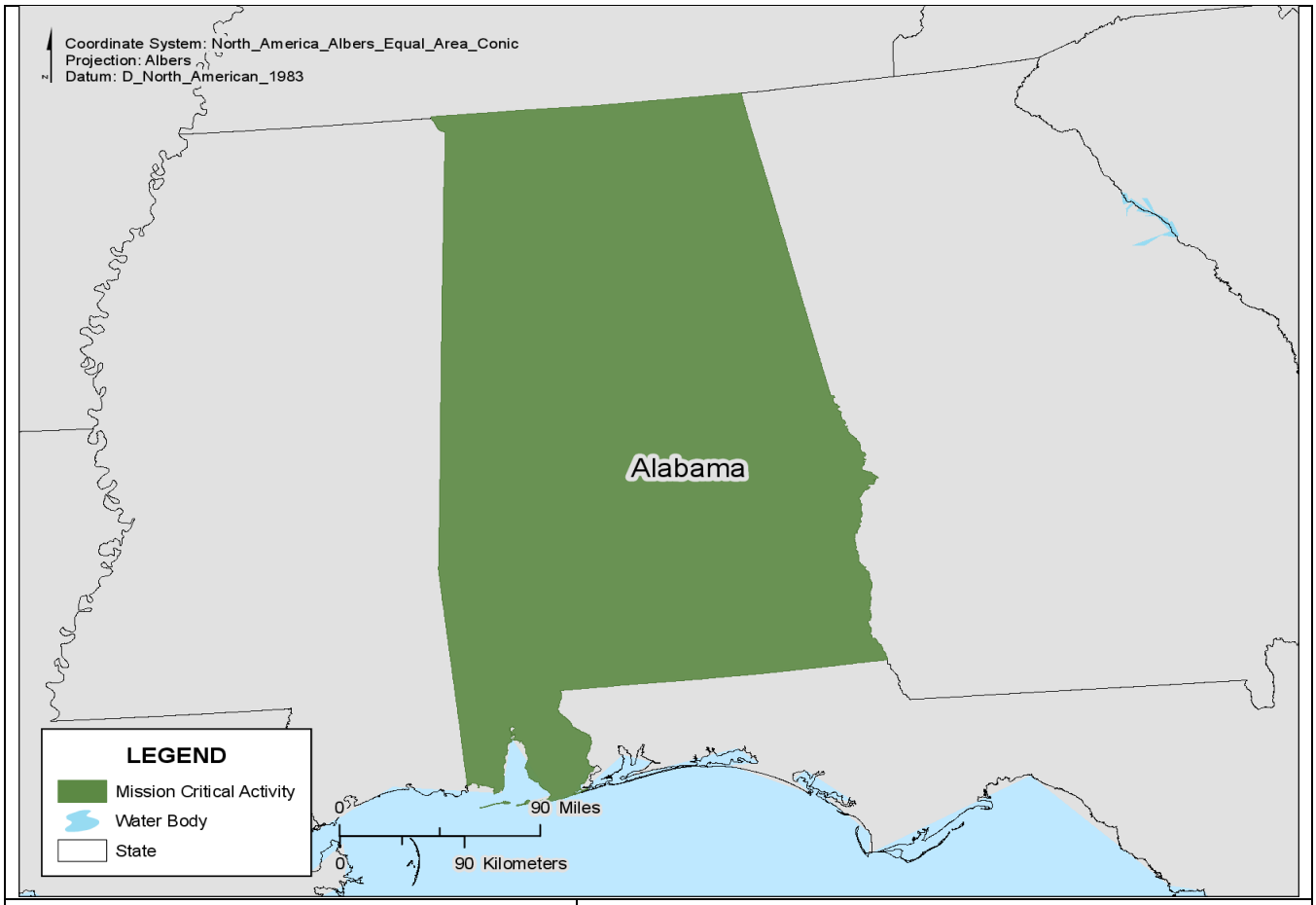
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Management



Mission Critical Activity Title:	Water management
Mission Critical Activity Description:	Fisheries management, watershed protection, coastal zone management, coastal zone protection, river and stream flow management, water resource policy.
MCA_ID:	3813064674_1
Organization Type:	State Government
Organization Name:	Alabama Department of Conservation and Natural Resources
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	No answer provided.
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

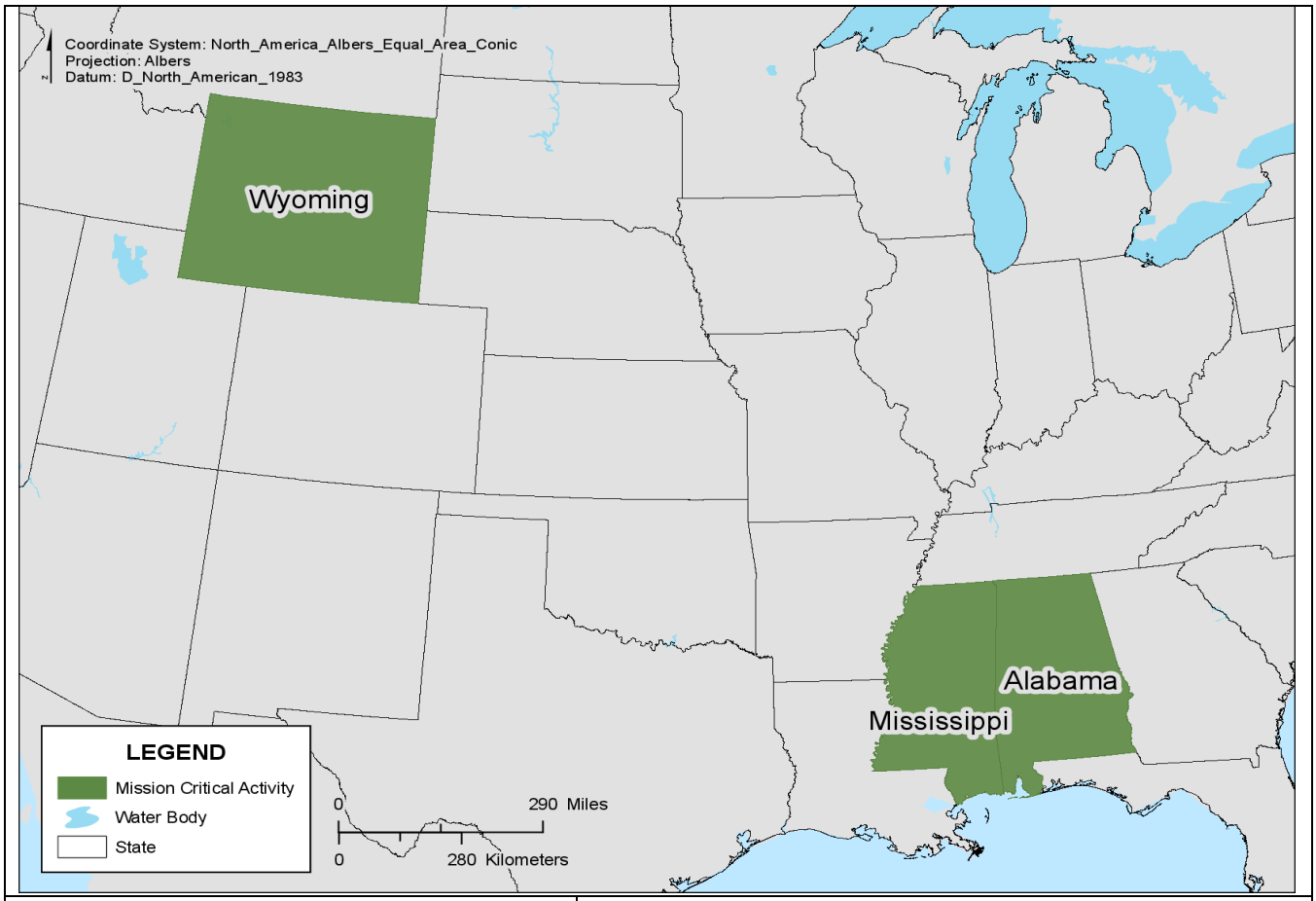
Future Benefits	
Future Annual Benefits ($):	No answer provided
Future Benefits Description:	No answer provided
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	None
Surficial Geology	Highly Desirable	None
Bathymetry	Highly Desirable	None
Climate	Highly Desirable	None
Contaminant Sources	Required	None
Elevation	Highly Desirable	None
Stream Flow	Required	Visual Inspection
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	None
Aquifers	Highly Desirable	None
Point Discharges	Required	None
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	None
USACE - National Inventory of Dams (NID)	Highly Desirable	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	None
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	None
Other (please specify the importance and highest analysis level):		

Climate Impacts on Streamflow



Mission Critical Activity Title:	Climate Impacts on Streamflow
Mission Critical Activity Description:	Research involving climate and climate change impacts on streamflow, paleo (using tree rings) reconstructions of streamflow, forecasting streamflow, and drought.
MCA_ID	3773979322_1
Organization Type:	State Government
Organization Name:	University of Alabama
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWIS.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Improved data access.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor

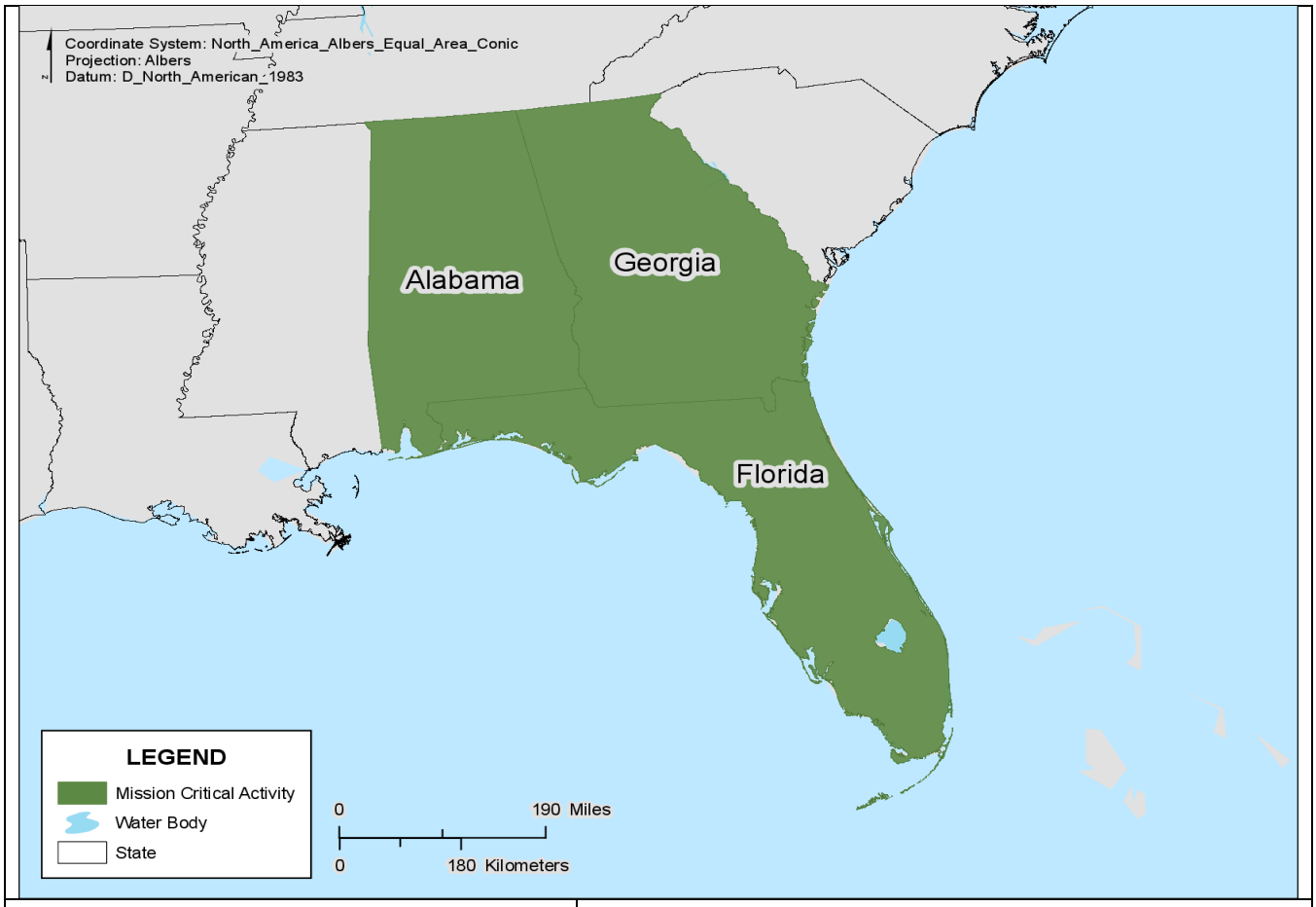
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Required	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Visual Inspection
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Stream Flow Management



Mission Critical Activity Title:	Stream Flow Management
Mission Critical Activity Description:	Economic development and flow and environment protection.
MCA_ID:	3828803791_1
Organization Type:	Not for Profit
Organization Name:	Tri Rivers Waterway Development Association
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	No answer provided.
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	No answer provided.
Future Benefits Description:	No answer provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

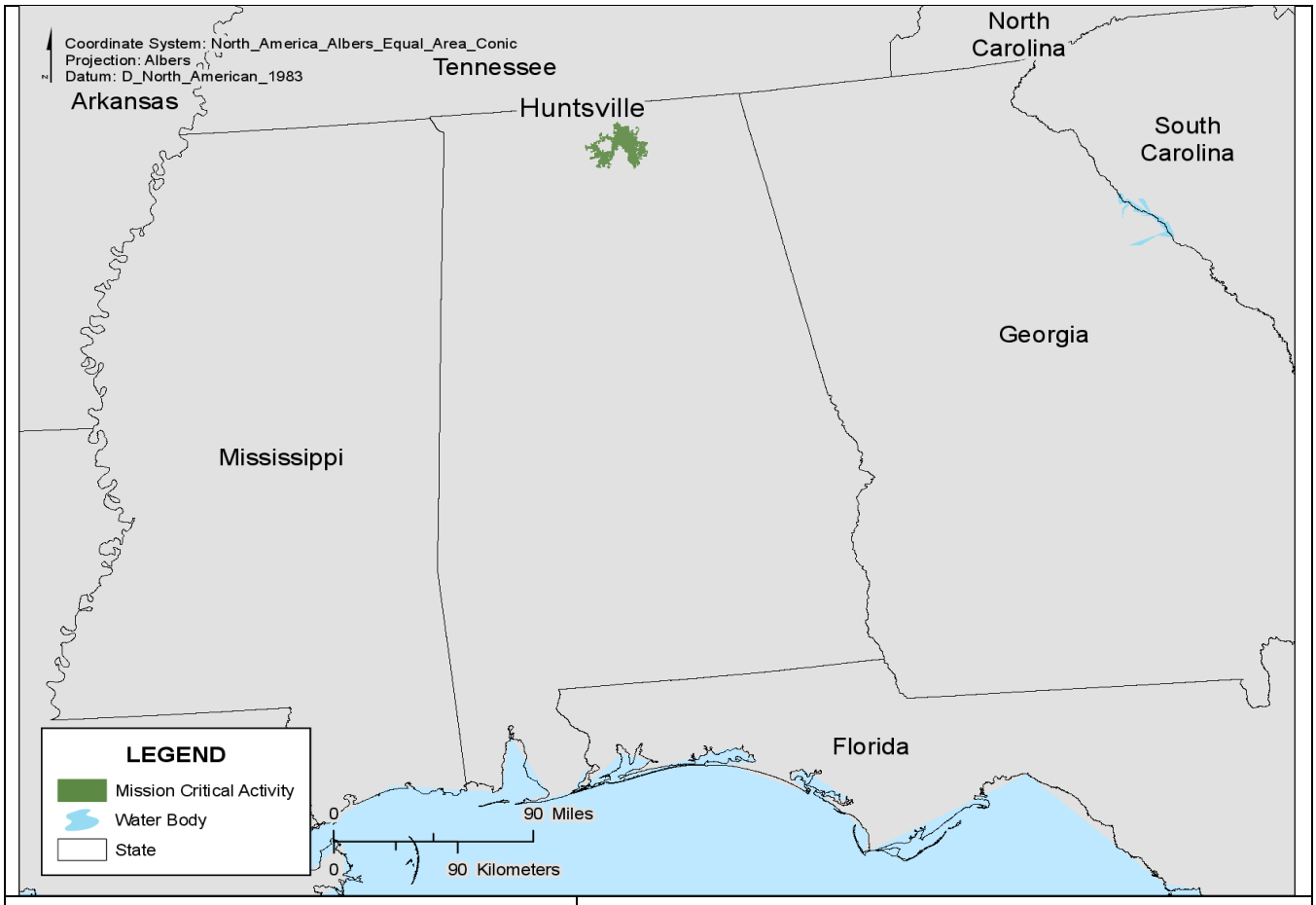
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater, flood mapping, hazard mapping.
MCA_ID:	3769766734_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Huntsville, Alabama
Business Use:	Urban and Regional Planning
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1000 square miles (640,000 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FIRM, our data.

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

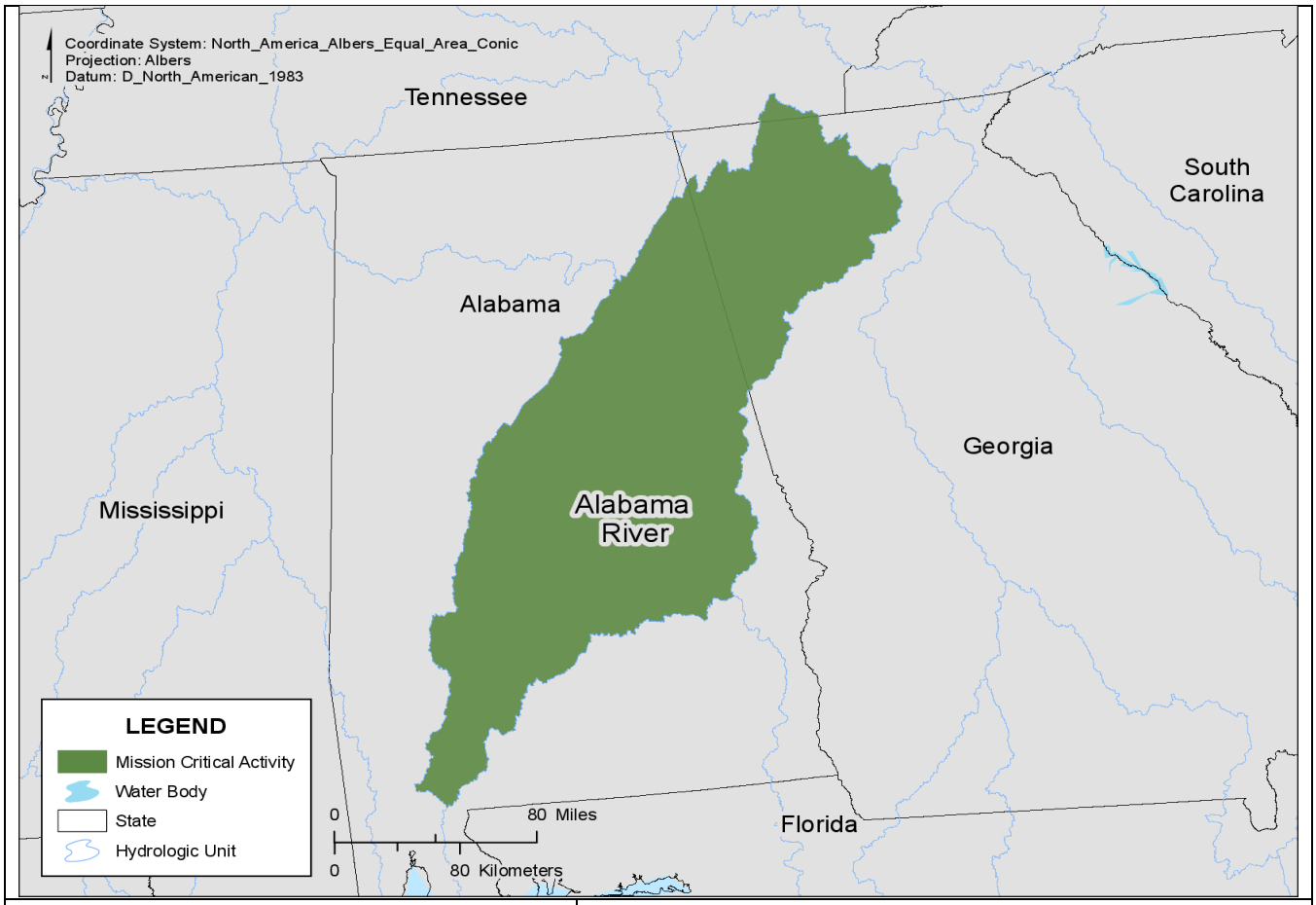
Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Cost savings from local budget information sharing.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice to Have	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Protection



Mission Critical Activity Title:	Watershed Protection
Mission Critical Activity Description:	Stormwater, watershed protection, flood hazards.
MCA_ID:	3769766734_2
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Huntsville, Alabama
Business Use:	Urban and Regional Planning
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Self-generated.

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

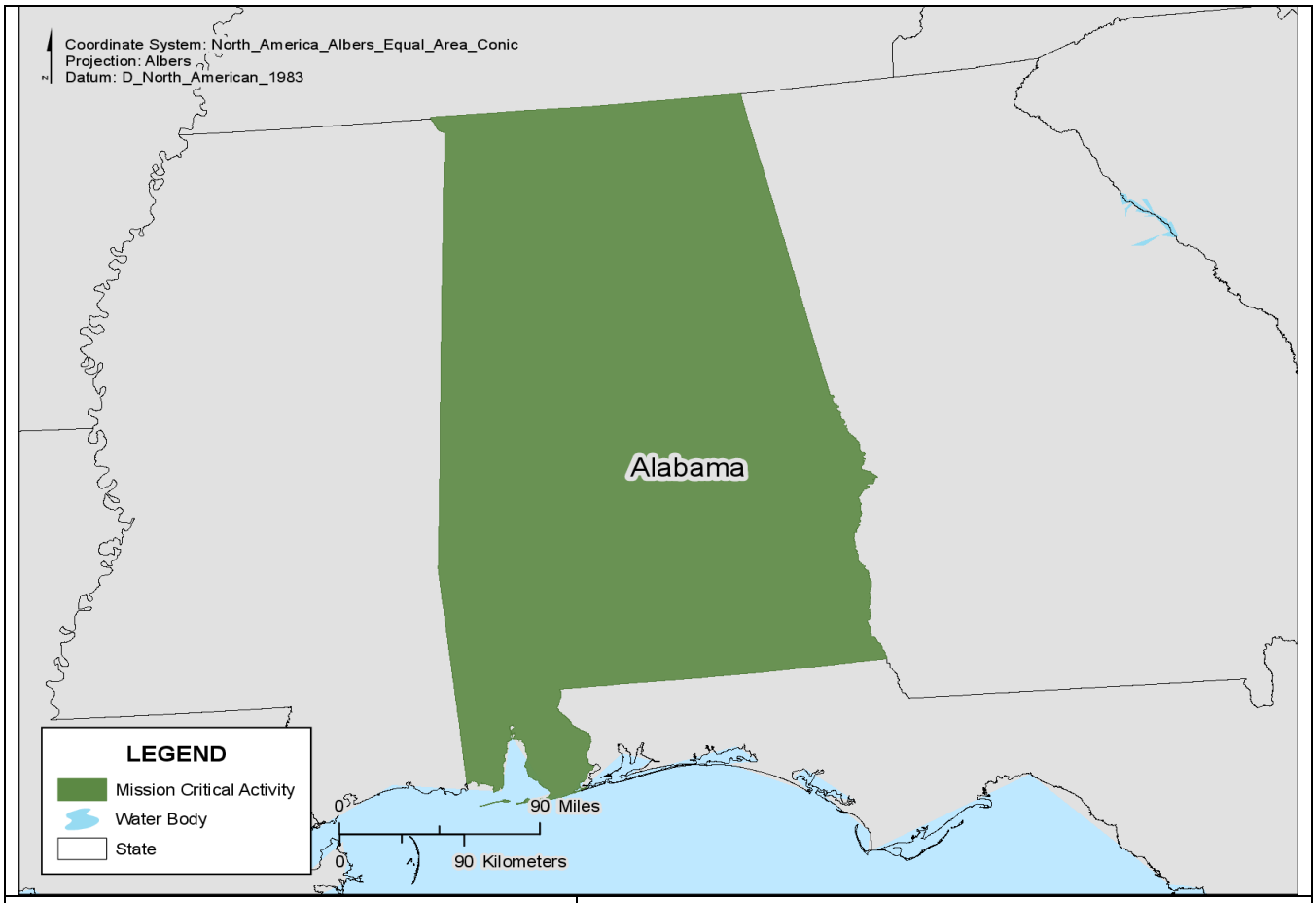
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Cost sharing.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Water quality assessment - We assess waters for 303(d) list, 305(b) categorization, TMDL development and water quality restoration.
MCA_ID:	3776331468_1
Organization Type:	State Government
Organization Name:	Alabama Department of Environmental Management
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$250,000
Current Annual Benefits ($):	$45,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Anything that gives us more accurate information reduces the costs required to verify information and perform analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left right/bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Surface and Groundwater Movement

Mission Critical Activity Title:	Surface and Groundwater Movement

Mission Critical Activity Description:	GSA's Geological Mapping Program uses hydrography data for karst identification of water movement between surface and groundwater via general streams and swallowed streams in karst areas. This becomes particularly helpful when trying to understand where surface contamination may impact cave systems and where chemicals from toxic spills may flow and impact water wells. Higher resolution is always welcome. Stream network patterns also help identify geologic structures such as faults that would be hidden on the surface by vegetation or sediment/soil. Hydrography data also help us identify jointing that defines cave pattern development in northern Alabama as well as depression marsh sinkhole karst density in south Alabama. Stream placement and patterns can help us understand patterns of landslide development and susceptibility of slope failure in certain areas. Streams, ponds, and coastlines help identify ancient floodplains, which can indicate areas that may magnify shaking intensities during an earthquake. Streams also help to identify fossil collecting sites and collection history in Alabama. The streams and water bodies also help to piece together geologic history in the coastal plain. Stream incising and meandering can tell more about uplift and ancient shoreline delineation for paleogeography studies. GSA's Ecosystems Investigations Program uses hydrography data for watershed assessment studies in strategic habitat units (SHUs) that support imperiled freshwater species. Also uses hydrography data for non-point source assessments (use NHD data in conjunction with other environmental geodatasets).
MCA_ID:	3801414365_1
Organization Type:	State Government
Organization Name:	Geological Survey of Alabama
Business Use:	Water Resource Planning and Management
Area of Interest:	State of Alabama and the entire Mobile Basin

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Higher resolution stream data would allow more precise determinations of stream restoration sites. The program would save money because fewer site reconnaissance visits would be needed.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

Future Benefits	
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Alaska

Quality surface water mapping is critical for meeting both short- and long-term science, regulatory, cartographic, natural resource management, and planning requirements; yet, in Alaska, the NHD has many issues that prevent using it to its full potential. Hydrography is identified in the Alaska Geospatial Strategic Plan (2011) as a statewide framework dataset and supports the following Mission Critical Activities (MCAs):

- **Coastal Hazard Mapping** (Alaska DNR, Division of Geological & Geophysical Surveys)
- **Decision support for sustainable development** (The Nature Conservancy)
- **Climate change mitigation and adaptation** (The Nature Conservancy)
- **Biological conservation and fisheries research** (University of Alaska Anchorage, Kenai Watershed Forum)
- **Watershed modeling, protection, and education** (Kenai Watershed Forum)
- **Regulatory protection of anadromous fish bearing waterbodies** (Alaska Department of Fish and Game, The Nature Conservancy)
- **Aquatic habitat and protected areas mapping** (Alaska Department of Fish and Game, The Nature Conservancy)
- **Water quality monitoring and management** (Alaska Department of Environmental Conservation, The Nature Conservancy)
- **Aquatic species harvest and contamination monitoring** (Alaska Department of Environmental Conservation)
- **Groundwater resources assessment** (Alaska DNR, Division of Geological and Geophysical Surveys)
- **Surface water mapping** (University of Alaska Anchorage)

While consistently mapped at 1:24,000 scale or better in the contiguous U.S., the NHD data in Alaska were taken from 1950s-era USGS Historical Topographic Maps at a broad scale of 1:63,360. These historic data need extensive updates and improvements to meet modern mapping standards and user needs. The dataset contains many errors including: streams mapped outside their current channels, misrepresentations of flowlines, irregular stream densities, disconnected streams and broken hydrologic networks, omission of existing streams and waterbodies, poor lake and waterbody perimeter mapping, and lack of stream/lake connectivity, lack of wetlands information, duplicate features, lack of integration with elevation data and imagery, erroneous feature classification (periodicity-perennial, ephemeral, intermittent), and numerous additional errors. Additionally, a historic lack of coordination between different groups has kept updates from succeeding in meeting modern national map standards.

Updating the NHD in Alaska has proven to be too large of a task for any single entity. Over the past five years, efforts by numerous organizations have updated the NHD to modern mapping standards in approximately 10 percent of the state; significant work remains to complete updates across the state. The update process and scope of work required to correct the issues with the current data is a time-consuming and expensive endeavor. Slow progress updating the NHD to national high-resolution standards is due in part to the quality of the existing data and also to difficulty in using the existing NHD edit and update tools. Updating the NHD requires a specific technical skill-set that must be practiced on a regular basis (especially via the conflation process). The complexity of the editing process creates additional costs for

any agency that they find difficult to take on. Because of this, few agencies are able to invest the time and money to train and maintain expertise in working directly to update the NHD.

Given the current hydrography situation in Alaska, there is a pressing need to correct these issues and improve NHD data to meet agency needs. In 2013, the Alaska Hydrography Technical Working Group (AHTWG) formed to address these issues. AHTWG promotes a strategic vision that supports the maintenance, stewardship, and use of a common hydrography dataset for all Alaskans. AHTWG supports updating the NHD through the Alaska Hydrography Database (AK Hydro). AK Hydro is a successful statewide stewardship model used to generate hydrography updates for the NHD and implement local attribute standards that are critical to Alaska (e.g. fish habitat, channel classification). AK Hydro makes editing hydrography data accessible to GIS users in Alaska who may not have the resources to learn and/or maintain the skills that are necessary to be proficient in the use of NHD editing tools. AK hydro streamlines the task by centralizing NHD maintenance services so that Alaskan agencies no longer have to attempt to run the complex NHD conflation processes on an irregular basis.

Improving the NHD in Alaska is a critical and essential step necessary to identify, monitor, and conserve key water resources. Despite the issues and challenges associated with using the NHD in Alaska, improving the data throughout Alaska has extremely broad interest and support, from Federal, state, local, non-profit, private, and collaborative groups. Support from USGS in the form of grants and improved editing tools will greatly improve efforts to update the NHD in Alaska and bring the data up to modern mapping standards.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓		✓	✓		✓				

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓			✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Somewhat Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data cannot be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Alaska managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Coastal Hazard Mapping

Mission Critical Activity Title:	Coastal Hazard Mapping
Mission Critical Activity Description:	Coastal Hazard Mapping.
MCA_ID:	3790902652_2
Organization Type:	State Government
Organization Name:	Alaska Division of Geological & Geophysical Surveys
Business Use:	Coastal Zone Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Continuously Updated Shoreline Product (CUSP), Alaska Hydro database.

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$300,000
Future Benefits Description:	More timely access to contemporary shoreline positions will improve shoreline change and coastal flood vulnerability mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Linkages to observations associated with tide gages.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Required	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice to Have	Associate Selected Data Type
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Natural Resources Management

Mission Critical Activity Title:	Natural Resources Management
Mission Critical Activity Description:	1. Decision support for agencies, organizations, regulators, and other stakeholders making decisions that affect freshwater salmon habitat in south-central Alaska. 2. Support for regulatory programs that promote water quality and abundance. 3. Support for sustainable design of large scale development projects such as hydroelectric and mining. 4. Support for measuring, mitigating, and adapting to climate change in Alaska.
MCA_ID:	3787962748_1
Organization Type:	Not for Profit
Organization Name:	The Nature Conservancy
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable

Requirements	
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Several disparate hydrography datasets are being used in south-central Alaska which are maintained and/or published by state and Federal agencies and local governments in Alaska.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Current hydrography data in Alaska are often coarse in resolution and accuracy and is almost never implicitly tied to the terrain. Therefore, any improvements to Alaska hydrography data are significant across all benefit types.
Future Operational Benefits	
Future Time/Cost Savings:	Major

Future Benefits	
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Biological Conservation and Natural Resource Management

Mission Critical Activity Title:	Biological Conservation and Natural Resource Management
Mission Critical Activity Description:	Our mission is to provide the scientific basis for effective biological conservation in Alaska. We serve statewide datasets for rare plants and animals as well as land cover and vegetation maps.
MCA_ID:	3798247263_1
Organization Type:	State Government
Organization Name:	University of Alaska Anchorage
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice to Have	Associate Selected Data Type
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Nice to Have	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Watershed Management

Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	Fisheries research, hydrology research, GIS analyses, watershed protection, watershed modeling and education.
MCA_ID:	3820877120_1
Organization Type:	Not for Profit
Organization Name:	Kenai Watershed Forum
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$250,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrographic information would help inform our hydrologic research and educational procedures and greatly increase the efficiency of our GIS products in general.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice to Have	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Fish Habitat Monitoring

Mission Critical Activity Title:	Fish Habitat Monitoring
Mission Critical Activity Description:	Provide regulatory protection of anadromous fish-bearing waterbodies through documentation of distribution.
MCA_ID:	3769763568_1
Organization Type:	State Government
Organization Name:	State of Alaska/Alaska Department of Fish and Game (ADF&G)
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$264,400
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown
Future Benefits Description:	Improved hydro would result in more accurate mapping of anadromous fish distribution.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Not Required	Visual Inspection
Point Discharges	Not Required	Visual Inspection
Water Use: Diversions	Not Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Not Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	Visual Inspection
Other (please specify the importance and highest analysis level):		

Conservation Area Management

Mission Critical Activity Title:	Conservation Area Management
Mission Critical Activity Description:	Mapping of protected areas or other fish or animal species.
MCA_ID:	3769763568_2
Organization Type:	State Government
Organization Name:	State of Alaska/Alaska Department of Fish and Game (ADF&G)
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$51,700
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown
Future Benefits Description:	Improved hydrography data would result in better mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Nice to Have	Visual Inspection
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality Management

Mission Critical Activity Title:	Water Quality Management
Mission Critical Activity Description:	Spill prevention and response, wastewater discharge permitting, water quality assessment, drinking water protection, contaminated site management, solid waste site management, shellfish harvest area monitoring, fish tissue contamination monitoring.
MCA_ID:	3792707467_1
Organization Type:	State Government
Organization Name:	Alaska Department of Environmental Conservation
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	AK Hydro database

Current Benefits	
Total Annual Program Budget:	Not available
Current Annual Benefits ($):	Unknown
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	Better delineation of water body impairments, better assessment of impacted resources, better identification of water quality management strategies, better protection of water resources, better compliance with Clean Water Act reporting requirements to US EPA.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Highly Desirable	Visual Inspection
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Groundwater Management

Mission Critical Activity Title:	Groundwater Management
Mission Critical Activity Description:	Groundwater resources assessment.
MCA_ID:	3790902652_1
Organization Type:	State Government
Organization Name:	Alaska Division of Geological and Geophysical Surveys
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10 million
Future Benefits Description:	Benefits for conducting statewide groundwater resource assessments would increase dramatically if the database were complete. With all relevant hydrography data in one place, we would be able to estimate groundwater availability at any point in the state.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Hydrographic Mapping

Mission Critical Activity Title:	Hydrographic Mapping
Mission Critical Activity Description:	Hydrographic mapping and coordination.
MCA_ID:	3793462037_1
Organization Type:	State Government
Organization Name:	University of Alaska Anchorage
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$350,000
Current Annual Benefits ($):	$60,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$7 million
Future Benefits Description:	Focus would turn to developing local resolution data and adding attributes to the data versus fixing coarse resolution base data. Would allow for adoption of a single dataset.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

American Samoa

Geographic Extents Required for Hydrography Data Access
Data not provided.

Data Types Required for Hydrography Data Access
Data not provided.

Data or Service Access Requirements for Hydrography Data
Data not provided.

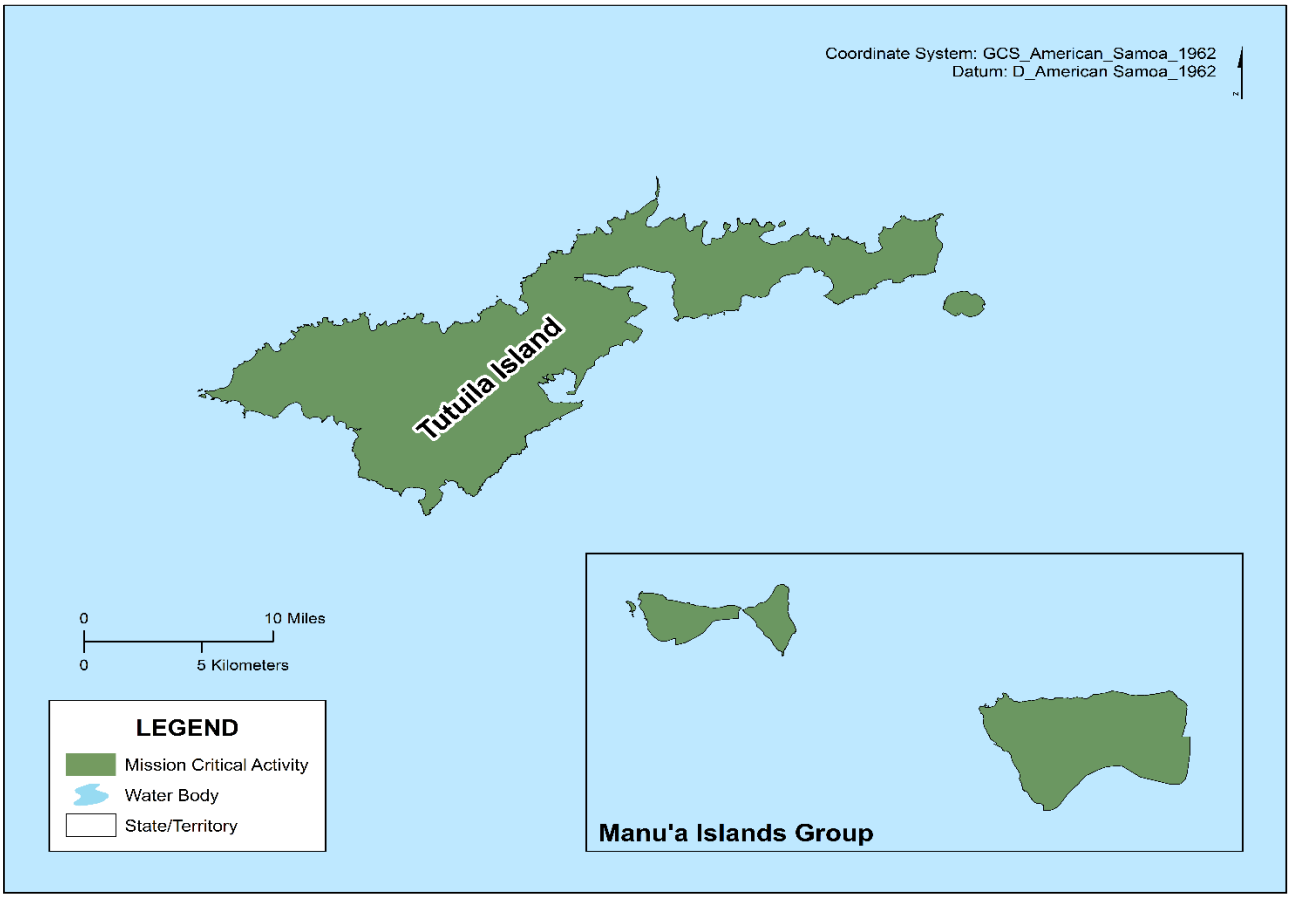
Requirements for Integration of Hydrography Data with Elevation Data
Data not provided.

Other Requirements
Data not provided.

Mission Critical Activities

American Samoa managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Our primary MCA would be flood risk mapping since we are the regulatory element in development for American Samoa but doesn't just limit us to flood risk, also run off issues, setbacks, and infrastructure updates.
MCA_ID:	3821202550_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	American Samoa Department of Commerce
Business Use:	Coastal Zone Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Required	Visual Inspection
Surficial Geology	Required	Visual Inspection
Bathymetry	Required	Visual Inspection
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Visual Inspection
Other (please specify the importance and highest analysis level):		

Arizona

Arizona provided three Mission Critical Activities (MCAs) covering three Business Uses. Yavapai County's MCA is Flood Risk, which falls under the Flood Risk Management Business Use. Arizona Department of Environmental Quality uses hydrography data in water quality, which falls under the Health and Human Services Business Use. The Arizona Department of Water Resources uses hydrography data for a variety of internal water monitoring activities. Their MCA is Water Resources and the corresponding Business Use is Water Resource Planning and Development.

Yavapai County maintains a surface water database, originally derived from NHD data, which is frequently updated for internal use. Complete and consistent hydrography linework and up-to-date stream classifications are priorities. The County also requires hydrography data that serve both networking (such as in StreamStats) and cartographic roles.

The Arizona Department of Environmental Quality (ADEQ) relies on hydrography data to track events in the state and cross borders. The NHD network has helped in mitigating spills both in the Upper Colorado Basin north of Arizona and in Mexico to the south. The agency has an extensive database of lakes and ponds that has been edited internally to keep data current with conditions and use. The agency has provided updates on some dams related to stock ponds to the Arizona Department of Water Resources, which is supervises dam safety.

The Arizona Department of Water Resources uses hydrography data for general management and planning concerning water sources across the state. The agency uses USGS data for uses related to water flow, location, and mapping. It is not a current user of the NHD but has modified older NHD data across substantial portions of Arizona for internal use. Important considerations for the agency are regular data updates, especially those related to positional accuracy, addition of local names, and stream classification.

Arizona does not currently have a state NHD steward, although a number of state and local agencies are interested in updates for at least some group of surface water features (such as lakes). Taken together, the State has requirements for higher resolution (1:24,000-scale or larger) data that are updated on a regular basis. Management of stream and lake/pond positional accuracy, updating stream classification, and recent dataset updates are higher priorities. The ability to import local data covering portions of the state to replace current NHD features would be of interest.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful

Quality Issue	Impact
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

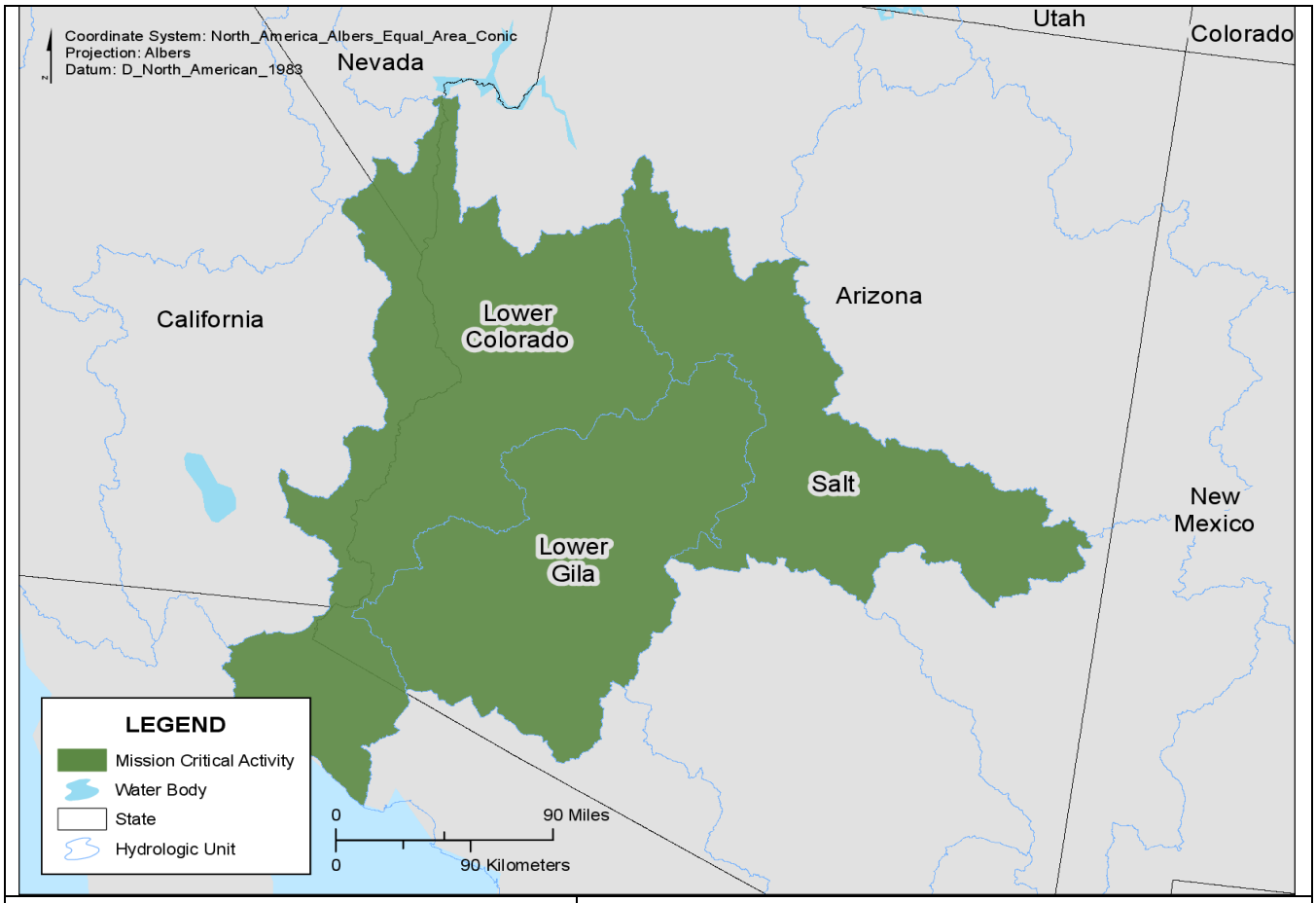
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Arizona managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk



Mission Critical Activity Title:	Flood Risk
Mission Critical Activity Description:	Flood Risk Analysis and Floodplain mapping; Monitoring stream flows for flood forecasts.
MCA_ID:	3769886117_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Yavapai County GIS
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4,000,000
Current Annual Benefits ($):	Don't know - do not use regularly.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Major
Current Other Benefits:	

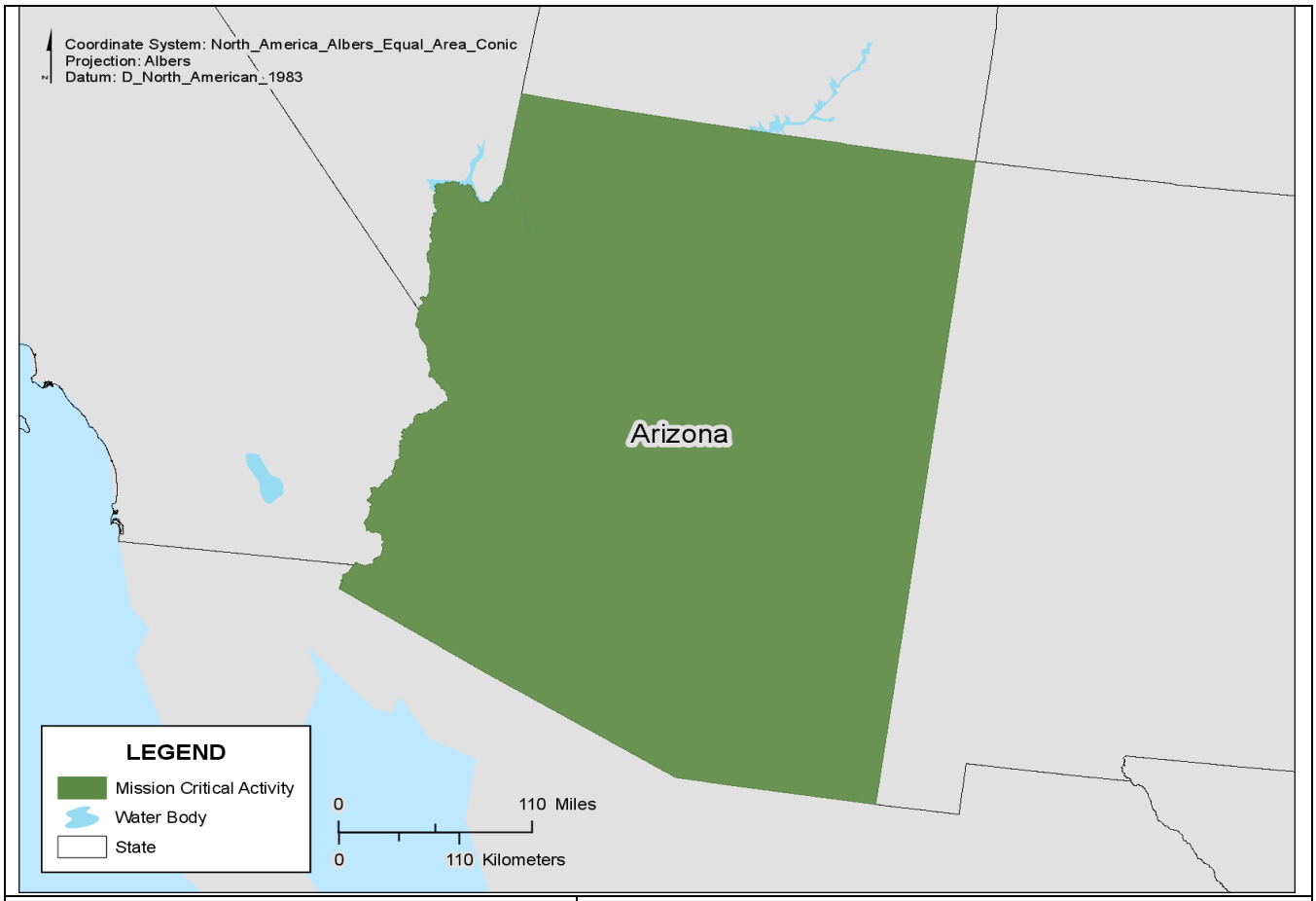
Future Benefits	
Future Annual Benefits ($):	Don't know.
Future Benefits Description:	Improved Flood Warning and Emergency Management.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	Yes
Other	Yes
	Irrigation.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	ADEQ's mission is to protect and enhance public health and the environment in Arizona. The department achieves this mission by administering the state's environmental laws and delegated Federal programs to prevent pollution of the air, water, and land, and to ensure cleanup of such pollution when it occurs.
MCA_ID:	3797007553_1
Organization Type:	State Government
Organization Name:	Arizona Department of Environmental Quality
Business Use:	Health and Human Services
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$56 million
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Greater accuracy provides for greater chances for better decision making.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	Yes
Other	Yes
	Multi-section segments, e.g. braided streams.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Resources

Mission Critical Activity Title:	Water Resources
Mission Critical Activity Description:	Groundwater management; surface water management; statewide hydrologic monitoring; land subsidence monitoring; dam safety monitoring; floodplain management.
MCA_ID:	3789596040_1
Organization Type:	State Government
Organization Name:	Arizona Department of Water Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	As the agency responsible for managing the water resources of the State of Arizona any improvement in the quality and/or availability of hydrographic information will greatly enhance our ability to meet our core mission-critical activities.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Don't Know

Future Benefits	
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Springs; stock ponds; dams; wells.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Arkansas

The Hydrography Requirements and Benefits Study (HRBS) was completed by four state agencies—Center for Advanced Spatial Technologies (CAST), Arkansas Geological Survey (AGS), Arkansas Game and Fish Commission (AGFC), and Arkansas Department of Environmental Quality (ADEQ)—and one environmental consulting firm (FTN Associates, Ltd.). These entities currently experience annual benefits ranging from $10,000 to $501,288 with the assistance of NHD data. These entities expect to experience future benefits ranging from $15,000 to $125,307 with the assistance of revised and improved NHD data.

NHD supported eight Mission Critical Activities in Arkansas: Watershed Analysis, Landscape Modeling, Environmental Review, Water Quality Protection, Water Quality Standards, Watershed Management, Wildlife Management and Conservation, and Flood Mapping.

Seven NHD-supported business uses were identified, including: Education K-12 and Beyond, Geologic Resource Assessment and Hazard Mitigation, Fish and Wildlife Resource Conservation/Environmental Review, River and Stream Flow Management, Water Quality, Wildlife and Habitat Management, and Flood Risk Management.

Since Arkansas acknowledges that protection of our state's resources may include the consideration of the surrounding areas and/or states, the majority of Arkansas's users' area of interest includes one or more states, territories, counties, or cities and a consistent level of detail. A positional accuracy of +/- 7 feet, 90 percent (1:2,400-scale), and a stream density of 2.5 miles of surface water channel per square mile (1:24,000-scale) will allow Arkansas to most accurately complete tasks to support Mission Critical Activities. Since detailed determinations are needed at times, a smallest contributing area of 1 square mile (640 acres) and a smallest mapped waterbody of less than an acre will allow the most detailed evaluations to support Mission Critical Activities.

Considering the wide variety of business uses, Arkansas users estimate moderate time/cost savings and mission compliance by having access to high-quality NHD data, which has allowed states to have a more efficient customer service experience. This includes moderate improvement to products or services, as well as major improvements in response or timeliness and customer experience. Use of high quality-NHD data and the related improved customer service allows for overall moderate improvement in societal concerns.

Arkansas is a highly agricultural state and has several areas experiencing rapid growth and construction. These two factors combined add to the state's concern regarding turbidity and sedimentation.

Hydrographic data are used for products for internal and public use. Enhanced NHD data will lead to better information and better decision making; increased accuracy and efficiency; and reduced time; all of which in turn could equate to an overall cost savings.

Specifically, accurate attribute information would be beneficial. Areas of need identified include:

- Proper designation of perennial, intermittent, etc.
- Proper naming

- Completion/revisions of major rivers that currently include breaks in the lines

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Nice To Have
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Somewhat Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

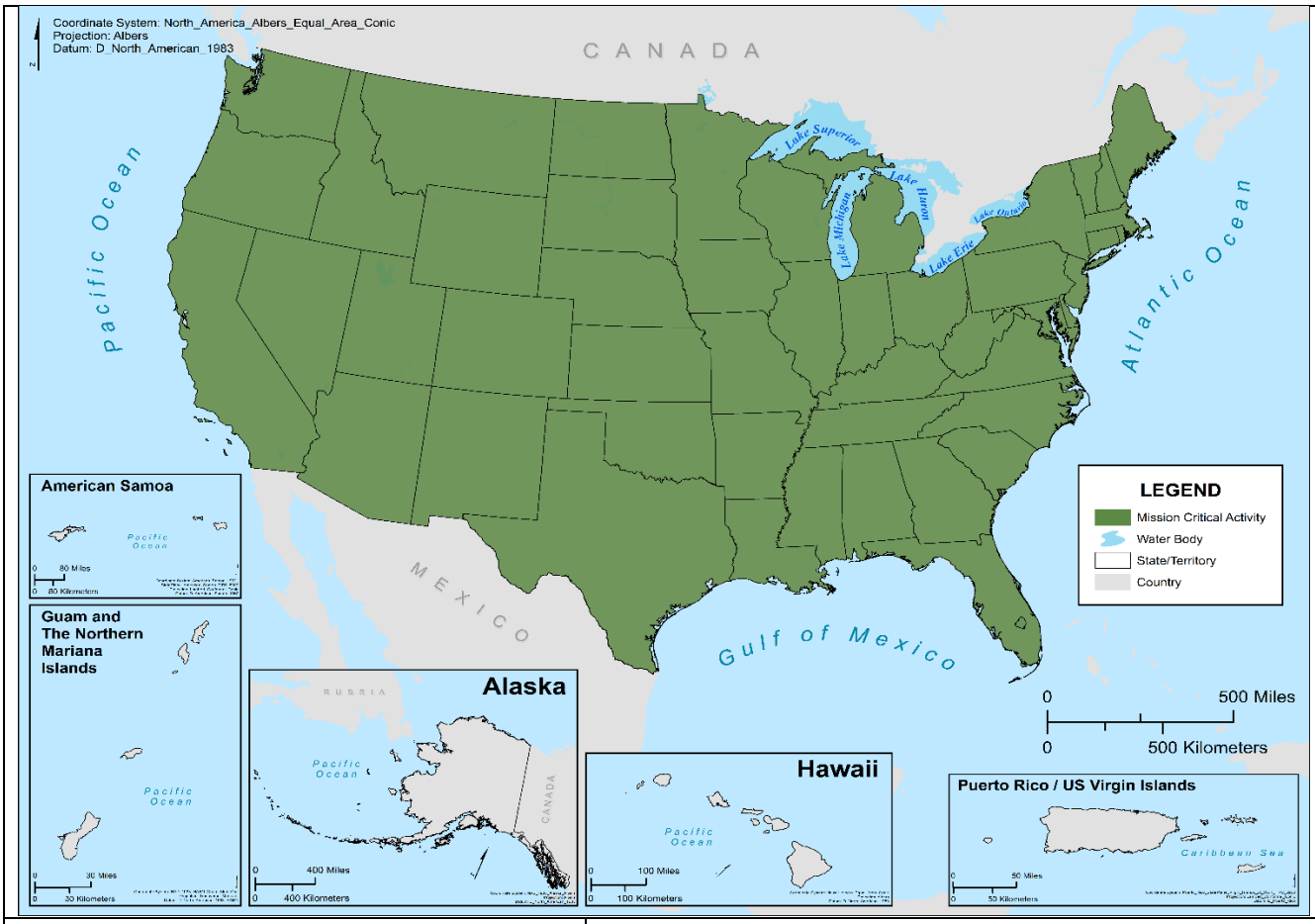
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Arkansas managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Watershed Analysis



Mission Critical Activity Title:	Watershed Analysis
Mission Critical Activity Description:	Watershed protection; watershed level reporting and analysis.
MCA_ID:	3827313255_1
Organization Type:	State Government
Organization Name:	University of Arkansas
Business Use:	Education K-12 and Beyond
Area of Interest:	Nationwide

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

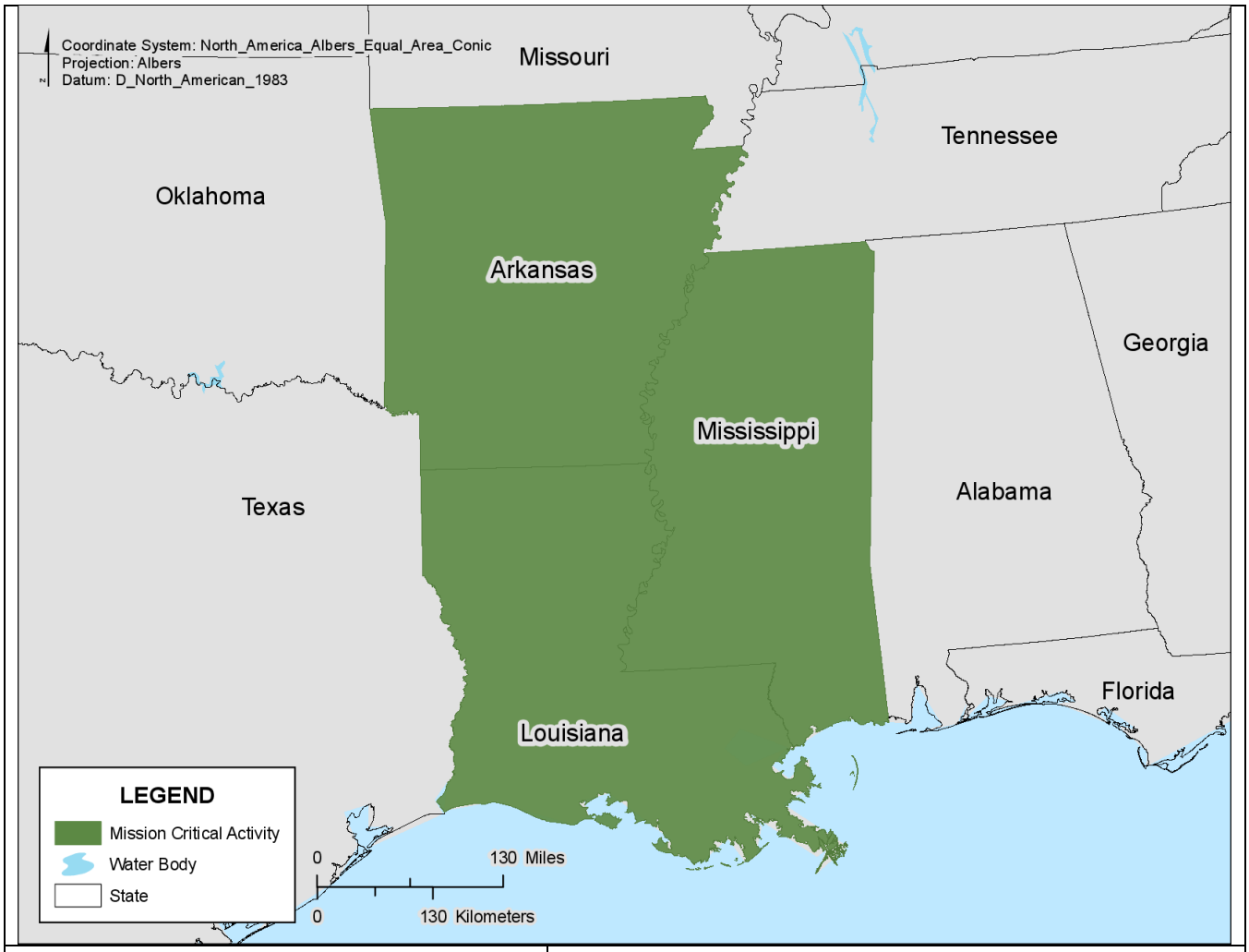
Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	These data updates would benefit Arkansas' constituents and research partners but it is not possible to place any dollar value estimates to these benefits.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice to Have	Perform Geospatial Analysis
Wetlands	Not Required	Visual Inspection
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Nice to Have	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Mapping



Mission Critical Activity Title:	Flood Mapping
Mission Critical Activity Description:	Creating and maintaining up-to-date flood hazard maps and other flood hazard information as part of FEMA's CTP (Cooperating Technical Partners) Program. Creating products for the National Flood Insurance Program (NFIP): Flood Insurance, Floodplain Management and Flood Hazard Mapping. Tracking stream study status through the CNMS (Coordinated Needs Management Strategy) database. NHD High Resolution is the basis for Profile Baselines.
MCA_ID:	3836990504_1
Organization Type:	Private or Commercial
Organization Name:	FTN Associates, Ltd.
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$20,000
Future Benefits Description:	Accurate data (both spatial and attributes) would reduce time correcting the network for use in flood studies.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Major
Future Other Benefits:	

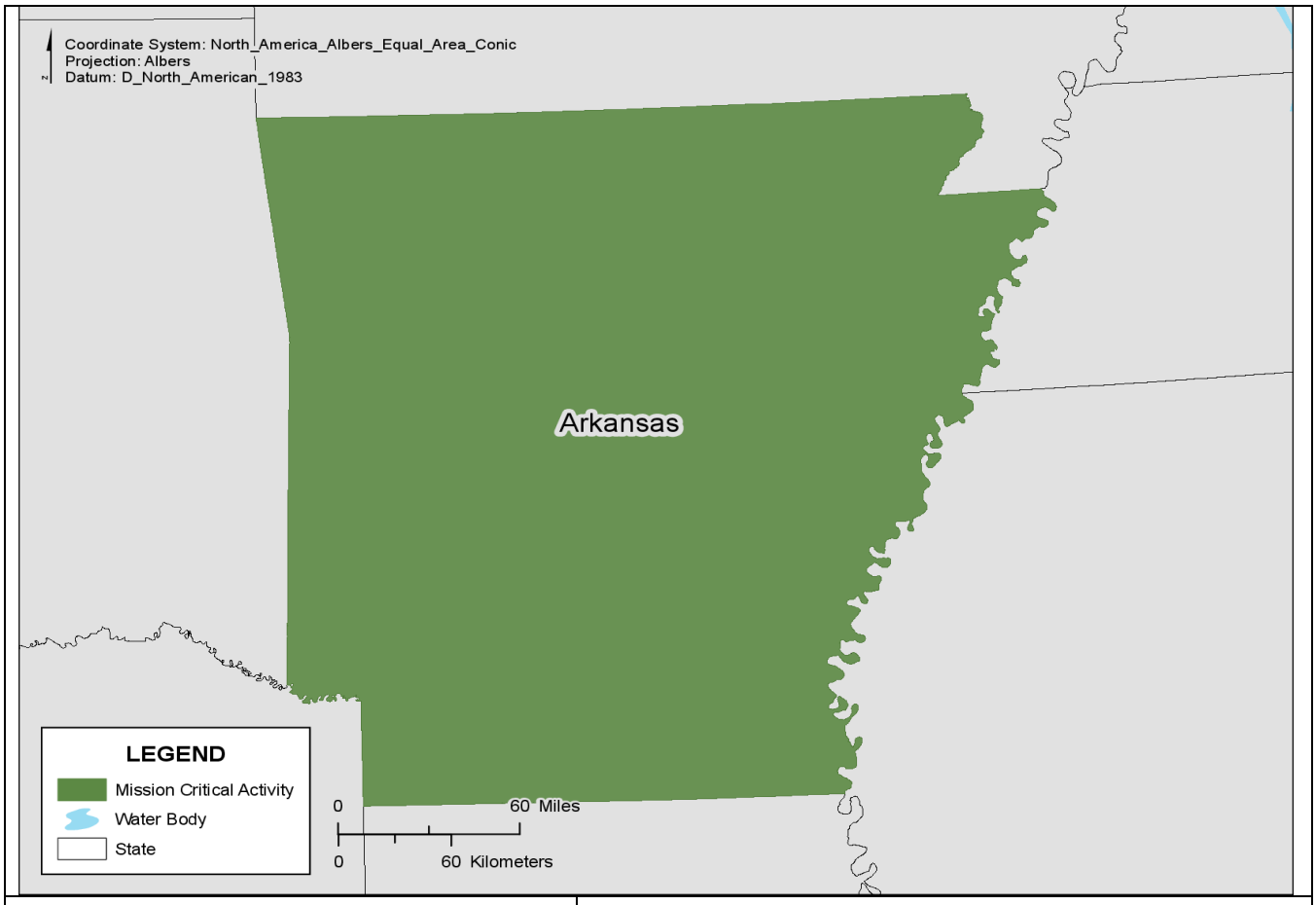
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Environmental Review



Mission Critical Activity Title:	Environmental Review
Mission Critical Activity Description:	Environmental reviews for projects and evaluation of mitigation and avoidance activities associated with stream and wetland impacts. Watershed protection, enhancement, and restoration.
MCA_ID:	3776716640_1
Organization Type:	State Government
Organization Name:	Arkansas Game and Fish Commission
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$130,000
Current Annual Benefits ($):	$21,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Increased accuracy of environmental reviews, less erroneous data.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable

Future Benefits	
Future Other Benefits:	

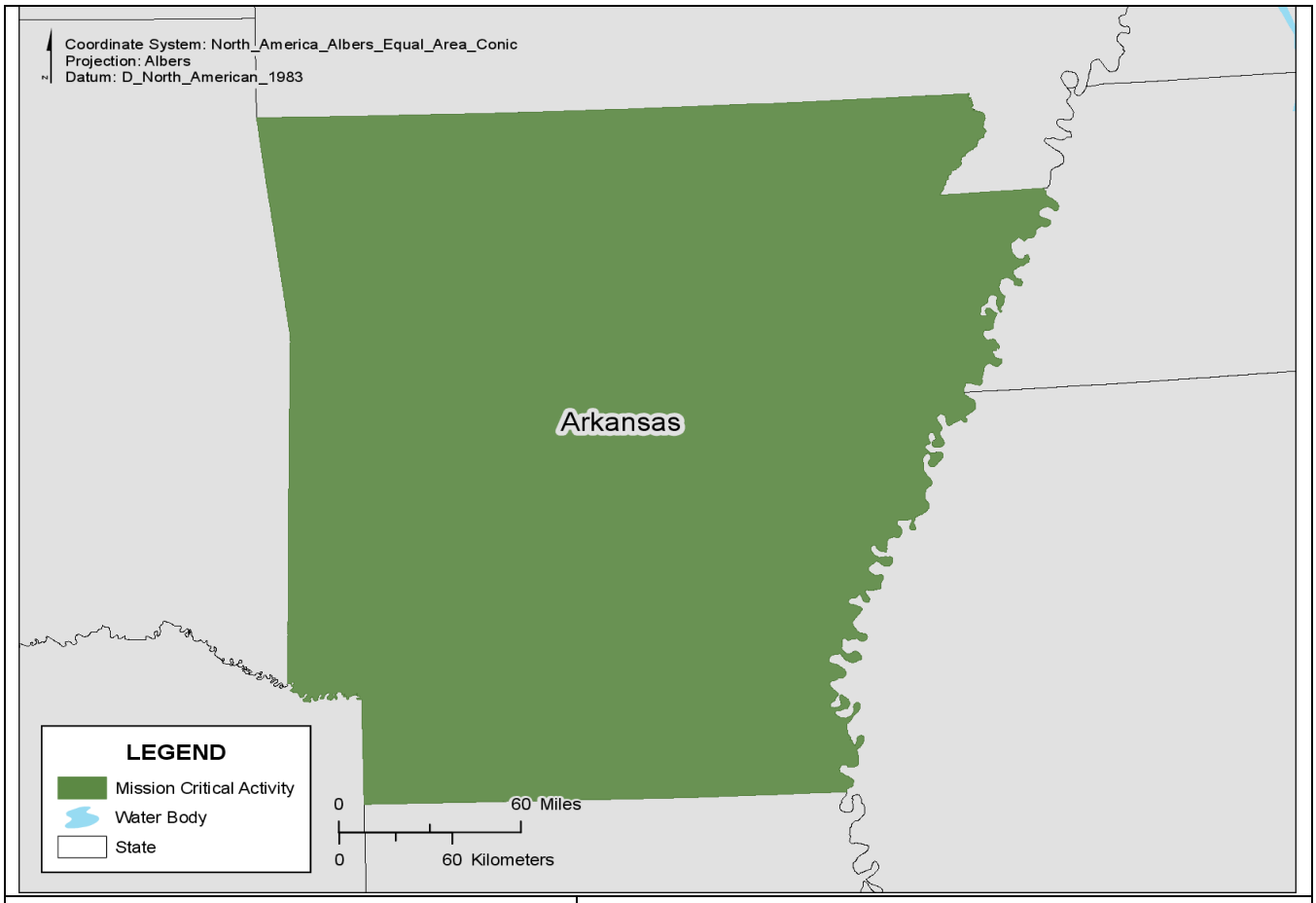
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Landscape Modeling



Mission Critical Activity Title:	Landscape Modeling
Mission Critical Activity Description:	Landslide hazard susceptibility modeling, flood inundation modeling, and cartography.
MCA_ID:	3827503919_1
Organization Type:	State Government
Organization Name:	Arkansas Geological Survey
Business Use:	Geologic Resource Assessment and Hazard Mitigation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

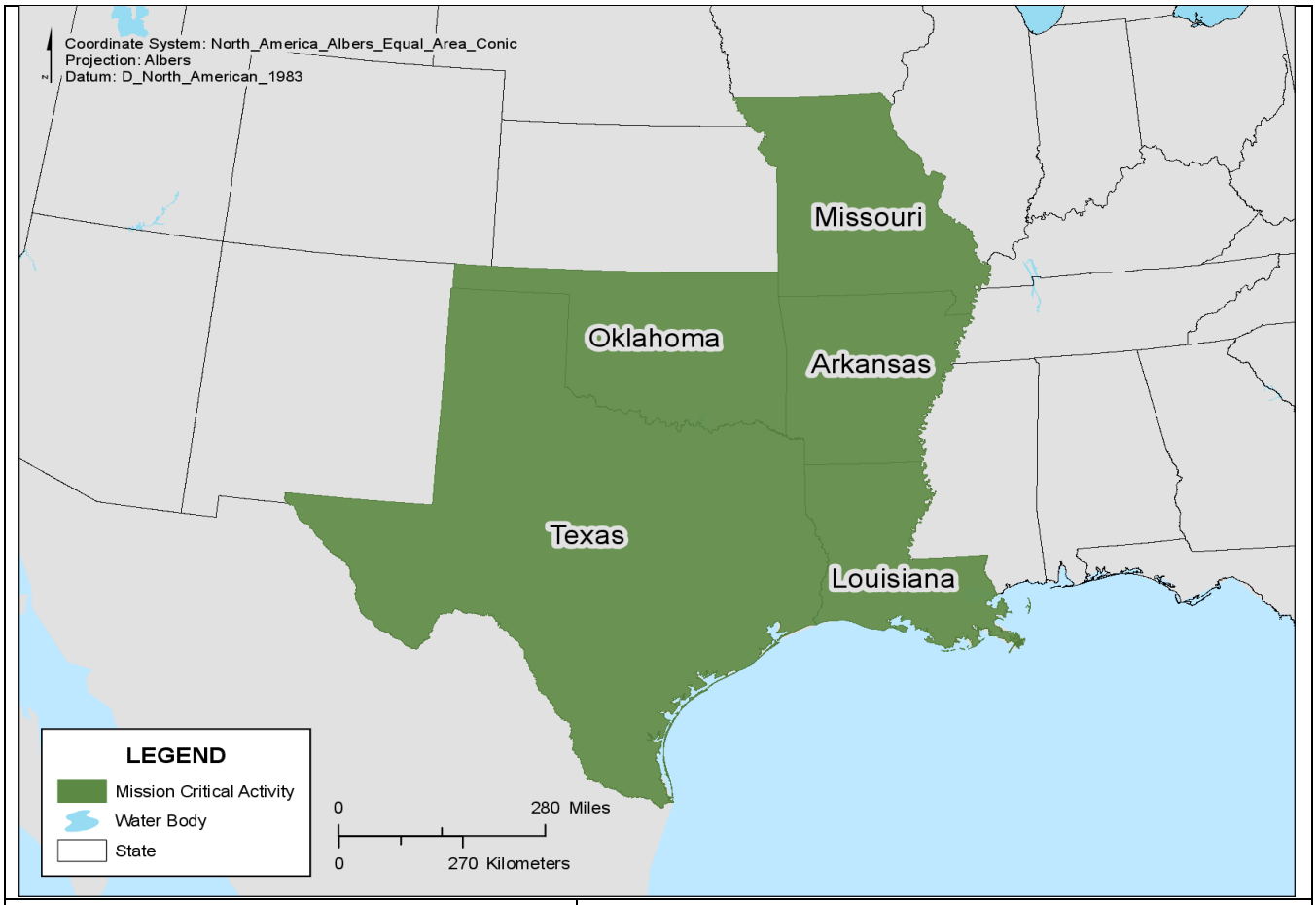
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Increased accuracy of landscape models.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality Protection



Mission Critical Activity Title:	Water Quality Protection
Mission Critical Activity Description:	ADEQ incorporates investigations of stream flow, stormwater flow, groundwater interaction, and losing streams into the development and review of Total Maximum Daily Loads (TMDLs), NPDES permits, Short Term Activity Authorizations (STAA), water quality and aquatic life study design, Remedial Action Decision Documents (RADD), etc.
MCA_ID:	3789792052_2
Organization Type:	State Government
Organization Name:	ADEQ
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1,465,199
Current Annual Benefits ($):	$501,228
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$125,307
Future Benefits Description:	Increased accuracy of NHD data will allow for greater accuracy and efficiency of flow investigations, permitting documents, and water quality and aquatic life studies, thereby allowing better protection of the state's waters.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

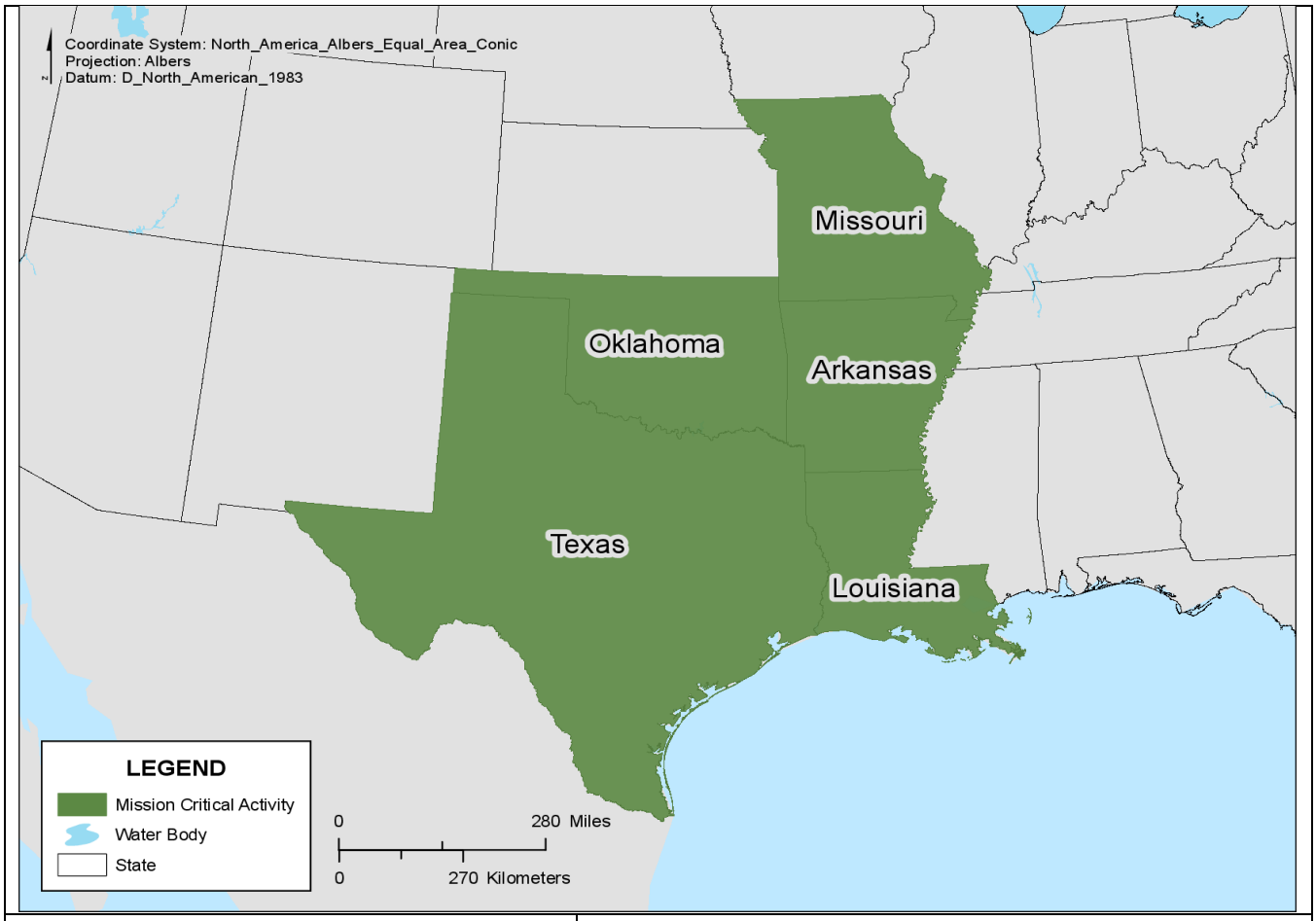
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Standards



Mission Critical Activity Title:	Water Quality Standards
Mission Critical Activity Description:	ADEQ's primary Mission Critical Activity for water is Development, Implementation, Assessment, and Enforcement of Arkansas's Water Quality Standards and the associated Designated Uses. Cartographically representing certain Designated Uses and Water Quality Standards Assessment outcomes using NHD data allows ADEQ to take into account a myriad of factors surrounding these areas.
MCA_ID:	3789792052_1
Organization Type:	State Government
Organization Name:	ADEQ
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1,465,199
Current Annual Benefits ($):	$501,228
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$125,307
Future Benefits Description:	Increased accuracy of NHD data will allow for the most appropriate development, implementation, and enforcement of water quality standards and designated uses.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

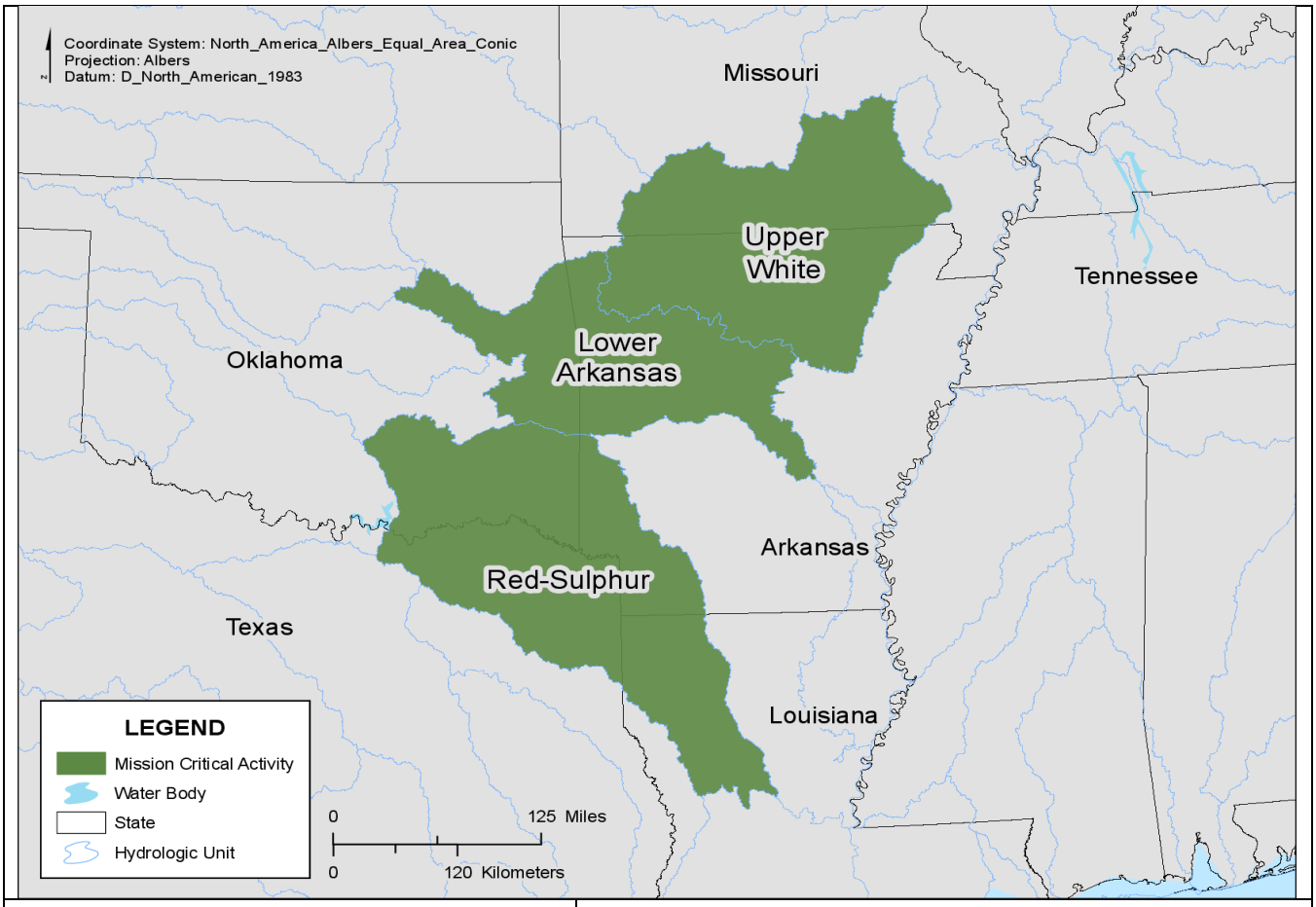
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Not Required	None
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	Watershed management.
MCA_ID:	3829454950_1
Organization Type:	Private or Commercial
Organization Name:	FTN Associates, Ltd.
Business Use:	Water Quality
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWIS - flow, water quality, biological data. STORET - water quality, biological data. NPDES permit program - permitted point source discharges. NAWQA data storehouse - water quality, biological data.

Current Benefits	
Total Annual Program Budget:	$270,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$20,000
Future Benefits Description:	Reduced time required to find and map data, reducing labor costs, and reduced possibility of errors or missed information due to having to hunt down and use disparate datasets.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor

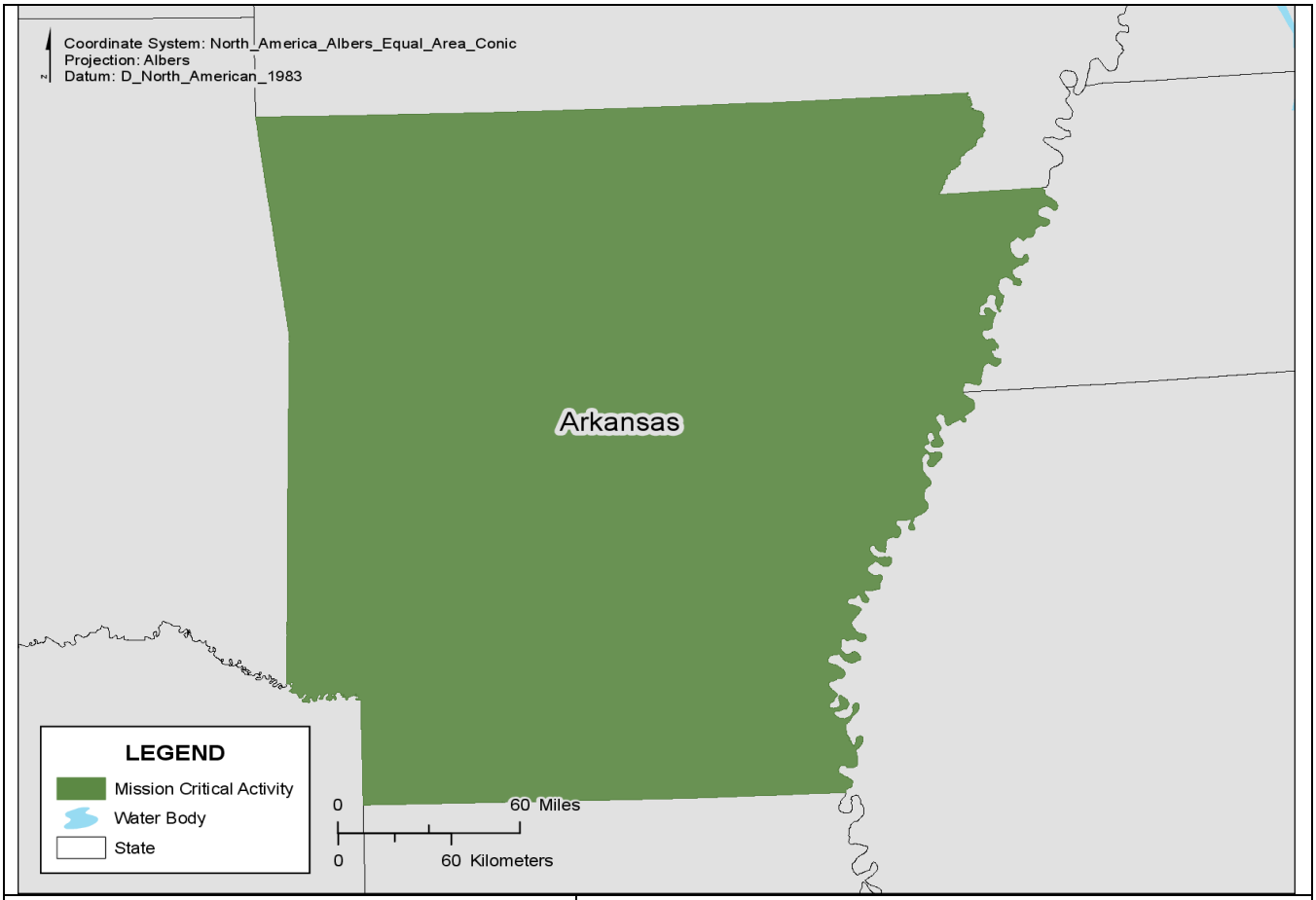
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Associate Selected Data Type
Aquifers	Required	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Wildlife Management and Conservation



Mission Critical Activity Title:	Wildlife Management and Conservation
Mission Critical Activity Description:	Statewide conservation of natural resources and habitat management for fish and wildlife species.
MCA_ID:	3797866738_1
Organization Type:	State Government
Organization Name:	Arkansas Game and Fish Commission
Business Use:	Wildlife and Habitat Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$72,468
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$29,251
Future Benefits Description:	Hydrographic data are used for products for internal use and public use. Enhanced data will lead to better information and better decision making; both of which in turn could equate to a cost savings.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Associate Selected Data Type
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

California

Drought in California is one of the primary focal points for discussion regarding the state's water resources. In terms of data and information, this means a major focus on where the water resources are, how they are being utilized, the quality of the water, and where the water is going. As a result of this interest, the state is initiating substantial updates to the NHD across CA. High-priority areas are now being nominated, and various agencies may contribute further funding as the project progresses. One example of a high-priority area for large scale, updated hydrography data is the Bay Delta estuary east of San Francisco Bay and north of the greater Central Valley. It is of critical importance due to issues of freshwater environmental flow and wetlands, species of concern and their habitats, flood control, water infrastructure and availability, and economic stability.

This study provides significant support for NHD updates by helping the state better understand various factors such as how updated NHD data may be used, which agencies might benefit most from the updates, and the amount of potential cost savings that may result from the update effort.

California reported 11 Mission Critical Activities (MCAs) that can be grouped into six business uses. The Water Quality business use had the most MCAs – four total. Two water quality MCAs were reported by a regional organization, and one each from a tribal government and a state agency. The Flood Risk Management and Water Resource Planning and Development Business Uses were each linked to two MCAs. Finally, the Infrastructure and Construction Management, Natural Resources Conservation, and River and Stream Ecosystem Management Business Uses each received one MCA.

The Water Quality Business Use has the most applications and it correspondingly had the most benefits, with $25 million in current benefits and $13 million in future benefits reported. Participants reported that additional MCAs could be provided.

Tribal and local governments have reported that the current high-resolution NHD data are not detailed enough for their needs. Additional details on the features, data density, and scales for local-resolution NHD data would be beneficial. Differences in the density of the stream network currently being shown in high-resolution NHD data causes concern in how to best collect data and in using the NHD as a reference and cartographic layer.

Missing MCAs (and their respective agencies) in California include agricultural stability dependent upon surface water management, which is important for the state's economic stability. Water information as it relates to transportation infrastructure (culverts) and other infrastructure is important but was not fully developed or captured in this effort.

Participants in the study also provided input on what they considered as very important aspects and considerations for developing hydrography data for the state, not all of which were captured in the survey. For example, levees were not mentioned as a related dataset, but shared geometry of waterbodies and levees would greatly assist the Department of Water Resources and the State in aiding flood mapping efforts. The relationship/integration between NHD and National Wetlands Inventory (NWI) data was also considered a key item that should be investigated, as well as potential linkages between surface water and groundwater to better understand recharge. Another significant recurring item relates to consistency

in mapping. Stakeholders desire consistent mapping guidelines, resolution, and density, rather than the varying patchwork currently available in the NHD; however, in the absence of consistency and standardization, users requested a tool or product that could allow for the generalization of local- and very-high-resolution data in the NHD so that there could be consistency for purposes of regional and statewide analysis. As the NHDPlus was another important topic, multiple users inquired about whether the potential expanded stewardship of the NHD can improve the coordination, scheduling, and resulting quality of NHDPlus. Finally, the incorporation of unofficial (non-GNIS) names into the NHD was another key request.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓		✓	✓	✓		✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required

Data or Service Access Method	Requirement
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful

Quality Issue	Impact
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

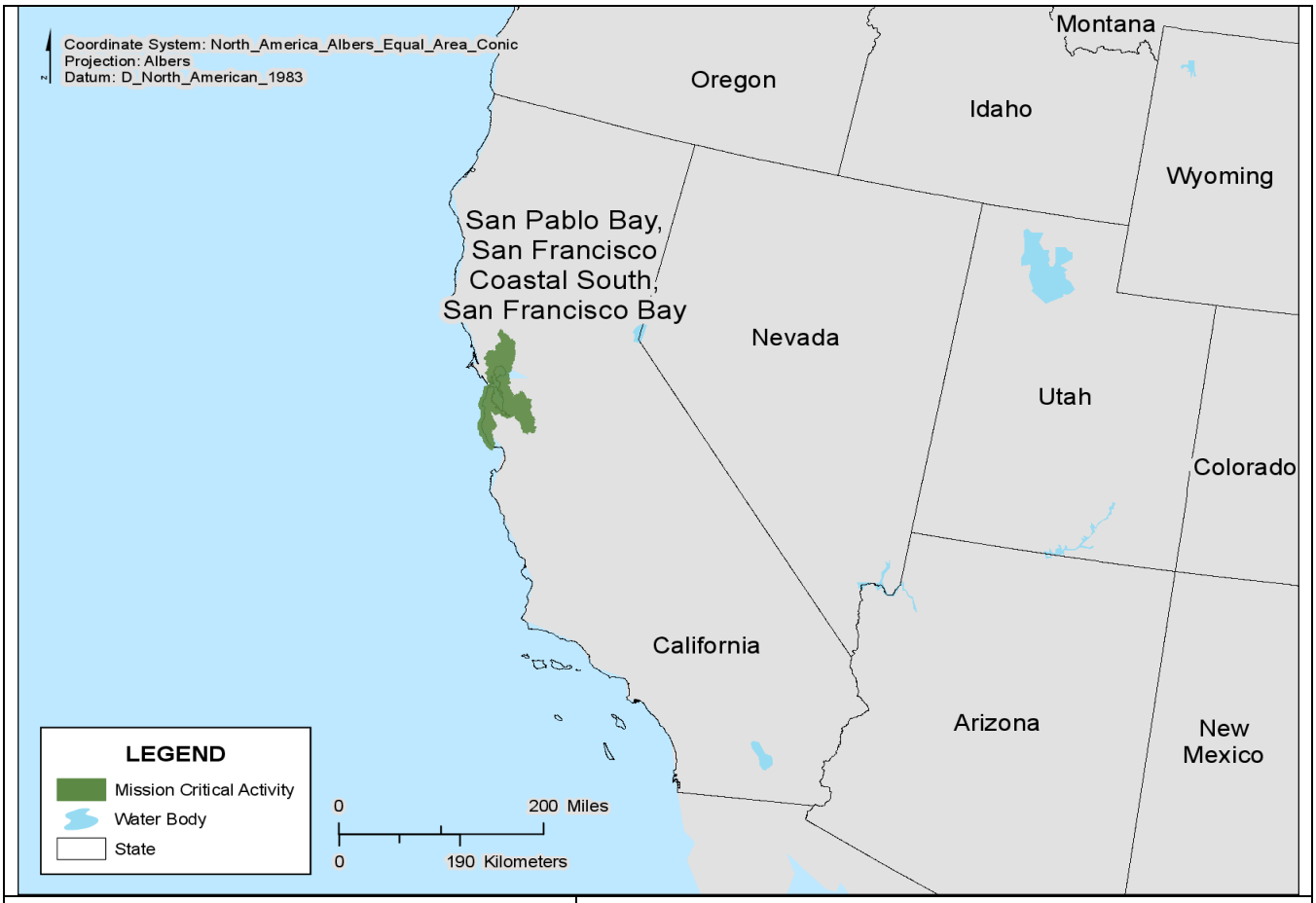
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

California managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Support for management of combined sanitary and storm sewer system.
MCA_ID:	3772468131_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	City and County of San Francisco, California
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

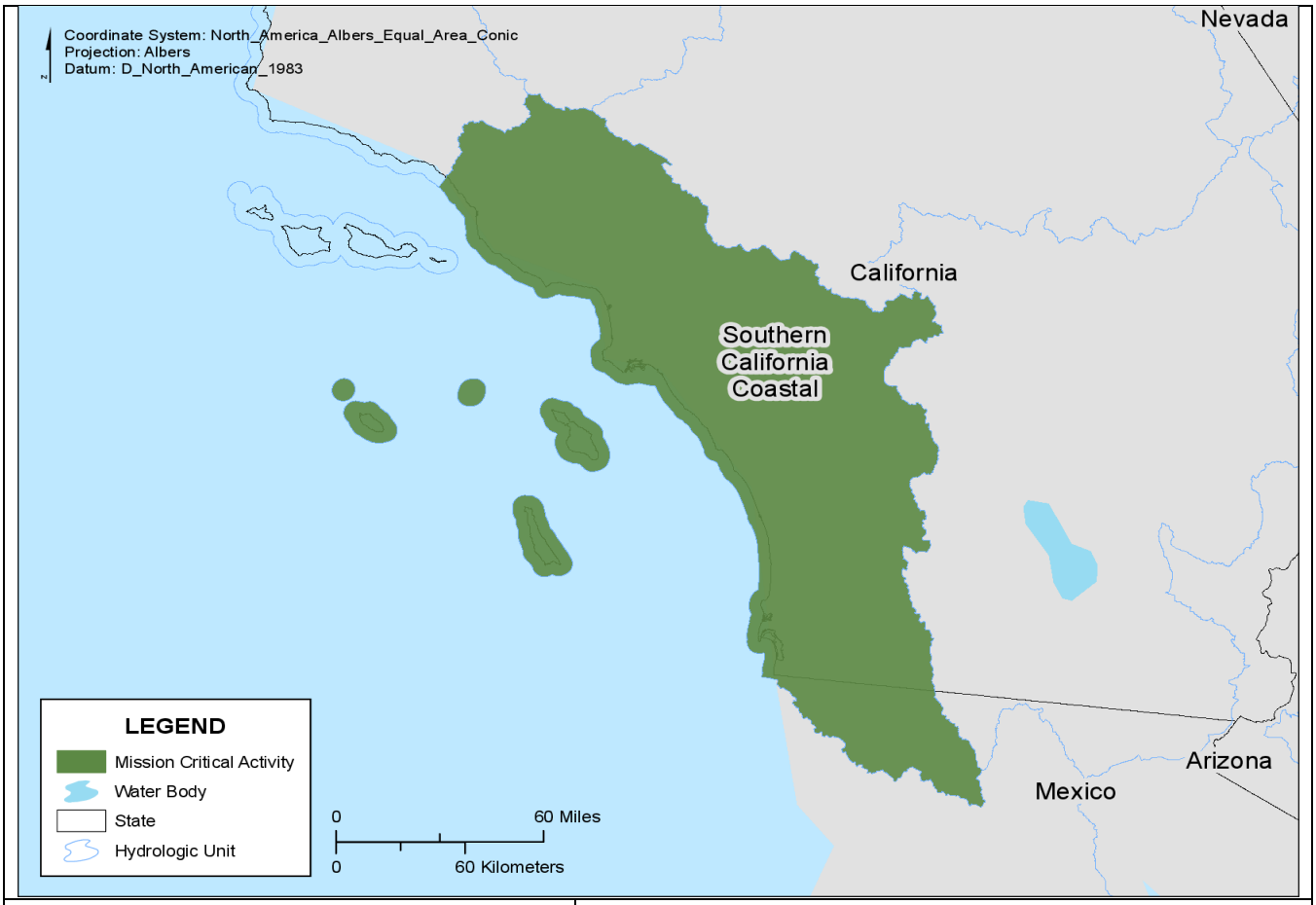
Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	Our urban area is compact; small catchments and detailed mapping are all that matter to our customers.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Associate Selected Data Type
Wetlands	Nice To Have	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Mapping and Water Infrastructure



Mission Critical Activity Title:	Flood Mapping and Water Infrastructure
Mission Critical Activity Description:	Critical activities include hydrologic studies in connection with the design of flood control facilities, flood risk analysis, and water conservation projects. Being in charge of the Hydrology Section and Hydrologic Records Unit, I am involved in developing hydrologic methods and policies for maintaining adequate levels of flood protection. I direct my staff to conduct frequency analysis on historical rainfall and runoff data and develop frequency-based design storms. I am extensively involved in using hydrologic and hydraulic models in connection with mapping flood zones per FEMA's requirements.
MCA_ID:	3793430870_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Flood Control District, County of Los Angeles
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We have our own hydrography dataset (local).

Current Benefits	
Total Annual Program Budget:	$2.7 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1.5 million
Future Benefits Description:	If we improve the quality and quantity of our hydrography information, we will be able to develop and manage our water resources more accurately and effectively. This is directly translated to benefits noted above. The streamflow data used to calibrate hydrologic models and extreme events such as 100-year or 500-year floods are key. We require more frequent and regular maintenance of the data. The rating curves are not up-to-date.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

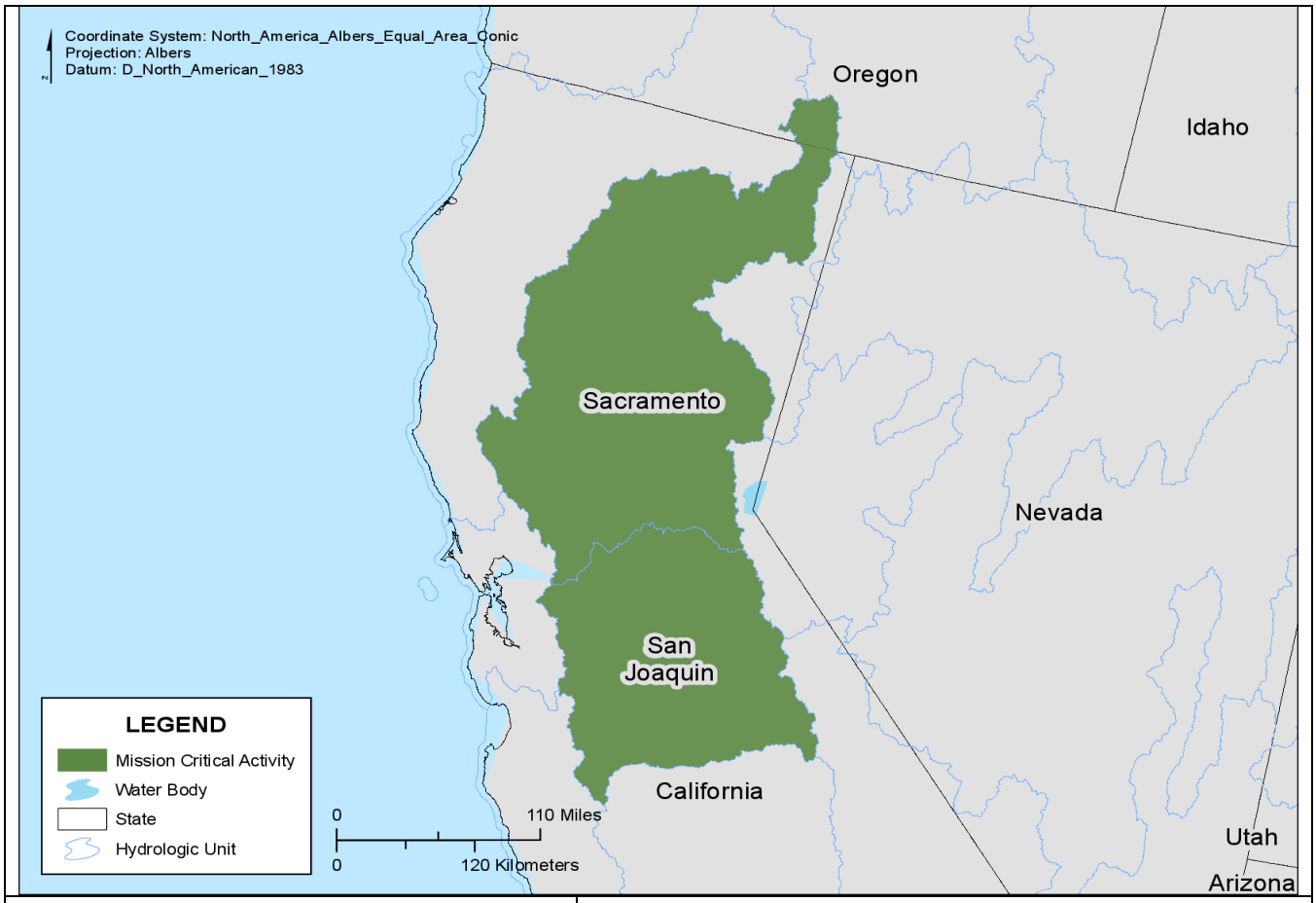
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Conservation and Water Infrastructure



Mission Critical Activity Title:	Conservation and Water Infrastructure
Mission Critical Activity Description:	The Delta Habitat Conservation and Conveyance Program (DHCCP) is a partnership between the California Department of Water Resources (DWR), the Bureau of Reclamation, the U.S. FWS, and the NOAA's National Marine Fisheries Service to evaluate ecosystem restoration and water conveyance alternatives identified by the Bay Delta Conservation Plan (BDCP). DHCCP will also evaluate alternatives identified through the environmental review process under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Goals of DHCCP: 1. Advance and support the BDCP. 2. Analyze BDCP-proposed actions and alternatives to the BDCP through a formal Environmental Impact Report/Environmental Impact Statement (EIR/EIS) process. 3. Analyze options and consider areas of concern presented by the public during the EIR/EIS process. 4. Develop engineering options for habitat restoration and water conveyance.
MCA_ID:	3794934980_1
Organization Type:	State Government

Organization Name:	CA Department of Water Resources
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	CA Levee Database (provide CA-based levee management information). CalWater Watersheds. USBR hydrology and lines.

Current Benefits	
Total Annual Program Budget:	$40 million
Current Annual Benefits ($):	$30,000 (from NHD strategic plan).
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown - depends on the outcome of the EIR/S; approximately $5,000,000 annually.
Future Benefits Description:	The BDCP EIR/S requires analysis of proposed water conveyance projects on all habitats in the BDCP. To do that, understanding the hydrography of the region is required in order for "accurate" analysis of impacts on different habitats, agriculture, restoration and mitigation, etc., and how construction might be impacted by hydrography.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	Legal, water supply reliability.

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	Yes

Required Characteristics	
	Inland/delta bathymetry, tidal elevations, salinity, ingress/egress of salt water from Bay and Delta.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Environmental Research and Monitoring

Mission Critical Activity Title:	Environmental Research and Monitoring
Mission Critical Activity Description:	Multiple MCAs depending on department. Includes flow modeling for sediment and contaminant transport. Using stream networks for wetland and riparian area mapping. Data support water quality monitoring and flood control and flood infrastructure.
MCA_ID:	3769870391_1
Organization Type:	Not for Profit
Organization Name:	San Francisco Estuary Institute
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	BAARI - our hydrography dataset for the Bay Area, Hydrography from local agencies (e.g. SCVWD stream network).

Current Benefits	
Total Annual Program Budget:	$9,000,000
Current Annual Benefits ($):	$200,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Increased level of detail for mapping; more qualitative information on the hydrography; ability to easily suggest and provide updates and changes; additional detailed data can assist with analysis and recommendations.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

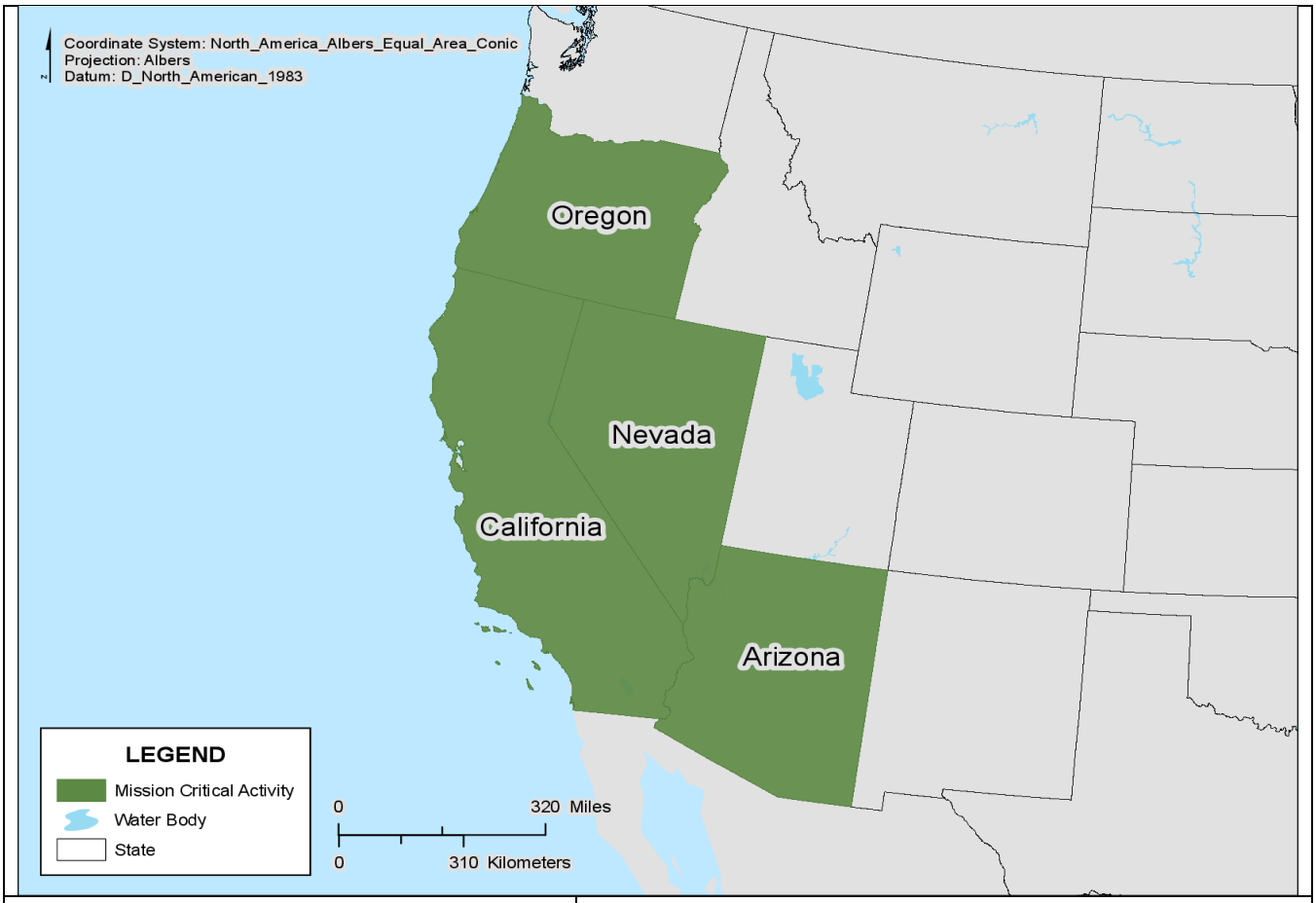
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Visual Inspection
Climate	Nice To Have	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Environmental Metric Calculations



Mission Critical Activity Title:	Watershed Environmental Metric Calculations
Mission Critical Activity Description:	Creation of specific watershed metrics for stream segments, watersheds, and nested watersheds. Further analysis of those metrics and watersheds to help determine baseline criteria for determining levels of stream and watershed health throughout the state. High-Resolution Vegetation Mapping using watershed lines and features to help identify alliance level vegetation categories.
MCA_ID:	3802734718_1
Organization Type:	Not for Profit
Organization Name:	CSU Chico Research Foundation, Geographical Information Center
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1,500,000
Current Annual Benefits ($):	$300,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000,000
Future Benefits Description:	Increased spatial accuracy. Additional metric calculations. Increased accuracy of pollution source point. Overall net benefit of watershed health. Increased accuracy of vegetation mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	None
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	None
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Water Quality and Stormwater Management

Mission Critical Activity Title:	Water Quality and Stormwater Management
Mission Critical Activity Description:	Surface water quality assessment, hydromodification management, wetland assessment and management, and stormwater management.
MCA_ID:	3813307048_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Southern California Coastal Water Research Project
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	$1.5 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	More ready access to high-quality data without having to create it at the local scale.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	None
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality

Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Surface water quality.
MCA_ID:	3813307048_2
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Southern California Coastal Water Research Project
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	$2 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

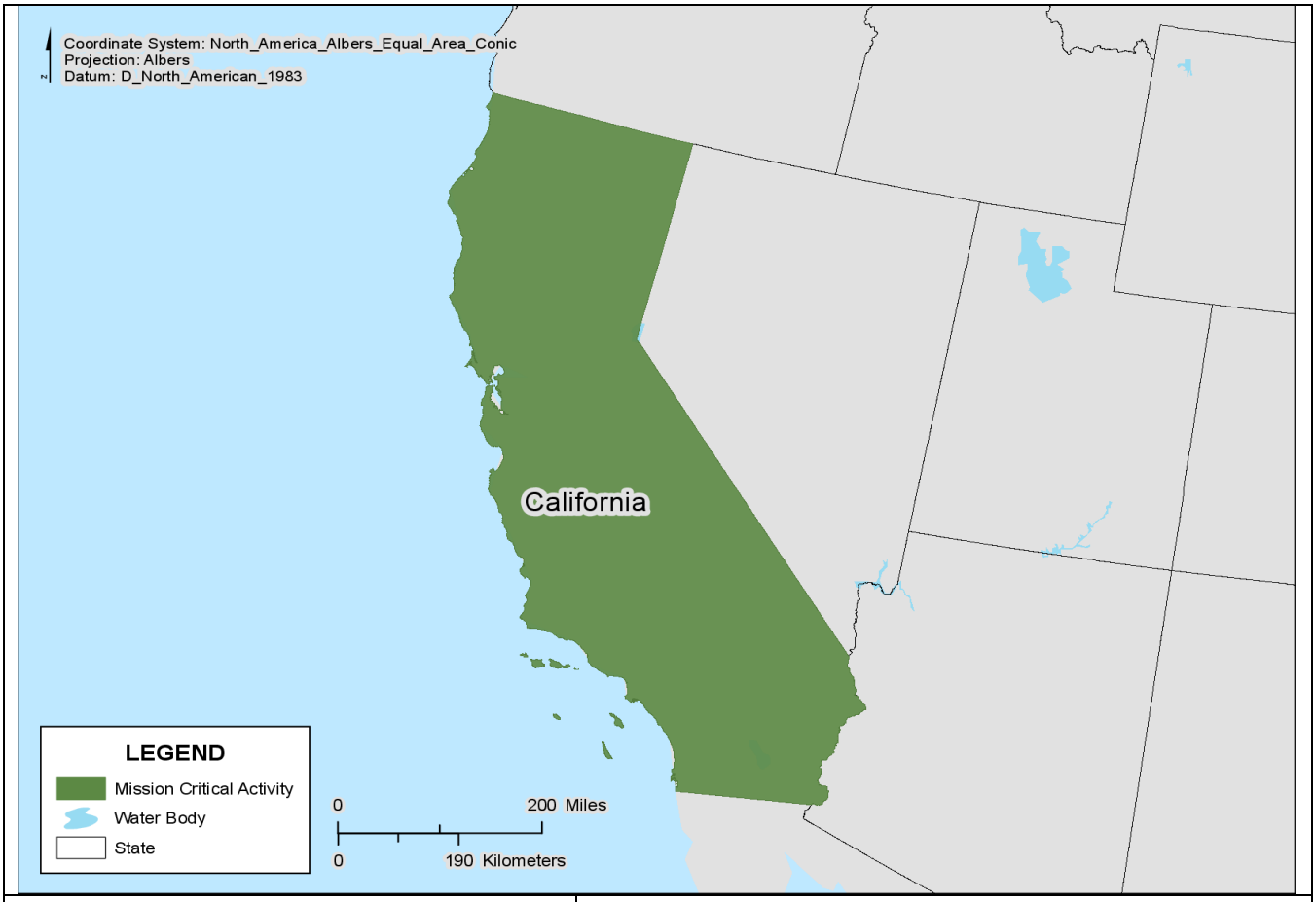
Future Benefits	
Future Annual Benefits ($):	$1.5 million
Future Benefits Description:	Improved resolution and data access.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Enforcement of water quality regulations.
MCA_ID:	3820832815_1
Organization Type:	State Government
Organization Name:	California Water Resources Control Board
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Calwater v.2.2.1 watersheds of California.

Current Benefits	
Total Annual Program Budget:	$30 million
Current Annual Benefits ($):	$23 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10 million
Future Benefits Description:	An updated high-resolution NHDPlus (1:24000 scale) would save staff time via the avoidance of duplication of effort in catchment delineation or stream analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable

Future Benefits	
Future Other Benefits:	

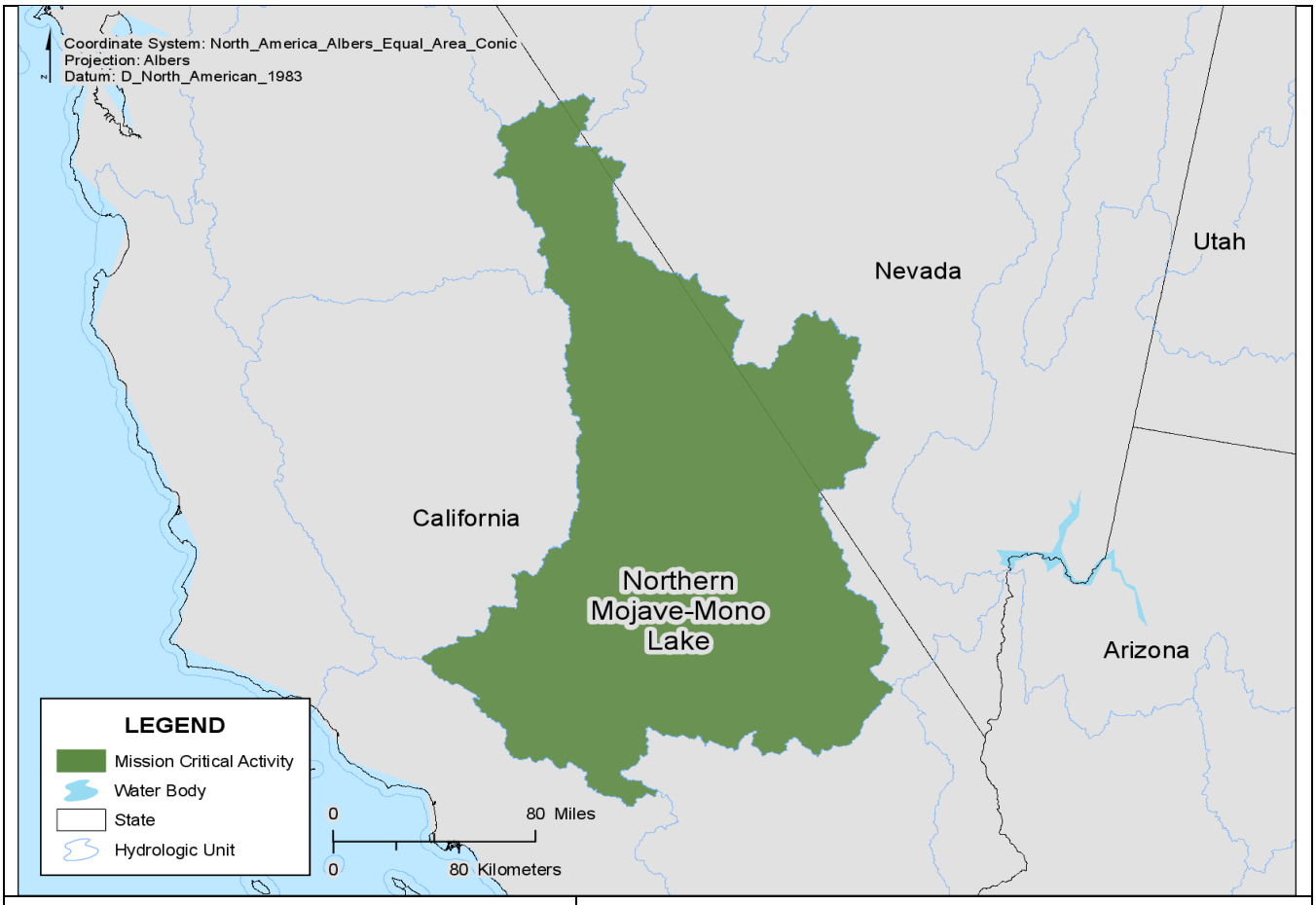
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	Yes

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Habitat Conservation and Water Management



Mission Critical Activity Title:	Habitat Conservation and Water Management
Mission Critical Activity Description:	Watershed protection for the Tribe's designated uses, which include preservation of biological habitats of special significance, cultural, freshwater replenishment, ground water recharge, migration of aquatic organisms, municipal and domestic supply, rare, threatened, or endangered species, water contact recreation, and wildlife habitat. A more complete list can be found in the Tribe's Water Quality Control Plan.
MCA_ID:	3823149387_1
Organization Type:	Tribal Government
Organization Name:	Bishop Paiute Tribe
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000 but varies each year.
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	We currently have almost no water resource data from the watershed that is upstream of the Reservation. Water quality and/or quantity data would be a major benefit to our program.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Over here we take what we can get.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Supply Management and Delivery

Mission Critical Activity Title:	Water Supply Management and Delivery
Mission Critical Activity Description:	The mission of the Sonoma County Water Agency is to effectively manage the water resources in our care. In particular, to maintain and improve reliability of the water supply production and transmission systems and our water quality, and to develop alternative supplies (recycled water).
MCA_ID:	3778323109_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Sonoma County Water Agency, California
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Surface water/ground water 2-D modeling is the direction that will meet water conservation planning mandates and water management at the county level.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable

Future Benefits	
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

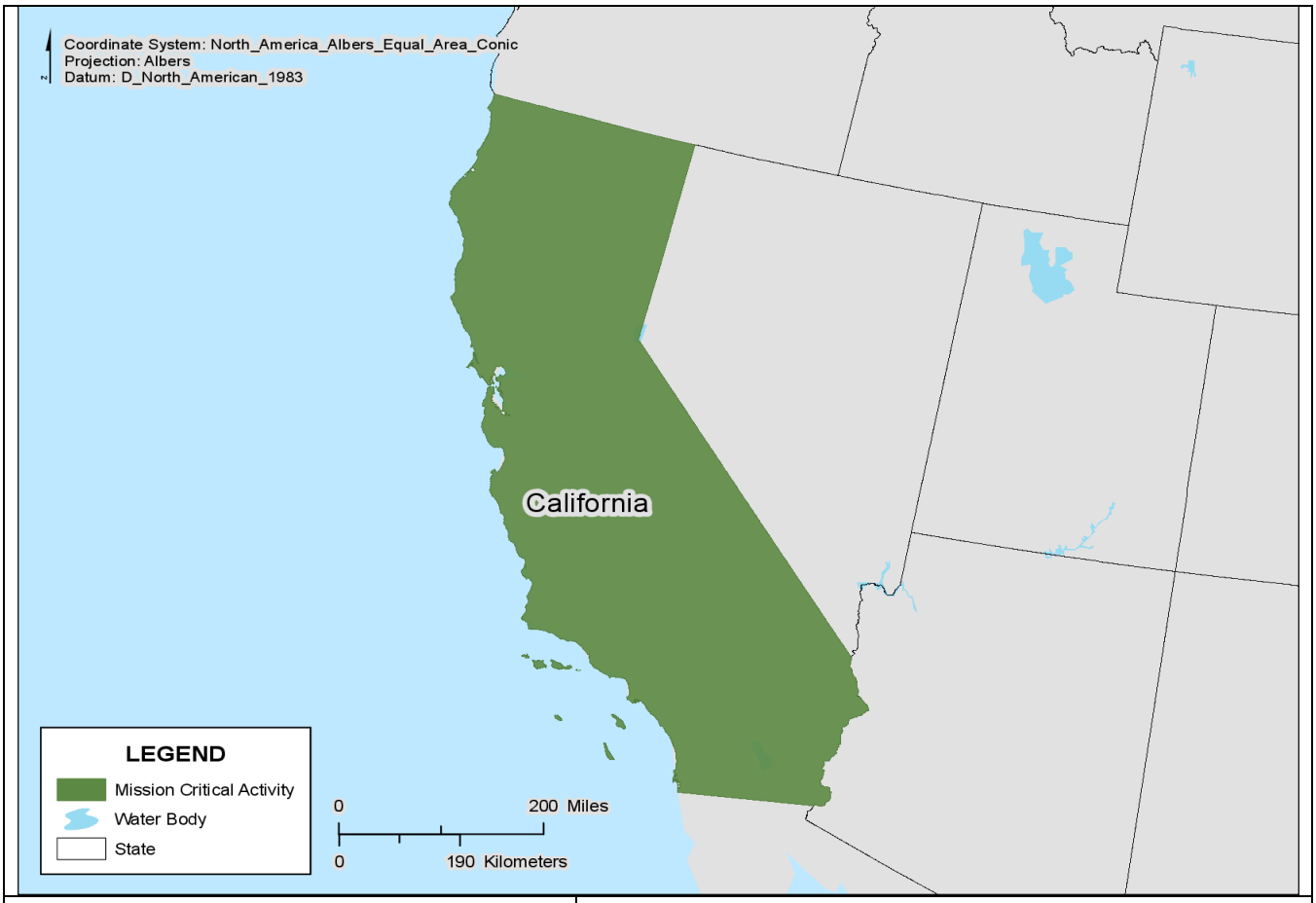
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resources Management



Mission Critical Activity Title:	Water Resources Management
Mission Critical Activity Description:	To manage California's water resources in cooperation with other agencies, to benefit the state's people, and to protect, restore, and enhance the natural and human environments. Numerous critical activities include use of hydrographic data in various planning, permitting, and construction projects for flood management, water supply reliability, water quality, conveyance, and environmental goals. Hydrographic data affect all manner of data requirements for mapping and analysis for such projects, which vary but have averaged a few billion dollars annually as of late.
MCA_ID:	3820756747_1
Organization Type:	State Government
Organization Name:	California Department of Water Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Miscellaneous water datasets, DWR internally-developed water datasets.

Current Benefits	
Total Annual Program Budget:	Budget for programs using hydrographic GIS datasets is probably somewhere closer to $200 million annually.
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	Major new benefits received with improved hydrographic information include: work hour savings because staff would have readily-available enhanced hydrography data statewide, reduced possibility of errors resulting from the use of disparate datasets.

Future Benefits	
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	Legal, water supply reliability.

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Colorado

Colorado was an early adopter of National Hydrography Dataset (NHD) Stewardship and use of NHD. Colorado considers the data to be the 'common technical platform' for hydrography data in Colorado. Users of hydrography data in Colorado analyze, map, and plan for the complex water issues facing Colorado today and in the future using the same data.

Many agencies and groups in the State of Colorado have requirements for more complete and current hydrographic geographic data. Integration of these hydrography data with other framework datasets (e.g. elevation data) only build in more value and uses of the data. Likewise, continued support at the Federal and state levels for integrated hydrography data grows the community of support for such endeavors.

The initial HRBS survey results for Colorado noted critical requirements for improved and coordinated hydrography data supporting the following Mission Critical Activities:

- Flood Protection and Mitigation
- Water Quality Control and Monitoring
- Water Supply Protection
- Water Rights Administration
- Fisheries Management

Key hydrography stakeholders in Colorado include:

- The Water Quality Control Division at the Colorado Department of Health and Environment (Water Quality Control and Monitoring)
- The Colorado Water Conservation Board (Flood Protection and Mitigation, Water Supply Protection)
- The Colorado Division of Water Resources (Water Rights Administration)
- The Colorado Division of Parks and Wildlife (Fisheries Management)

Not included in this list are the many local water provider and water conservation agencies that have a need for authoritative and integrated hydrography data. Many of these agencies work in conjunction with state and Federal agencies to develop and protect the water resources of Colorado. Colorado is facing significant water challenges in the future related to population increase, climate change, and water scarcity. Since Colorado is a 'water short' state, access to more accurate spatial data for rivers, streams, drains, lakes, ponds, wetlands, watershed boundaries, and related features that are maintained at the state level, supported at the local level, and funded at the Federal level is vital to the health of Colorado's water resources now and in the future.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Nice To Have
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Nice To Have
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Nice To Have
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Nice To Have

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

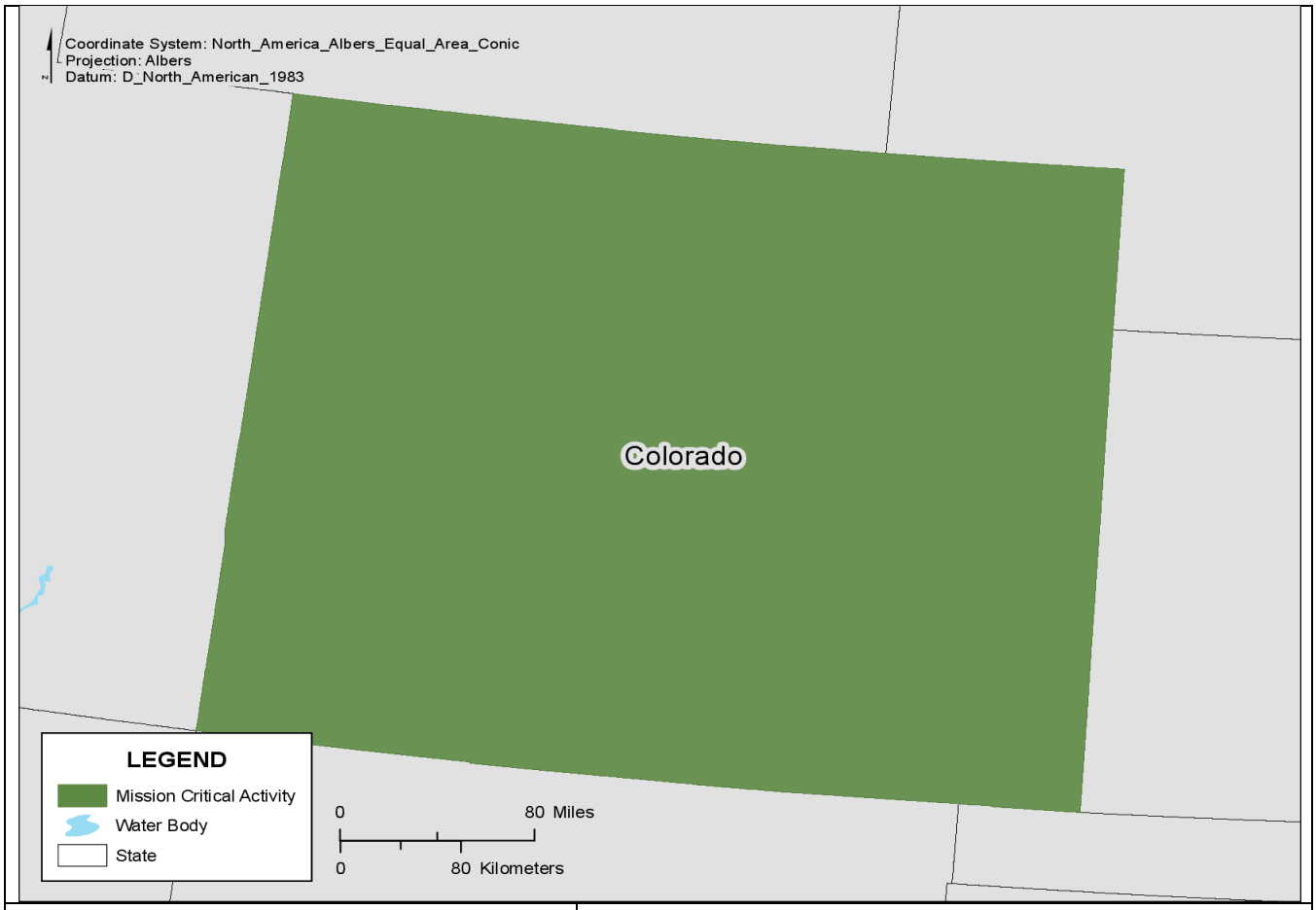
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Colorado managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Supply Protection



Mission Critical Activity Title:	Water Supply Protection
Mission Critical Activity Description:	Water supply protection.
MCA_ID:	3773619302_2
Organization Type:	State Government
Organization Name:	Colorado Water Conservation Board
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

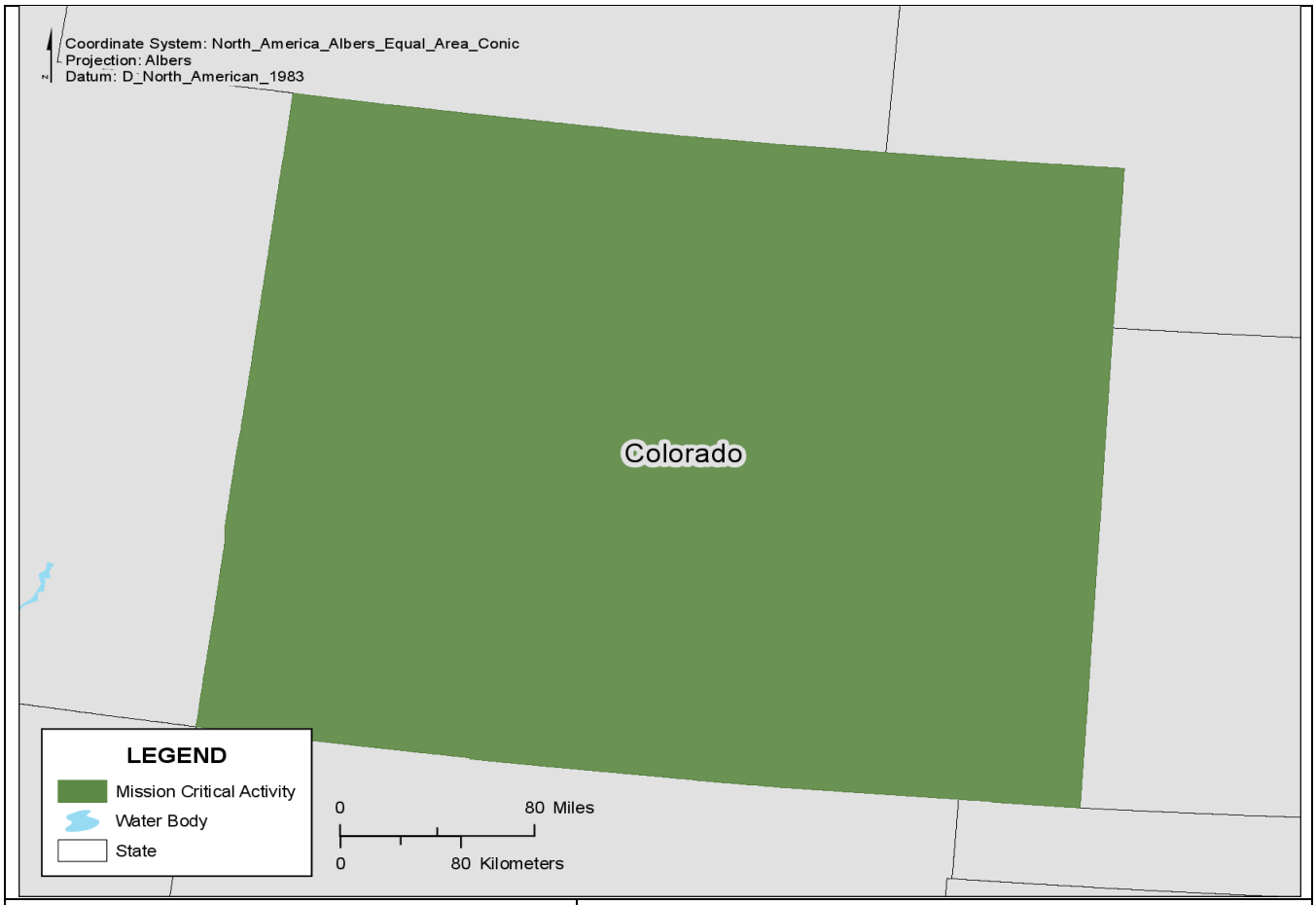
Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	Enhanced NHD data could help with floodplain modeling and post-flood activities.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Hazard



Mission Critical Activity Title:	Flood Hazard
Mission Critical Activity Description:	Flood hazard mitigation.
MCA_ID:	3792291835_1
Organization Type:	State Government
Organization Name:	Colorado Parks & Wildlife
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

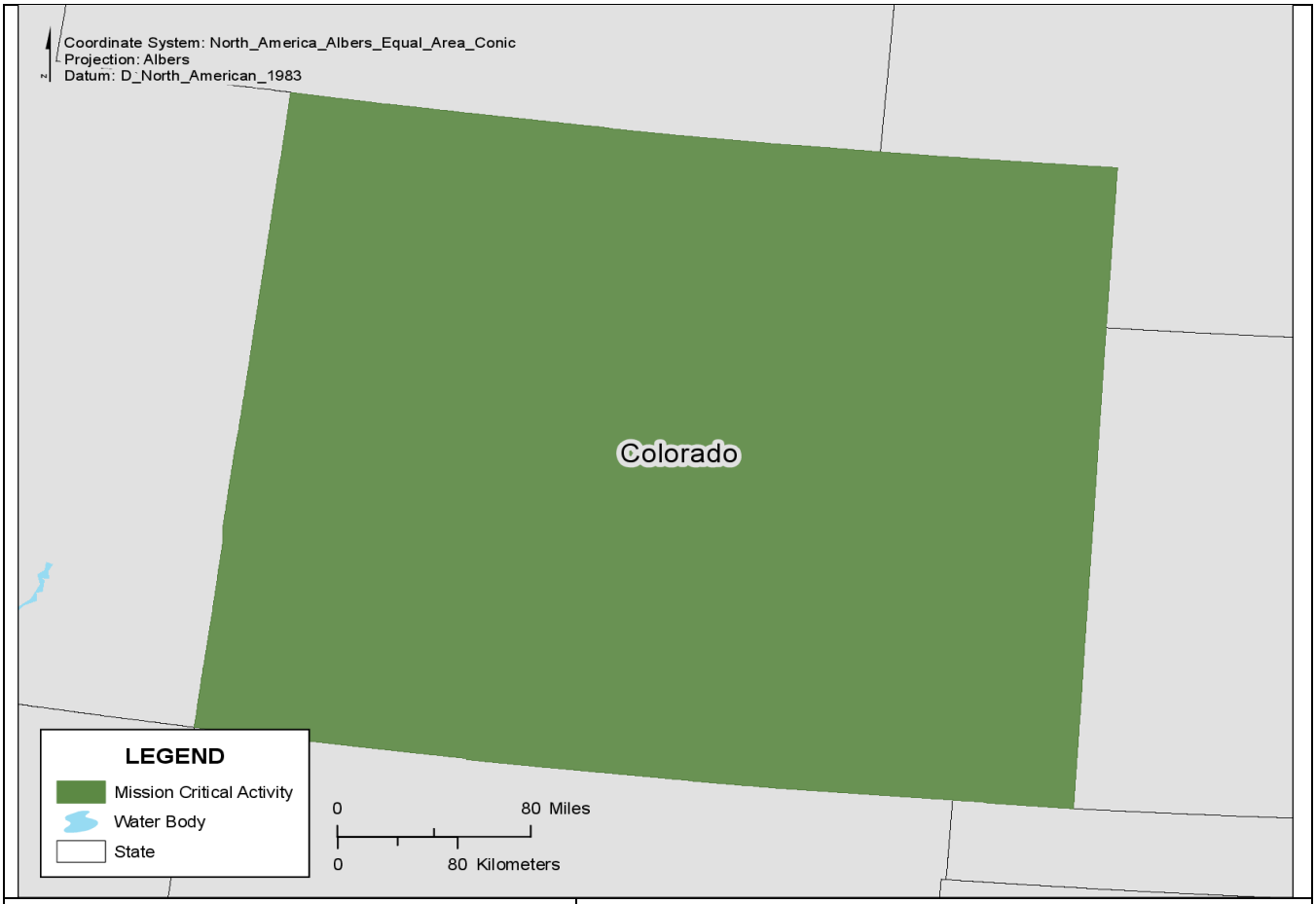
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	It would be easier to produce fisheries maps for both customers and internal clients.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice to Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Water quality monitoring and control.
MCA_ID:	3772405684_1
Organization Type:	State Government
Organization Name:	Colorado Department of Public Health and Environment
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 170 feet, 90% (1:100,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We have our own version of the NHDPlus with internal breaks on streams and internal coding.

Current Benefits	
Total Annual Program Budget:	Don't know.
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know.
Future Benefits Description:	Availability of information and ease of download would improve.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Nice to Have	None
Stream Flow	Nice to Have	None
Wetlands	Nice to Have	None
Census (population statistics)	Nice to Have	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	None
USACE - National Inventory of Dams (NID)	Nice to Have	None
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	None
USGS National Water Information Sites (NWIS)	Nice to Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Supply Protection

Mission Critical Activity Title:	Water Supply Protection
Mission Critical Activity Description:	Water supply protection.
MCA_ID:	3773619302_1
Organization Type:	State Government
Organization Name:	Colorado Water Conservation Board
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$3 million
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved geospatial analysis due to having data in one location and tied together. Time savings would be moderate.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Rights

Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	Water rights administration.
MCA_ID:	3778104120_1
Organization Type:	State Government
Organization Name:	Colorado Division of Water Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Increasing content in the NHD decreases the amount of time needed to build data and add value to those data. Using the NHD in its native format or using extracts of the data to meet certain business needs allows for the development of use rather than the development of data. Also, having a content-driven dataset like the NHD available to everyone provides a common technical platform for analysis and collaboration. If some of the database constraints related to the Board of Geographic Names rules could be solved, the benefits of the NHD would be greatly enhanced for Colorado.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Nice to Have	Visual Inspection
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Not Required	None
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Connecticut

Mission Critical Activities (MCAs) identified for Connecticut include Watershed Management, Protecting Water Dependent Uses, Improving Public Access, Restoring Coastal Habitat, Flood and Erosion Control and Coastal Hazards, Providing Natural Resource-Based Geospatial Information to the Public, Fisheries Management, Managing State Parks, Boat Launches and Forest to Provide Recreational Opportunities for the Public, Permitting and Regulating Dams, and Protection of the Quality and Quantity of Groundwater and Surface Water to Manage Drinking Water Supplies.

Eight Business Uses were identified. They include Coastal Zone Management, Education K-12 and Beyond, River and Stream Ecosystem Management, Water Quality, and Water Resource Planning and Development.

No current annual benefits were estimated; a future annual benefit of $755,000 is estimated. A high-level manager at the Connecticut Department of Energy and Environmental Protection noted the benefits to having high-quality data to support environmental decisions that will affect generations are immeasurable. It is worth millions of dollars.

Four of the eight respondents were part of the Connecticut Department of Energy and Environmental Protection (DEEP). All MCAs were identified by DEEP with the following exceptions:

- University of Connecticut - Providing Natural Resource-Based Geospatial Information to the Public
- State of Connecticut, Office of Policy and Management- Fisheries Management
- State of Connecticut, Office of Policy and Management – Land Use Policy and Planning
- Connecticut Department of Public Health - Protection of the Quality and Quantity of Groundwater and Surface Water to Manage Drinking Water Supplies

Although not noted in the survey, major concerns are sea level rise, Long Island Sound water quality, flooding, and drinking water quality.

Two future improvements were noted: increased densification of stream networks and improved horizontal accuracy

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

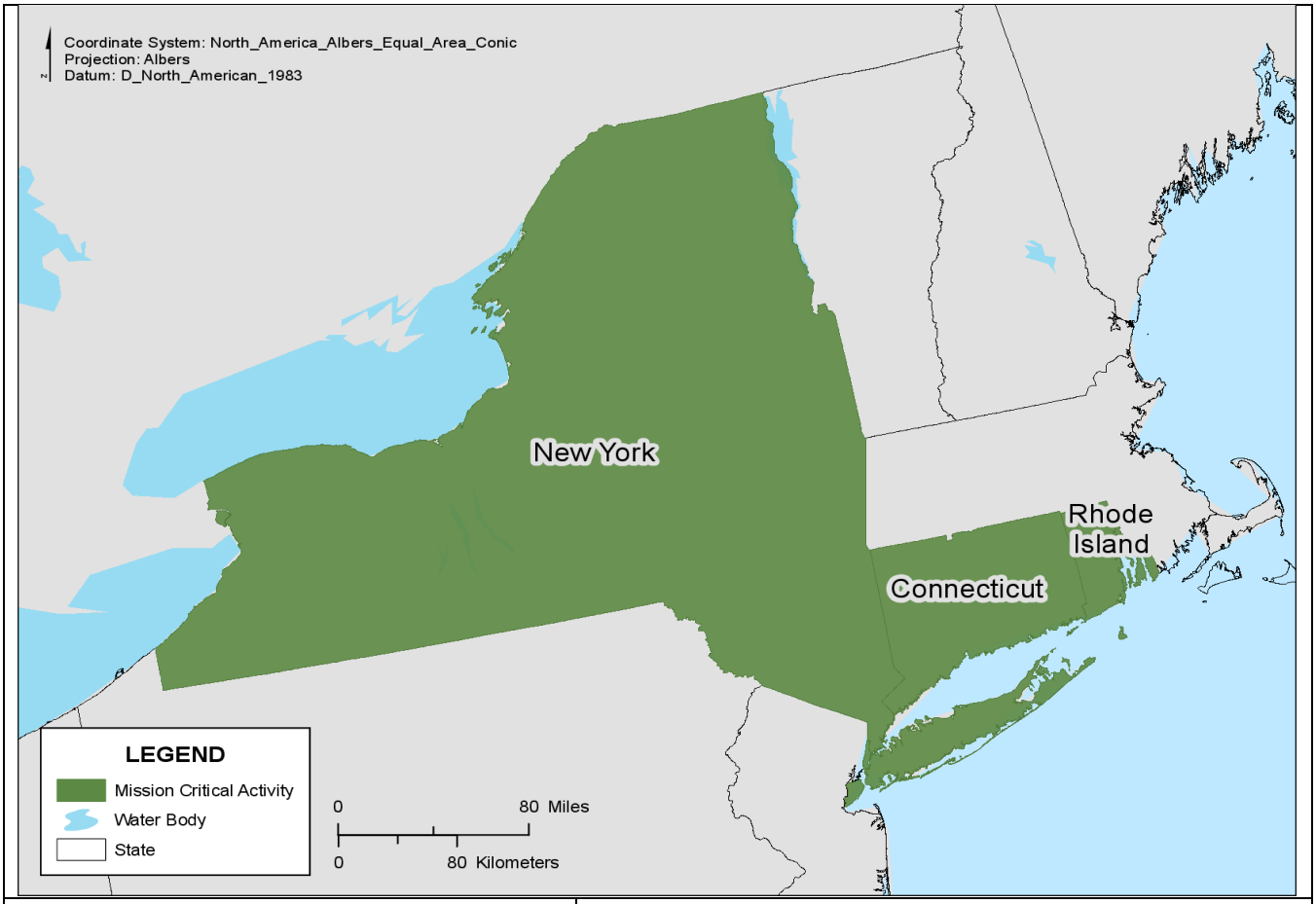
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Connecticut managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Quality and Quantity



Mission Critical Activity Title:	Water Quality and Quantity
Mission Critical Activity Description:	DEEP is responsible for protecting and managing the environment and natural resources of the state of Connecticut. There are a variety of programs related to managing water resources including water quality and quantity. In addition, the Department manages fisheries, wetlands, forests, and other natural resources. The Department also manages state parks, boat launches, and forests to provide recreational opportunities for the public. Coastal Management manages and protects coastal resources. The program includes watershed management, protecting water dependent uses, improving public access, restoring coastal habitat, flood and erosion control, and coastal hazards.
MCA_ID:	3794475286_3
Organization Type:	State Government
Organization Name:	CT Dept. of Energy and Environmental Protection
Business Use:	Coastal Zone Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Connecticut's hydrography and drainage basins. Datasets from NOAA and USGS.

Current Benefits	
Total Annual Program Budget:	Approximately $4.5 million.
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	The benefits to having high-quality data to support environmental decisions are immeasurable.
Future Benefits Description:	An improved hydrography layer will improve the results of the analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

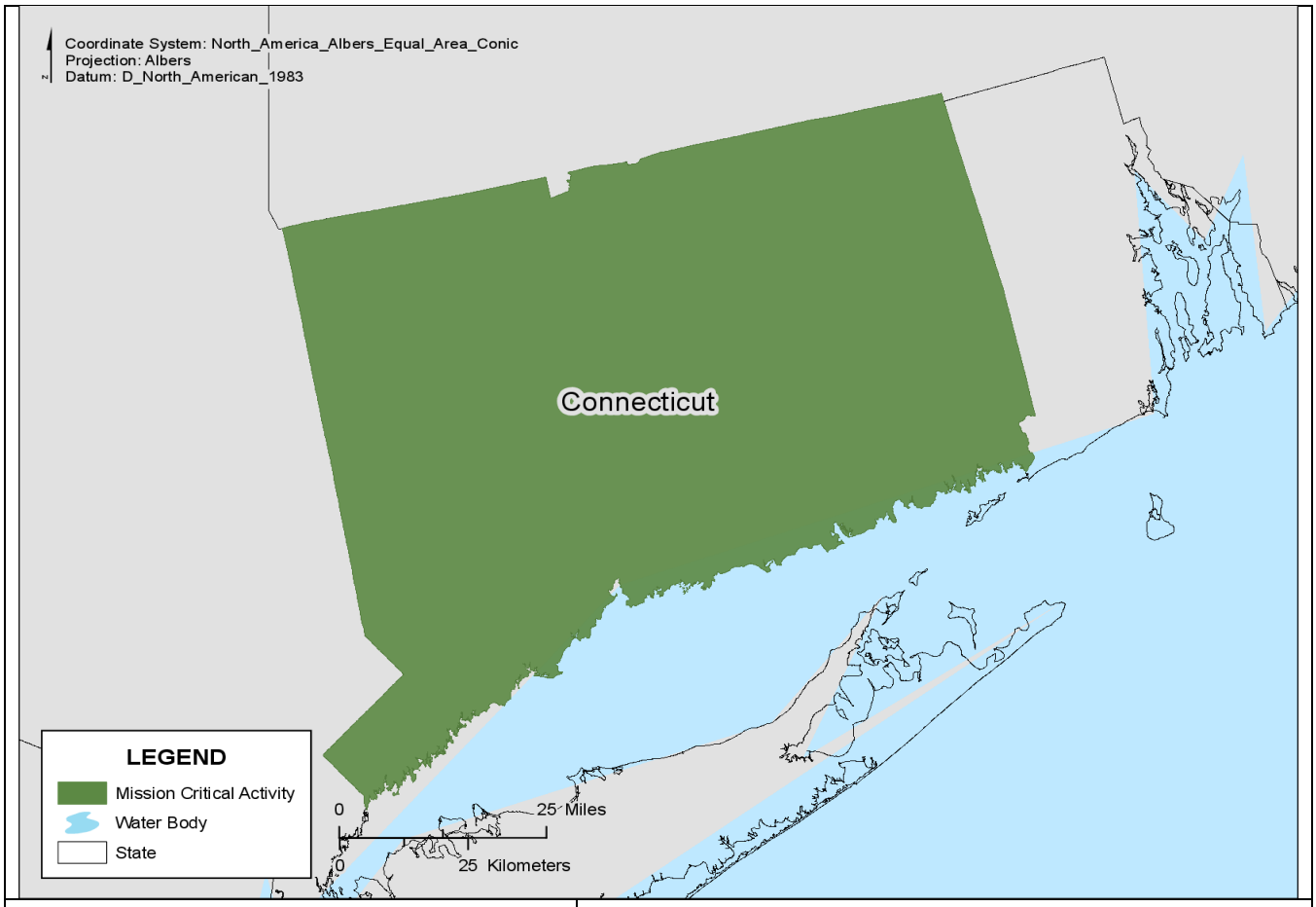
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice to Have	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Data Warehouse



Mission Critical Activity Title:	Data Warehouse
Mission Critical Activity Description:	Our MCA is providing natural-resource-based geospatial information to the public. Hydrography is a critical dataset for our users, which includes people from all different sectors.
MCA_ID:	3812565836_1
Organization Type:	State Government
Organization Name:	University of Connecticut
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	The CT NHD is being updated and we expect more benefits once it is updated.

Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	Better information (data) means better informed decisions and a happier (and increasing) user base.
Future Operational Benefits	
Future Time/Cost Savings:	Not Applicable
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

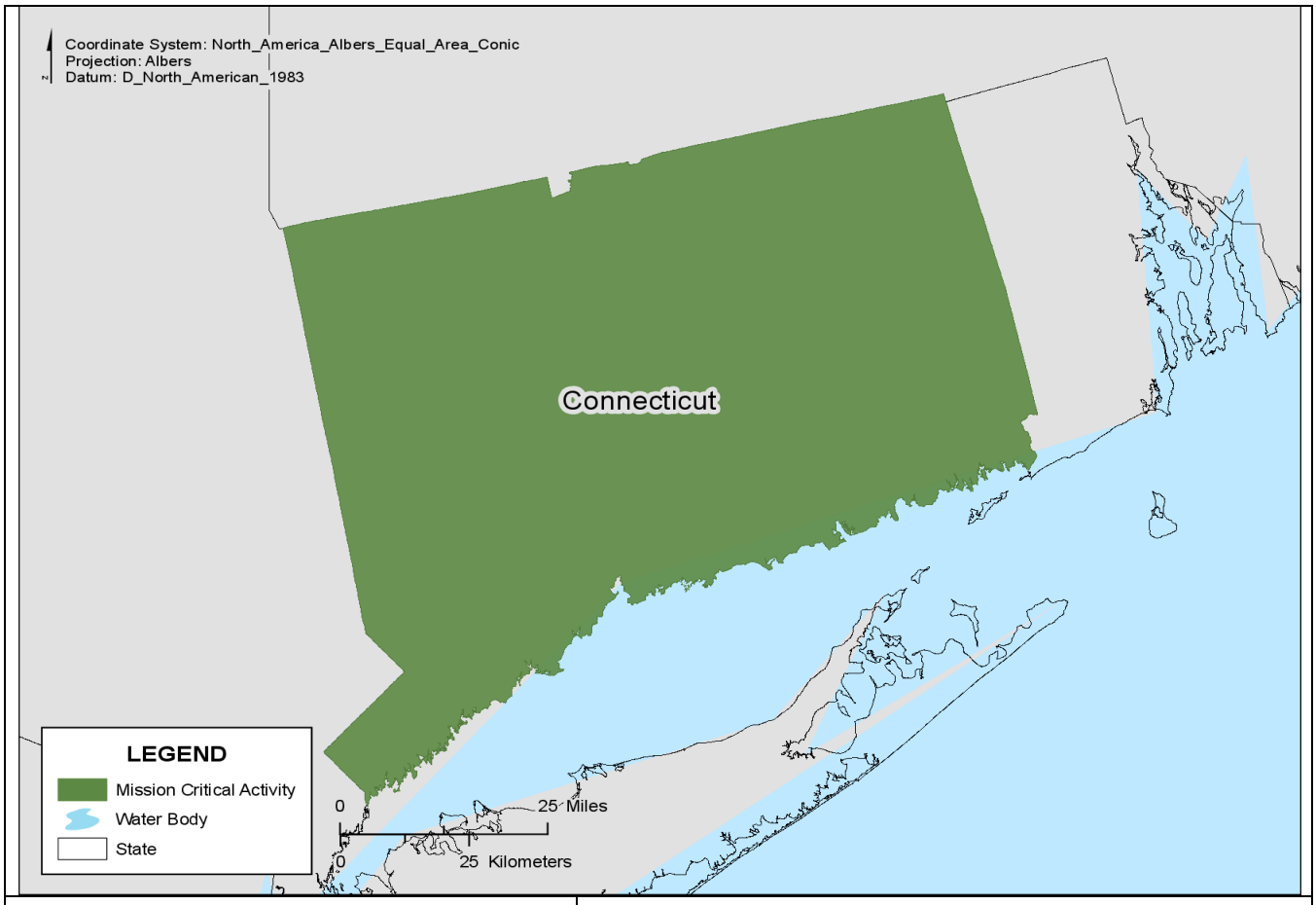
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	We use whatever we can get.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Fisheries Management



Mission Critical Activity Title:	Fisheries Management
Mission Critical Activity Description:	DEEP has a number of fisheries programs including habitat restoration and enhancement, which works to conserve, restore, and enhance the state's aquatic environments.
MCA_ID:	3794475286_4
Organization Type:	State Government
Organization Name:	CT Dept. of Energy and Environmental Protection
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Connecticut's own hydrography and drainage basins.

Current Benefits	
Total Annual Program Budget:	Don't know.
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

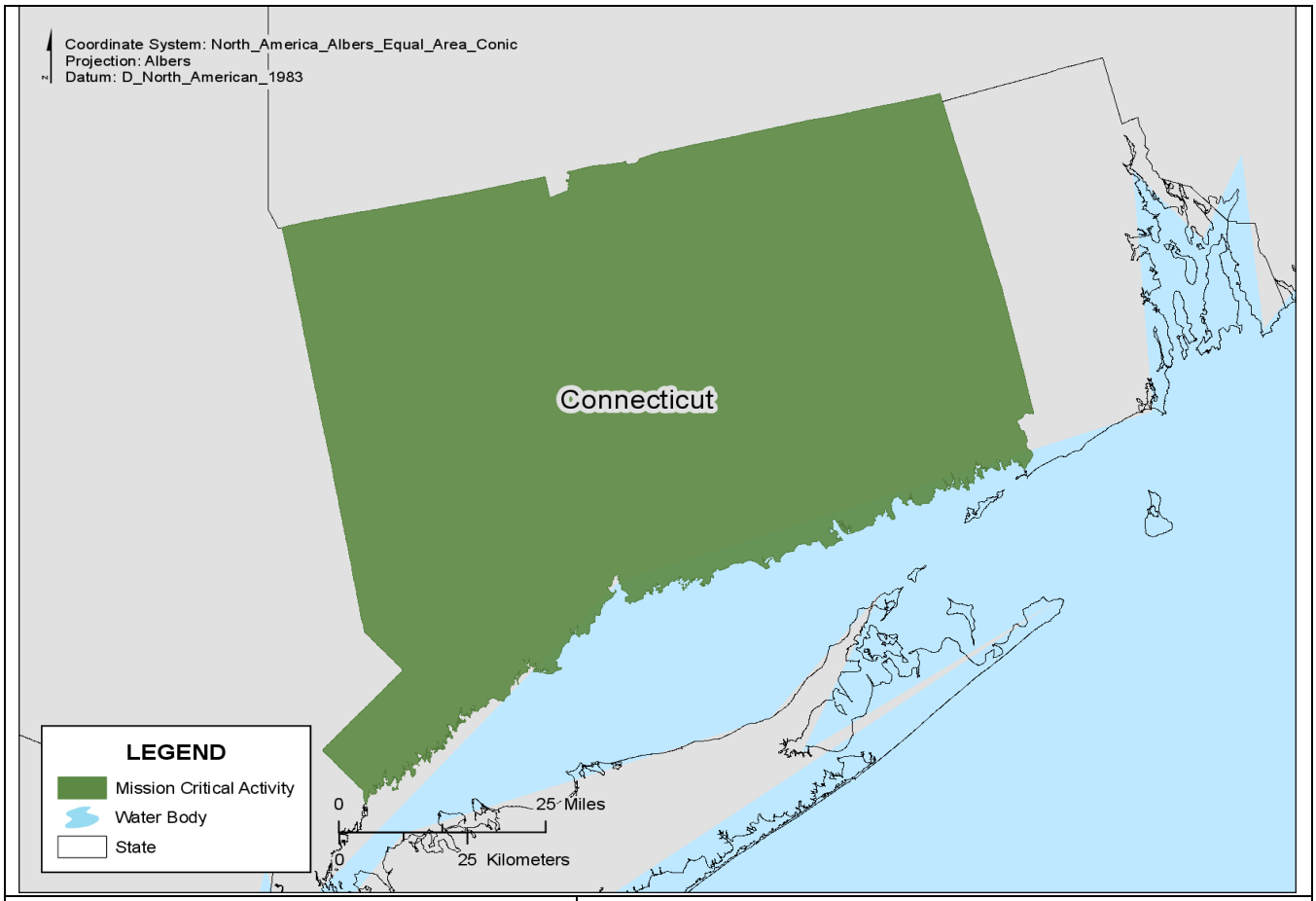
Future Benefits	
Future Annual Benefits ($):	The benefits to having high quality data to support environmental decisions are immeasurable.
Future Benefits Description:	An improved dataset for analysis will improve the results of the analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	None
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	None
Other (please specify the importance and highest analysis level):		

River Flow Management



Mission Critical Activity Title:	River Flow Management
Mission Critical Activity Description:	DEEP is responsible for protecting and managing the environment and natural resources of the state of Connecticut. There are a variety of programs related to managing water resources including water quality and quantity. In addition, DEEP manages fisheries, wetlands, forests, and other natural resources. The Department also manages state parks, boat launches, and forests to provide recreational opportunities for the public. There are several programs related to stream flow including dam safety for permitting and regulating dams.
MCA_ID:	3794475286_1
Organization Type:	State Government
Organization Name:	CT Dept. of Energy and Environmental Protection
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Connecticut's own hydrography dataset and drainage basins.

Current Benefits	
Total Annual Program Budget:	Approximately $4.5 million.
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	The benefits to having high quality data to support environmental decisions are immeasurable.
Future Benefits Description:	An improved dataset for use in the analysis would improve the results of the analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

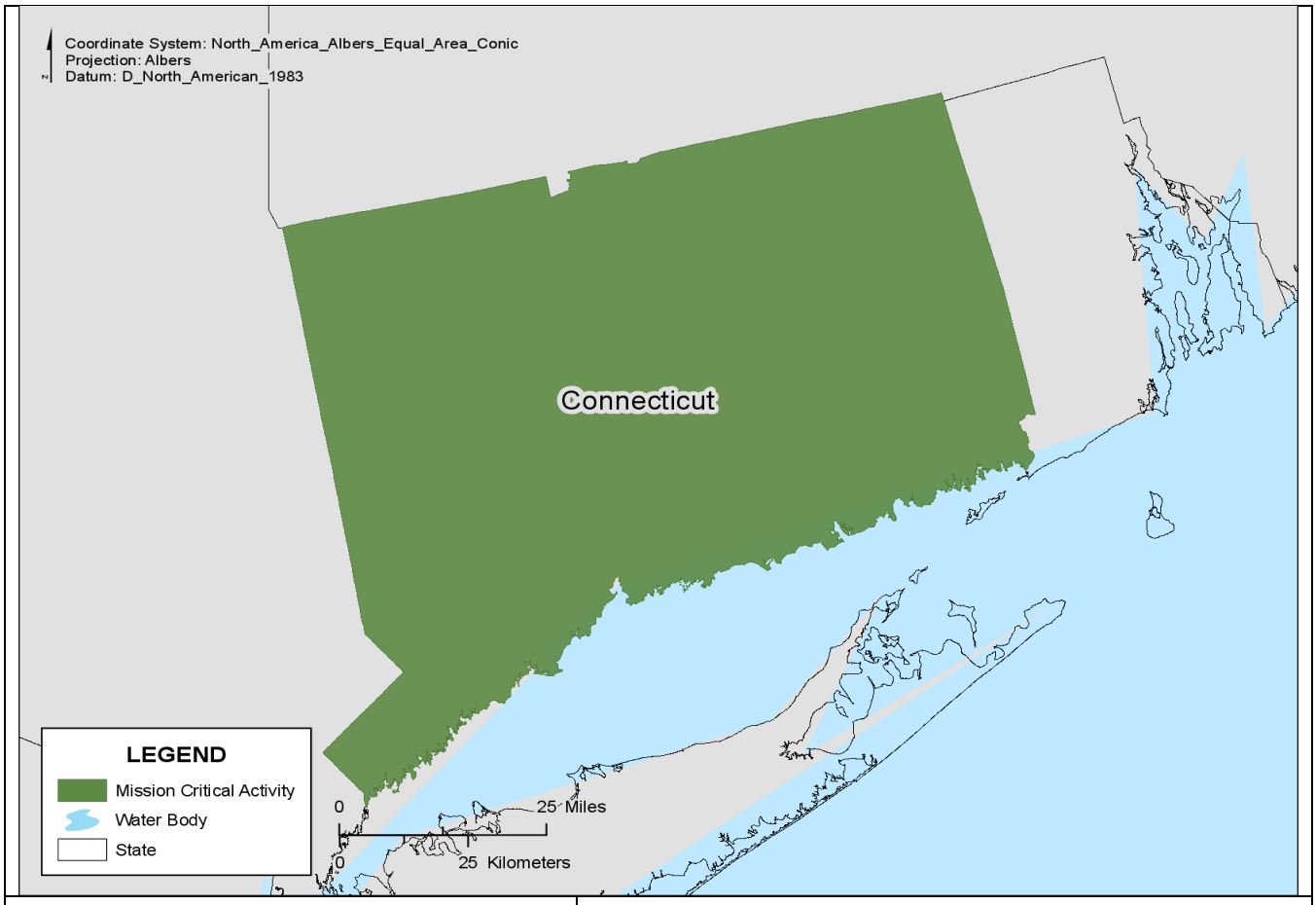
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes

Required Analytical Functions	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Land Use Policy



Mission Critical Activity Title:	Land Use Policy
Mission Critical Activity Description:	Land use policy and planning
MCA_ID:	3792687846_1
Organization Type:	State Government
Organization Name:	State of Connecticut, Office of Policy and Management
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$0
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	Work hour savings by having authoritative data readily available and not having to search for the best available data; moderate.

Future Benefits	
Future Annual Benefits ($):	$5,000.00 per year.
Future Benefits Description:	High-quality hydrography data are critical to land use planning for the determination of conservation & avoidance areas due to natural hazards and environmental/natural resource protection. Operational time or cost savings that would be realized include: work hour savings by having readily available hydrographic data in all areas of interest. Work hour savings by having authoritative data readily available and not having to search for the best available data. Reduced possibility of errors resulting from use of disparate datasets. Reduction in time necessary for analysts to execute mission critical tasks.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable

Future Benefits	
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

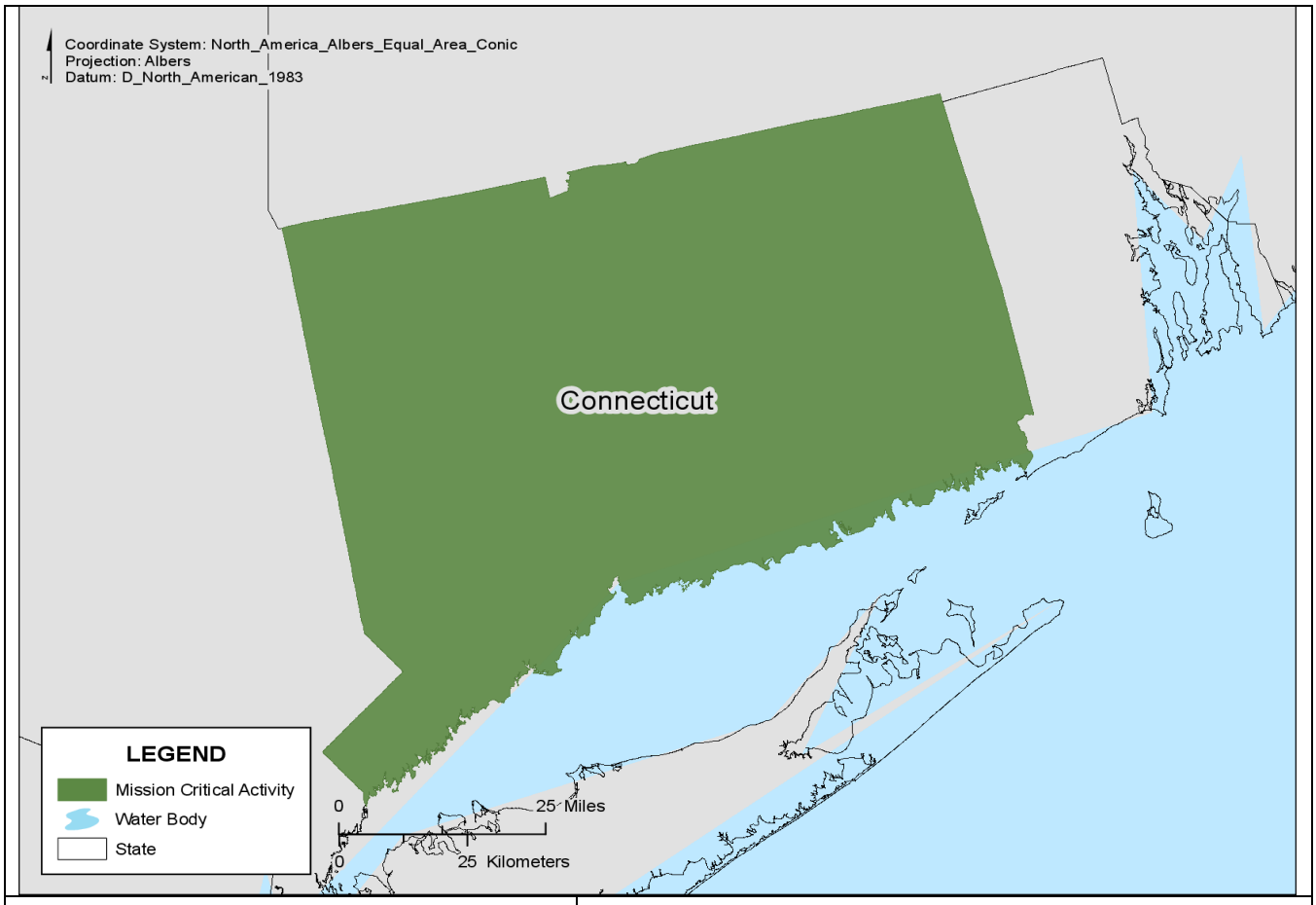
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	DEEP is responsible for protecting and managing the environment and natural resources of the state of Connecticut. There are a variety of programs related to managing water resources including water quality and quantity. In addition, the Department manages fisheries, wetlands, forests, and other natural resources. The Department also manages state parks, boat launches, and forests to provide recreational opportunities for the public. DEEP's water quality programs include drinking water, surface water, and ground water. The Water Quality Standards and regulations are the foundation of the program and establish designated uses for surface and ground water.
MCA_ID:	3794475286_2
Organization Type:	State Government
Organization Name:	CT Dept. of Energy and Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Connecticut's hydrography and drainage basins.

Current Benefits	
Total Annual Program Budget:	Approximately $9 million.
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	The benefits to having high quality data to support environmental decisions are immeasurable.
Future Benefits Description:	An improved dataset for the analysis will improve the quality of the results.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

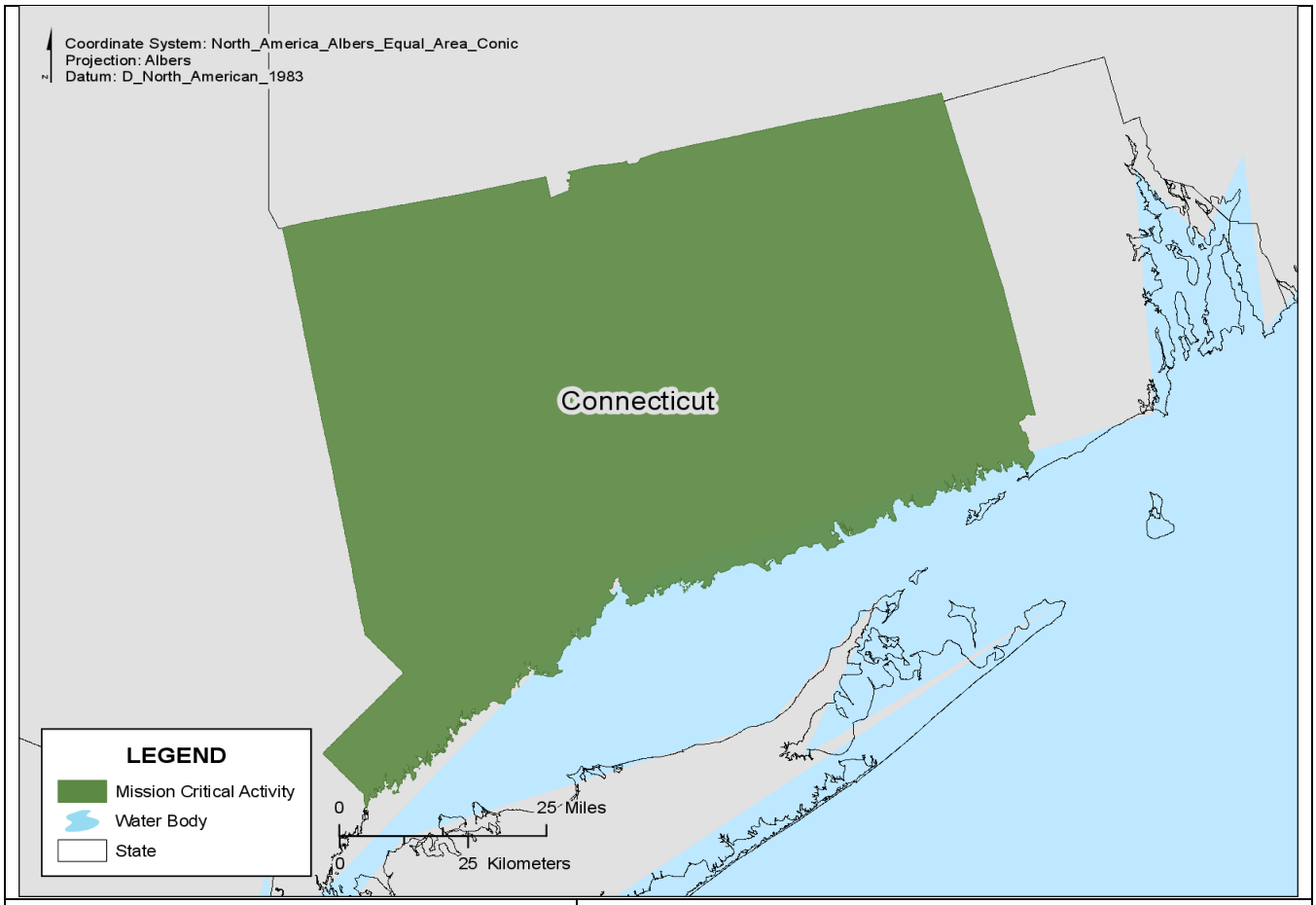
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Not Required	None
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Protection of the quality and quantity of groundwater and surface water drinking water supplies.
MCA_ID:	3772024525_1
Organization Type:	State Government
Organization Name:	Connecticut Department of Public Health
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Connecticut natural drainage basins with elevation contours.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	The more accurate the data available to analysts, the more accurate and efficient the permit reviews are. It's possible that time savings could be achieved on field visits as more accurate information would be available during the desktop review that occurs prior to the field visit.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Minor

Future Benefits	
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	None
USGS National Water Information Sites (NWIS)	Nice to Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	None
Other (please specify the importance and highest analysis level):		

Delaware

The driving Mission Critical Activity (MCA) for the NHD in Delaware is the permitting of construction of any sort in a buffer zone around perennial streams; NHD data are the source for such streams. The Delaware Department of Natural Resources and Environmental Control (DNREC) staff upgraded the state NHD to 1:20,000-scale, but funding for additional data maintenance has not been approved. It should be noted that DNREC is not the WBD steward; the USGS Water Science Center office in Dover has that role currently, and with new statewide QL2 lidar delivered in April 2015, the opportunity to update that dataset is available and a meeting is planned on this topic.

The other major MCA which DNREC plans to include with the NHD is what are referred to as "tax ditches." These features are located in agricultural areas for the most part, and are used to lower the water table so land can be farmed. Many tax ditches have little to no perennial flow, and can be influenced by wind direction or tide in coastal ditches as gradient. Data for these tax ditches exist at DNREC, and discussions with the new DNREC management have started that may lead to the inclusion of these fully-attributed data in the NHD. The other documented MCA in this survey was provision of hydrography data for cartographic reference as one of the Delaware geospatial framework themes, submitted by the former DNREC GIS staff, now at Delaware Department of Technology and Information (DTI). River flooding is comparably not a large factor when measured against coastal flooding events. Delaware would benefit from a large-scale, lidar-derived coastline to improve modeling of storm flooding and long-term sea level rise so that hydrographic features can be easily integrated with parcel data.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓		✓				✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓					

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Nice To Have
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Nice To Have
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

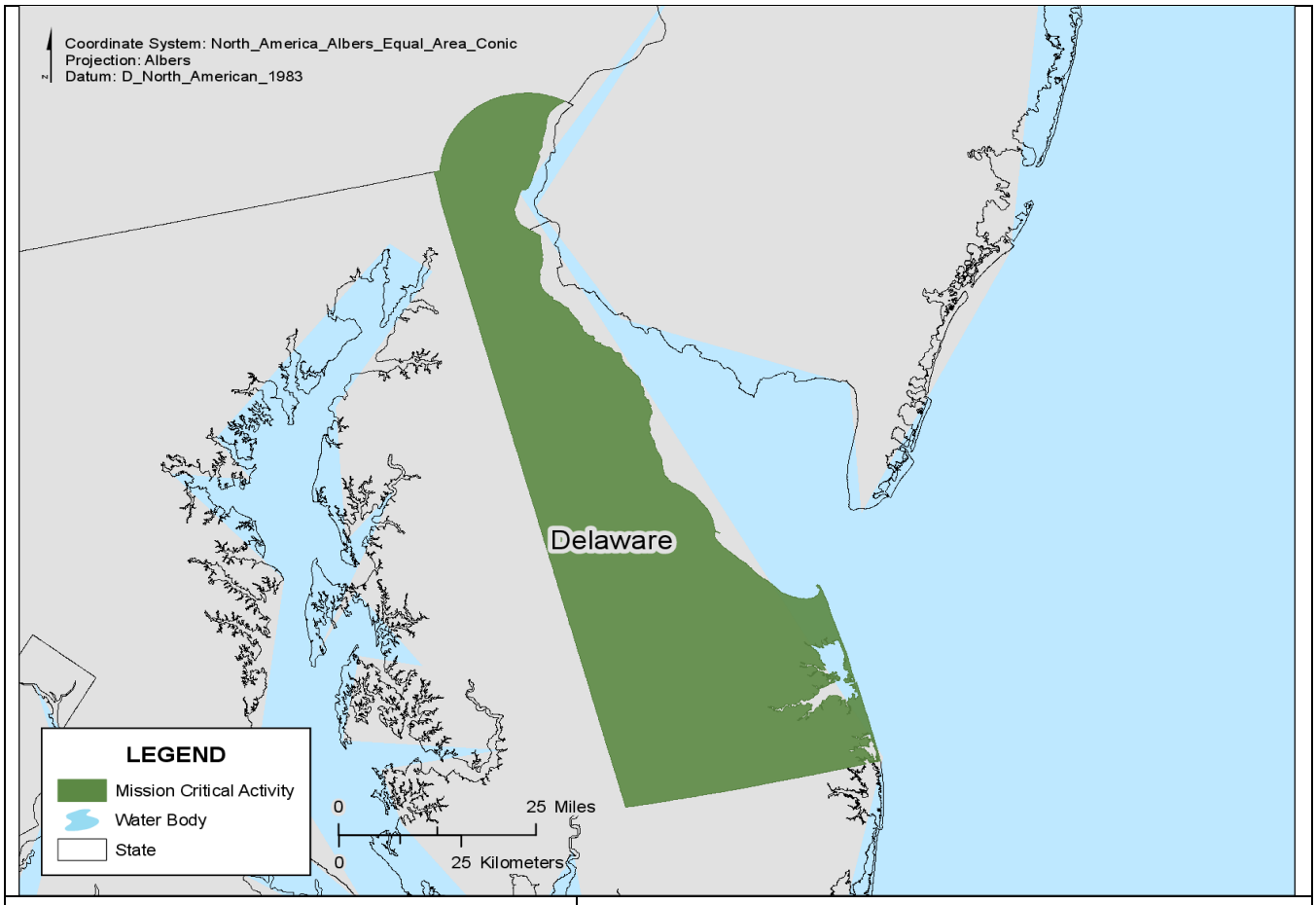
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 10% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Delaware managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Agricultural Ditches



Mission Critical Activity Title:	Agricultural Ditches
Mission Critical Activity Description:	Location and condition of tax ditches that drain agricultural fields.
MCA_ID:	3836990502_1
Organization Type:	State Government
Organization Name:	Delaware Dept. of Natural Resources
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

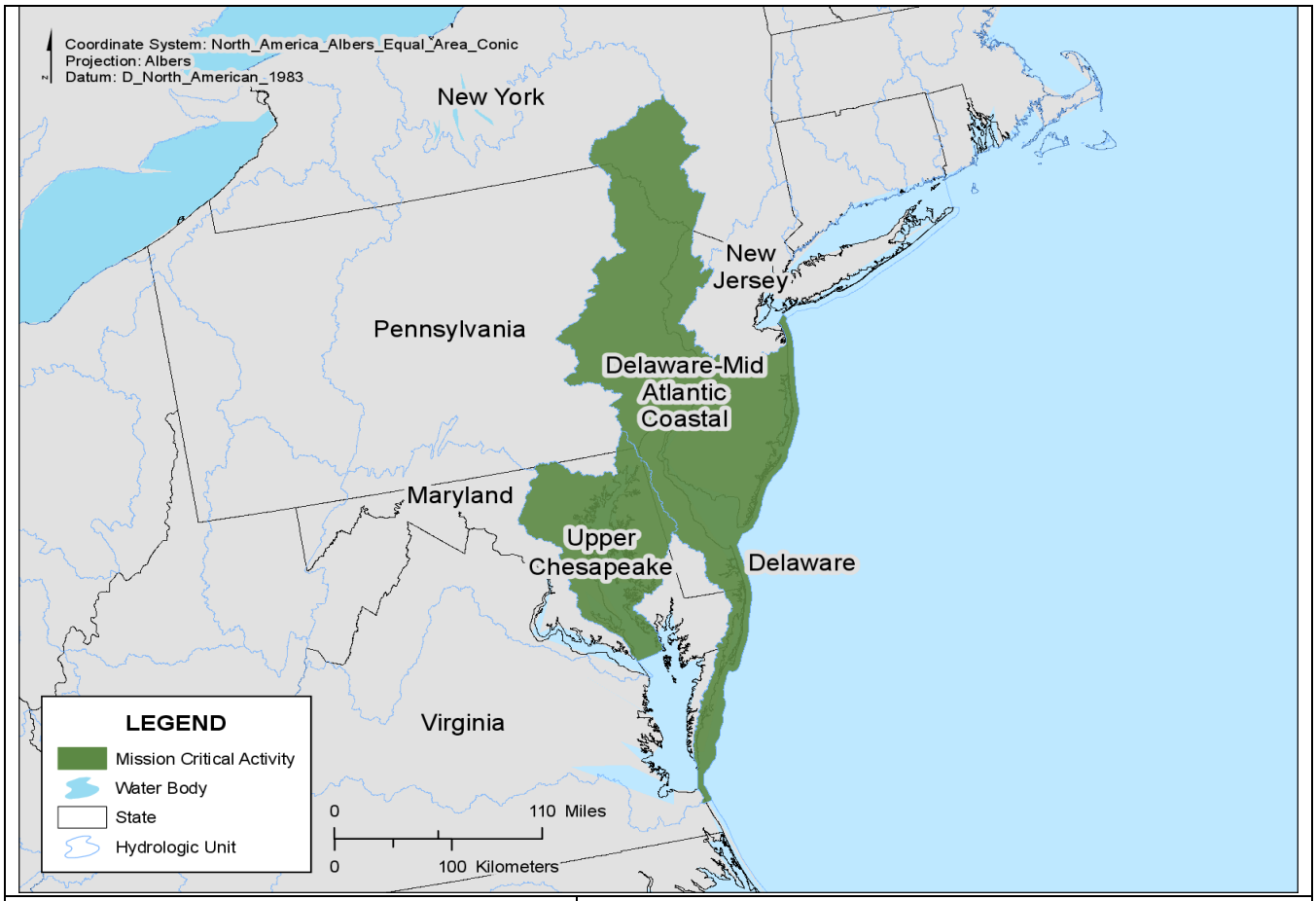
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Orthoimagery.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology		
Bathymetry		
Climate		
Contaminant Sources		
Elevation	Required	Perform Geospatial Analysis
Stream Flow		
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)		
Aquifers		
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)		
EPA - STOrage and RETrieval Data Warehouse (STORET)		
USACE - National Inventory of Dams (NID)		
USDA - National Agriculture Statistics Service (NASS)		
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)		
USGS National Water-Quality Assessment Program (NAWQA)		
Other (please specify the importance and highest analysis level):	Parcels - Required, Perform Geospatial Analysis	Parcels - Required, Perform Geospatial Analysis

Permitting Near Perennial Streams



Mission Critical Activity Title:	Permitting Near Perennial Streams
Mission Critical Activity Description:	Determining if a water conveyance feature is jurisdictional under Title 7 and the Regulations Governing the Use of Subaqueous Lands. The evaluation process is called a jurisdictional determination and if a feature is determined to be jurisdictional, a permit is required to perform work in the feature.
MCA_ID:	3804409904_1
Organization Type:	State Government
Organization Name:	Delaware Department of Natural Resources Wetlands and Subaqueous Lands Section
Business Use:	Marine and Riverine Navigation Safety
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Our total program funding is primarily fee-dependent and as such the annual budget is determined by the year-to-year carryover of the fees from the previous year.
Current Annual Benefits ($):	We are statutorily obligated to perform jurisdictional determinations for public subaqueous lands; however, there is no fee charged for the service. Therefore, this portion of our program is operated as a loss (in terms of man-hours, multiple hundreds of hours annually). Public availability of accurately-mapped jurisdictions may result in less demand for our services, but the service will still be offered. $30,000 to $50,000.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided
Future Benefits Description:	Would add more and more accurate data to our determinations, improve efficiency of permit process, and improve external confidence in DNREC data. Incorporating high-accuracy jurisdictional determinations (via the NHD) in site inspection planning or in-field mapping should reduce the amount of time needed to perform our reviews.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	

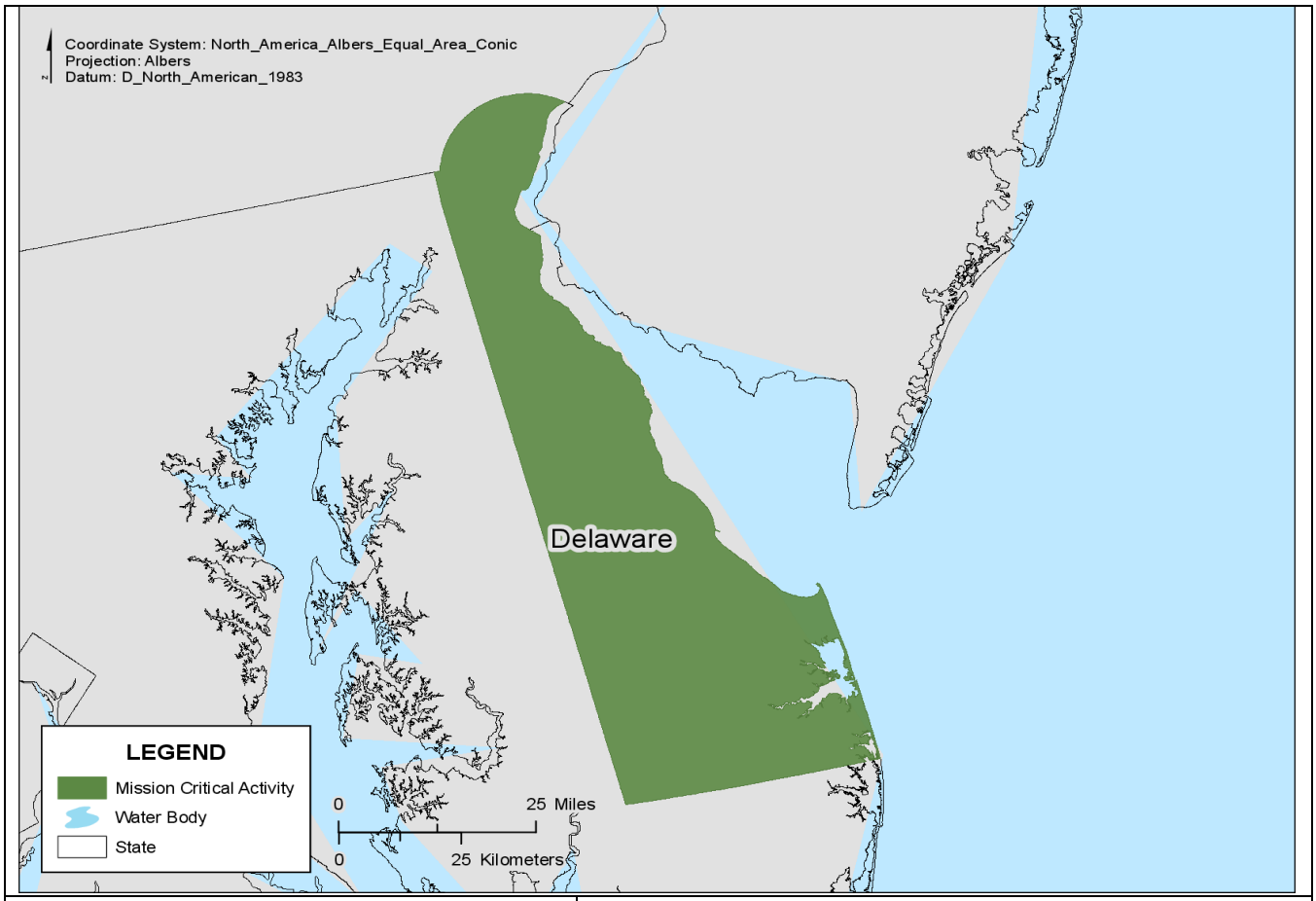
Required Characteristics	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Framework Data Theme



Mission Critical Activity Title:	Framework Data Theme
Mission Critical Activity Description:	To provide water data for modeling and cartographic purpose to GIS Users in the State of Delaware.
MCA_ID:	3828678300_1
Organization Type:	State Government
Organization Name:	Dept. of Technology & Information, Delaware
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Benefits include improved map readability and utility due to better water layers.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Nice To Have	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

District of Columbia

The District of Columbia (DC) occupies 69 square miles with the Potomac River forming its southern boundary. With a population of over 658,000 the population density is over 9,800/square mile. DC also has the highest ratio of Federal land ownership east of the Mississippi River at 21.6 percent, double the percentage of any other eastern state. In this urban environment, most Federal land is "green-space" and is managed independent of the DC government. DC uses three different hydrography datasets at present, none of which receive regular maintenance. The District's hydrography project is a joint effort involving the Office of the Chief Technology Officer (OCTO) and DC Water under the stewardship of the Department of Energy and the Environment (DOEE).

The local-resolution NHD and WBD data will enable much better modeling of runoff from pervious and impervious surfaces, including rooftops, which collect a lot of storm-water. DC has excellent local-resolution data such as 6-inch orthoimagery and detailed parcel data, so bringing the hydrography and watersheds in line with other geospatial framework data will enhance visualization, permitting, and planning efforts. Local-resolution NHD data will include engineering data for underground conveyances from local institutional sources so that modeling will be possible for applications such as StreamStats and Flood Inundation Mapper.

Storm-water monitoring needs entail proper siting of Best Management Practices (BMPs) such as rooftop gardens, bioretention, and other green infrastructure practices including riparian buffers to mitigate the runoff. BMPs support Chesapeake Bay Program goals for improving Chesapeake Bay water clarity and overall bay health, as well as goals for improving local water quality in the Potomac and Anacostia Rivers and Rock Creek. Flood zone mapping is the next-largest response, and relates mostly to infrastructure protection such as monuments, public land, and surface and air transportation, not so much as residential flooding. Another complication is that rooftop stormwater runoff is shunted over topographic "highs."

Water Quality is of prime concern, as the Potomac River offers a scenic recreation venue, and some people fish in the Potomac and Anacostia Rivers. Additionally, the Anacostia is one of the originally-designated urban watersheds, and the National Capital Region of the National Park Service is the Federal Managing agency along with the USGS Water Science Center, and they have expressed interest in local-resolution data. Also in consideration is that the Maryland Department of the Environment is planning to derive local 1:2,400-scale-resolution NHD and WBD data from the same QL2 lidar data that DC will use. Maryland harbors 80 percent of the Anacostia watershed, so upon completion of these projects, greatly improved management tools will offer enhanced data and data consistency that DC and Maryland have never had before.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓				✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

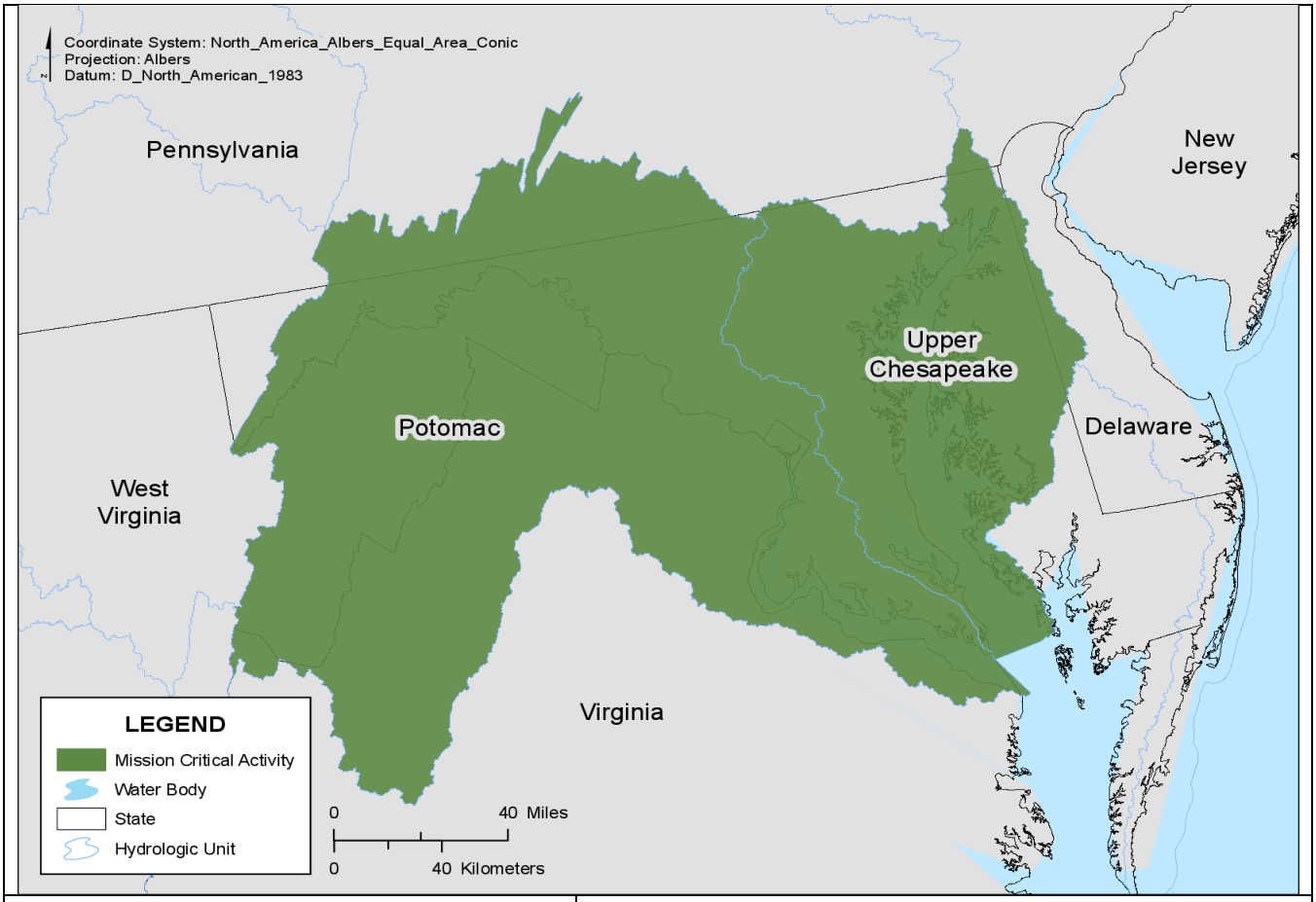
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

District of Columbia managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	Hydrologic data is used in Stormwater Management, TMDL, Flood Mitigation, Sewershed mapping, and sub-watershed and watershed mapping. It can also be used for determining locations of streams for site determination for restoration planning and developing storm water retention practices.
MCA_ID:	3806820401_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	District of Columbia Government
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4.4 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know.
Future Benefits Description:	More complete and better data would yield better analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Not Required	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Management

Mission Critical Activity Title:	Flood Management
Mission Critical Activity Description:	Stormwater management, flooding, and watershed protection (note: we are only a planning agency for the region; we do not implement).
MCA_ID:	3807773778_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	National Capital Planning Commission
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$0
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	N/A
Future Benefits Description:	This survey does not really apply to the general flood study work that NCPC is working on for DC.
Future Operational Benefits	
Future Time/Cost Savings:	Not Applicable
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable

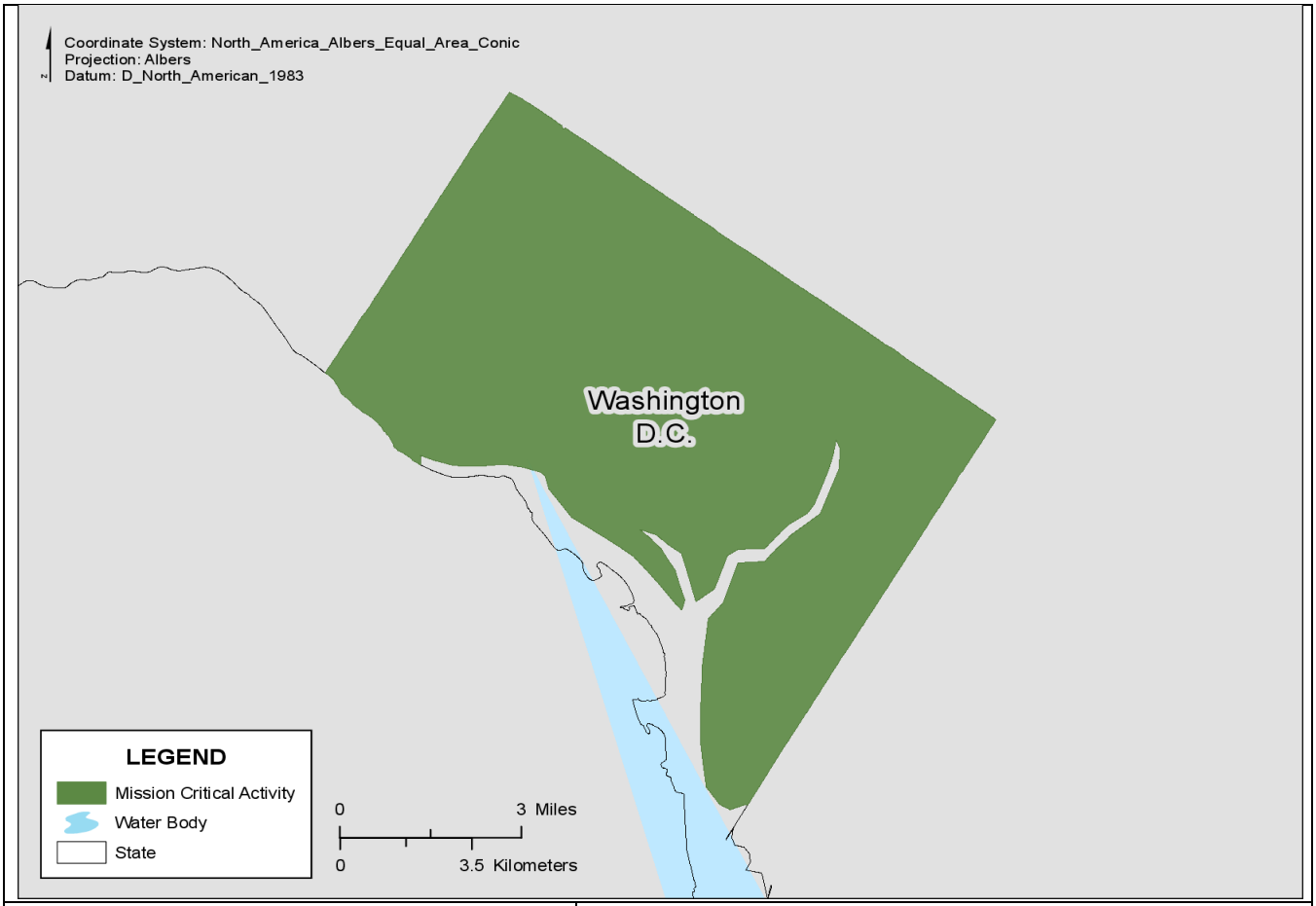
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice To Have	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Nice To Have	None
Wetlands	Nice To Have	None
Census (population statistics)	Nice To Have	None
Aquifers	Nice To Have	None
Point Discharges	Nice To Have	None
Water Use: Diversions	Nice To Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	None
USACE - National Inventory of Dams (NID)	Nice To Have	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	None
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Water quality protection, water quality modeling, hydrologic modeling, watershed mapping, land use mapping.
MCA_ID:	3808016909_1
Organization Type:	State Government
Organization Name:	District of Columbia Department of the Environment, DC
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$7.5 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Improved mission compliance (operational), time or cost savings (operational), environmental benefits (societal benefits), improved products or services (customer service).
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Florida

The State of Florida supports the NHD through a long-standing stewardship agreement between the Florida Department of Environmental Protection and the USGS National Geospatial Program. The large majority of hydrography data end users in the state recognize the NHD as the most comprehensive source for surface water data representation. There does exist, however, a small minority of regional agencies that have surface water modeling requirements that cannot be met with the current NHD data model. As an alternative to the NHD, it was found that these regional agencies largely rely upon the NHDPlus or custom ArcHydro-based hydrography data systems developed in-house to meet their unique business requirements.

For the State of Florida, hydrography system stakeholders selected to participate in the study represented state, regional, and local governments. In addition, study participation included GIS managers from non-profit and Tribal groups. This Florida HRBS working group identified Watershed Protection, Stormwater Management, Emergency Management/Response, Water Quality Assessment and Modeling, Natural Resources Conservation, and Flood Control as being Mission Critical Activities that use hydrography data systems.

The current primary qualitative benefits realized through use of surface water data and systems were associated with mission compliance and time/cost savings for programs associated with flood management, natural resources conservation, climate change, and improved response times to emergencies. Significant future qualitative benefits were reported as being similar to current benefits and would be realized through delivery of a more robust set of hydrography system tools and enhanced data, which would enable decision makers to better manage Mission Critical Activities. System enhancements would be perceived to deliver a better understanding of the natural environment through depiction of higher-resolution surface water networks and associated tools to support modeling. In particular, it was agreed that developing methodology to seamlessly integrate bathymetric with hydrographic data would be of significant benefit in support of all state Business Uses identified.

Current and future quantitative cost benefits of hydrography data systems were widely recognized as significant upon review of the Hydrography Requirements and Benefits Study (HRBS) survey responses and follow-up discussions. Unfortunately, specific benefits were reportedly difficult to quantify due largely to the fact that specific activities tied to hydrography data systems do not typically receive individual line-item funding allocations by state agencies.

Organizations with locally-maintained hydrography datasets expressed interest in identifying and implementing a process to efficiently submit local updates performed in-house to the NHD. The consensus was that the existing stewardship program could be leveraged to facilitate a coordinated approach supporting transfer of these local updates to the national dataset.

During HRBS interviews in the hydrography data user community, details pertaining to additional hydrography system requirements, benefits, and concerns not fully captured in the formal survey surfaced, including: improved modeling requirement of bi-directional flow features, publishing an

authoritative source for the state's coastline, enhancing stream flow attribution, and refining watershed data boundaries to accurately represent the hydrography landscape unique to Florida.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓		✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

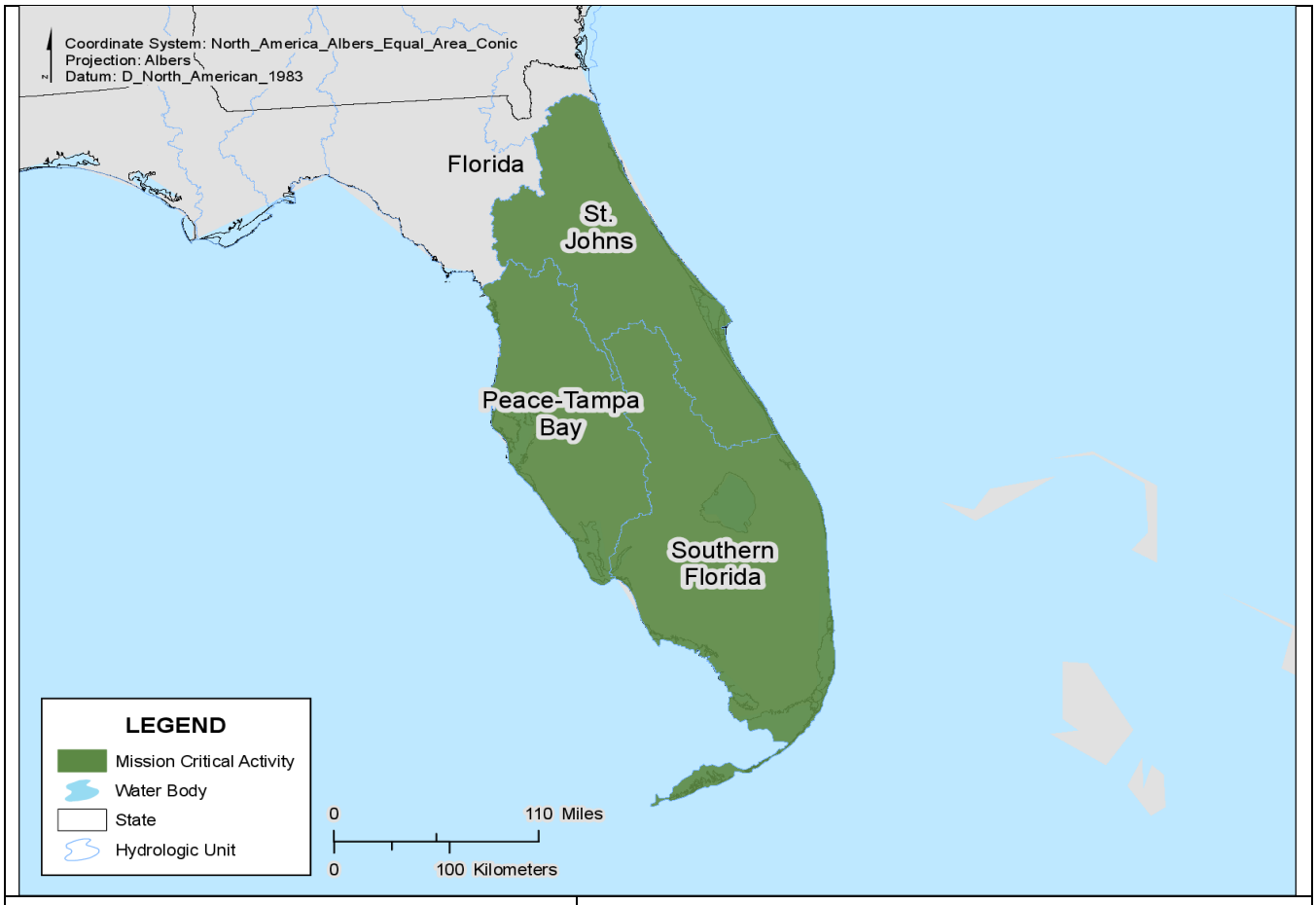
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 10% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Florida managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Watershed Protection



Mission Critical Activity Title:	Watershed Protection
Mission Critical Activity Description:	The primary Mission Critical Activities encompass watershed protection through flood risk mapping; habitat analysis; wetland distribution, frequency, and connectivity understanding; change detection of resources; and management of resources.
MCA_ID:	3803669392_1
Organization Type:	Tribal Government
Organization Name:	Seminole Tribe of Florida
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	No answer provided.
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	No answer provided.
Future Benefits Description:	Improved hydrographic information would improve the understanding of the natural resources that persist as well as the management of flood waters; therefore, improving the response time and applicable management strategies would provide societal benefits within the community.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Stormwater Management

Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater Management: local and regional flood mitigation and treatment of surface runoff. This includes GIS datasets such as detailed drainage mapping, traceable stormwater inventory/asset networks, as well as GIS-based analysis and the use of engineering-based hydrologic and hydraulic modeling software.
MCA_ID:	3829233299_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Tallahassee-Leon County GIS
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally revised NHD, NHDPlus.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Better ability to analyze how amount of runoff that comes to us from outside the county, both within Florida and from Georgia; improved emergency response; increased National Flood Insurance Program credits.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

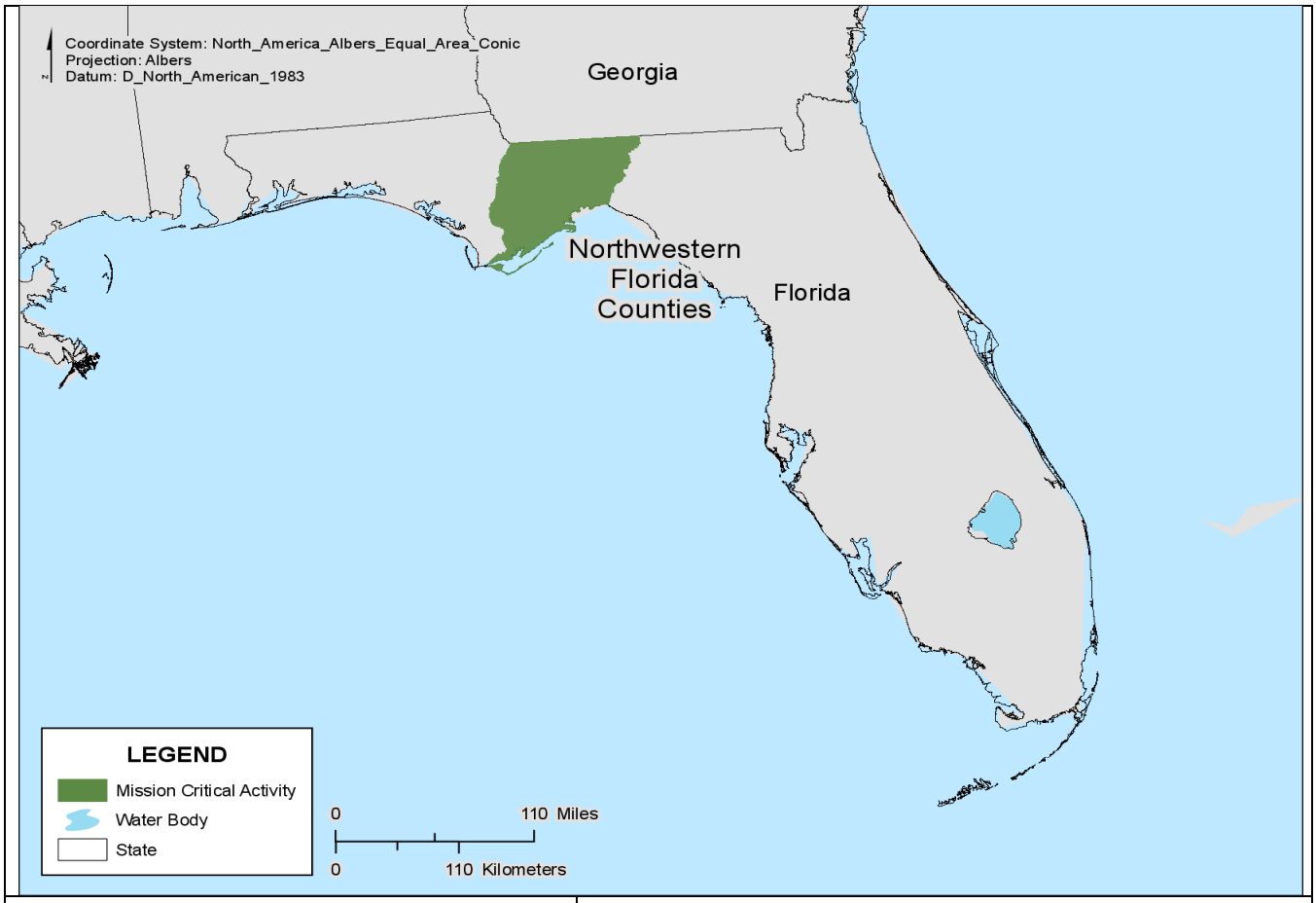
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Control structures (weirs, spillways, conduit, etc.), constructed ponds, reservoirs, karst depressions, natural waterbodies, swallets.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes

Required Analytical Functions	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Natural Disaster Emergency Management



Mission Critical Activity Title:	Natural Disaster Emergency Management
Mission Critical Activity Description:	Emergency Management (tropical storm/hurricane response).
MCA_ID:	3829233299_3
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Tallahassee-Leon County GIS
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally revised NHD, NHDPlus.

Current Benefits	
Total Annual Program Budget:	Staff time but no budget item.
Current Annual Benefits ($):	$200,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Improved deployment of resources/personnel, better assistance to citizens, better preparation for flood events, improved documentation of event impacts to assist citizens recover losses, better communication with FEMA and NGOs.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Don't Know

Future Benefits	
Future Other Benefits:	

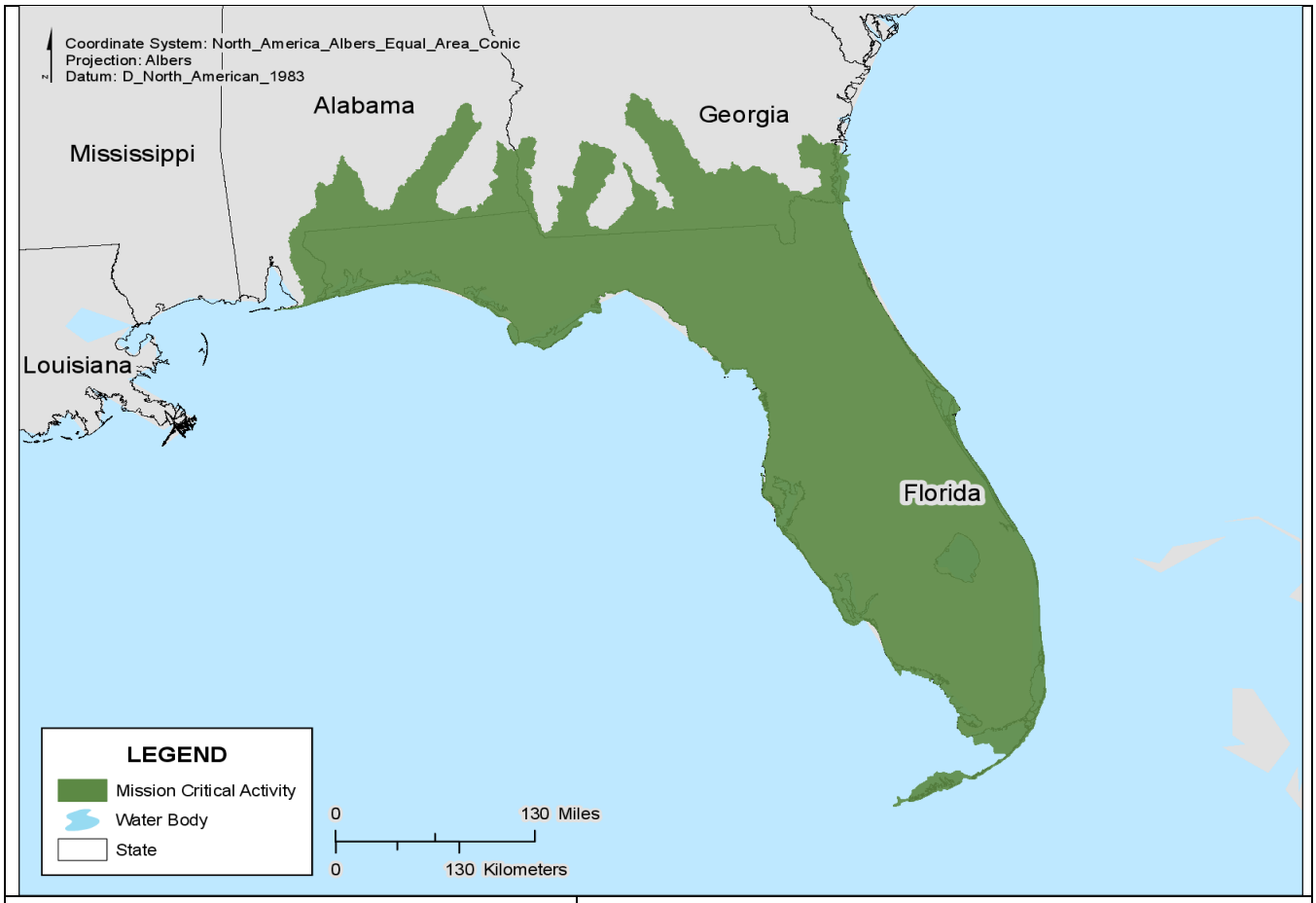
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality Assessment and Restoration



Mission Critical Activity Title:	Water Quality Assessment and Restoration
Mission Critical Activity Description:	Water quality assessment and restoration.
MCA_ID:	3806634006_1
Organization Type:	State Government
Organization Name:	Florida Dept. of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Waterbody IDs (WBIDs) and Planning Units.

Current Benefits	
Total Annual Program Budget:	The Division of Environmental Assessment and Restoration in the Florida Department of Environmental Protection is a large organization that uses the same hydrographic data across multiple programs in different ways. Standardized metrics needed to respond to this survey for assessing our organization across these programs, on the cost benefits of having improved and idealized hydrographic information, are not in place. Nonetheless, USGS hydrography data are integral to our daily operations, and improvements in those data products would benefit our work.
Current Annual Benefits ($):	The Division of Environmental Assessment and Restoration in the Florida Department of Environmental Protection is a large organization that uses the same hydrographic data across multiple programs in different ways. Standardized metrics needed to respond to this survey for assessing our organization across these programs, on the cost benefits of having improved and idealized hydrographic information, are not in place. Nonetheless, USGS hydrography data are integral to our daily operations, and improvements in those data products would benefit our work.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	The Division of Environmental Assessment and Restoration in the Florida Department of Environmental Protection is a large organization that uses the same hydrographic data across multiple programs in different ways. Standardized metrics needed to respond to this survey for assessing our organization across these programs, on the cost benefits of having improved and idealized hydrographic information, are not in place. Nonetheless, USGS hydrography data are integral to our daily operations, and improvements in those data products would benefit our work.
Future Benefits Description:	An improved hydrography dataset allows for better definition of hydrologic connectivity between ground water sources, outflows (springs), and receiving surface waters, allowing us to back-track potential contaminant sources (largely non-point) and to then begin source mitigation via the TMDL/BMAP practices. Better hydrography will allow for more accurate TMDL predictions if the new data can improve the accuracy of model calibrations. Better connections and faster downloading of gage and NWIS data would save valuable time.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes

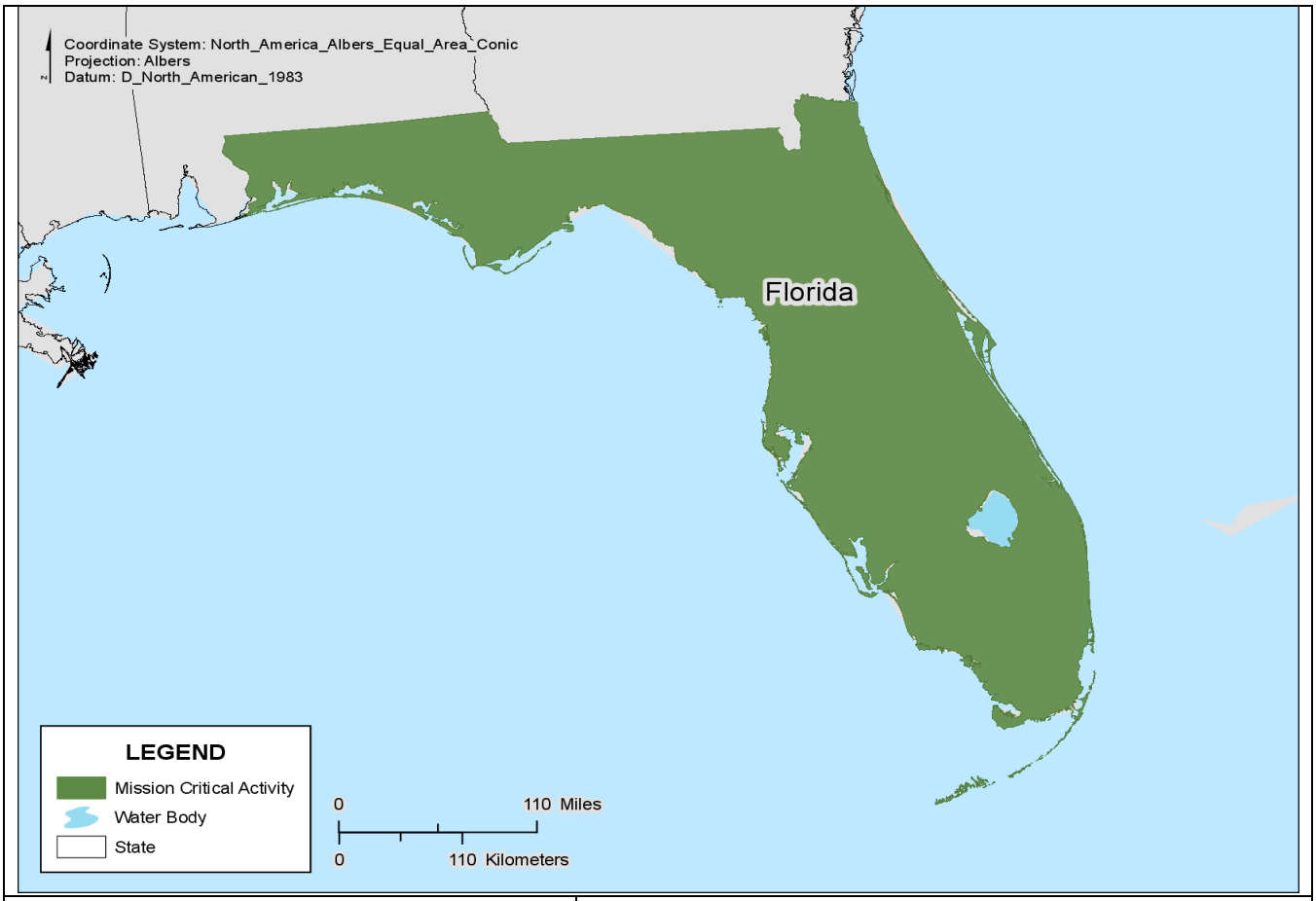
Required Characteristics	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Modeling Surface Water Hydrography



Mission Critical Activity Title:	Modeling Surface Water Hydrography
Mission Critical Activity Description:	Our primary use of NHD data is to aid in modeling of surface water conservation priorities as part of the Florida Forever Conservation Needs Assessment, a set of data and analyses that informs the Florida Forever environmental land acquisition program.
MCA_ID:	3819084647_1
Organization Type:	Not for Profit
Organization Name:	Florida State University
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Watershed boundaries created by state Dept. of Environmental Protection.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$1,500
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$4,000
Future Benefits Description:	An improved dataset more closely tailored to our needs would likely speed modeling efforts, allowing for more frequent updates. We also might be able to upgrade the modeling method to a more hydrologically sophisticated approach.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

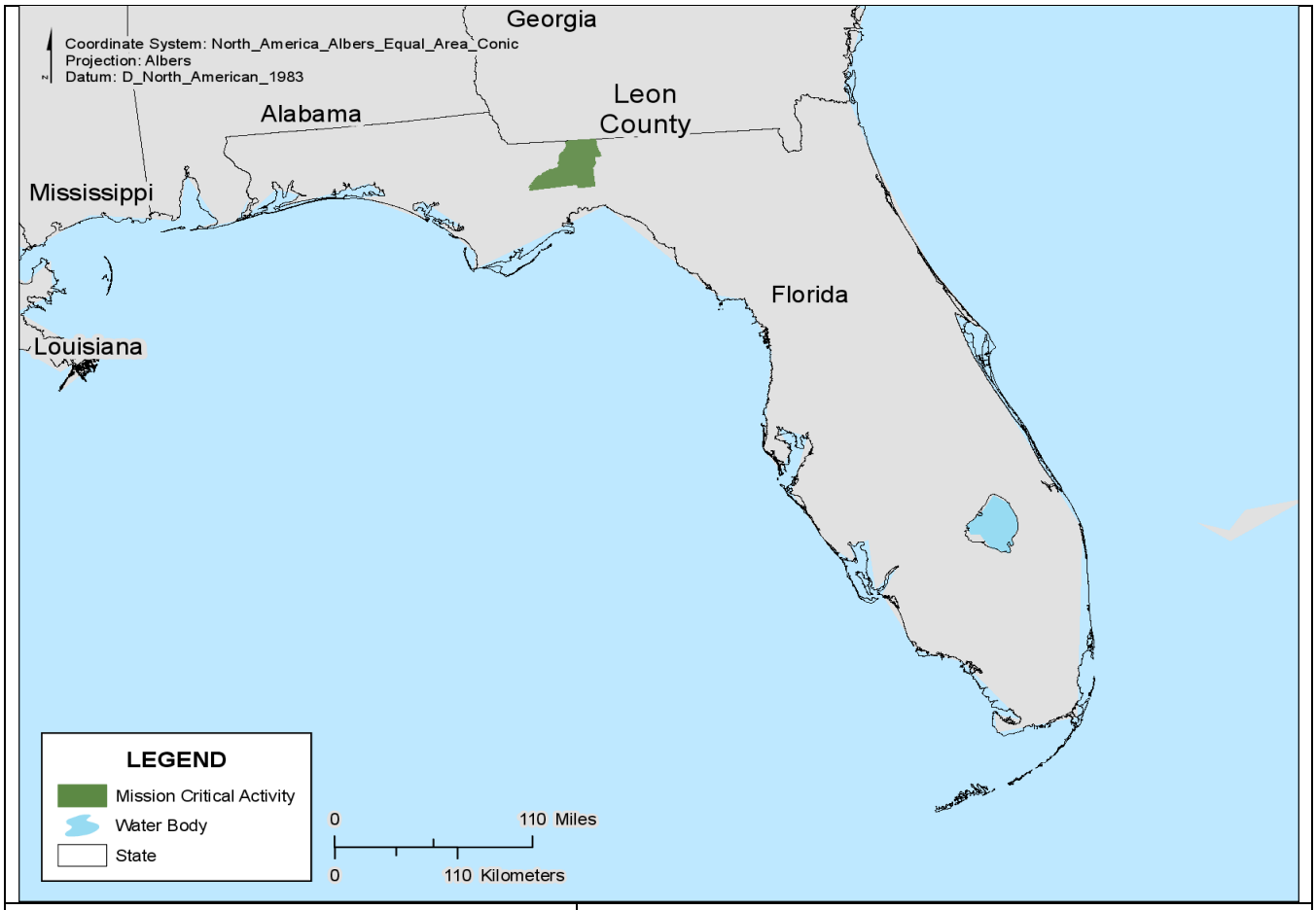
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality Assessment



Mission Critical Activity Title:	Water Quality Assessment
Mission Critical Activity Description:	Water Quality Assessment supporting Total Maximum Daily Load and National Pollutant Discharge Elimination System programs.
MCA_ID:	3829233299_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Tallahassee-Leon County GIS
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Local revision of the NHD.

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	No answer provided
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

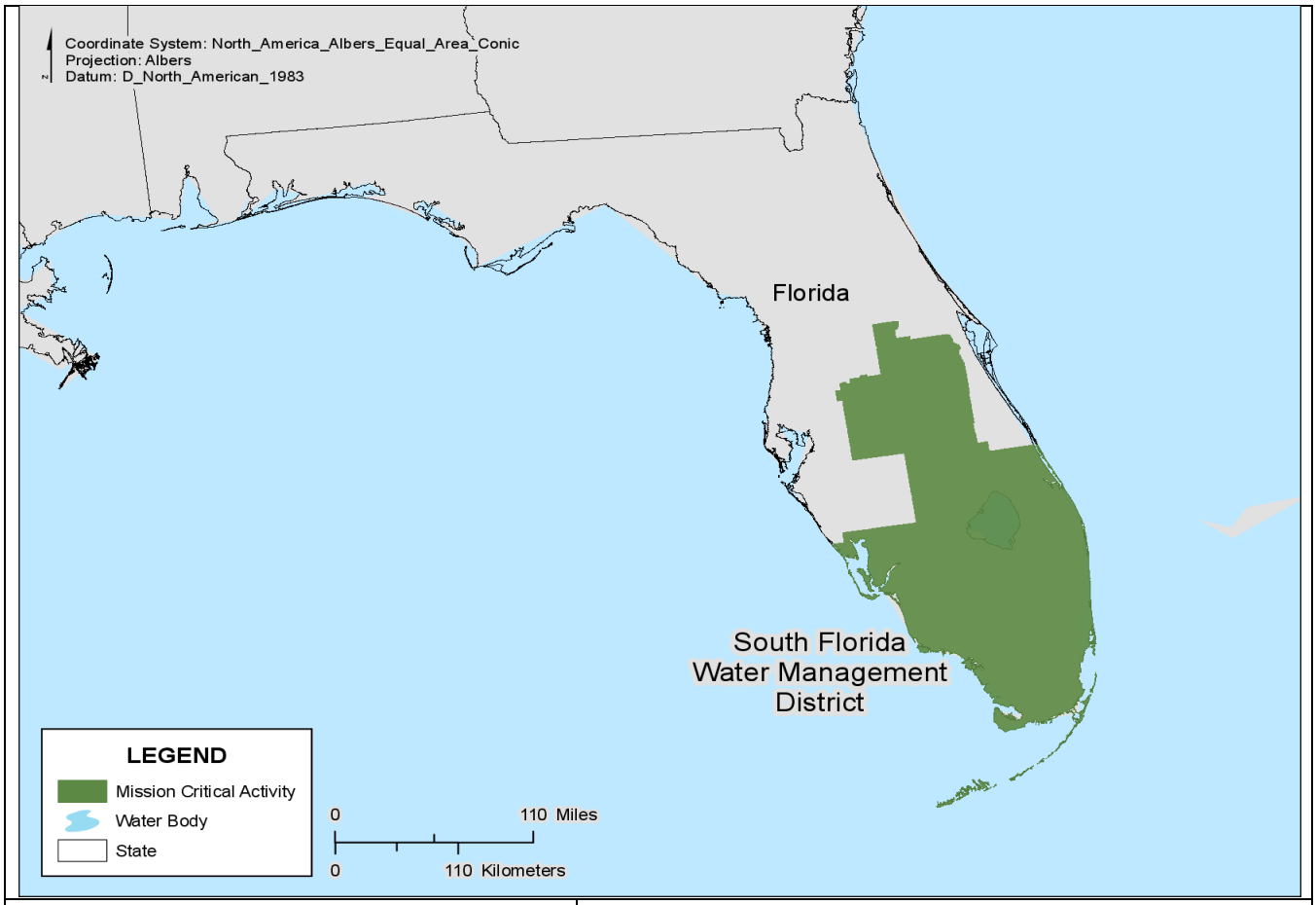
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Time savings in reporting, improved linkage to STORET, Federal funds to the community for compliance credits.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Natural waterbodies, constructed ponds.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Manage and Protect Water Resources



Mission Critical Activity Title:	Manage and Protect Water Resources
Mission Critical Activity Description:	Our mission is to manage and protect water resources of the region by improving water quality, flood control, water supply, and natural systems.
MCA_ID:	3810193437_1
Organization Type:	State Government
Organization Name:	South Florida Water Management District
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We use our Arc Hydro Enhanced Database that was initially populated with the 1:24,000-scale NHD data. Include addition of primary and secondary hydrographic features that have been quality controlled and improved in our database.

Current Benefits	
Total Annual Program Budget:	No answer provided.
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	No answer provided.
Future Benefits Description:	Improvements won't have a direct effect on our business.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

Future Benefits	
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

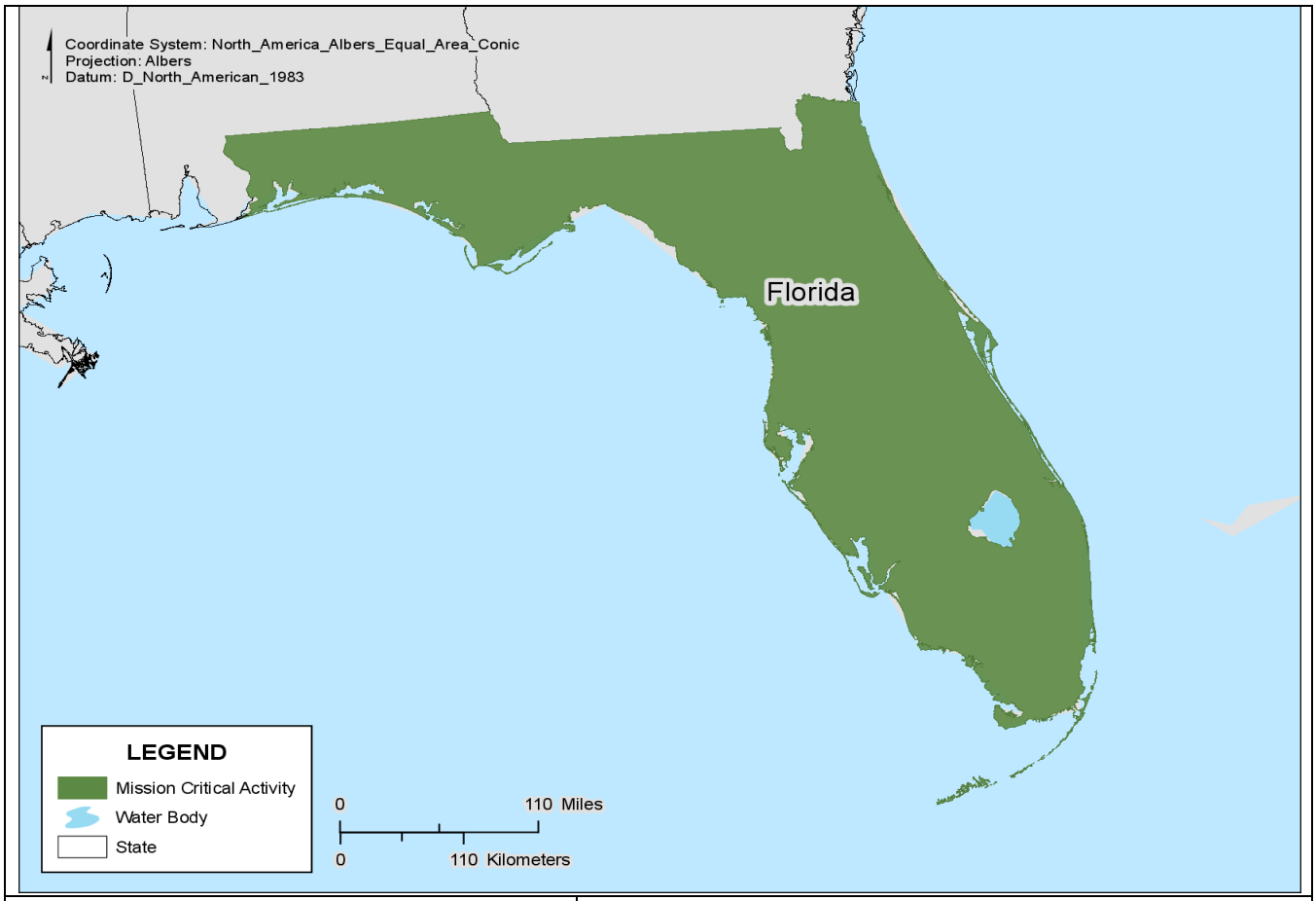
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Visual Inspection
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Required	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Wildlife and Habitat Conservation



Mission Critical Activity Title:	Wildlife and Habitat Conservation
Mission Critical Activity Description:	Fish and Wildlife Conservation
MCA_ID:	3826372697_1
Organization Type:	State Government
Organization Name:	Florida Fish and Wildlife Conservation Commission
Business Use:	Wildlife and Habitat Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Florida Major Rivers (Florida Resources and Environmental Analysis Center, 1989); Florida Impaired Waters (FDEP, 2013); Florida Lakes (Florida Fish and Wildlife Conservation Commission, 2012); Florida River Centerlines (various).

Current Benefits	
Total Annual Program Budget:	$4 million
Current Annual Benefits ($):	No answer provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Specific budgetary benefits unknown.
Future Benefits Description:	We need high resolution bathymetry for modeling stream flow, storm surge, climate change, animal activity, habitat resilience, etc. to assist in hydrography systems analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major

Future Benefits	
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Georgia

The State of Georgia benefits from the use of national hydrography data in a variety of ways, from simple cartographic uses to more complex activities such as creating mapping applications, managing data, and performing geospatial analysis. Seven organizations participated in the online survey and/or workshop. These study respondents were from government agencies at multiple levels and private industry: city, county, regional, and state. Respondents to the survey were chosen to represent current public sector users of hydrography data, with needs and applications that span a wide diversity of technical sophistication and deployment in business applications and processes. The results of the survey indicate current and future uses for hydrographic data, provide opportunities for greater speed and efficiency of information delivery, reduction of costs, and the ability to make sound decisions on the best available information and data.

The initial HRBS survey results for Georgia noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Flood Risk Management
- Flood Risk Mapping
- Watershed Protection/Management
- Watershed Analysis
- Hydrographic Flow Analysis, and Modeling
- Regional Water Planning
- Water Planning/Quality

Subsequent Georgia meetings with key hydrography stakeholders have identified additional critical activities with many similar requirements for improved hydrography framework data. These include the following:

- Fisheries Management
- Forest Management
- Conservation Planning
- Land Use Change and Vulnerability Risk Assessment
- Water Withdrawal Assessment and Groundwater Protection
- Recreation
- Cross Agency Integration Based on Common Data

The State's future benefits include more accurate and enhanced NHD data; cost savings to the government; increased information sharing opportunities; better quality and improved data access; and market competitiveness. As the quality, usages, and requirements of the NHD evolve, there will be an increasing demand for database updates and accuracy. Access to more accurate spatial data for rivers, streams, drains, lakes, ponds, wetlands, watershed boundaries, and related features that are maintained at the local or county level and supported as authoritative data among state and federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓			✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

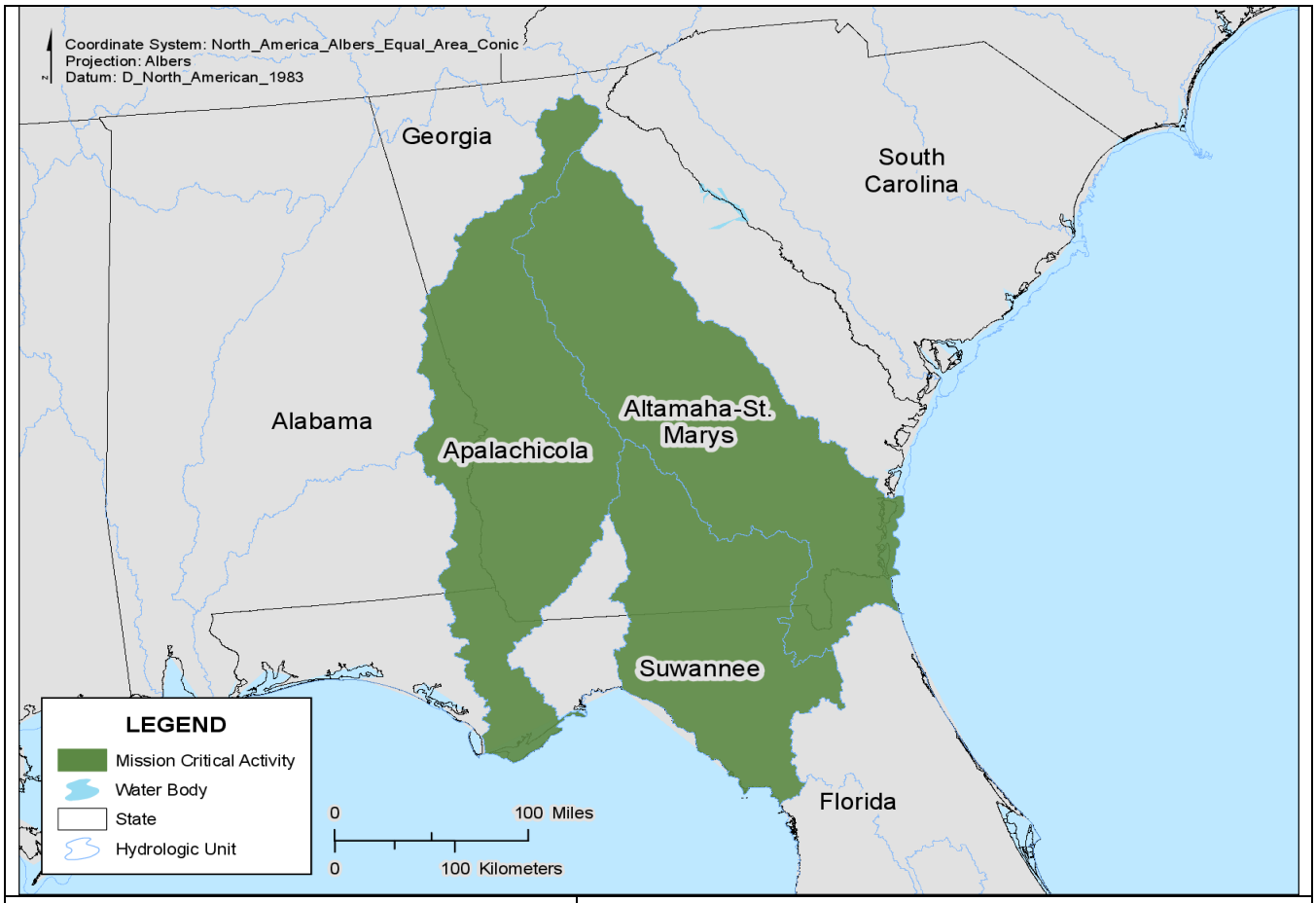
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Georgia managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	To provide a flood Risk MAP that will result in a community initiating mitigation actions for sustainable reduction of loss of life and property.
MCA_ID:	3795934967_1
Organization Type:	State Government
Organization Name:	Georgia Department of Natural Resources
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.4 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Over $50 million.
Future Benefits Description:	Improved detailed information provided to communities with high need yet low amount of funds available.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major

Future Benefits	
Future Other Benefits:	

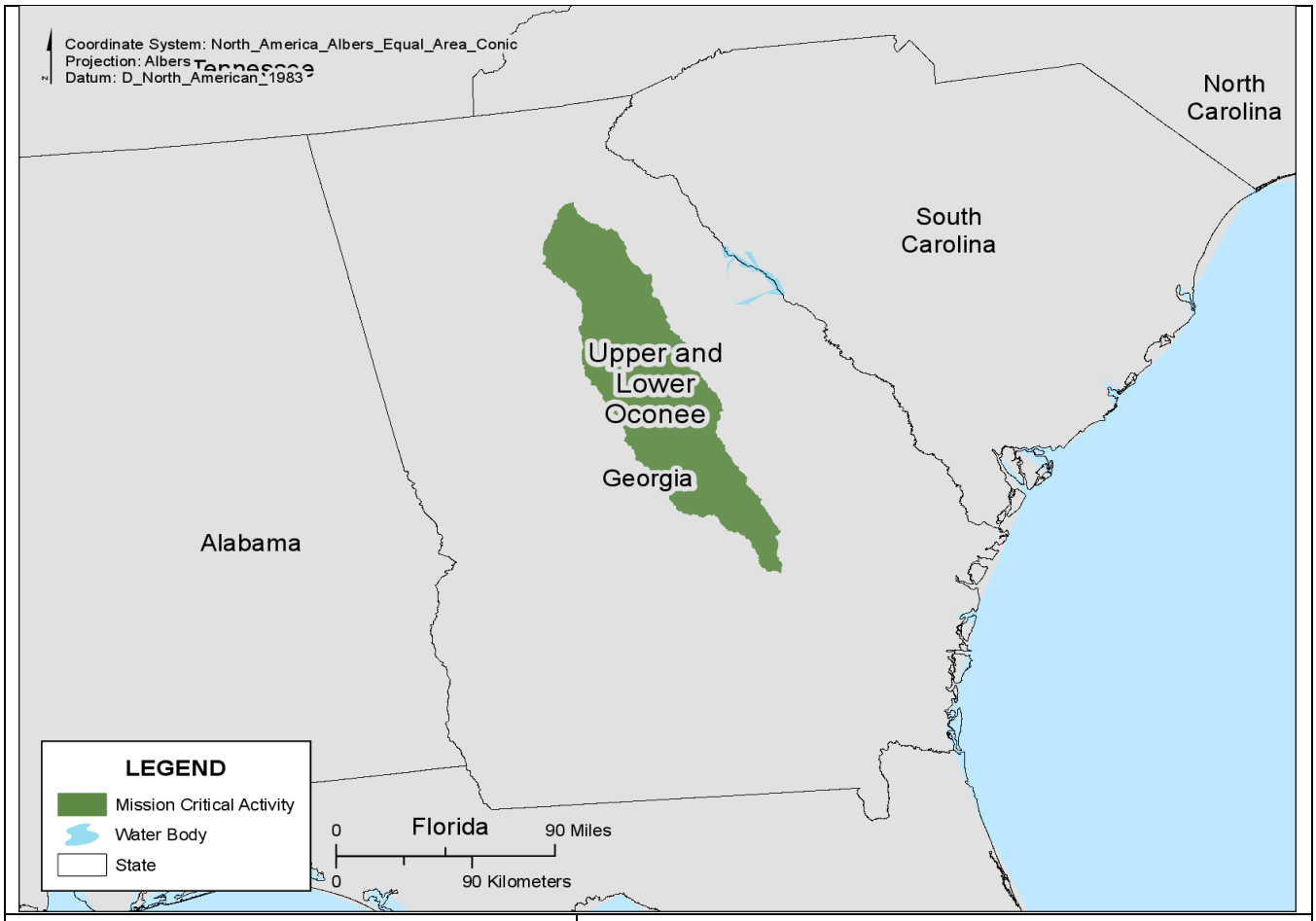
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3803695767_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Baldwin County Board of Commissioners
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-collected lidar.

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	We have a good understanding of the local hydrography. We require a better understanding of the extra-jurisdictional environment as we relate to it and it relates to us with the same level of detail that we have obtained.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Required	Visual Inspection
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Protection

Mission Critical Activity Title:	Watershed Protection
Mission Critical Activity Description:	Watershed protection.
MCA_ID:	3803695767_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Baldwin County Board of Commissioners
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

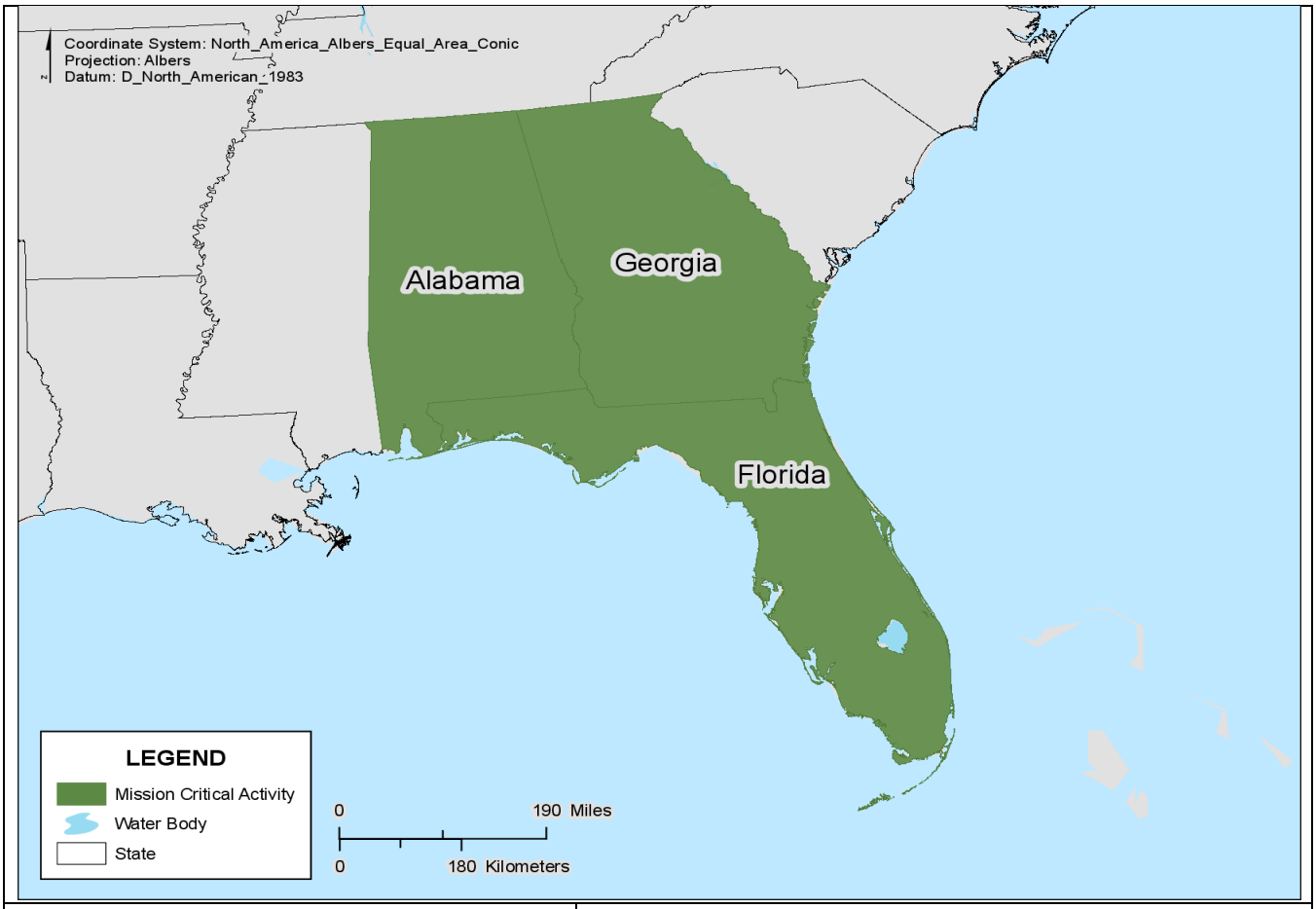
Future Benefits	
Future Annual Benefits ($):	$40,000
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Not Required	Visual Inspection
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	In addition to Water Quality, the GAEPD Watershed Protection Branch uses data for BU1, BU2, BU3, and BU15.
MCA_ID:	3829068212_2
Organization Type:	State Government
Organization Name:	Georgia Environmental Protection Division
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	I don't know.
Current Annual Benefits ($):	I don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	I don't know.
Future Benefits Description:	This mission-critical group is often required to run streamflow models quickly to produce answers for upper management for policy decisions. Better data will improve accuracy of answers.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable

Future Benefits	
Future Other Benefits:	

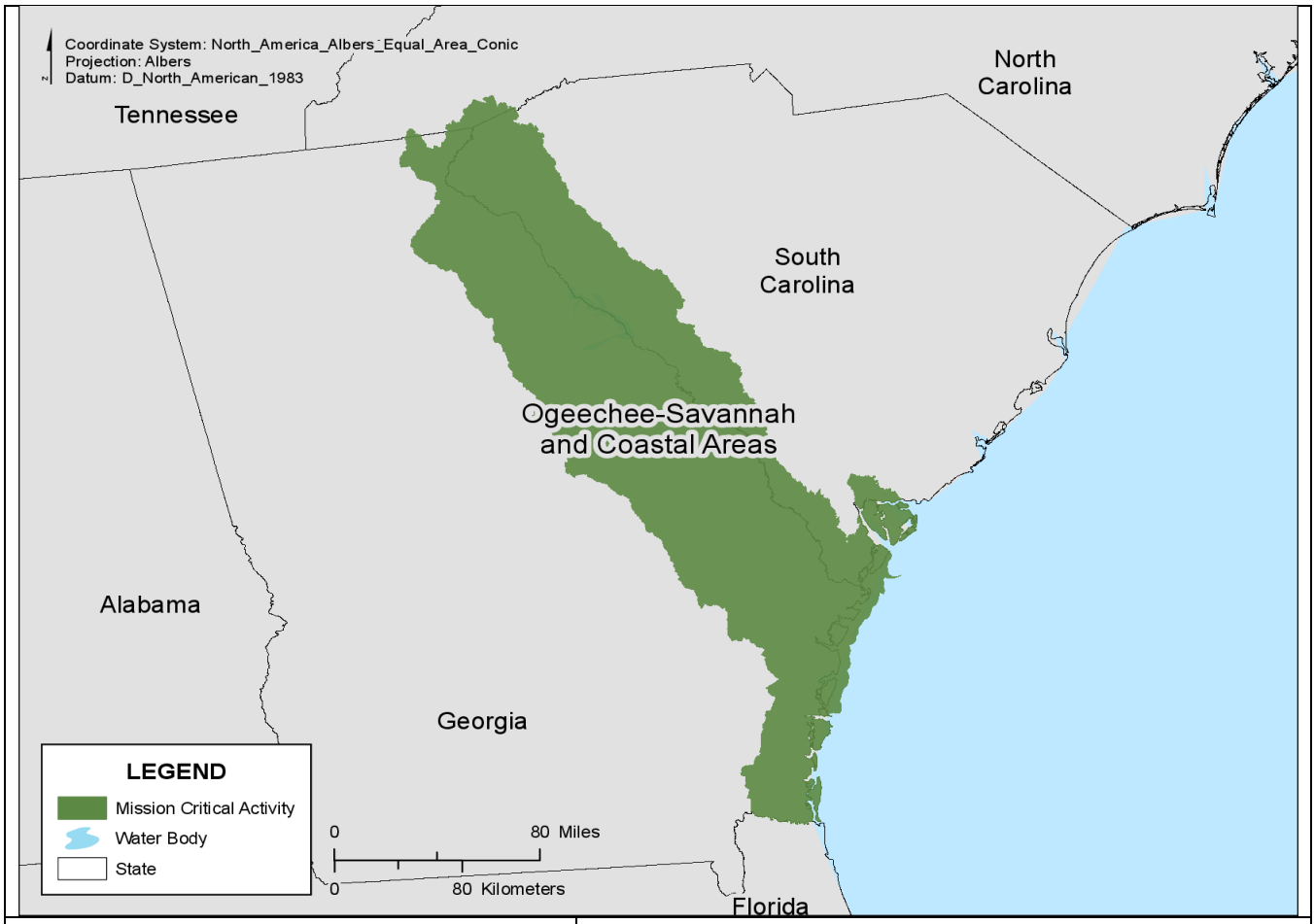
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

GIS Consulting Firm Watershed Analysis



Mission Critical Activity Title:	GIS Consulting Firm Watershed Analysis
Mission Critical Activity Description:	Where Matters is a GIS consulting firm assisting clients with watershed analysis, including mapping, water quality monitoring, discharge points, soils, wetlands, and land use mapping.
MCA_ID:	3789614737_1
Organization Type:	Private or Commercial
Organization Name:	Where Matters, LLC
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

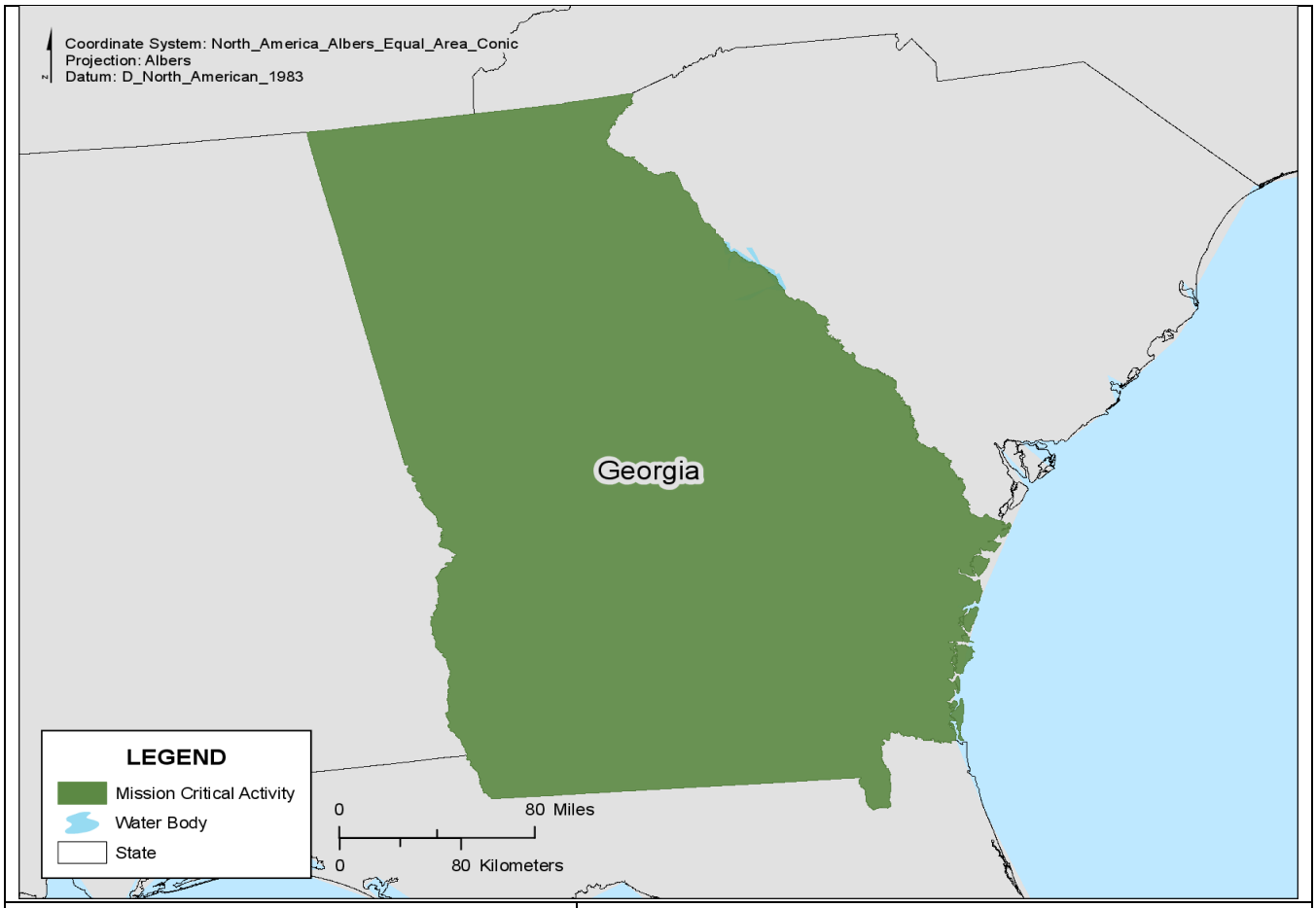
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Not Sure.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice to Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Visual Inspection
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice to Have	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	In addition to Water Quality, the Branch uses data for BU1, BU2, BU3, and BU15. The NHD is used for modeling TMDLs and other load reduction models associated with waste water loads for permitting.
MCA_ID:	3829068212_1
Organization Type:	State Government
Organization Name:	Georgia Environmental Protection Division
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	I don't know.
Current Annual Benefits ($):	I don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	I don't know.
Future Benefits Description:	The NHD is really the only hydrography we have. Improvements are always needed; however, other outside issues play a role in benefits from use (computers with hardware that can process large datasets, dataset storage, training of staff, etc.).
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know

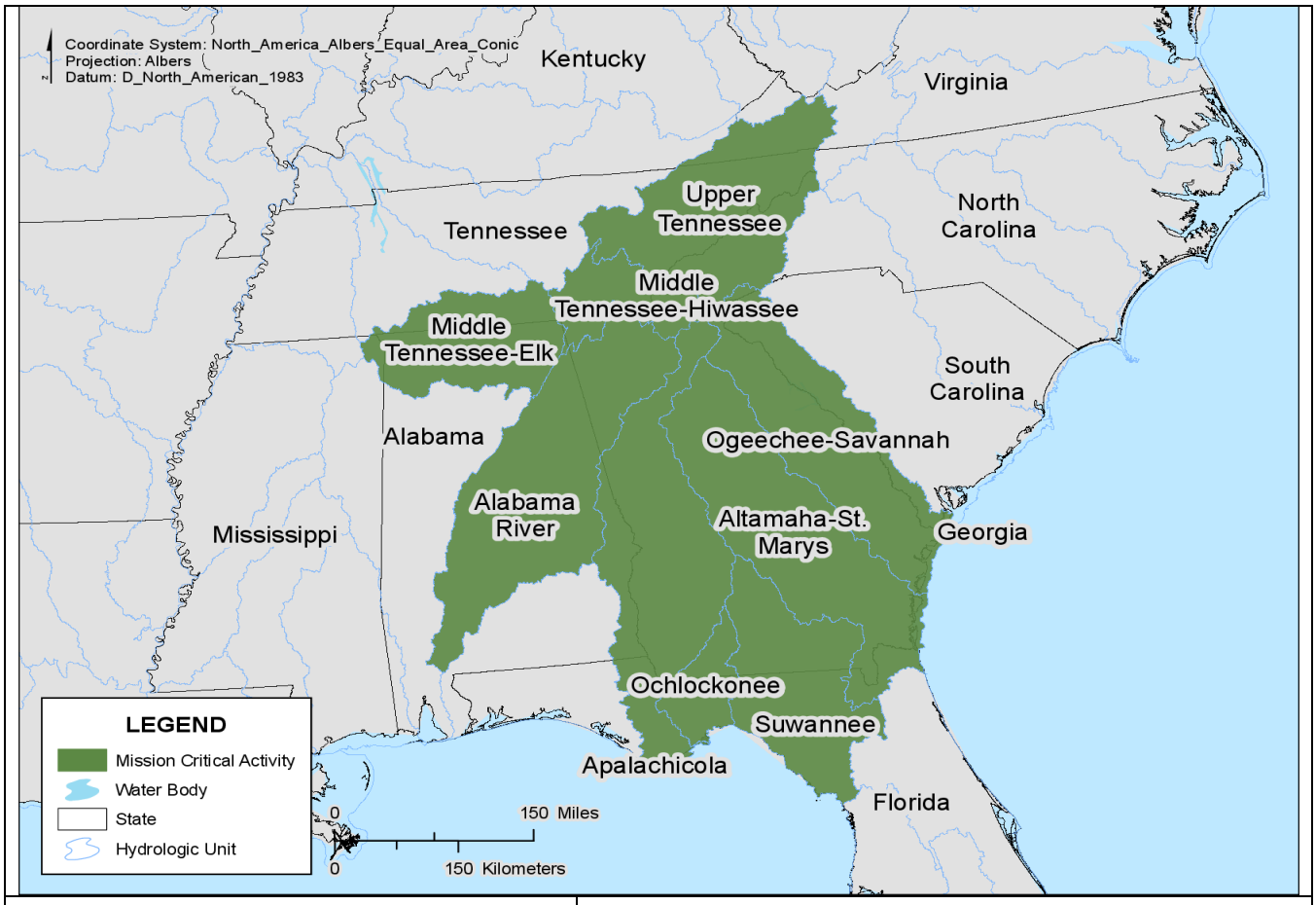
Future Benefits	
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Regional Water Planning



Mission Critical Activity Title:	Regional Water Planning
Mission Critical Activity Description:	Comprehensive regional water planning.
MCA_ID:	3812857336_1
Organization Type:	State Government
Organization Name:	Georgia Environmental Protection Division
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 170 feet, 90% (1:100,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Hawai‘i

Hawai‘i provided details on three Mission Critical Activities (MCAs) in the state. Two of the MCAs were similar and cover the same Business Use. The Water Resource Management MCA is applied regionally by Maui County and statewide by the Commission on Water Resource Management. Both of these MCAs fall within the Water Resource Planning and Development Business Use. The third MCA is related to water protection planning by Hawai‘i Rural Water Association and is in the Water Quality Business Use.

The Commission on Water Resource Management is the state steward for Hawai‘i. A major need in Hawai‘i is the ability to tie local hydrography feature names to the NHD. The state has used an older hydro dataset, originating with the Division of Aquatic Resources (DAR), which has had local names added to it. The Commission developed a crosswalk table to link the names in DAR to the NHD. The crosswalk table is then permanently related to a copy of the NHD resulting in NHD data with local information. The crosswalk and table relation are redone periodically as the NHD changes. Diversions, irrigation canals (needing names and flow direction), and the over/under relationships of flowline features are of particular importance. The use of the Hydrography Event Management (HEM) tool is a future consideration for relating state diversion attributes to the NHD.

Maui County covers several islands and is responsible for maintaining a master water plan. Hydrography data updates for the plan come from the Commission on Water Resource Management and USGS. The County has used USGS data for periodic planning but does not use the NHD frequently. Regular updates to NHD features would provide more utility in general and the addition of shallow water aquifer extents would be particularly valuable.

The Hawai‘i Rural Water Association provides training and technical assistance to small and rural community and wastewater systems. Larger scale mapping needs are related to the smaller areas of interest. Related geospatial data are very important, particularly elevation along with land cover and aquifers. There is also a need to generate hydrography from high-resolution elevation for applications with high accuracy requirements.

State hydrography data considerations include adding aquifer boundaries and need to include local water feature names in the NHD. One concern for Hawai‘i hydrography updates is the heavy vegetation, which makes it difficult to detect and update hydrography features without detailed elevation data.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓					✓		✓	✓			

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
	✓	✓				✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful

Quality Issue	Impact
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

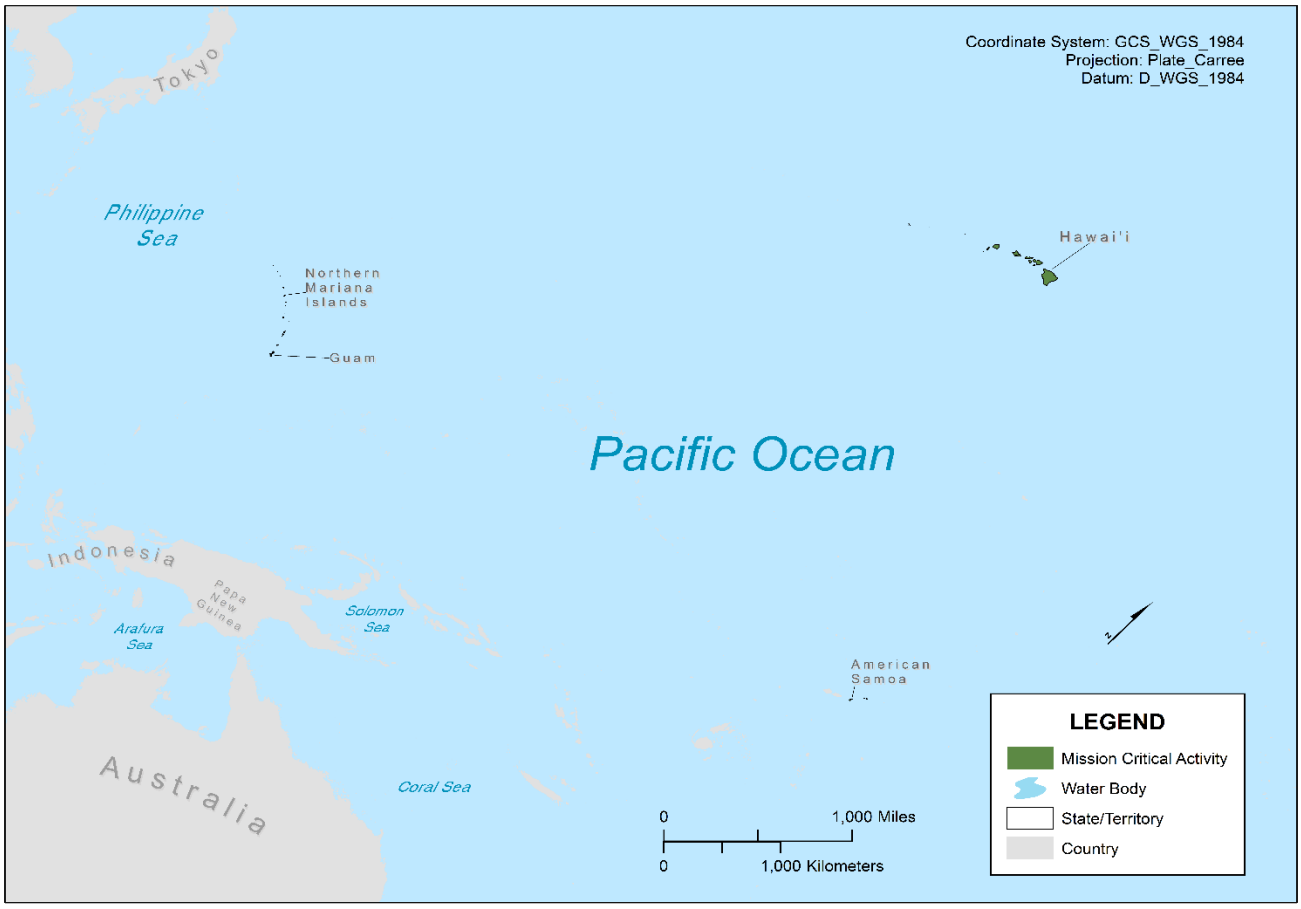
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 10% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Maybe

Mission Critical Activities

Hawai'i managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Protection Planning



Mission Critical Activity Title:	Water Protection Planning
Mission Critical Activity Description:	Source Water Protection Planning, which includes watershed protection, water well capture zone delineation, water contamination mapping, water quality and quantity assessments, watershed basin/sub-basin delineations, and more.
MCA_ID:	3821302905_1
Organization Type:	Not for Profit
Organization Name:	Hawai‘i Rural Water Association
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major

Future Benefits	
Future Human Lives Saved:	Minor
Future Other Benefits:	

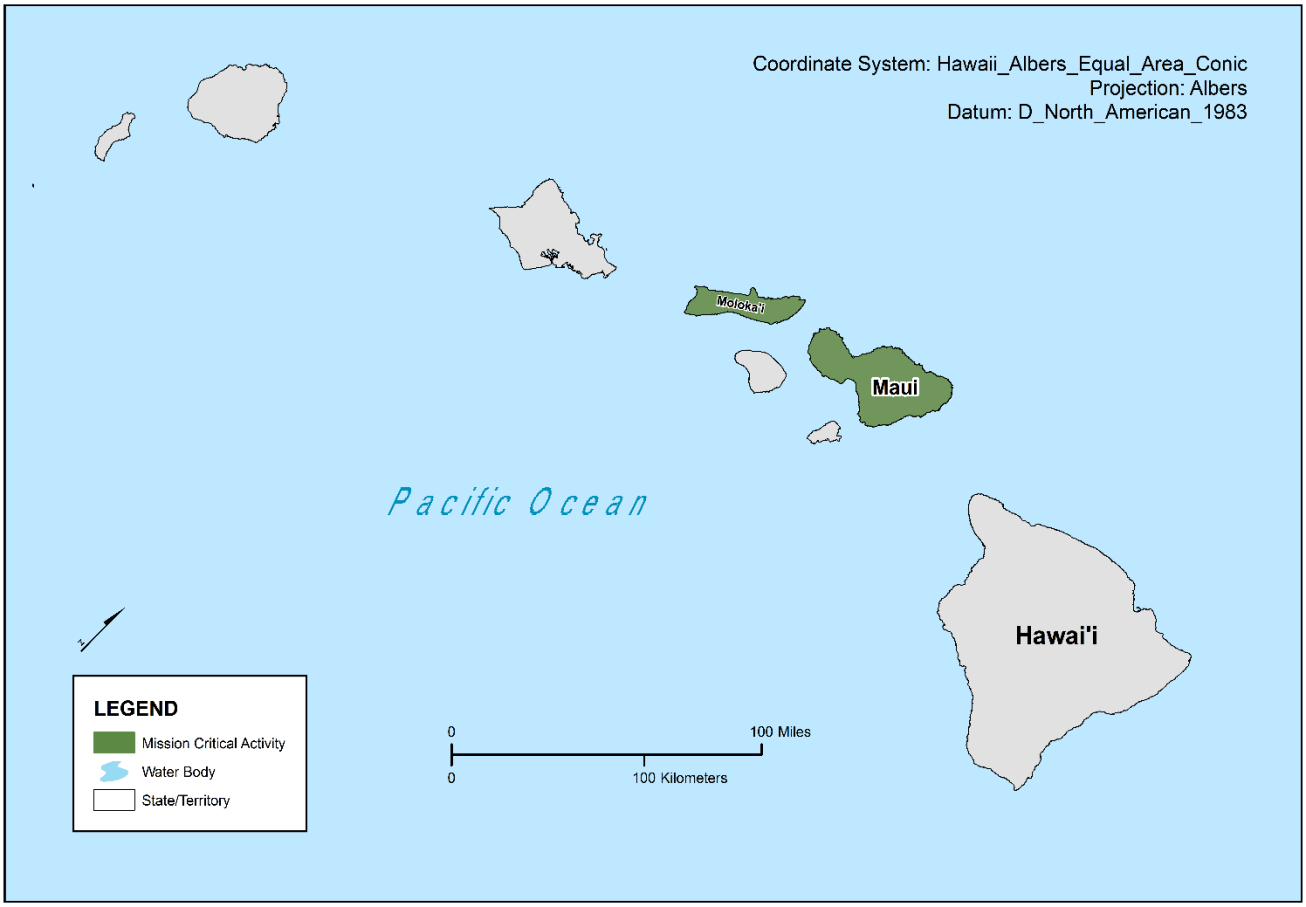
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice to Have	Visual Inspection
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Resource Management



Mission Critical Activity Title:	Water Resource Management
Mission Critical Activity Description:	Water resource management and master planning.
MCA_ID:	3795899418_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Maui County Department of Water Supply
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.5 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Indirect benefit from improved data used by USGS and other researchers that are contracted with our organization and the State Commission on Water Resource Management to provide accurate data for ground and surface water availability and interactions (sustainable yields, stream flow). Improved data on groundwater flow, soil, geology to determine capture zones based on time of travel for drinking water wells is crucial for water quality protection programs.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

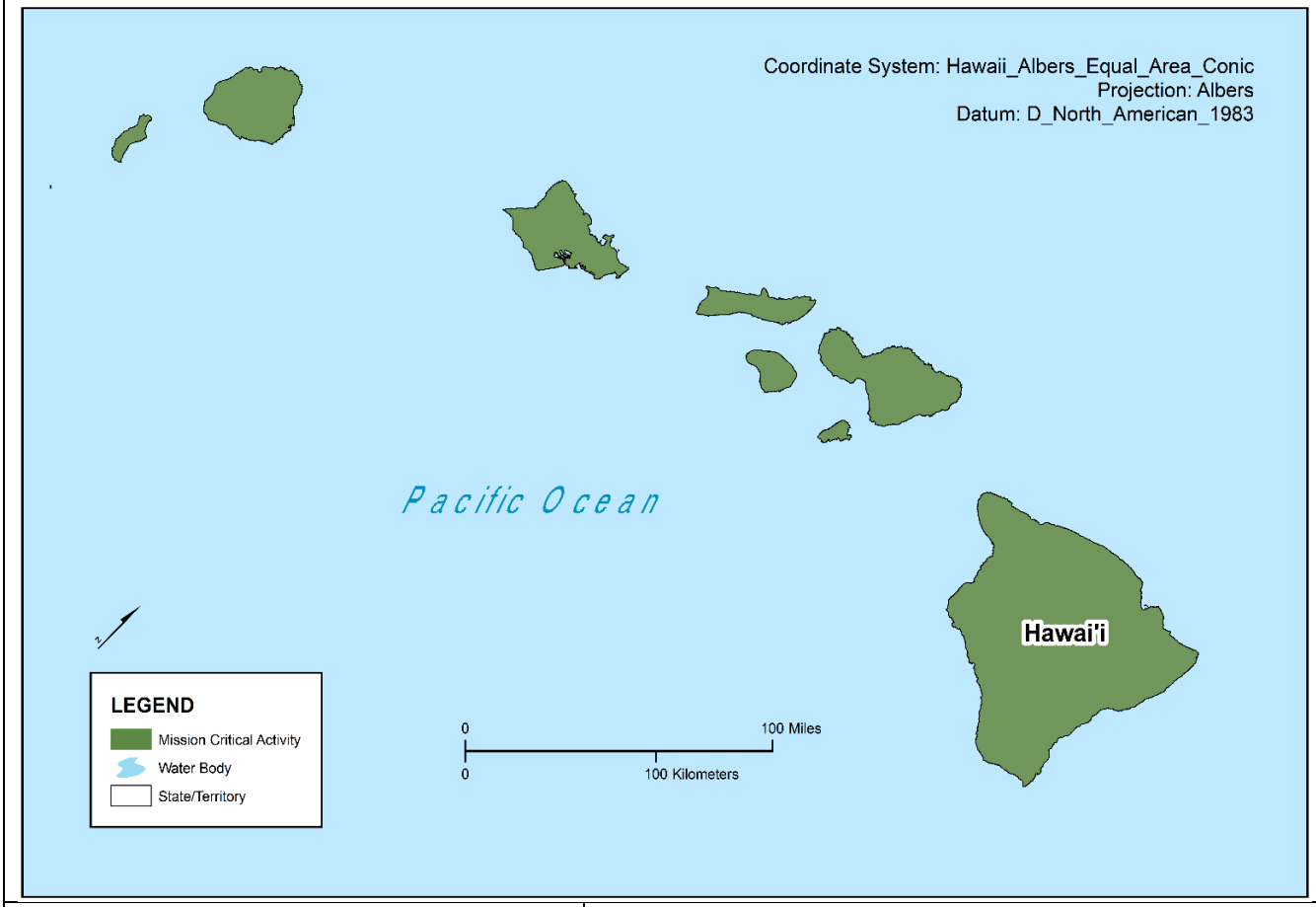
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Aquifer characteristics, rainfall data.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Required	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resource Management



Mission Critical Activity Title:	Water Resource Management
Mission Critical Activity Description:	Water resource management for the State of Hawai‘i.
MCA_ID:	3802579807_1
Organization Type:	State Government
Organization Name:	Commission on Water Resource Management, DLNR, State of Hawai‘i
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	State of Hawai'i, Division of Aquatic Resources 'stream' layer. State of Hawai'i Dept. of Land & Natural Resources 'surface water hydrographic units' layer.

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$1 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Stream Stats for State of Hawai'i. Diversions included in NHD. State hydrologic units compatible with HUC-14. Update stream gages. More stream gages. Update dams. Update wetlands for Maui County and Hawai'i island.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Idaho

In March 2015, the Idaho Geospatial-Executive Council recognized the National Hydrography Dataset (NHD) as the state framework dataset theme (Water Features element) within The Idaho Map (TIM). As a result the NHD became the state standard for the digital representation of surface water features. Hydrography supports the following Mission Critical Activities (MCAs):

- Irrigation (Water District 37)
- Flood Hazards (Idaho Bureau of Homeland Security)
- Hydraulic Modeling (Idaho Power Company)
- Idaho Department of Water Resources (IDWR)

The Idaho Department of Water Resources (IDWR) has worked with state, Federal, and tribal partners to identify and update features in the NHD. Areas that require updating include urban or irrigated areas, where hydrography has been altered due to land use practices. Updating NHD requires tools, training, support, and coordination. NHD updates also require base layers such as accurate aerial photography to correct the geometry of existing features. While we want to improve the NHD, the complexity of the editing process creates additional costs for any agency that they find difficult to take on. Having a common, useful, and accurate hydrography layer is essential in modeling, coordination, data exchange, and visualization.

As use of the NHD becomes more widespread there will be increasing demand for database updates, for example, to add missing streams and align existing streams with current imagery and elevation layers produced from lidar-derived data. There are also issues with feature classification—stream or canal, for example—and stream periodicity—perennial, intermittent, or ephemeral. Some public agencies base regulations on these data which can affect the activities of businesses and the public.

The State of Idaho coordinates with neighboring states, and tribal and Federal agencies located in the region to prioritize and leverage resources to address and coordinate updates. We do this while conforming to best practices and our stewardship agreement. Assistance from USGS in the form of grants and tool development greatly improve our efforts to update the NHD. The ability to add feature names in coordination with the Board of Geographic Names has been difficult in the past; we hope that this will be streamlined in the future. The ability to coordinate with USGS and the NHD community in data model updates, applications, maintenance, tools, and support is important in keeping the database current and useful in Idaho.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓	*	

*HUC-10

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Nice To Have
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Nice To Have
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Nice To Have
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Nice to have
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice to have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Nice To Have
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Nice To Have
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Nice To Have

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Somewhat Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

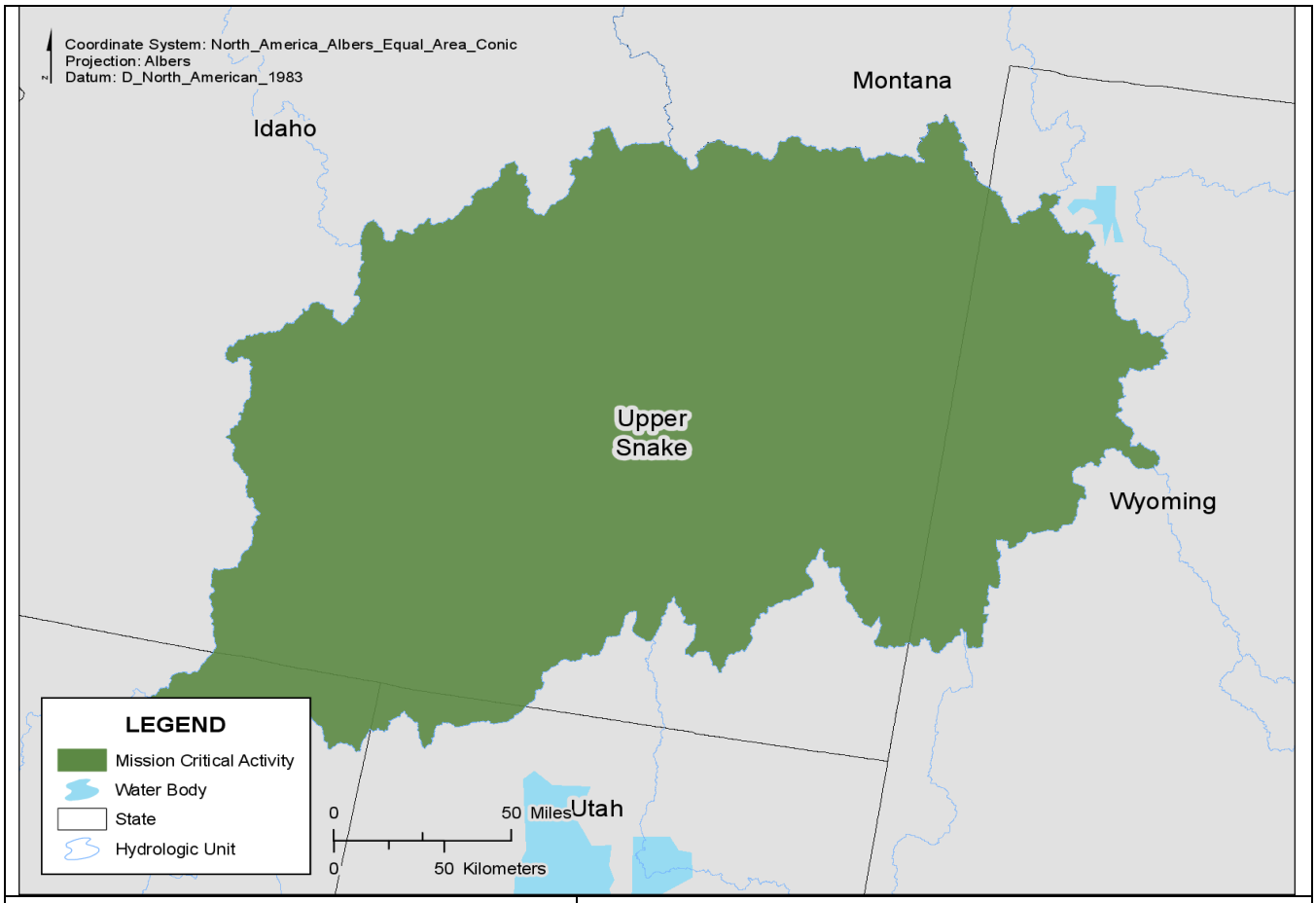
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Idaho managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Irrigation



Mission Critical Activity Title:	Irrigation
Mission Critical Activity Description:	Irrigation supply prediction. The Water District has a need to accurately predict water supply for irrigation purposes. With significant issues in water rights, accurate water supply prediction is important to the State.
MCA_ID:	3772465057_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Water District 37
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	No major benefits from improved hydrographic information. Current level of information is adequate because hydrographic data were recently updated.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

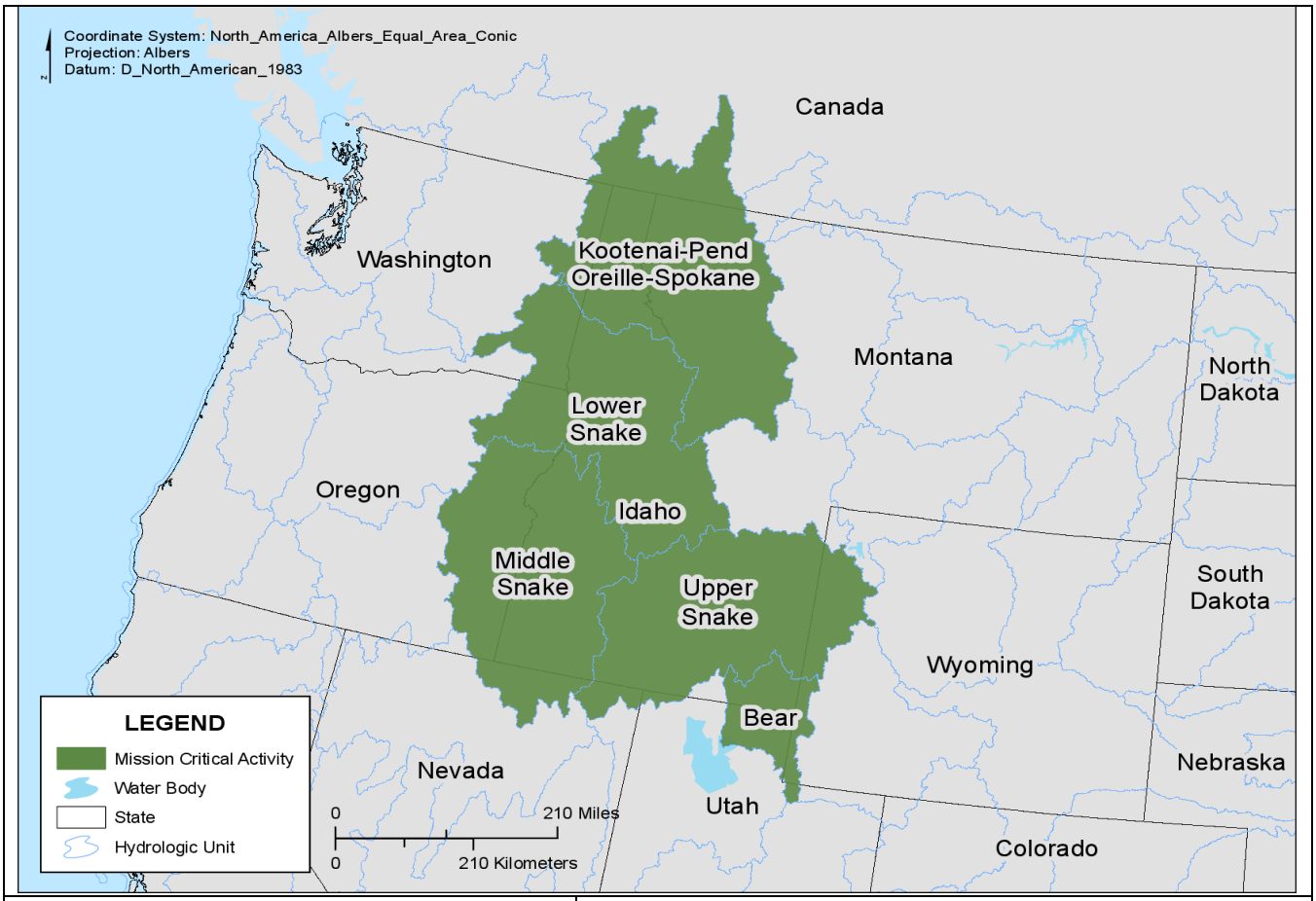
Future Benefits	
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice to Have	Visual Inspection
Stream Flow	Required	Visual Inspection
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Hazards



Mission Critical Activity Title:	Flood Hazards
Mission Critical Activity Description:	Activity - flood hazard mapping, Digital Flood Insurance Rate Map (DFIRM) production, and multi-hazard risk assessment in coordination with Idaho Silver Jackets team (IBHS, IDEQ, ITD, IDWR, NOAA NWS, NRCS, FEMA, USACE, USBR, USGS), other federal, state, local, and academic stakeholder teams. Hazardous materials program, hazard mitigation program, critical infrastructure/key resources, emergency operations center, GIS section, and area field officers. Idaho geography includes Pacific NW and Great Basin Watersheds.
MCA_ID:	3776945190_1
Organization Type:	State Government
Organization Name:	Idaho Bureau of Homeland Security
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Lidar technology and hydrography are coordinated at the state level for multi-agency benefits for these mission-critical technologies. Also necessary: waterbodies, stream gages, StreamStats, (a variety of situational awareness tools), SnoTel monitoring sites, GOESWest weather satellite, local engineering data depicting conveyance structures and imagery, etc.

Current Benefits	
Total Annual Program Budget:	$110,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major

Current Benefits	
Current Other Benefits:	It is difficult to quantify benefits. When working together with our Federal, state, and local governments on prioritizing precious public funds expended on programmatic or operational planning, preparing, response, and recovery activities. This agency places a premium on reciprocity, whereby the outputs from a partner program become the inputs for our program (and vice versa). This leads to higher efficiencies in government, making the actual benefit difficult to monetize, since capitalization occurs across multiple budget lines/categories for multiple agencies. I have conservatively estimated the reported dollar benefits to the state Risk MAP program alone, but if expanded to the entire IBHS agency (or the other Federal, state, or local agency partners) the dollar value would undeniably be compounded significantly.

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	DFIRM production involves a multi-year engineering study. The quality of the maps resulting from these studies is solely dependent on the quality of inputs. Other applications include flood-following-wildfire modeling/forecasting, debris/mud flow modeling, soil types, landslides, and other multi-hazard considerations. Hydrologic and topographic data are major dependencies for all of these project applications. Severe winter storms, tornados, straight-line winds, and drought are meteorological inputs. HazMat streamflow modeling (real time) would be invaluable for understanding pollutant densities, dispersion estimates, impacts to human life, property, the environment, and knowing which community drinking water intakes to shut down, and when.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	Yes
	Water, generally speaking, is associated with and a contributing factor to a variety of natural and human-caused hazards in Idaho, including: alluvial fan, landslide acceptability, drought (flow periodicity), evaluation and balance of flood/drought risk (Dam Rule Curves, flooding vs irrigation supply), precipitation gages (early warning system), etc.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	GOESWest Land Satellite – Perform Geospatial Analysis	GOESWest Land Satellite – Perform Geospatial Analysis

Hydraulic Modeling

Mission Critical Activity Title:	Hydraulic Modeling
Mission Critical Activity Description:	River and reservoir hydraulic modeling. Idaho Power Company is a regulated electrical power utility. Its business involves the purchase, sale, generation, transmission, and distribution of electricity. A significant amount of electricity is generated from hydropower.
MCA_ID:	3774145654_1
Organization Type:	Private or Commercial
Organization Name:	Idaho Power Company
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Our benefit of having better quality data would be not having to survey and/or contract out for those data. Our organization collects lidar and bathymetry that is tied to a sub-centimeter survey control network. Using USGS-related hydrographic data (less accurate) with highly-accurate point cloud data can be problematic when deriving conclusions or assessing impacts to other resources.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Management

Mission Critical Activity Title:	Water Management
Mission Critical Activity Description:	The Idaho Department of Water Resources serves the people of Idaho and protects their welfare by making sure water is conserved and available to sustain Idaho's economy, ecosystem, and the resulting quality of life. IDWR provides a variety of services for the public, such as water rights research, historical record reproduction of water rights, driller's reports, and dam safety inspections.
MCA_ID:	3769964082_1
Organization Type:	State Government
Organization Name:	Idaho Department of Water Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$168,997
Current Annual Benefits ($):	Essential dataset but costs are difficult to calculate.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Essential dataset for our workflow but costs are difficult to calculate.
Future Benefits Description:	Benefits vary depending on the hydrography updates needed. Accurate hydrography is needed to manage water resources and to apply the prior appropriation doctrine in the western United States.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Would like bathymetry for lakes and reservoirs.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice to Have	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Illinois

Illinois relies on hydrography data for many applications, from public safety to mapping. National Water Information System (NWIS) stream gages provide critical data during times of flooding, drought, and emergency response. These data and the NHD are also important for studies to reduce flood impacts. Use of thermal modeling information combined with continuous temperature and flow measurements of rivers in Illinois is extremely important. There are a number of nuclear power plants in Illinois that are monitored for the protection of the State's residents. This study to determine the state hydrographic needs was conducted with representation from city and state government agencies, as well as private industry.

The best resolution of the current NHD only meets a portion of the hydrography data needs for the state. Improving NHD data to meet high-resolution topography would provide a hydrography dataset for local and state needs for integrating with applications based on lidar and USGS 3DEP. A conservative estimate results in a 3 percent predicted Future Annual Benefit with this type of dataset. NHD data at this high resolution would allow direct integration into various hydrography applications in the state to enhance watershed analyses and management, dam safety assessment, water flow monitoring and tracking, flood mitigation and control, hydrologic and hydraulic modeling, and floodplain mapping. Enhancing the NHD to include information regarding: flow diversion points and lines; flow periodicity and velocity; bridge and culvert locations; stream gage locations; cross section geometry; sinkholes, springs, wetlands, sand boils, levees, and levee break locations; and bathymetry will allow further integration and eliminate more of the manual tasks currently required for hydrography applications.

The consensus among study participants is the need for an improved, high-resolution NHD data integrated with NWIS and updated at a frequency of no less than every five years. Having a reliable hydrography dataset that has all the requirements listed in the attached study would enable staff to spend less time collecting and maintaining the data and more time doing analyses, engineering, and solving issues and problems that affect Illinois.

The state is heavily influenced by the Illinois and Mississippi River Watersheds. Providing for the safety of the citizens of the state would be vastly improved by an enhanced hydrography dataset. While these two rivers are major sources for traffic movement for goods needed by the entire nation, they are also unfortunately a major source for the nitrogen loads that are being spilled into the Gulf of Mexico. This is a big environmental issue for Illinois. Modeling point source and nonpoint source pollution of water and environmental cleanup would be greatly enhanced by a hydrography dataset that is capable of handling the requirements needed.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Little or No Impact
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Illinois managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

State Flood Response

Mission Critical Activity Title:	State Flood Response
Mission Critical Activity Description:	Flood surveillance and flood response.
MCA_ID:	3797680516_1
Organization Type:	State Government
Organization Name:	State of Illinois
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	Yes
	Locally collected/derived, DFIRMs, USACE data.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$200,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	The hydrologic data we currently use (gage data from NWIS) is sufficient for our Mission Critical Activity of Flood Surveillance and Flood Response. Real-time flood inundation mapping would be a beneficial improvement that we could use. We are creating our own real-time flood inundation map products as staff time allows.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Sand boils, levee breaks.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream flow	Required	Visual Inspection
Wetlands	Not Required	None
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Mitigation

Mission Critical Activity Title:	Flood Mitigation
Mission Critical Activity Description:	Urban Flood mitigation
MCA_ID:	3797680516_2
Organization Type:	State Government
Organization Name:	State of Illinois
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-collected hydro data, NWI, FEMA DFIRM, USACE data.

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$150,000
Future Benefits Description:	Improved integration of data required to perform flood control studies would eliminate some of the manual tasks that need to be performed.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Springs, sand boils, levees.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Required	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Visual Inspection
Stream Flow	Required	Visual Inspection
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Hydrologic and Hydraulic Modeling

Mission Critical Activity Title:	Hydrologic and Hydraulic Modeling
Mission Critical Activity Description:	Hydrologic and hydraulic modeling.
MCA_ID:	3797720102_1
Organization Type:	Private or Commercial
Organization Name:	Hanson Professional Services Inc.
Business Use:	Flood Risk Management
Area of Interest:	Nationwide

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USACE data.

Current Benefits	
Total Annual Program Budget:	$350,000
Current Annual Benefits ($):	$700,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$350,000
Future Benefits Description:	Increased productivity.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Risk Mapping

Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3823212377_1
Organization Type:	State Government
Organization Name:	Illinois State Water Survey
Business Use:	Flood Risk Management
Area of Interest:	One or more states

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	In-house generated, FEMA NFHL.

Current Benefits	
Total Annual Program Budget:	$1.5 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

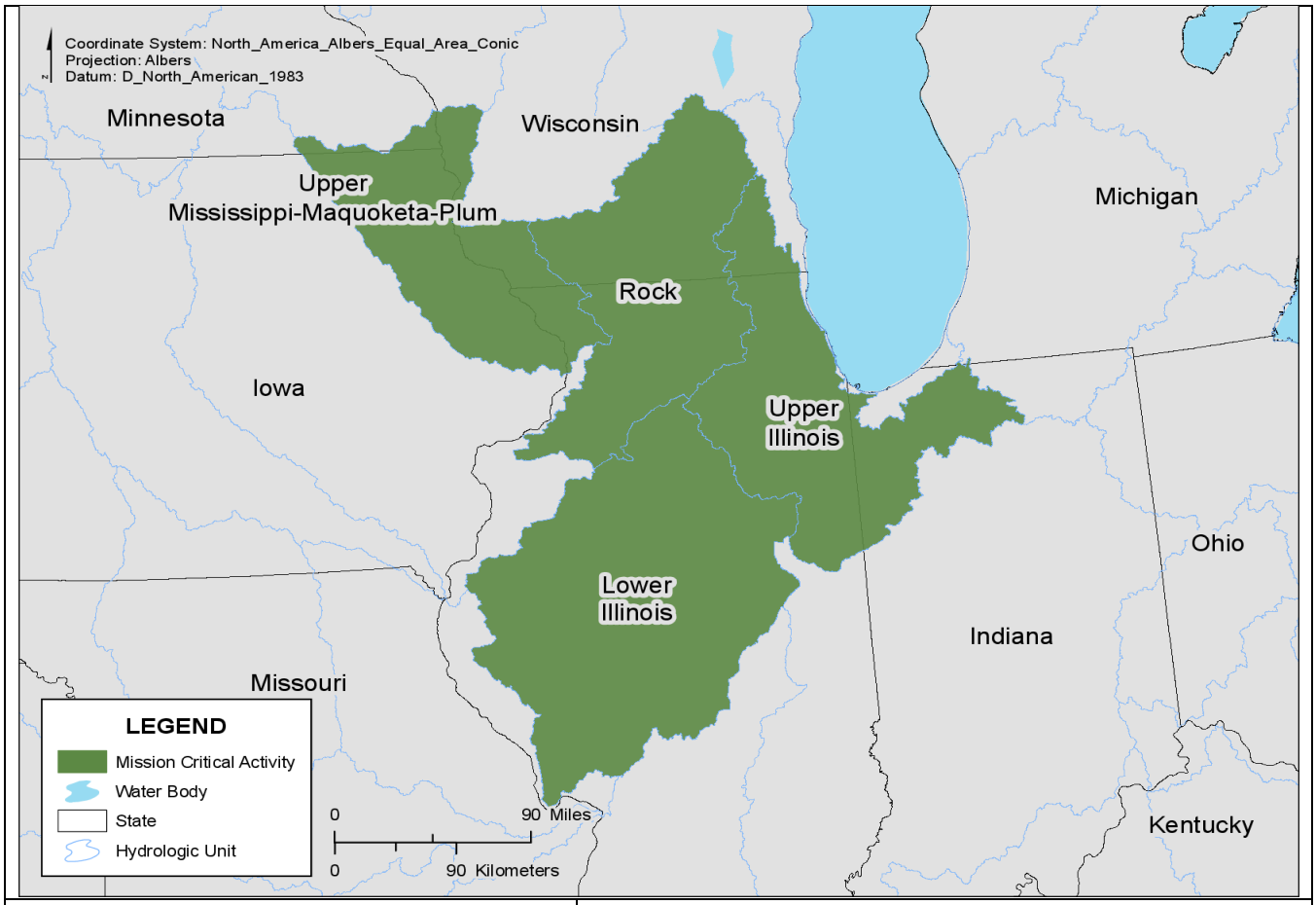
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	No major benefits.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

NPDES Requirements



Mission Critical Activity Title:	NPDES Requirements
Mission Critical Activity Description:	Monitor Mississippi, Kankakee, Des Plaines, Rock, and Illinois River temperatures and flows in Illinois in order to ensure that our power plants can meet their NPDES permit thermal discharge limitations.
MCA_ID:	3776556542_1
Organization Type:	Private or Commercial
Organization Name:	Power Generation
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-created temperature for Kankakee, Des Plaines, Illinois, Rock, and Mississippi Rivers.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$300,000
Future Benefits Description:	Use of thermal modeling information combined with continuous USGS supplied temperature and flow measurements of rivers in Illinois.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Not Applicable

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

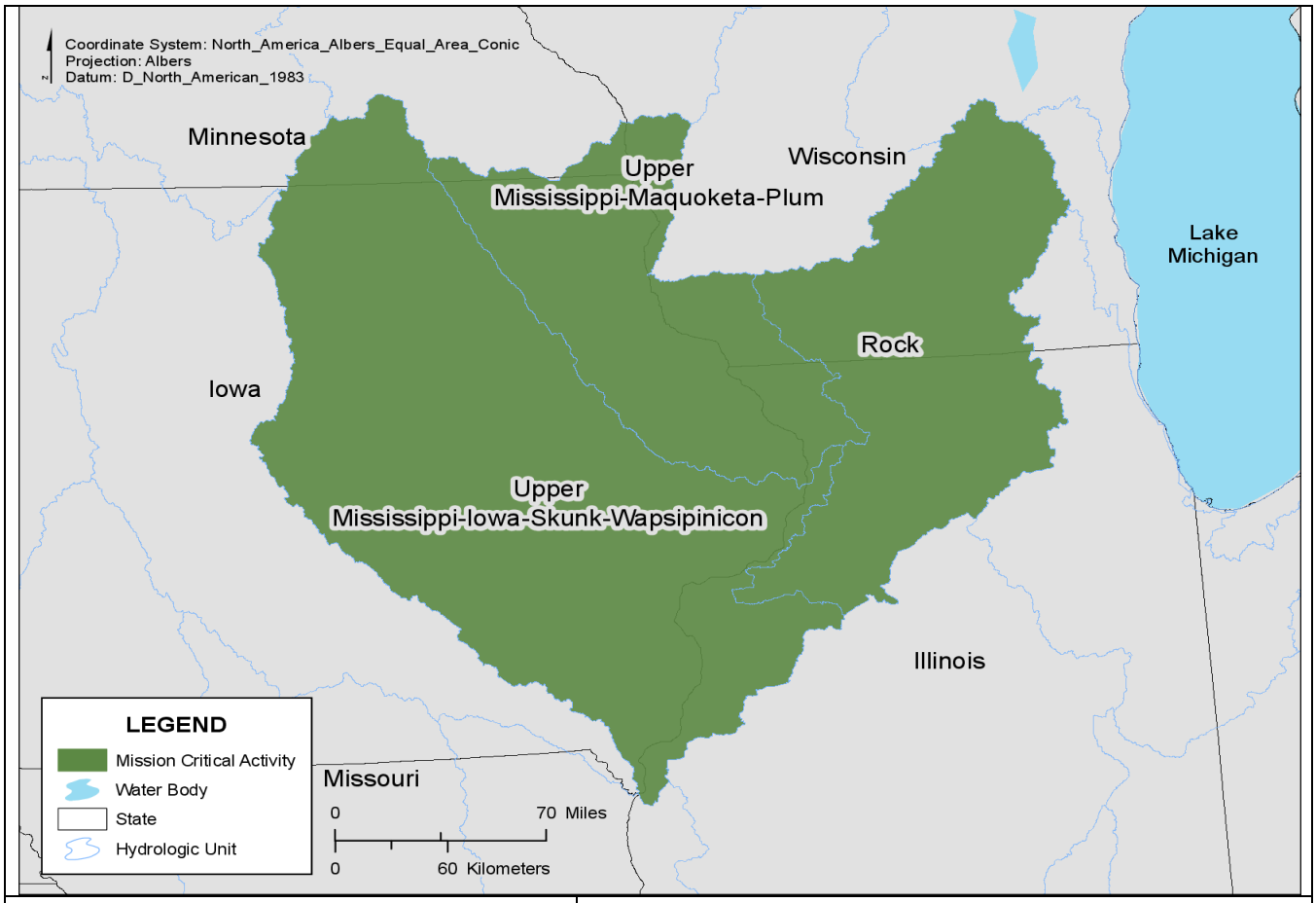
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3801218372_1
Organization Type:	City Government
Organization Name:	City of East Moline, Illinois
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USACE data, FEMA DFIRM, NWI.

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Availability if we need the data.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Springs.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Indiana

The Department of Natural Resources (DNR) and Department of Environmental Management are two Indiana state agencies that identified six Mission Critical Activities (MCAs) that can be grouped into three business uses:

- Flood Risk Management
- Water Quality
- Water Resource Planning and Development

The National Hydrography Data (NHD), Watershed Boundary Data (WBD), StreamStats, NHDPlus, and National Water Information System (NWIS) (stream gages) are very important hydrologic and hydrographic data sources that Indiana state agencies rely upon. These data are used to support the following MCAs:

- Flood Risk Mapping
- Water Quality Monitoring
- Floodplain Management and Regulation
- Surface Water and Watershed Assessment and Management
- Water Resources and Uses
- Water Quality Reporting

All of the above MCAs pose serious hydrologic risks (e.g. flooding is typically an annual threat, but drought also occurs); therefore, it is important for Indiana to have up-to-date hydrography, elevation, and imagery data integrated spatially with additional GIS layers such as: WBD data, land cover, wetlands, and point discharge locations. Indiana is ranked tenth in national total agricultural production and is also in the top five for crop production; consequently, water quality, water usage, and drainage tile locations are important aspects related to this industry. In addition, ditches are important hydrographic features used to drain wetlands and agriculture. Levees and levee-like structures are important features related to flood protection in urban areas; they may increase flood risk in some cases.

Indiana DNR would like to have StreamStats updated with high-resolution NHD data along with the recent higher-resolution elevation data derived from lidar. DNR would also prefer a generalized form of the high-resolution NHD data as an additional hydrography layer.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
	✓	✓		✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Highly Desirable
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Nice To Have
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful

Quality Issue	Impact
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

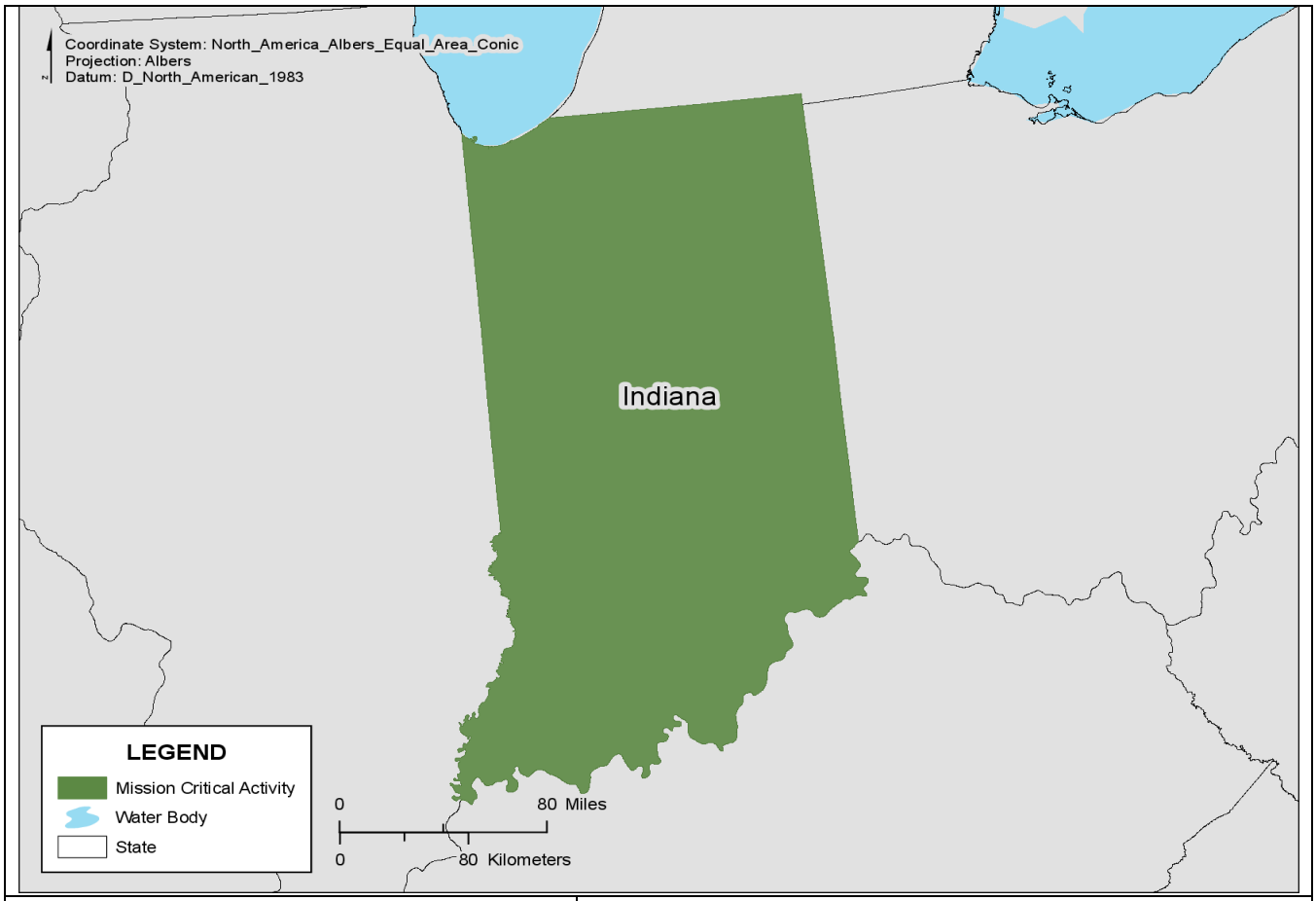
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Indiana managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Creation of data for flood risk mapping.
MCA_ID:	3771649134_1
Organization Type:	State Government
Organization Name:	Indiana DNR - Division of Water
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

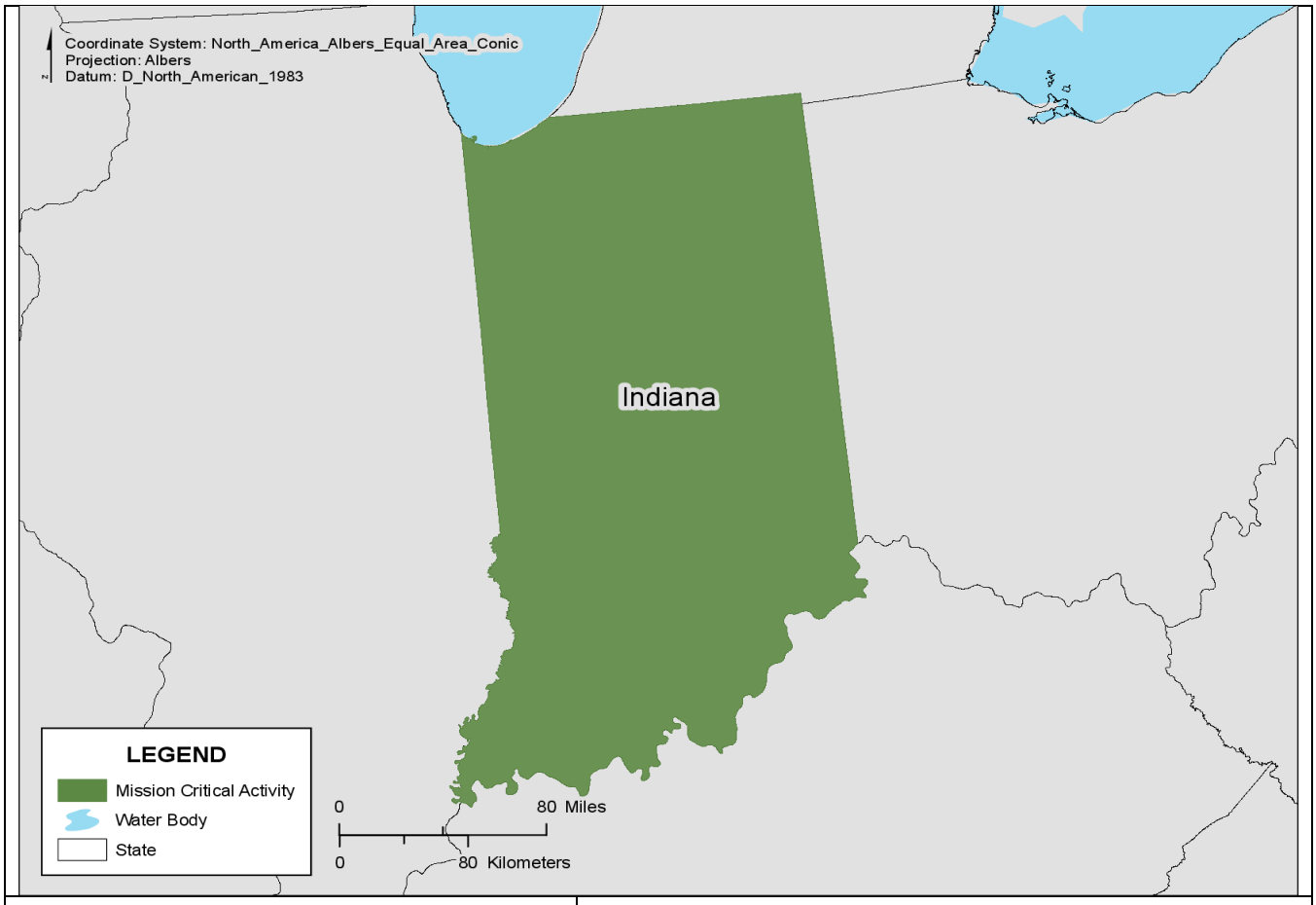
Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	We will be able to create more accurate Flood Hazard Areas, flood inundation mapping, and better risk map products.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Floodplain Management



Mission Critical Activity Title:	Floodplain Management
Mission Critical Activity Description:	Floodplain management and mapping, including regulatory functions by this office and support for regulatory functions by local communities. Also providing floodplain information to the public and other stakeholders, and collaborating with other agencies.
MCA_ID:	3786896853_1
Organization Type:	State Government
Organization Name:	Indiana Department Of Natural Resources
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Other datasets derived from NHD, mainly FEMA CNMS data.

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Higher level hydrography information (currently in development in Indiana) has already provided us with more accurate hydrologic and hydraulic studies, provided a great time savings in developing floodplain information, and will have a significant impact on future agency initiatives.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Major
Future Other Benefits:	

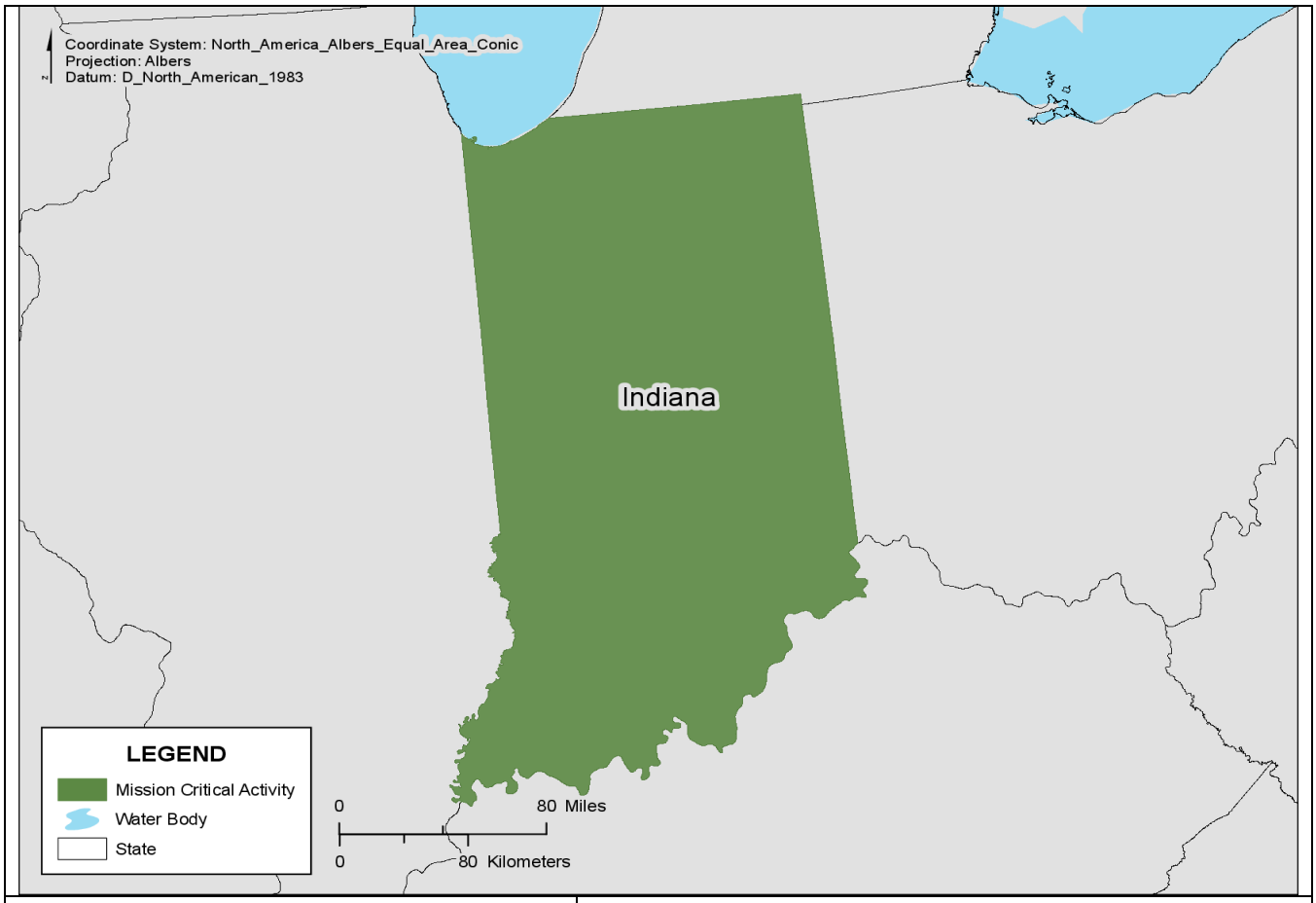
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Surface Water Assessment and Watershed Management



Mission Critical Activity Title:	Surface Water Assessment and Watershed Management
Mission Critical Activity Description:	Surface water assessment and watershed management plan development.
MCA_ID:	3796752373_1
Organization Type:	State Government
Organization Name:	Indiana Department of Environmental Management
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$6.2 million
Current Annual Benefits ($):	Unable to determine.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

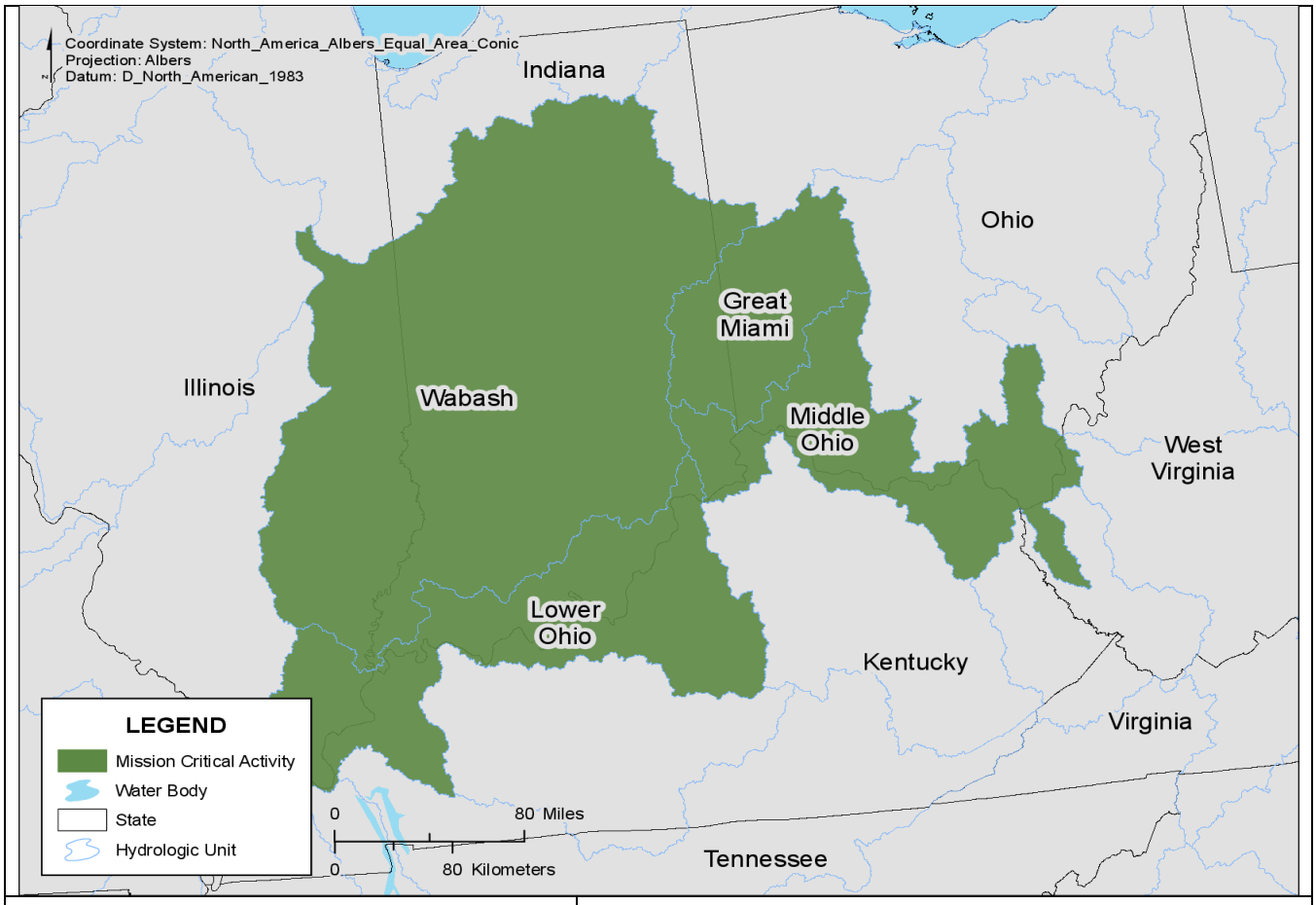
Future Benefits	
Future Annual Benefits ($):	Unable to determine a dollar amount.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Nice To Have	Visual Inspection
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring and Assessment



Mission Critical Activity Title:	Water Quality Monitoring and Assessment
Mission Critical Activity Description:	Provide physical, chemical, and biological data for assessment of aquatic life and recreational use as well as fish consumption. The data are an integral component of the Water Quality Monitoring and Assessment Report, encompassing the 303(d) list of non-supporting waterbodies and the 305(b) assessment report to satisfy reporting requirements to U.S. EPA. The data are also useful for municipal, industrial, agricultural, and recreational decision-making processes, including development of Total Maximum Daily Loads (TMDLs) and watershed planning and restoration activities.
MCA_ID:	3810538624_1
Organization Type:	State Government
Organization Name:	Indiana Department of Environmental Management
Business Use:	Water Quality
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$6 million
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.

Future Benefits	
Future Benefits Description:	Cost savings in regards to staff time bringing together multiple sources of accurate data to create TMDLs and develop watershed plans for implementation and restoration. Reduced labor costs by having stakeholders perform some of their own analyses. With the improved hydrographic information, better mission compliance could take place in terms of 1) planning more efficient monitoring activities; 2) better use of funds or plans to restore watersheds and improve overall water quality; and 3) determining where to sample for areas most likely to show water quality improvements. Stakeholders developing watershed restoration plans and TMDLs would benefit from improved data for facility siting or sources and pathways of potential nonpoint source runoff. Reduced time necessary for staff to execute their mission-critical tasks (causes and sources of impairment, critical areas for restoration, and critical areas for protection). Stakeholders would experience more confidence in their funding being used more appropriately to really make a difference in water quality improvements and protection. Improved education of citizens by seeing how their watershed may be impacted by different farming or urban practices. Restoration and protection of waterbodies for aquatic life and recreational use as well as fish consumption.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	

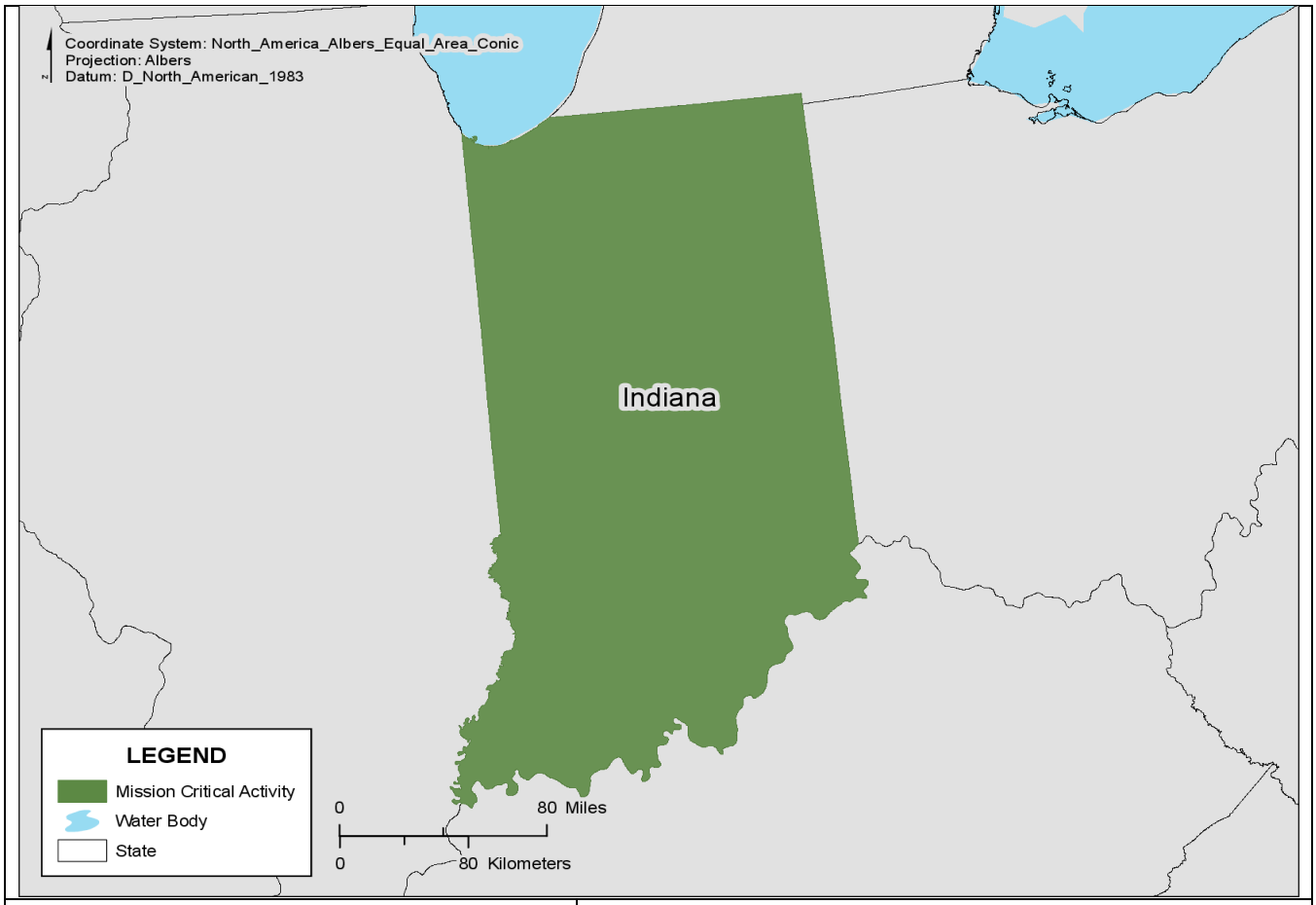
Required Characteristics	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resources and Uses



Mission Critical Activity Title:	Water Resources and Uses
Mission Critical Activity Description:	Water resources and uses.
MCA_ID:	3771649134_2
Organization Type:	State Government
Organization Name:	Indiana DNR - Division of Water
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Soils, land use.

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

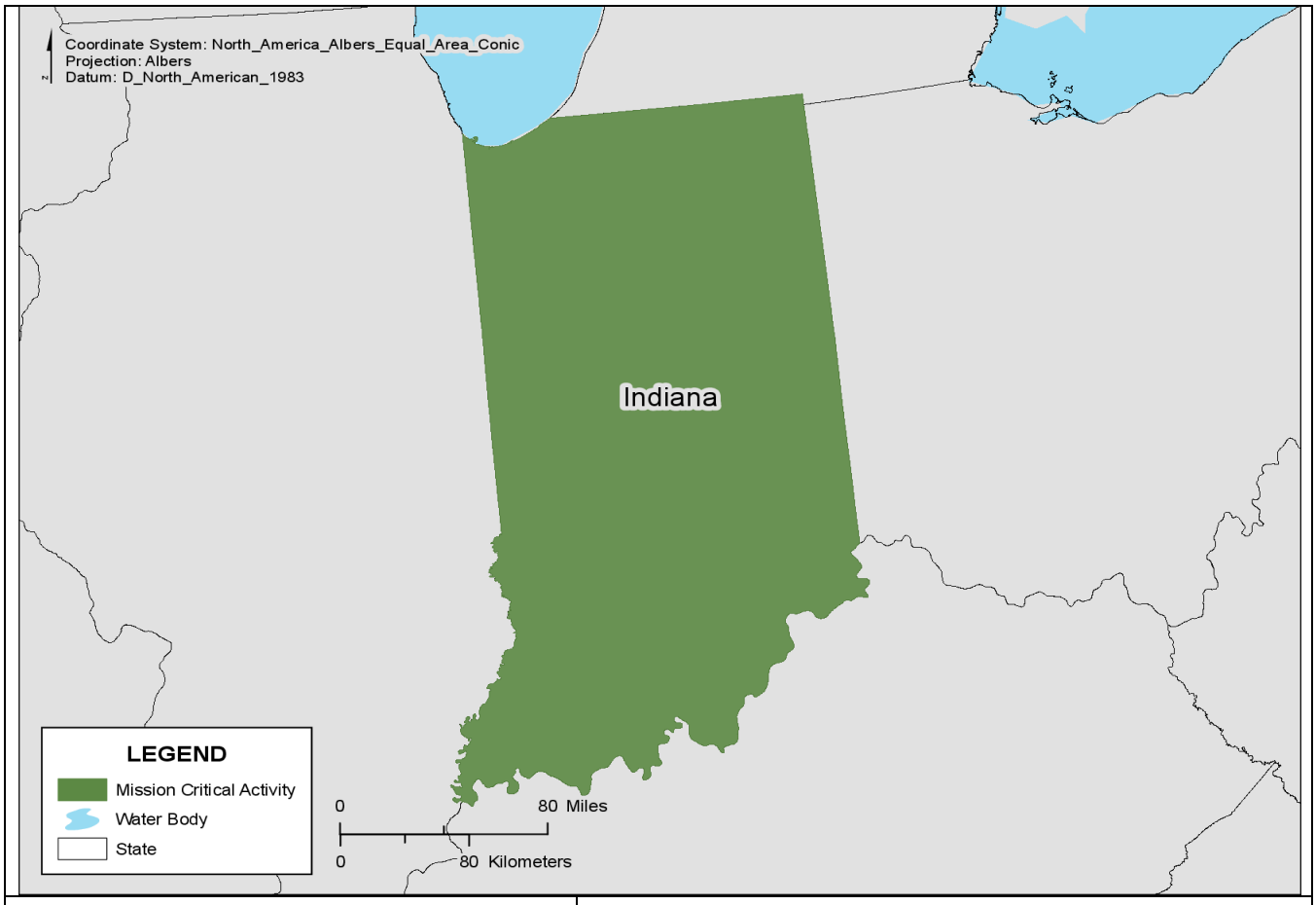
Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Will allow us to map water sources more efficiently.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Required	Associate Selected Data Type
Point Discharges	Nice To Have	None
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring and Assessment



Mission Critical Activity Title:	Water Quality Monitoring and Assessment
Mission Critical Activity Description:	Reporting water quality assessment results pursuant to CWA Sections 305(b) and 303(d). Hydrography data are used to map water quality assessment results for the development of the state's Integrated Report, including the 303(d) list of impaired waters and TMDL development. The 303(d) list is used to guide TMDL development and to prioritize CWA Section 319 grant funding for planning and restoration activities.
MCA_ID:	3802009551_1
Organization Type:	State Government
Organization Name:	Indiana
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USGS Hydrologic Unit Codes.

Current Benefits	
Total Annual Program Budget:	$2.9 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	The information providing value-added benefits pertains to: 1. Our ability to more accurately apply water quality data in assessments; the more accurate our application of data, the fewer "false positives" we get in our impairments, and thus spend less to restore waters that are not truly impaired; 2. Our ability to better understand sources of impairment for more effective and targeted restoration; 3. Ability to better communicate assessment results to the public and EPA.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate

Future Benefits	
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Strahler’s stream order.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	

Required Analytical Functions	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Not Required	None
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Iowa

Many water programs in the state of Iowa have requirements for more complete and current hydrography data that are integrated with other framework layers, including improved alignment with statewide lidar elevation data.

The initial HRBS survey results for Iowa and subsequent discussions with key hydrography stakeholders noted critical requirements for improved and coordinated hydrography data supporting the following Mission Critical Activities:

- River and Stream Flow Management
- Emergency Management and Response
- Water Resources Planning and Management
- Flood Risk Management (Floodplain Mapping and Safety of Dams)
- Geologic Resource Assessment

Access to more accurate spatial hydrography data that are maintained and supported as authoritative data among state and Federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable

Data or Service Access Method	Requirement
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

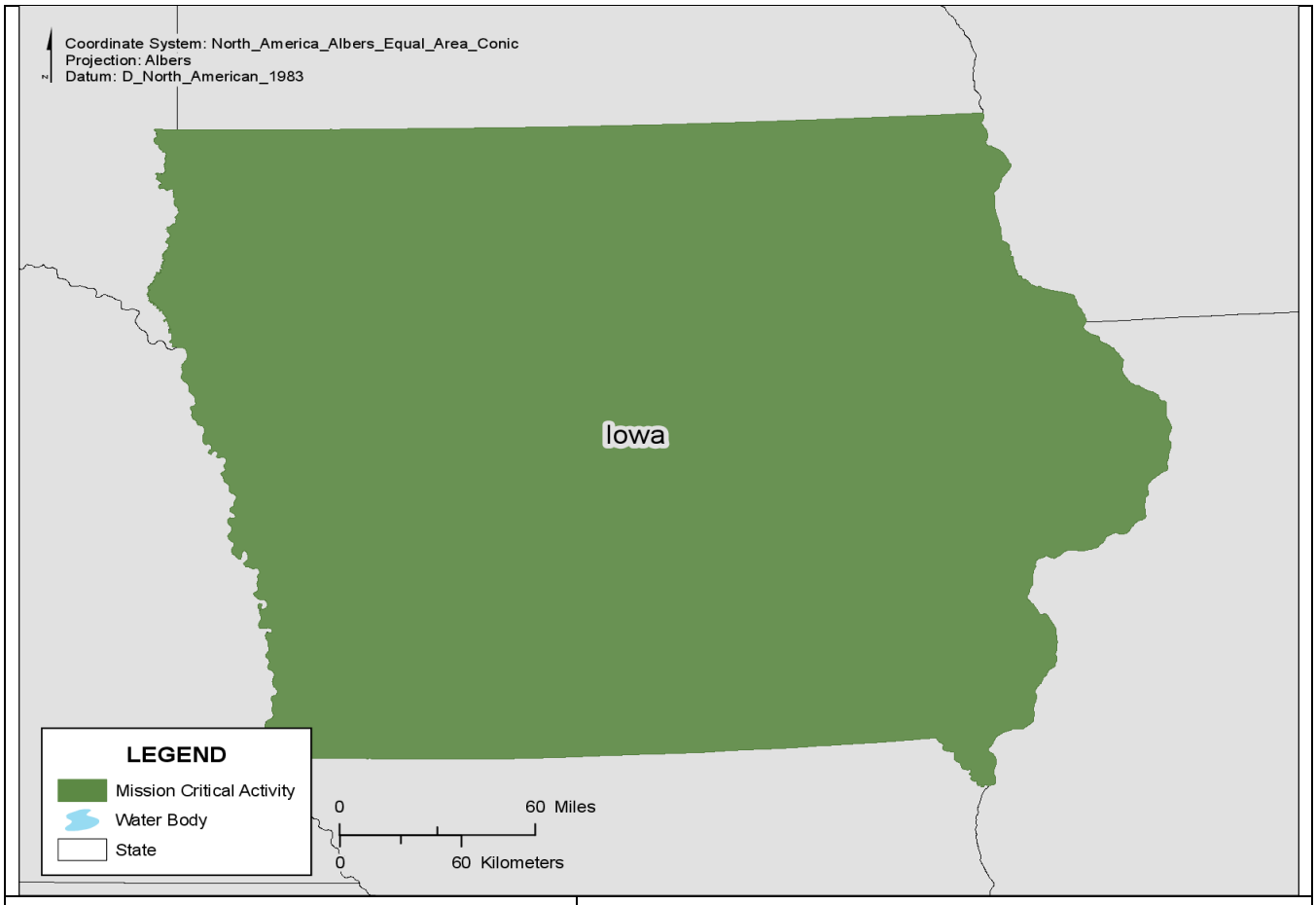
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Significant problem, but we have workarounds
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Iowa managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Resource Planning



Mission Critical Activity Title:	Water Resource Planning
Mission Critical Activity Description:	Watershed protection and water quality improvement. Modeling of watershed conditions and priority areas. Water quality sampling and improvement tracking.
MCA_ID:	3772018364_1
Organization Type:	Not for Profit
Organization Name:	Iowa Soybean Association
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

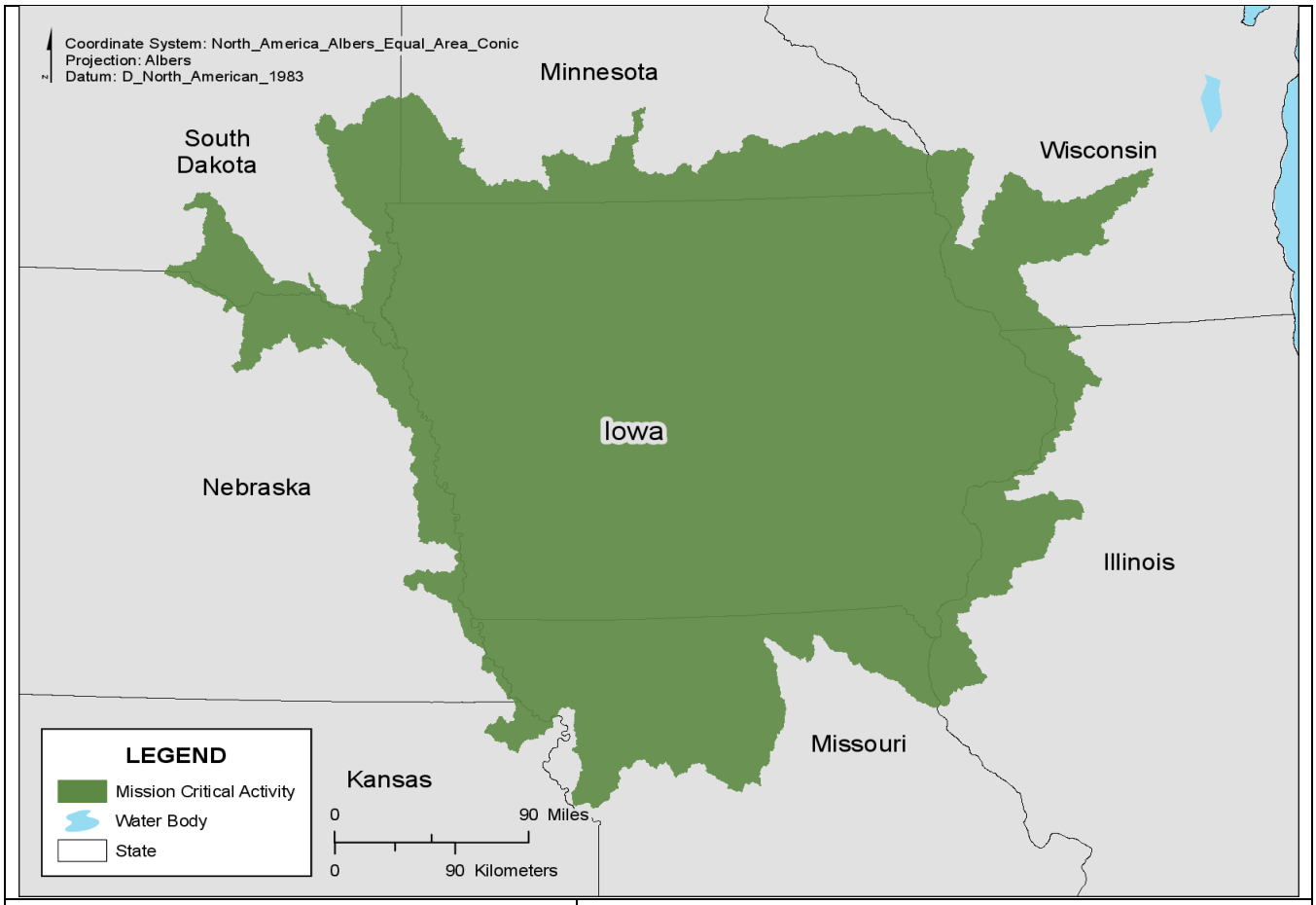
Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Natural Resource Conservation



Mission Critical Activity Title:	Natural Resource Conservation
Mission Critical Activity Description:	Floodplain mapping and management, water quality data management, fisheries management.
MCA_ID:	3836990505_1
Organization Type:	State Government
Organization Name:	Iowa Department of Natural Resources
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes

Current Benefits	
Total Annual Program Budget:	$3 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

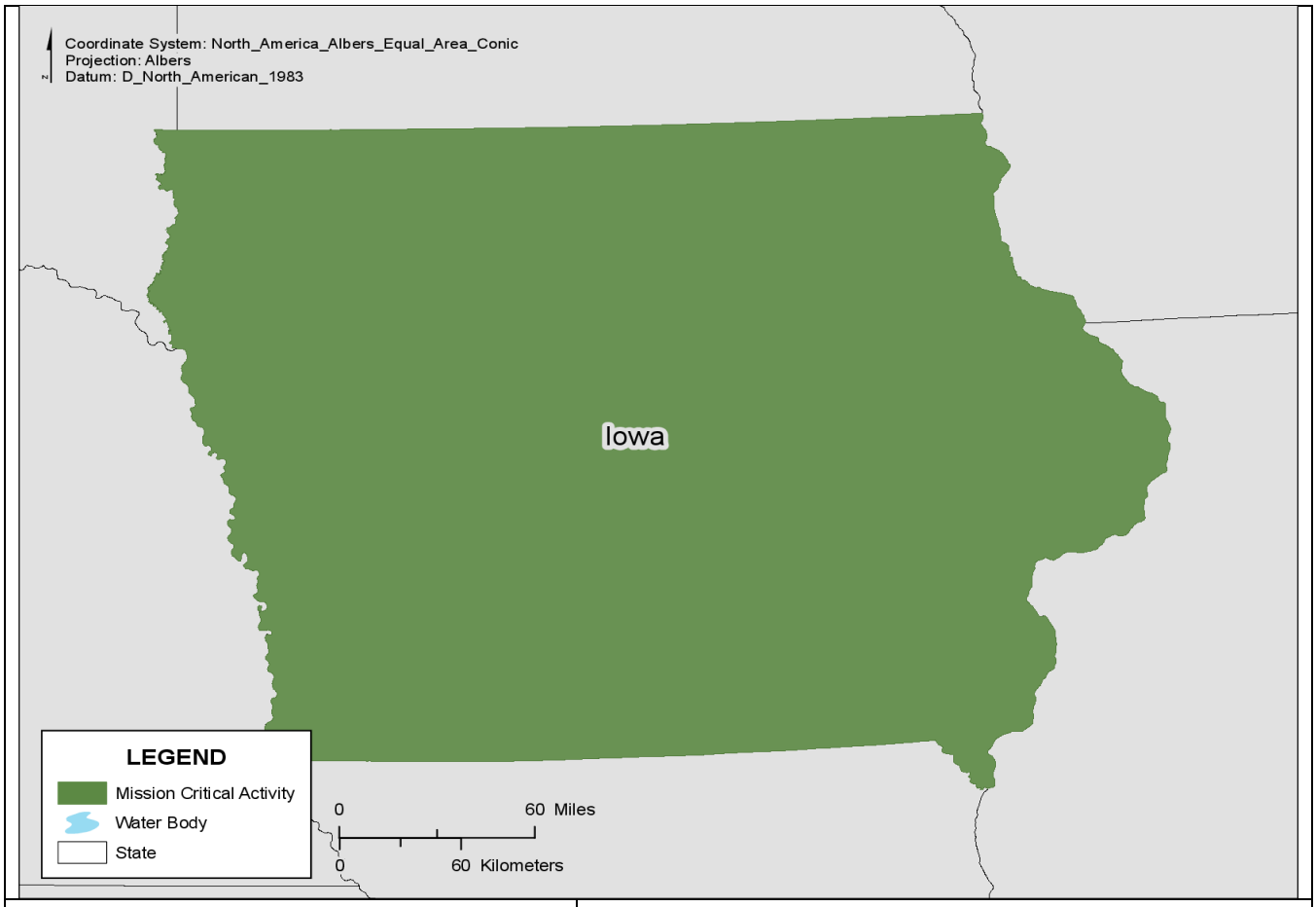
Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	We are currently spending a great deal of time and money developing a dataset that we anticipate becoming a local-resolution NHD layer. If/when this happens, I would expect our costs to decrease while the reach of the data increases.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Emergency Management



Mission Critical Activity Title:	Emergency Management
Mission Critical Activity Description:	Homeland security and emergency management activities to include: response, planning and preparedness, and recovery.
MCA_ID:	3813019504_1
Organization Type:	State Government
Organization Name:	Iowa Homeland Security & Emergency Management
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	Not sure.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Major
Current Other Benefits:	

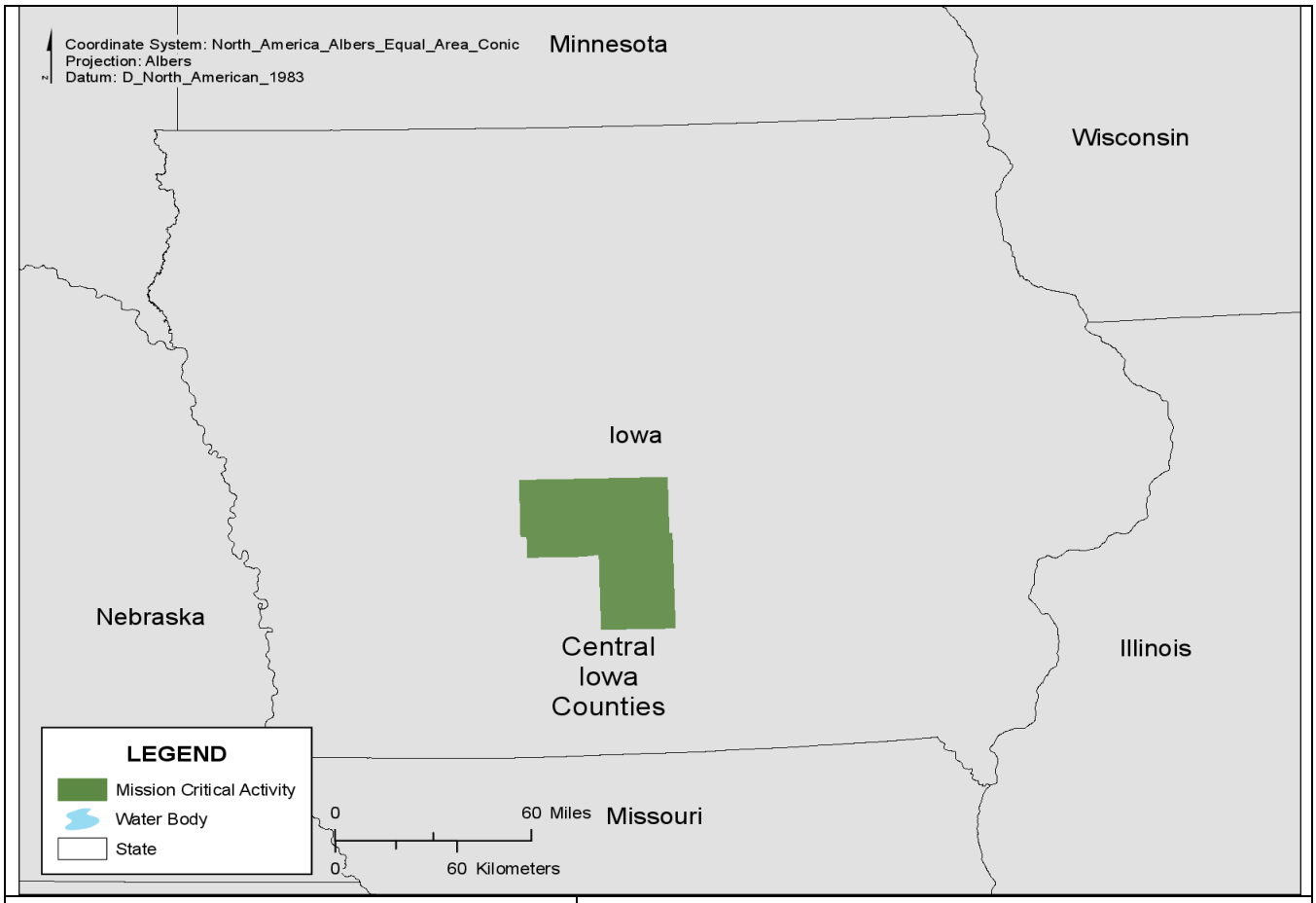
Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	None.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	Visual Inspection
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3778191837_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	City of Des Moines, Iowa
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USGS stream gage and flow data through National Weather Service, watershed boundaries from Iowa DNR.

Current Benefits	
Total Annual Program Budget:	$20 million
Current Annual Benefits ($):	Gages important but not using NHD now.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

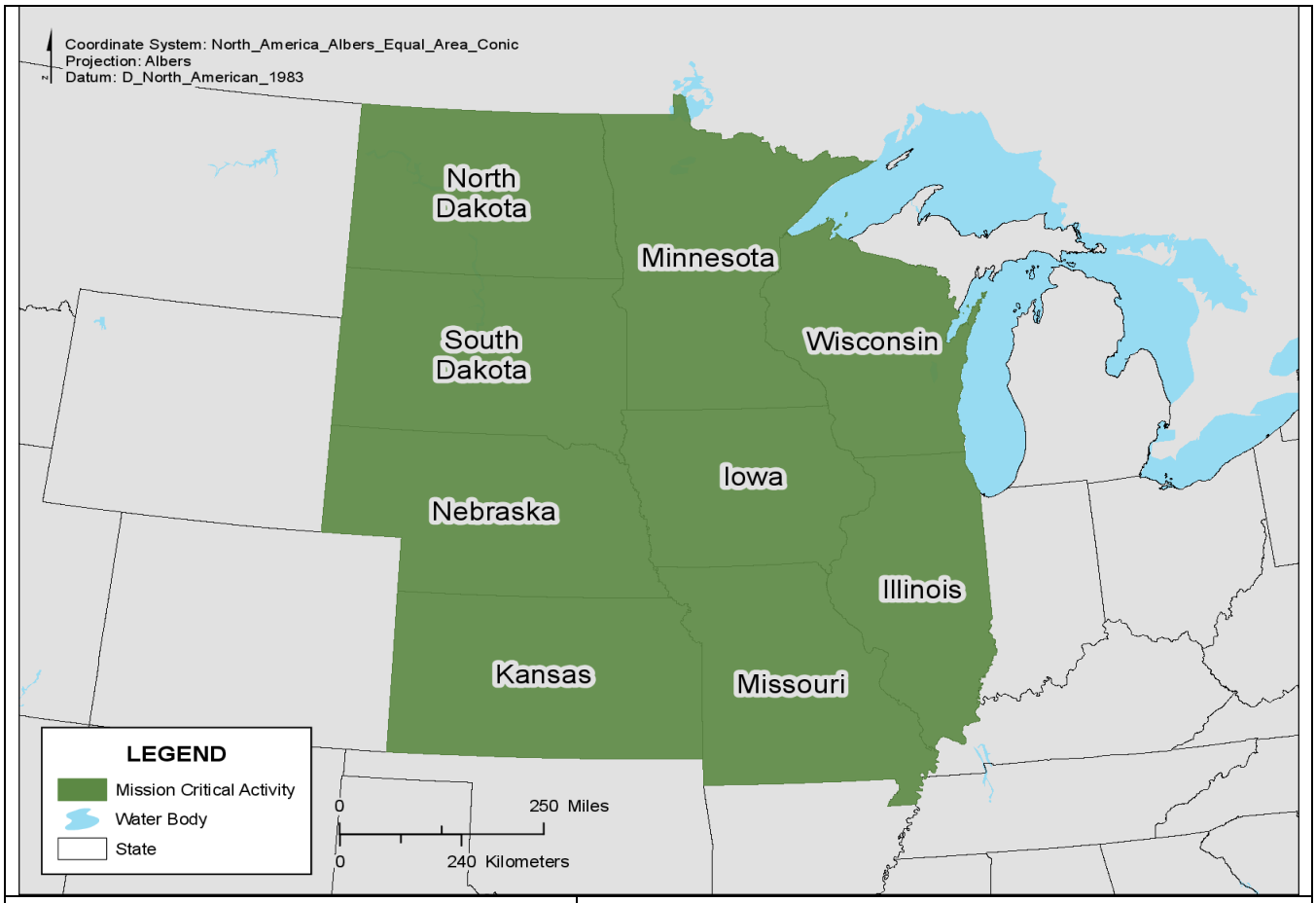
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Reduce need to maintain hydrography GIS data internally.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Geologic Resource Assessment



Mission Critical Activity Title:	Geologic Resource Assessment
Mission Critical Activity Description:	I conduct surface geological mapping, primarily of alluvial landscapes, and primarily for purposes of landscape evolution (terrace formation, crosscutting relationships of meander belts), and for purposes of determining the depths at which archaeological sites might be buried in Holocene-age sediments.
MCA_ID:	3798841935_1
Organization Type:	Private or Commercial
Organization Name:	EarthView Environmental, Inc.
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$120,000
Current Annual Benefits ($):	I do not know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	More detailed streamlines at horizontal resolution matching FEMA-spec BE-DEMs at scales of 1:1000-1:10,000. Less need to manipulate existing, or hand-digitized lacking or inaccurate streamlines and surficial geology mapping. Improved accuracy and ease of modeling of landforms such as terrace scarps, alluvial fans, paleochannels, and other landforms that are the key to geological mapping and geospatial analysis of alluvial landforms.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	

Required Analytical Functions	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Associate Selected Data Type
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Kansas

Many water programs in the state of Kansas have requirements for more complete and current hydrography geographic data that are integrated with other framework layers, including improved alignment with statewide lidar elevation data.

The initial Hydrography Requirements and Benefits Study (HRBS) survey results for Kansas noted critical requirements for improved and coordinated hydrography data supporting the following Mission Critical Activities:

- River and Stream Flow Management
- Water Quality Management
- Water Resources Planning and Management
- Flood Risk Management
- Feedlot Evaluation
- Wetlands Management

Access to more accurate spatial hydrography data that are maintained and supported as authoritative data among state and Federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓				✓	✓		✓				

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required

Data or Service Access Method	Requirement
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

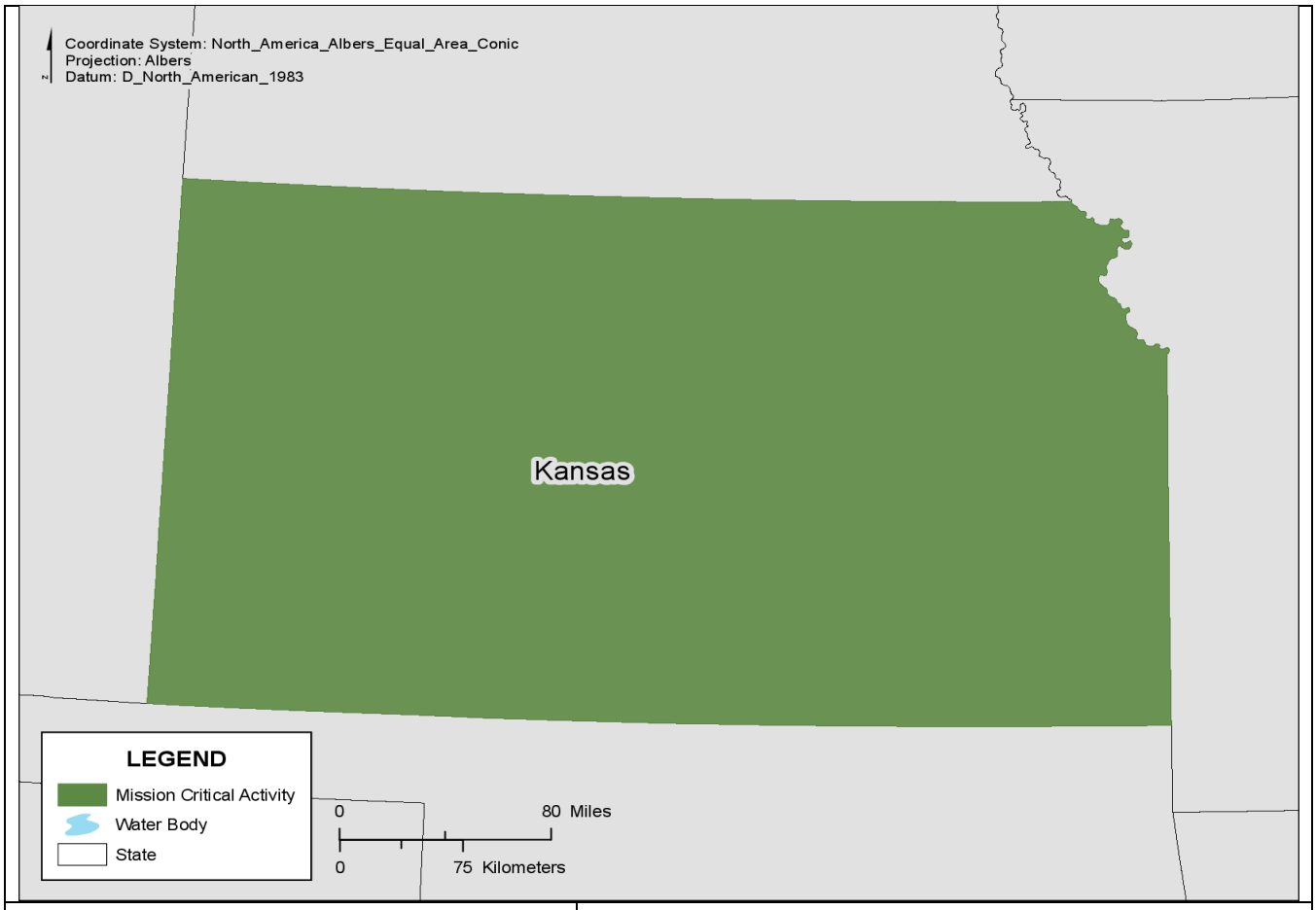
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Maybe

Mission Critical Activities

Kansas managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Floodplain Management



Mission Critical Activity Title:	Floodplain Management
Mission Critical Activity Description:	Flood risk mapping - FEMA Cooperating Technical Partner.
MCA_ID:	3829417913_1
Organization Type:	State Government
Organization Name:	Kansas Department of Agriculture - Division of Water Resources
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$999,999
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Having the NHD as a starting point saves time for our engineers creating a drainage network within the basin where we are producing flood hazard information.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

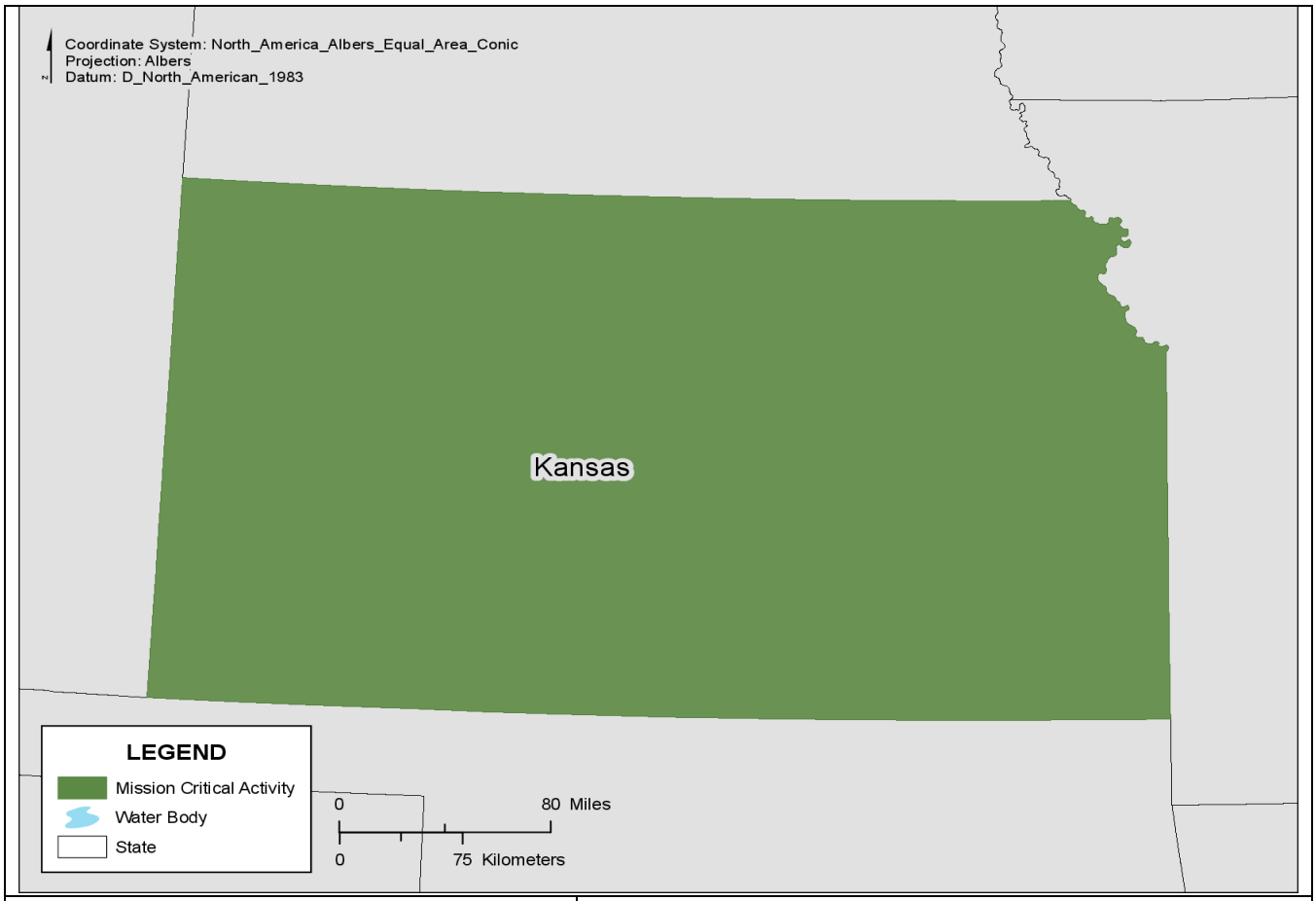
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Channel network is required for the first step in our floodplain mapping process.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	None
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Wetlands Management



Mission Critical Activity Title:	Wetlands Management
Mission Critical Activity Description:	Wetland and potential wetland mapping and assessment for improving overall watershed health.
MCA_ID:	3816424341_2
Organization Type:	State Government
Organization Name:	Kansas Biological Survey, University of Kansas
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Land Cover Database (NLCD), National Elevation Dataset (NED), National Wetlands Inventory (NWI).

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Having more complete, detailed, and accurate information regarding inventories of wetlands and waterbodies, as well as better knowledge of their position in the hydrologic landscape (including hydrologic relation to other features) would facilitate better analyses, which in turn should improve the efficacy and optimality of on-the-ground conservation efforts directed toward functional wetland restoration, preservation, and construction.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

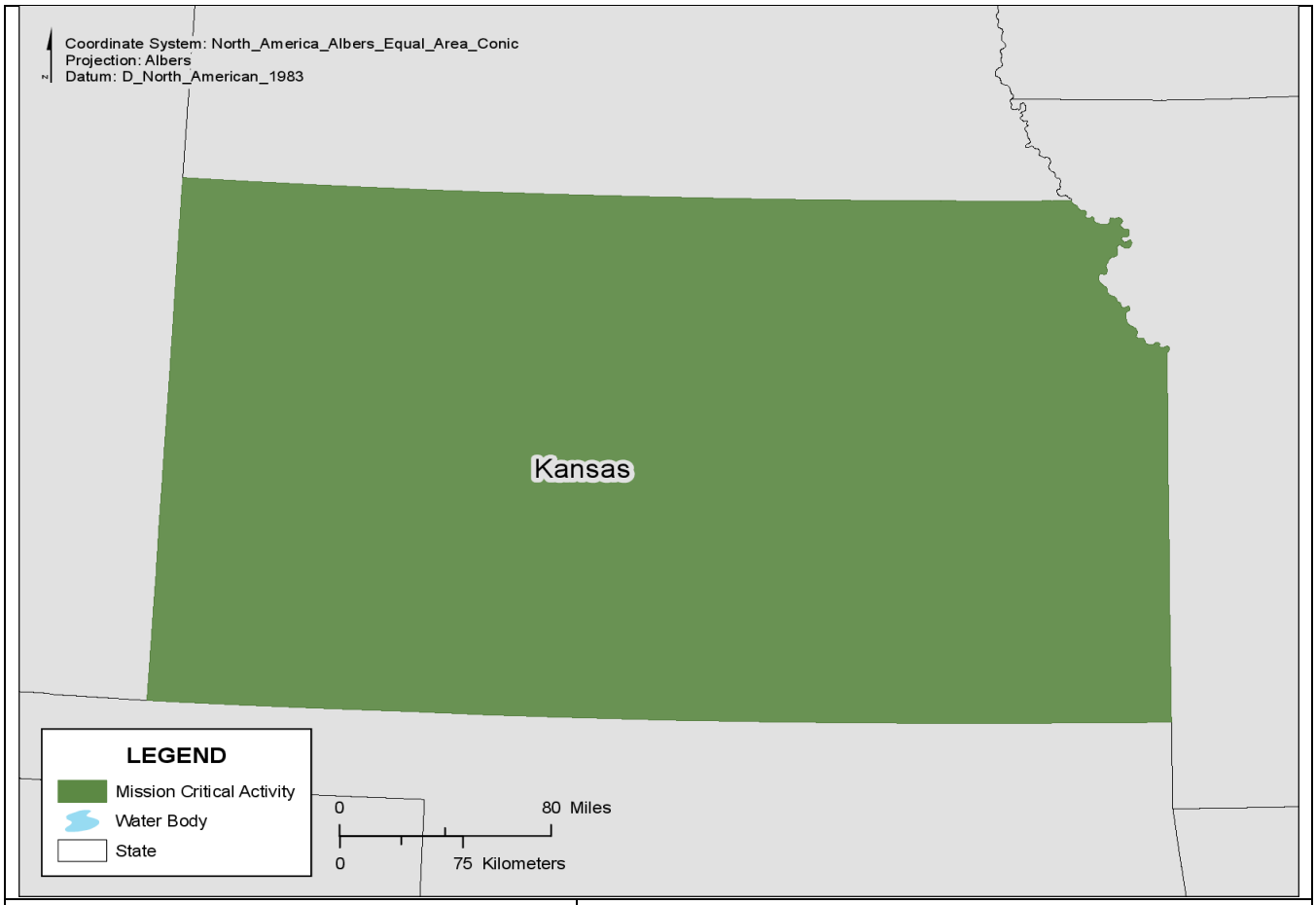
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	Assessing watershed-level characteristics, causes, impacts, and mitigation strategies for reservoir storage loss due to sedimentation.
MCA_ID:	3816424341_1
Organization Type:	State Government
Organization Name:	Kansas Biological Survey, University of Kansas
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Land Cover Database (NLCD), National Elevation Dataset (NED), National Wetlands Inventory (NWI), National Inventory of Dams (NID).

Current Benefits	
Total Annual Program Budget:	$250,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Better hydrographic and type data about the waterbodies and their position in/connection to the drainage network would greatly facilitate GIS analysis and improve our ability to characterize the hierarchical relationships among these features.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

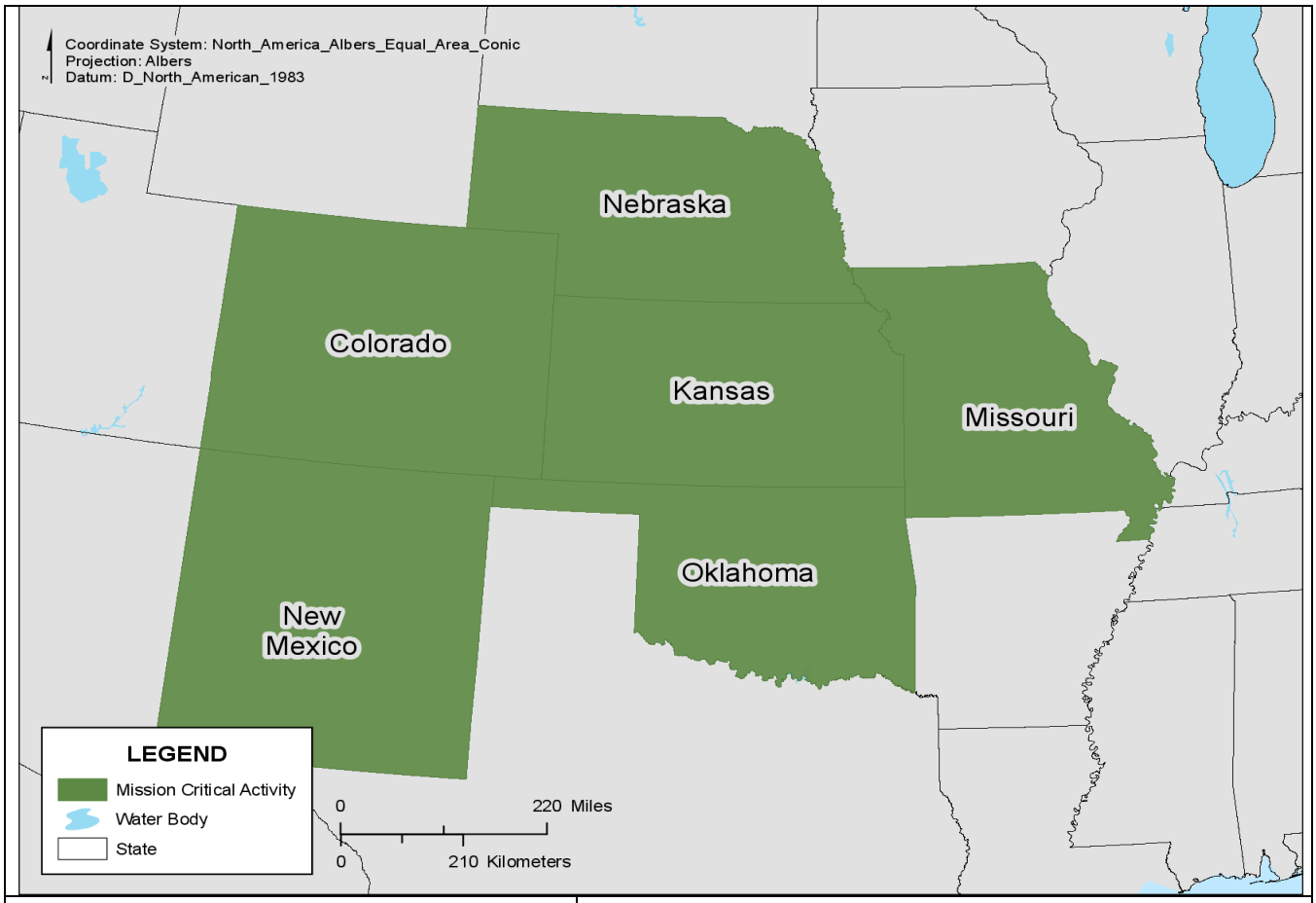
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Waterbodies with more specific attributes regarding type (such as water treatment plant, floodplain depression, traditional dam, borrow pit, pit mine, etc.).

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	

Required Analytical Functions	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Associate Selected Data Type
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Maintain and where possible improve the water quality in the state of Kansas through permits and monitoring.
MCA_ID:	3781036625_1
Organization Type:	State Government
Organization Name:	Kansas Department of Health and Environment
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$350,000
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

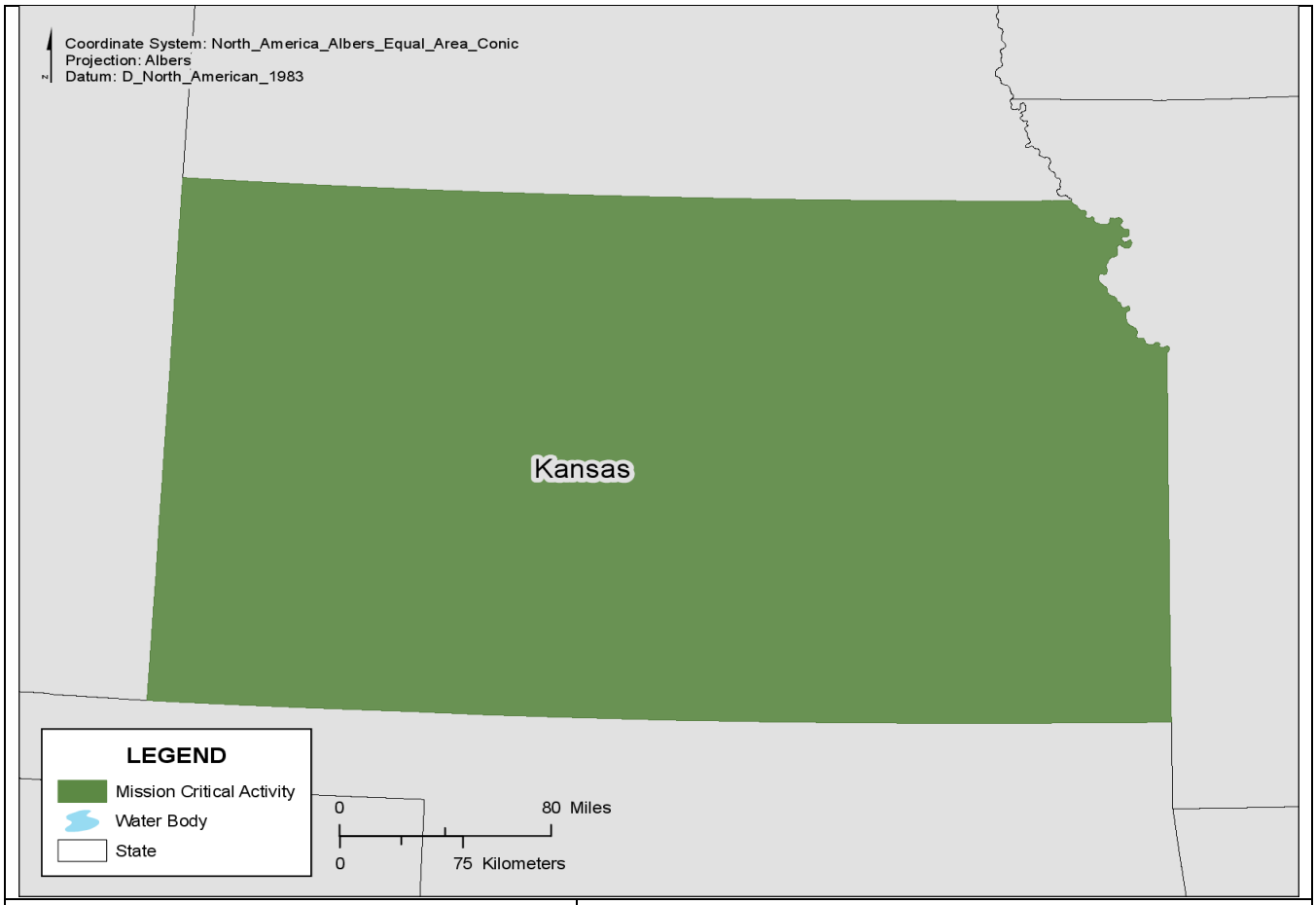
Future Benefits	
Future Annual Benefits ($):	$3,000
Future Benefits Description:	To more accurately locate and define nonpoint pollution contributions.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Feedlot Evaluation



Mission Critical Activity Title:	Feedlot Evaluation
Mission Critical Activity Description:	Feedlot site evaluations.
MCA_ID:	3781036625_2
Organization Type:	State Government
Organization Name:	Kansas Department of Health and Environment
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

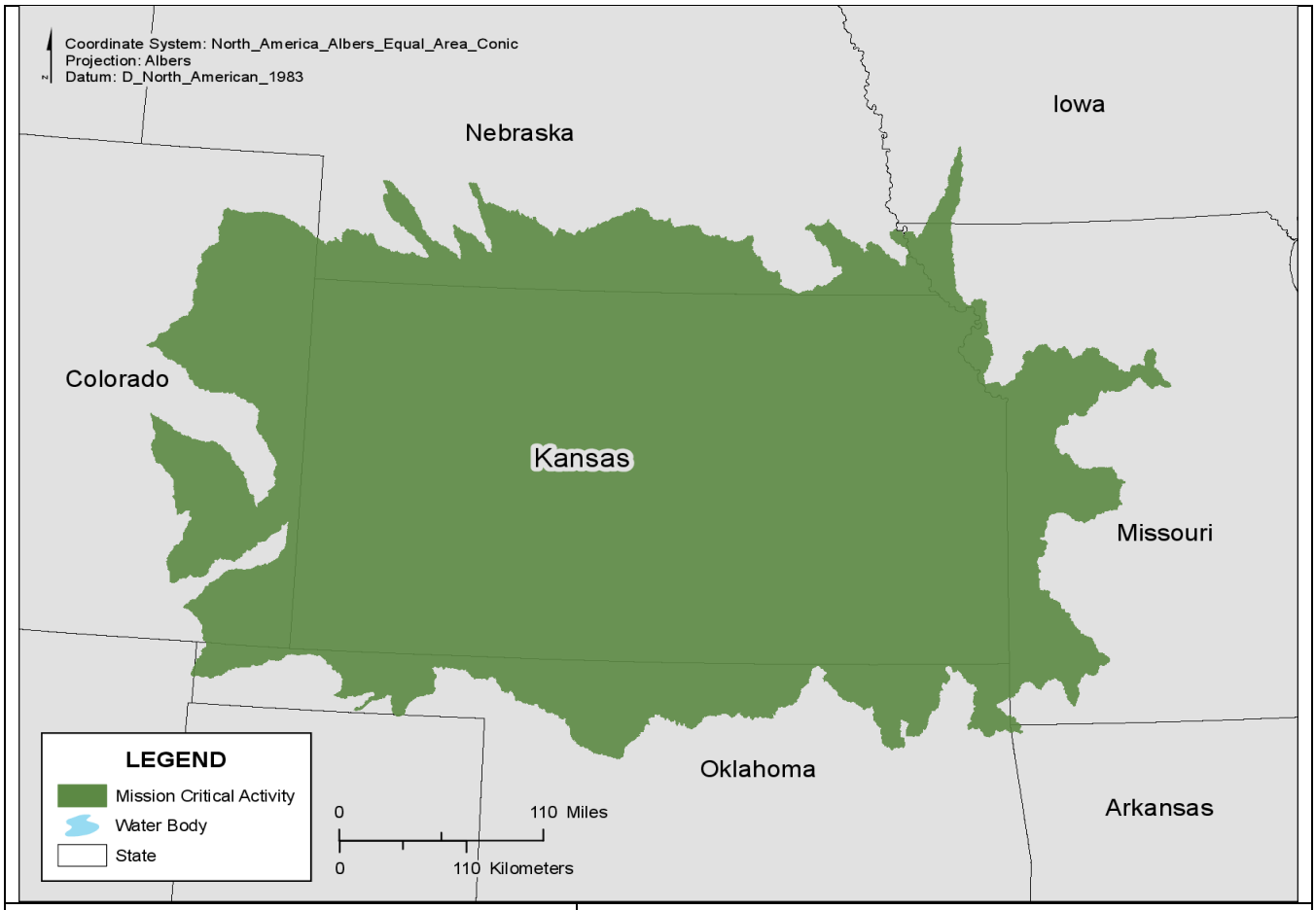
Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Better define impact from feed lots.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resource Management



Mission Critical Activity Title:	Water Resource Management
Mission Critical Activity Description:	Total maximum daily load.
MCA_ID:	3781036625_3
Organization Type:	State Government
Organization Name:	Kansas Department of Health and Environment
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

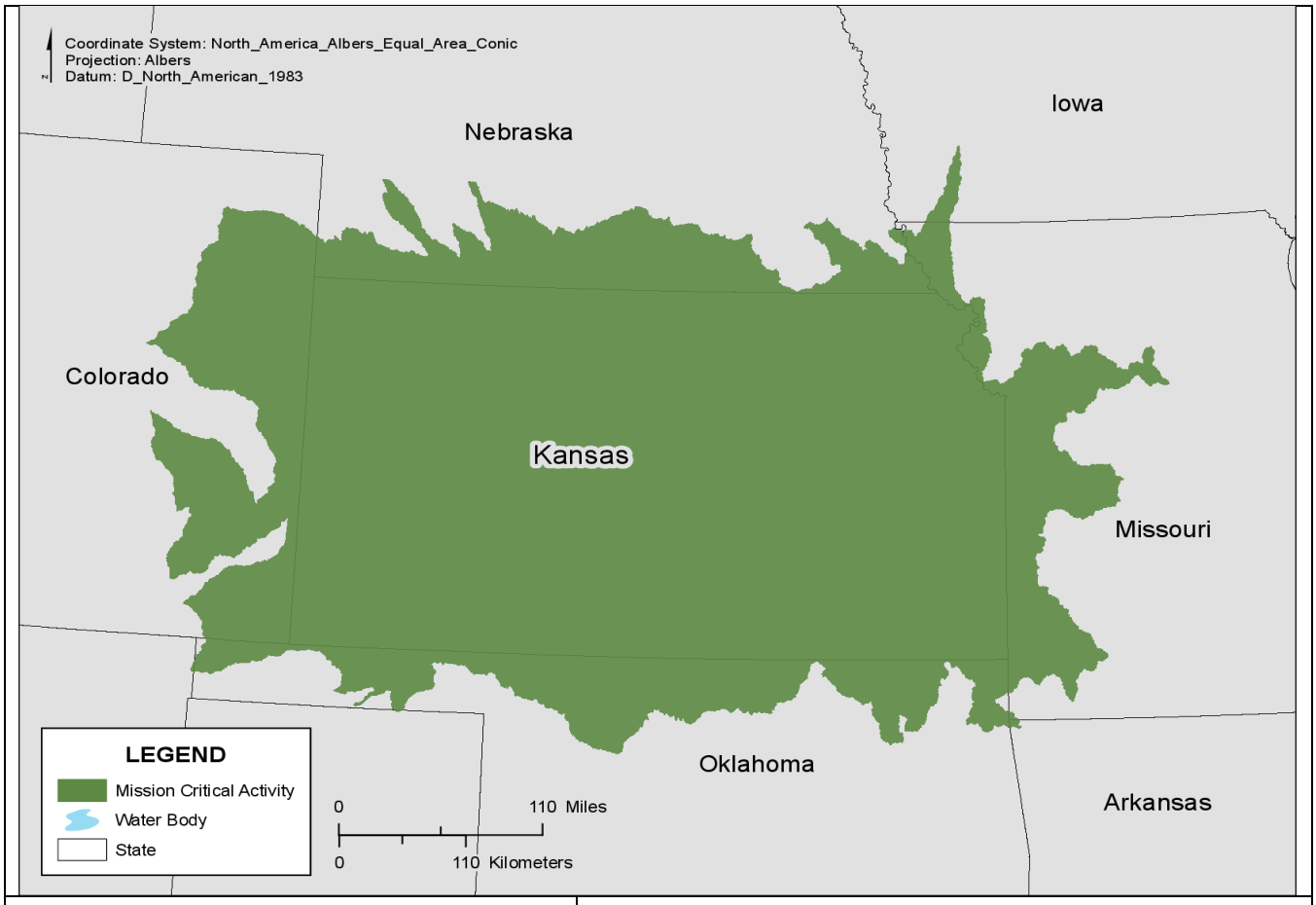
Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Better define the areas and point sources the need to be modified to achieve an acceptable daily maximum load of pollutants.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resource Planning



Mission Critical Activity Title:	Water Resource Planning
Mission Critical Activity Description:	Mapping.
MCA_ID:	3828519609_1
Organization Type:	State Government
Organization Name:	Kansas Water Office
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$150,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	More accurate maps
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Kentucky

Two Kentucky state agencies, the Kentucky River Authority and the Kentucky Division of Water, identified two Mission Critical Activities (MCAs):

- Water Quantity and Management of the Kentucky River
- Watershed Management, Flood Risk Mapping, and Water Quality

The above MCAs relate to two Business Uses (BUs):

- River and Stream Flow Management
- Water Resource Planning and Development

The National Hydrography Dataset (NHD), Watershed Boundary Data (WBD), National Water Information System (NWIS) (stream gages), and NHDPlus are very important hydrologic and hydrographic data sources that Kentucky state agencies rely upon and which are used to support the two BUs noted above. Additional MCA characteristics important to Kentucky are: velocity of time of travel, leakage at points, left/right bank delineation, flood stage, floodplain boundary, flow periodicity, and riverine bathymetry. Other related hydrographic features considered important are diversion points, bridges and culverts, and wetlands. Management of drinking water, water and wastewater planning, water quantity, withdrawals and water usage, drought, and dam safety are all important MCA components for Kentucky.

Analytical functions important to Kentucky are: stream navigation, calculating stream distances, calculating time of travel, finding upstream/downstream features within watersheds, calculating drainage areas, delineating catchments, determining downstream flood areas, accumulating upstream/downstream features, and finding events or features on networks to be able to preset symbolization, allowing users to define symbolization, allowing mash-ups and creating time-series animations.

Kentucky considers integration of the followings layers with the NHD, WBD, and NWIS important: land cover, bathymetry, climate, elevation, and stream flow. In an effort that supports data integration, Kentucky is in the process of acquiring statewide base data for imagery and lidar. In addition, Kentucky is impacted by a significant karst geomorphology and is integrating their Karst Atlas into the NHD.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Somewhat Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful

Quality Issue	Impact
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

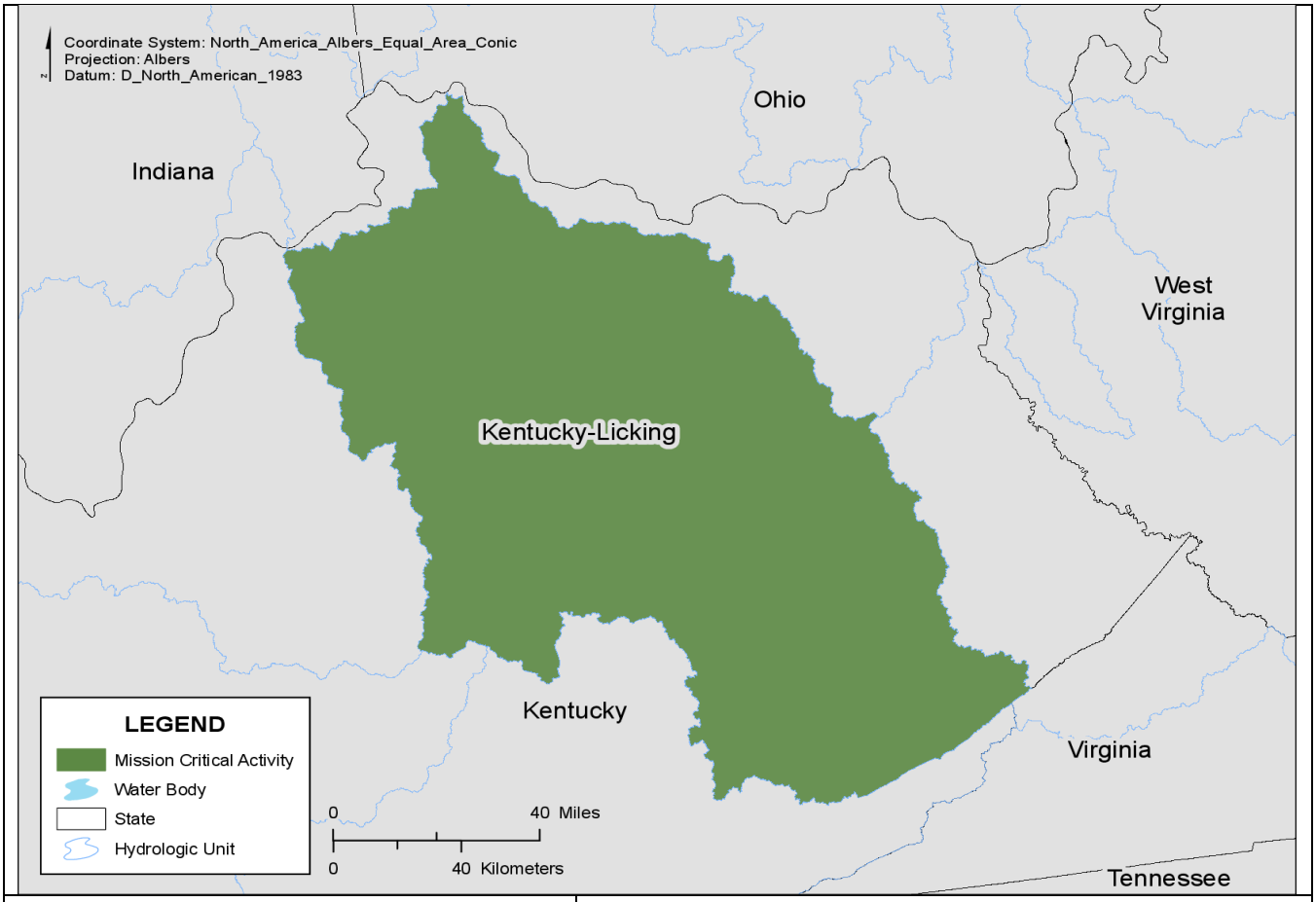
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Kentucky managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Quantity and Management of the Kentucky River



Mission Critical Activity Title:	Water Quantity and Management of the Kentucky River
Mission Critical Activity Description:	The primary Mission Critical Activity of the Kentucky River Authority is the management of water quantity available in the Kentucky River for approximately 13 communities that rely on it as their primary source of drinking water. Management includes both long term planning (infrastructure improvement to dams, allowable withdrawals, where new water withdrawals/uses should be allowed, etc.) and day-to-day decision making during a drought (e.g. how to reduce water withdrawals, how much water to transfer through the 14 dams to maintain water quality and distribute the water equitably).
MCA_ID:	3803762994_1
Organization Type:	State Government
Organization Name:	Kentucky River Authority
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Having as close to 100% accuracy and as close to real-time streamflow data as possible will allow us to make sound decisions during extreme drought. Particularly, how we need to conserve water, and move water through the 14 Kentucky River Locks and Dams.
Future Operational Benefits	
Future Time/Cost Savings:	Minor

Future Benefits	
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

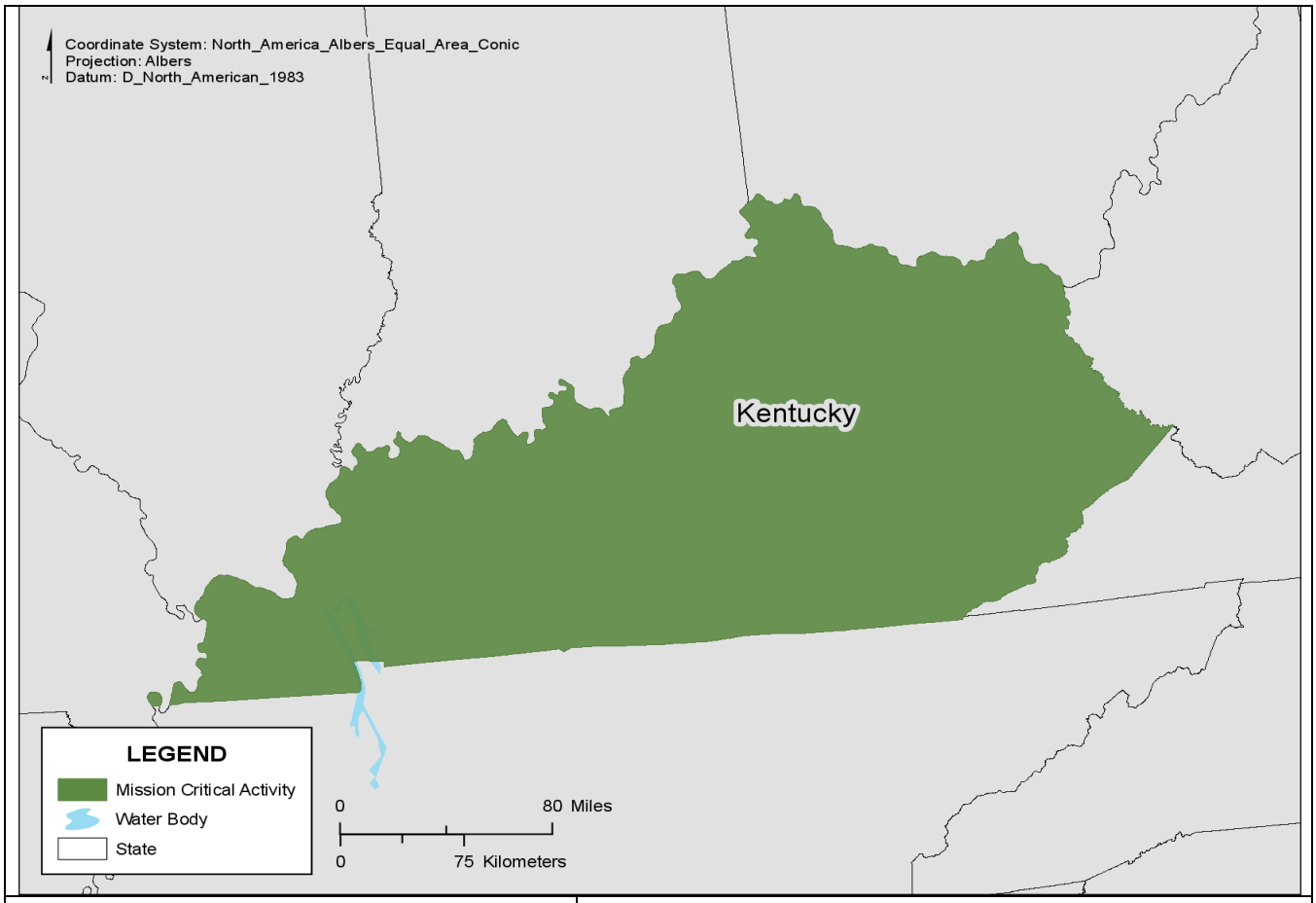
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Visual Inspection
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Visual Inspection
Stream Flow	Required	Visual Inspection
Wetlands	Not Required	Associate Selected Data Type
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Management, Flood Risk Mapping, Water Quality



Mission Critical Activity Title:	Watershed Management, Flood Risk Mapping, Water Quality
Mission Critical Activity Description:	Watershed management, stormwater management, flood risk mapping, dam safety, levee safety, GIS, water quality.
MCA_ID:	3772733017_1
Organization Type:	State Government
Organization Name:	Kentucky Division of Water
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4-5 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	More accurate tools for environmental and hydrographic features. Better computations for modeling water quality and quantity.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Louisiana

The State of Louisiana has worked with USGS to maintain and improve the National Hydrography Dataset (NHD), with a goal of providing a single basemap and dataset for the needs of the state and nation. Five state agencies and one non-profit organization participated in the HRBS survey. Seven Mission Critical Activities (MCAs) were reported: Coastal Zone Management, Transportation, Socioeconomic Analysis, Water Quality, Cadastral Management, Coastal Research and Outreach, and Wildlife and Fisheries Management. Additional Business Uses (BUs) for the data include Flood Risk Management, Urban and Regional Planning, Water Resource Planning and Development, and Mapping Navigable Waterways.

The Louisiana Department of Transportation and Development (LA DOTD) has MCAs associated with transportation planning and design, topographic mapping, emergency response, and flood control. Future benefits of hydrography data will include improvements to watershed modeling and flow determination for bridge and flood control design, storm surge risk assessment, and levee and dam inspections. The Louisiana Department of Environmental Quality (LDEQ) MCAs include water quality standards, assessments, and nonpoint source pollution. A fully-functional NHD network will result in more accurate reporting, modeling, and permitting. LDEQ has a desire for high-resolution NHDPlus.

The Louisiana Coastal Protection and Restoration Authority (CPRA) is responsible for developing and implementing a comprehensive coastal protection and restoration Master Plan for Louisiana. This plan incorporates modeling of coastal and inland hydrologic processes for alternative restoration scenarios. The program would benefit from greater access to gage data (including real-time), bathymetry data, and water quality data. The Louisiana Department of Wildlife and Fisheries (LDWF) uses the NHD to support modeling for habitat assessment, oyster leasing, and waterfowl management. An improved NHD layer will support LDWF emergency operations, including search and rescue and spill response.

The Louisiana Office of State Lands requires waterbody and watershed boundaries to manage lands claimed by the State of Louisiana and the associated royalties from mineral leases. Future benefits include access to bathymetric data to determine navigable waterways.

The Lake Pontchartrain Basin Foundation analyzes impacts of human activities and natural occurrences on coastal Louisiana to further coastal sustainability. With improved NHD data, future benefits include better water quality monitoring, pollution tracking, and analysis and monitoring of coastal restoration diversion projects.

Louisiana would like to work towards a single hydrography base layer for the state that facilitates the MCAs reported in the HRBS. Continued coordination with USGS and EPA is needed to promote and support development of the NHD and NHDPlus. Because of Louisiana's large area of coastal wetlands, improved coordination must be developed with USFWS, NOAA, and others to incorporate information from the National Wetlands Inventory (NWI), navigational charts, and bathymetry data. Navigable waters/navigation routes are important economic drivers in Louisiana. Coordinating with the U.S. Army Corps of Engineers (USACE) to use NHD data is important for transportation and environmental concerns, for example, goods and commodity flows, streamflow maintenance, and dredging. Louisiana would like to see coordination with USACE to incorporate navigable waterways into the NHD; however, NHD

maintenance activities need to be better coordinated with state NHD stewards before updates are performed. Louisiana wishes to maintain the substantial investment that the state and USGS have put into the NHD. Specifically, the state requests that the NHD data not be generalized. Generalization is a cartographic technique to produce cartographic products and should not alter the underlying data. The state would also like the ability to incorporate bi-directional flow into the NHD.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓			✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Nice To Have
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

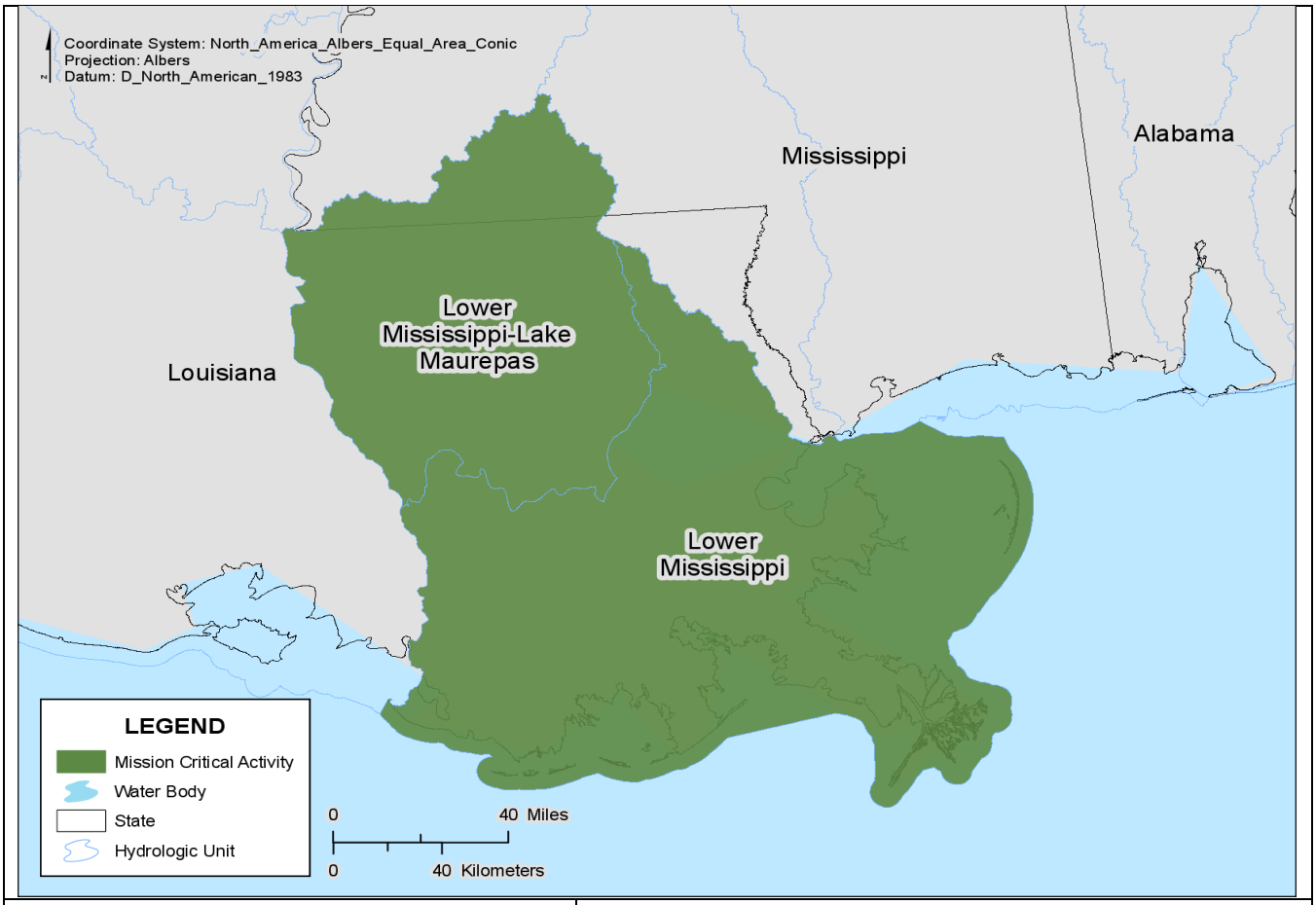
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Louisiana managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Socioeconomic Impacts



Mission Critical Activity Title:	Socioeconomic Impacts
Mission Critical Activity Description:	The Coastal Sustainability Program's mission is to evaluate and analyze impacts of human activities and natural occurrences on coastal Louisiana toward the purpose of furthering coastal sustainability in Louisiana.
MCA_ID:	3817171016_2
Organization Type:	Not for Profit
Organization Name:	Lake Pontchartrain Basin Foundation
Business Use:	Coastal Zone Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	Improved network connectivity and coastal bathymetry would improve development of hydrocoast mapping and related analyses, improve analysis of freshwater discharges into estuary, and improve analysis of impacts of diversions. Would also improve mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

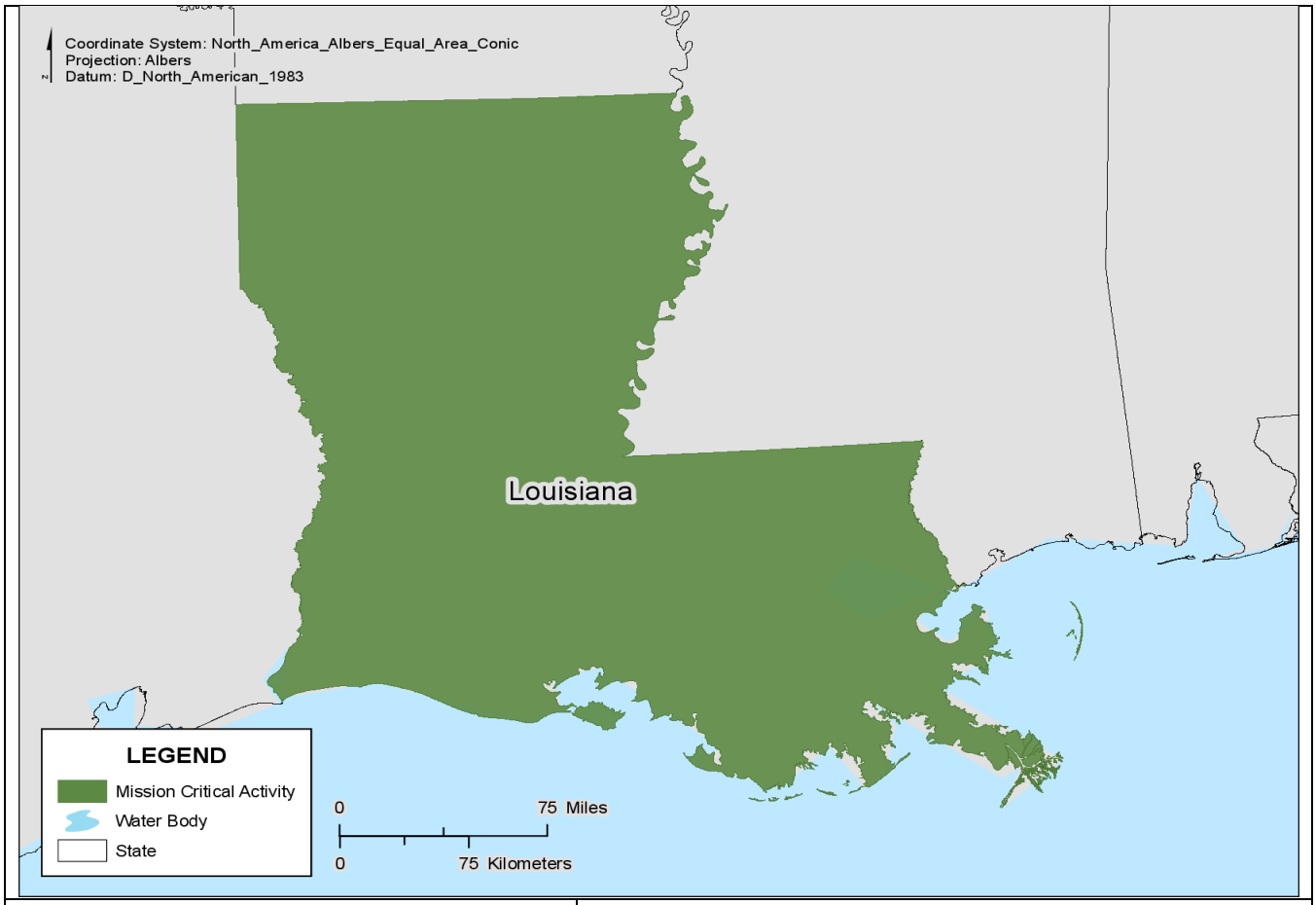
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	Visual Inspection
Point Discharges	Not Required	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Coastal Zone Management



Mission Critical Activity Title:	Coastal Zone Management
Mission Critical Activity Description:	Coastal restoration and protection.
MCA_ID:	3790112842_1
Organization Type:	State Government
Organization Name:	Louisiana Coastal Protection and Restoration Authority
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

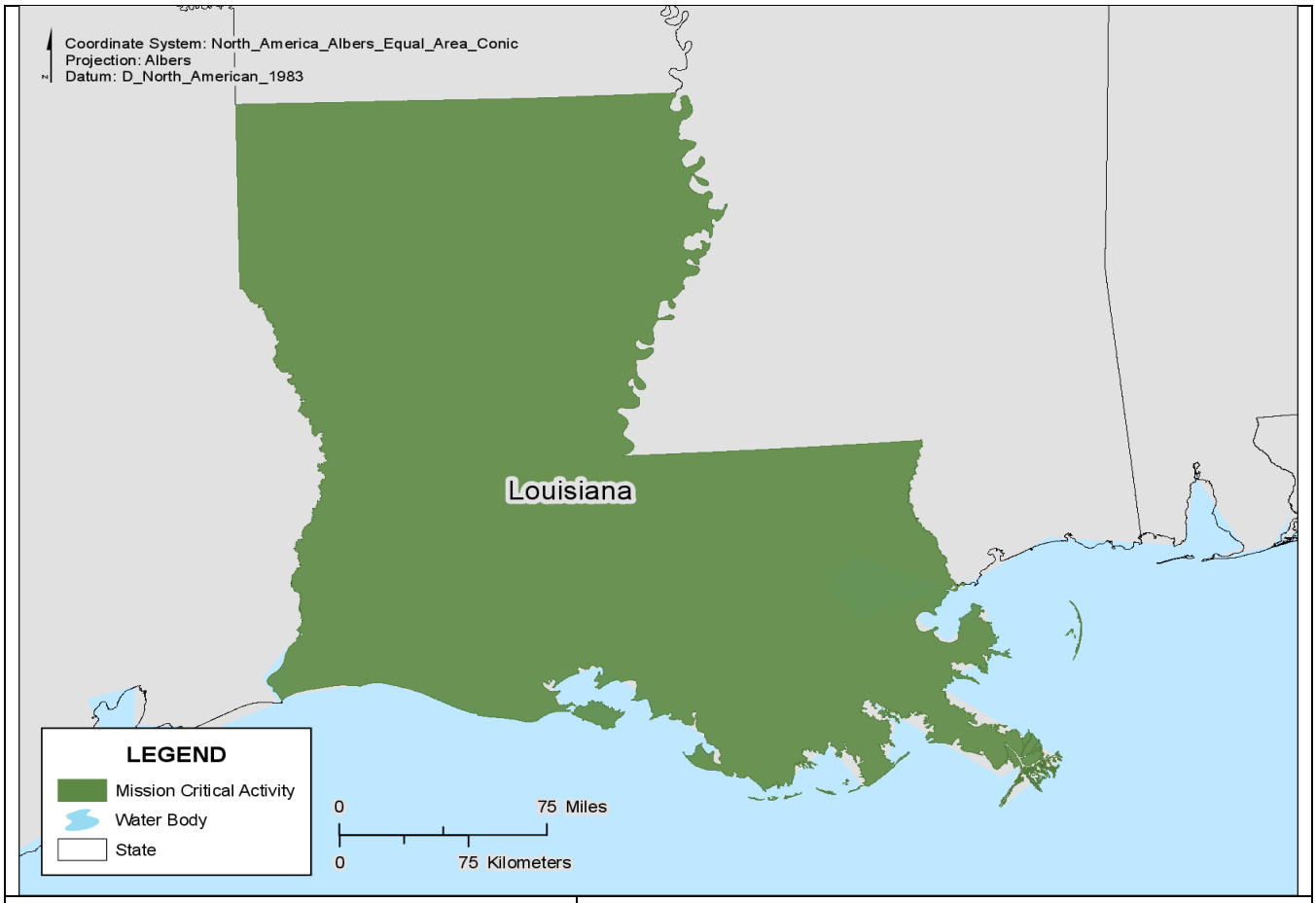
Future Benefits	
Future Annual Benefits ($):	$400,000
Future Benefits Description:	More real-time stations would improve operational and societal benefits.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Transportation, Ports, NFIP, and Levees



Mission Critical Activity Title:	Transportation, Ports, NFIP, and Levees
Mission Critical Activity Description:	Transportation planning/design, emergency operations, national flood insurance program, levee inspections, stormwater, topographic mapping, flood control, ports and waterways.
MCA_ID:	3794550988_1
Organization Type:	State Government
Organization Name:	LaDOTD, Louisiana
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	State-wide levee data.

Current Benefits	
Total Annual Program Budget:	$1.7 billion
Current Annual Benefits ($):	$1.1 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2.5 million
Future Benefits Description:	Watershed modeling, flow determination for bridge and flood control design. Maintaining and updating topographic mapping. Improved MS4 monitoring. Support levee inspection. Storm surge risk assessment.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

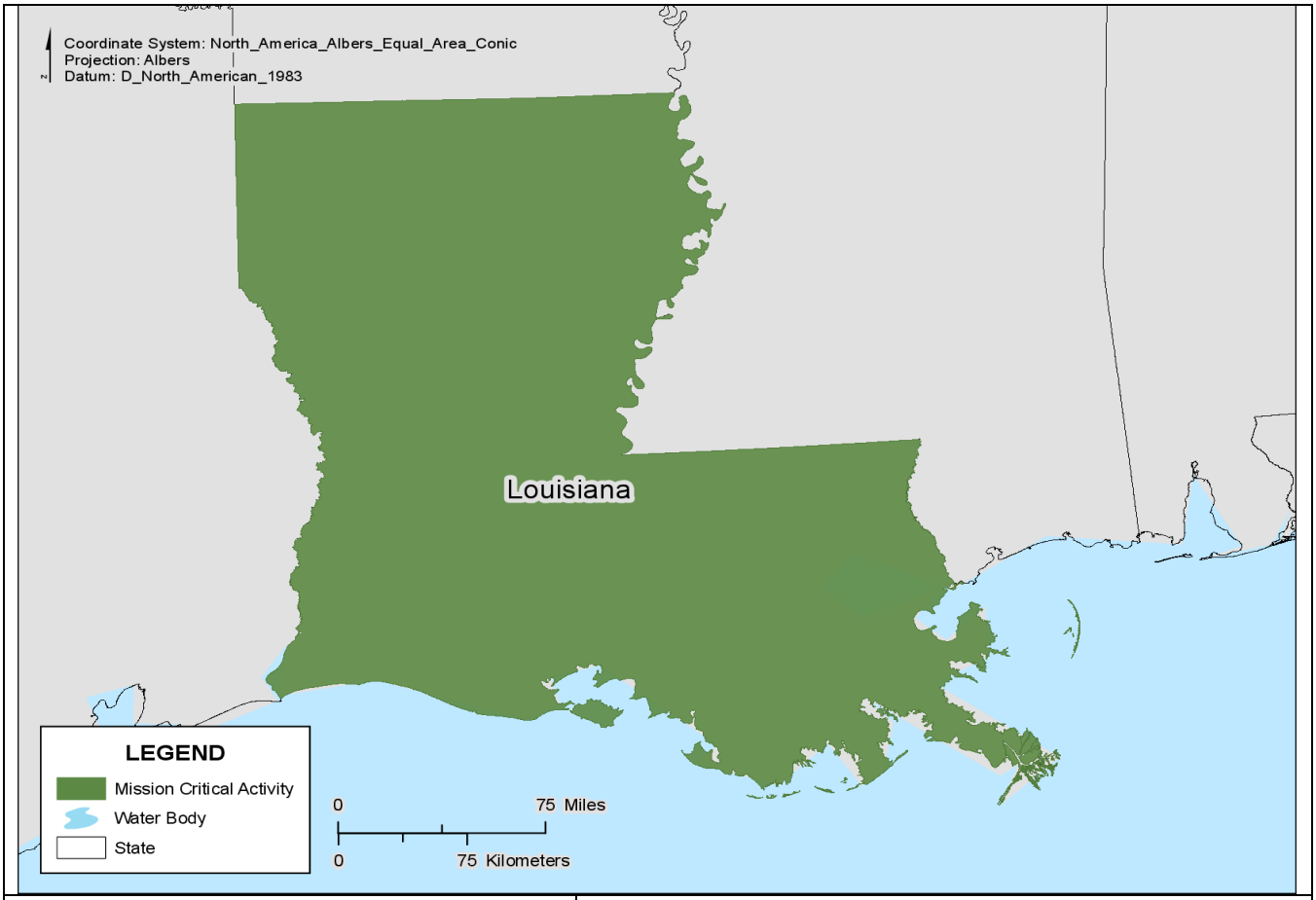
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality and Environmental Management



Mission Critical Activity Title:	Water Quality and Environmental Management
Mission Critical Activity Description:	Water quality management: includes WQ Standards, WQ Assessment, TMDL development, nonpoint source pollution, Louisiana Pollutant Discharge Elimination System (LPDES) permitting.
MCA_ID:	3782246617_1
Organization Type:	State Government
Organization Name:	Louisiana Dept. Of Environmental Quality
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2,483,600
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$496,720
Future Benefits Description:	We would be able to better satisfy our Critical Mission. More precise WQ assessment. More precise TMDL calculation. Improved nonpoint source runoff modelling.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable

Future Benefits	
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

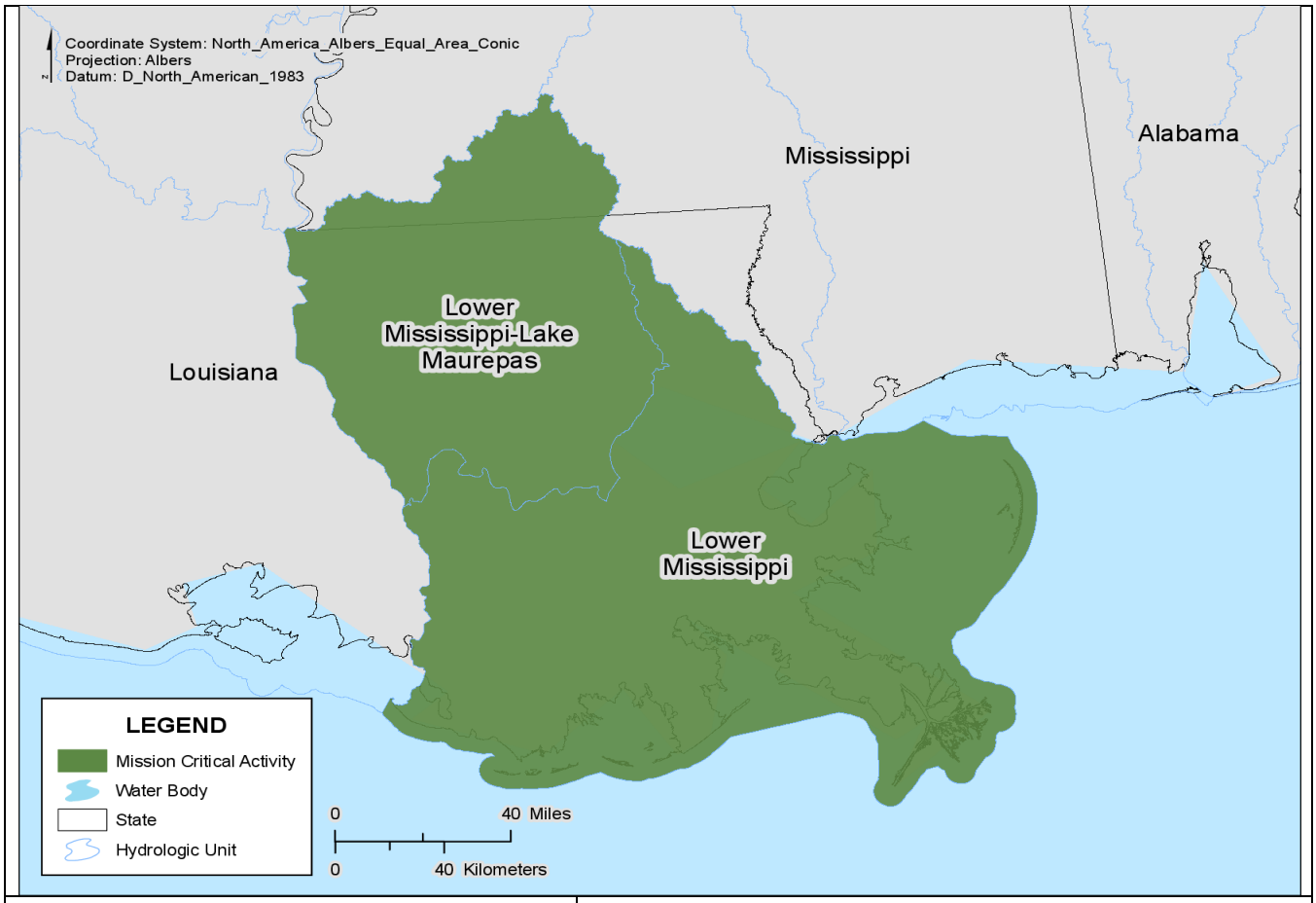
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Public Awareness and Coastal Research



Mission Critical Activity Title:	Public Awareness and Coastal Research
Mission Critical Activity Description:	Our mission statement is to protect the Lake Pontchartrain Basin for the benefit and enjoyment of the public. Originally this mission related almost entirely to pollution from extractive industries in Lake Pontchartrain. Over the years, the organizations role has expanded to include i) the upland rivers that discharge into the lake, and ii) the coastal marsh that fringes the Basin.
MCA_ID:	3817171016_1
Organization Type:	Not for Profit
Organization Name:	Lake Pontchartrain Basin Foundation
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Various other datasets from Federal and state agencies.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	Not sure.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Not sure.
Future Benefits Description:	Improved water quality monitoring, pollution tracking, and coastal restoration policies.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

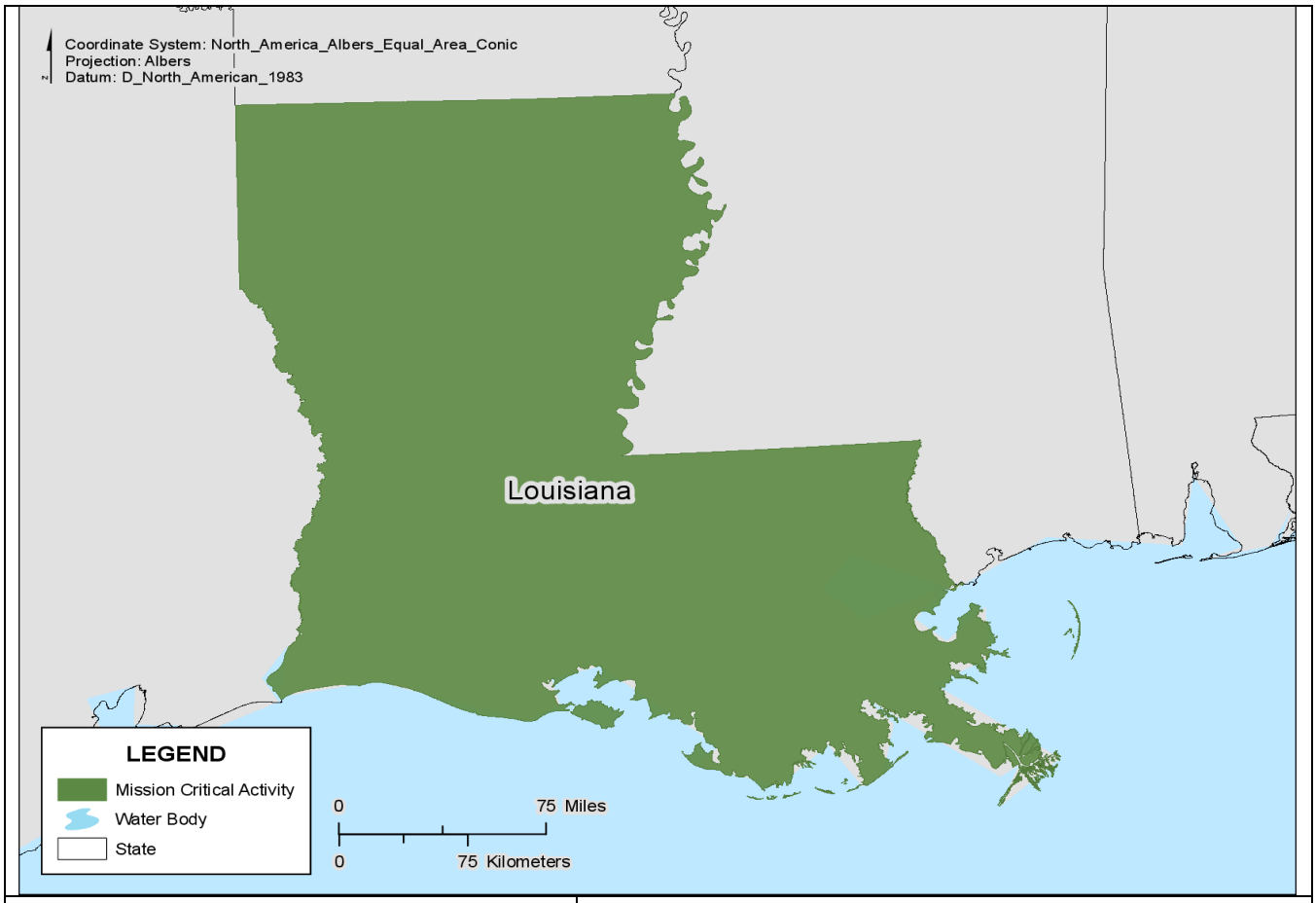
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Administrative Boundaries



Mission Critical Activity Title:	Administrative Boundaries
Mission Critical Activity Description:	Land and waters management, specifically those lands and waters owned or claimed by the State of Louisiana.
MCA_ID:	3772057126_1
Organization Type:	State Government
Organization Name:	Louisiana Division of Administration
Business Use:	Water Resource Planning and Management
Area of Interest:	Louisiana

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Louisiana State Claimed Waters produced by Louisiana Office of State Lands.

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

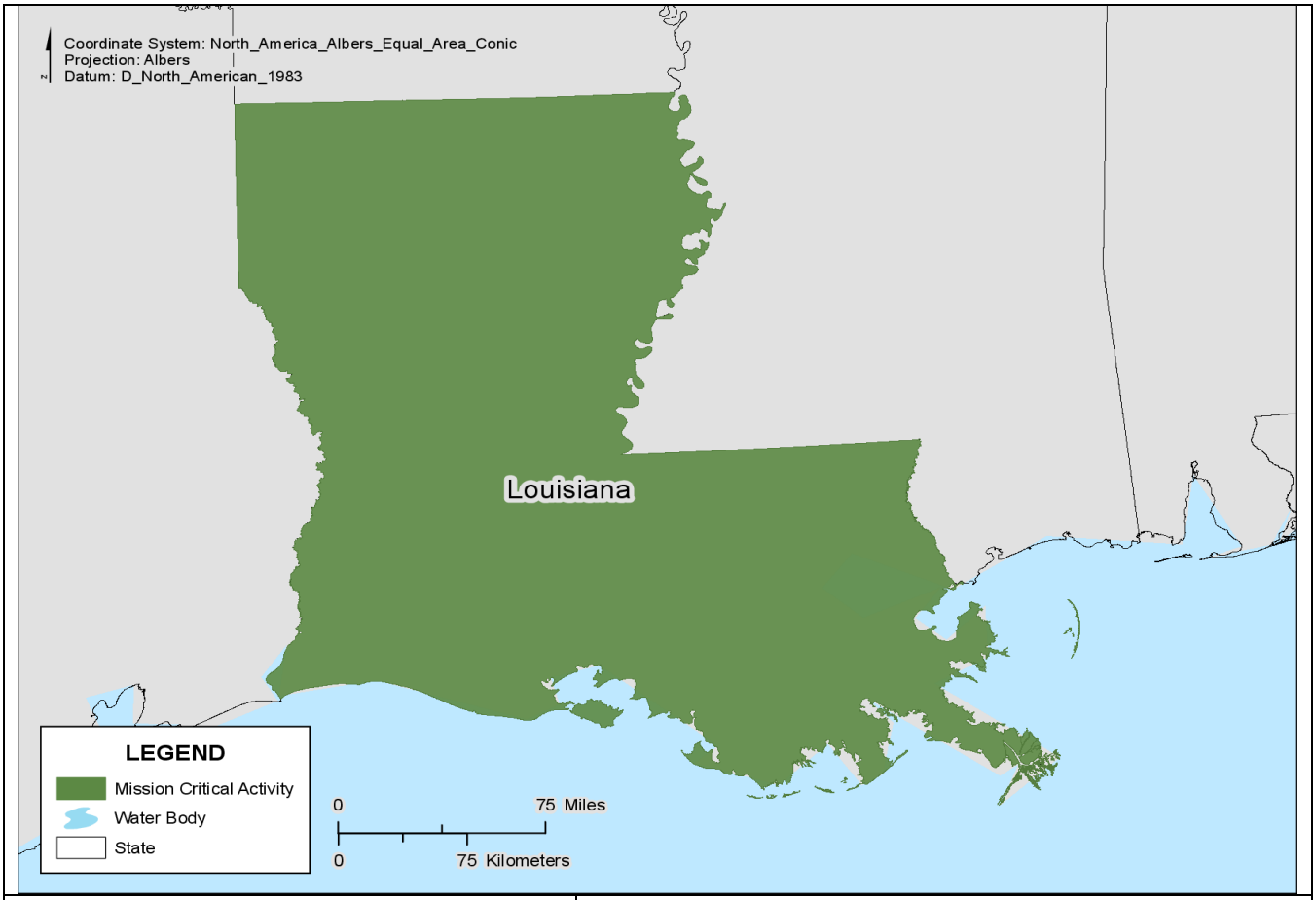
Future Benefits	
Future Annual Benefits ($):	$150,000
Future Benefits Description:	Access to better waterbody and watershed boundaries and more frequent updates of these boundaries.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Wildlife and Fisheries Management



Mission Critical Activity Title:	Wildlife and Fisheries Management
Mission Critical Activity Description:	Geospatial support of wildlife and fisheries management.
MCA_ID:	3797677595_1
Organization Type:	State Government
Organization Name:	Louisiana Department of Wildlife and Fisheries
Business Use:	Wildlife and Habitat Management
Area of Interest:	Louisiana

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved hydrographic information would allow more accurate data to be included as factors determining habitat management decisions.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	Visual Inspection
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Maine

Maine has abundant surface water resources including 3,400 miles of coastline, over 31,000 miles of river and streams, and more than 6,000 lakes and ponds. The greatest value of these water resources is the recreational opportunities they afford and the aquatic habitats they maintain. Among consumptive human uses, public water supply ranks among the most important uses, but others include thermoelectric power generation, irrigation, livestock, industrial and mining activities, and aquaculture. Surface water is used in a non-consumptive application for hydroelectric power generation.

Information gathered from state and local officials identified nine Mission Critical Activities (MCAs) that require access to GIS-based hydrographic data. The priority MCAs are summarized as:

- Assessment and management of ambient surface water quality (in rivers, streams, wetlands, lakes, ponds, marine, and estuarine waters) as required by various state and Federal directives
- Sustainable water use
- Hydrologic design for DOT bridges and culverts including hydraulic design for fish passage at highway stream crossings
- Flood risk mapping
- Management of marine and freshwater fisheries, wildlife species, and natural communities

Important state issues cutting across many agency lines include maintaining water quality and quantity, management of marine and freshwater habitat including fish passage, and perhaps most significantly, adaptation to climate change. The latter affects culvert and bridge design, water availability, irrigation demand, coastal and inland wetland habitat, flood zone determinations, coastal resiliency, water quality, and recreational opportunities.

While detailed survey responses were quite variable, there are some trends. The median response for the required data update frequency is 4 to 5 years. The median response for the required positional accuracy was +/- 7 feet and 2 acres for smallest mapped waterbody. Major current and future benefits were identified for program operations and survey responses indicate that benefits will be larger in the future across all three categories of the survey.

Unmet needs for water data/information in the state include:

- Add urban area infrastructure to the NHD
- Integrated use of wetlands with existing NHD data
- Improve watershed delineations
- Data and applications to manage invasive aquatic plants
- Methods to facilitate the calculation of flushing rates of lakes and ponds to predict nitrogen and phosphorus retention
- Stream mapping – adding omissions and correcting errors in existing data
- Moving to local-resolution NHD

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓			✓	✓			✓			

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Nice To Have
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

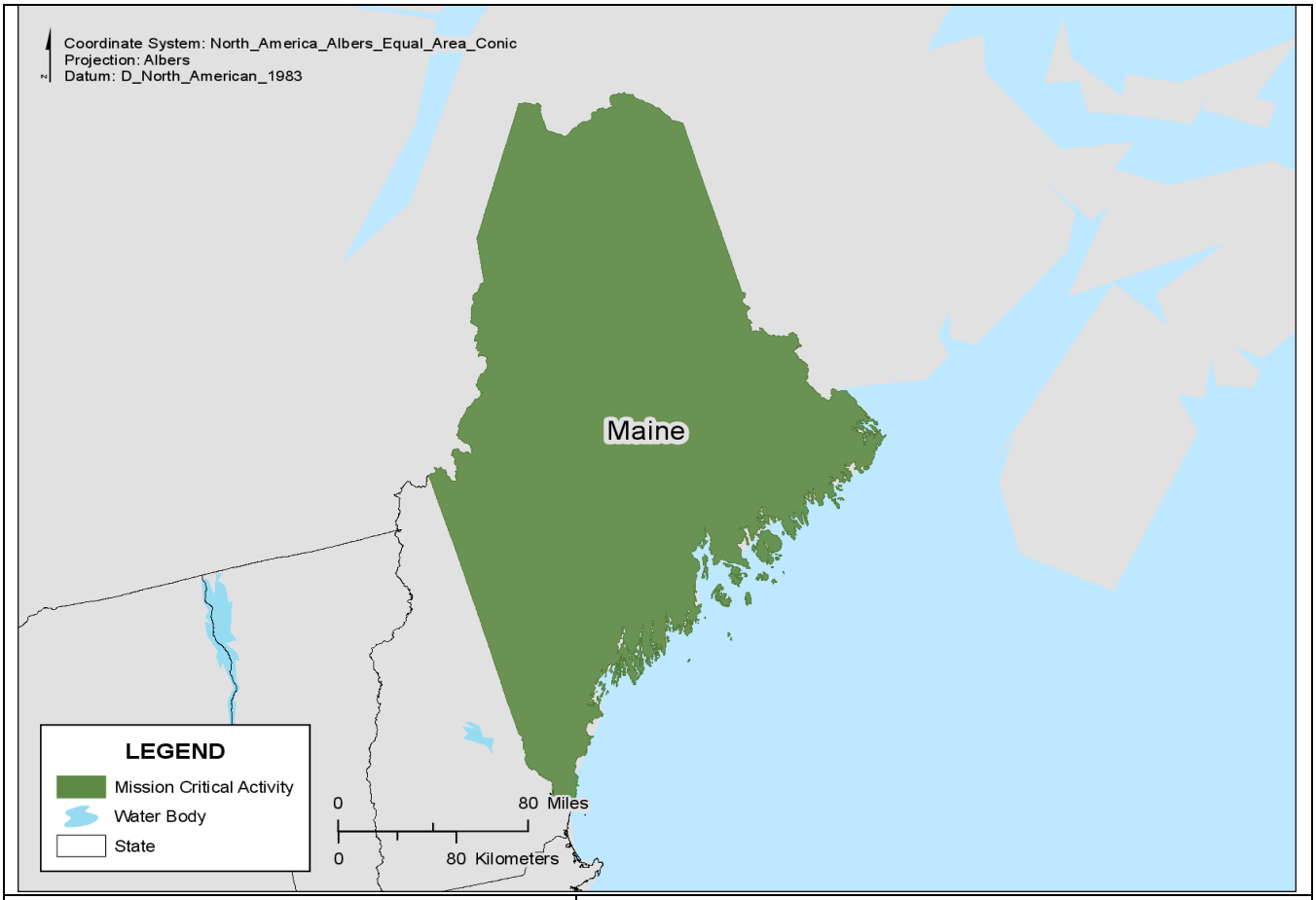
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Maine managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Hydrologic Design



Mission Critical Activity Title:	Hydrologic Design
Mission Critical Activity Description:	Hydrologic design for DOT bridges and culverts.
MCA_ID:	3801925402_1
Organization Type:	State Government
Organization Name:	Maine Dept. of Transportation
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI, DEM.

Current Benefits	
Total Annual Program Budget:	$200 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

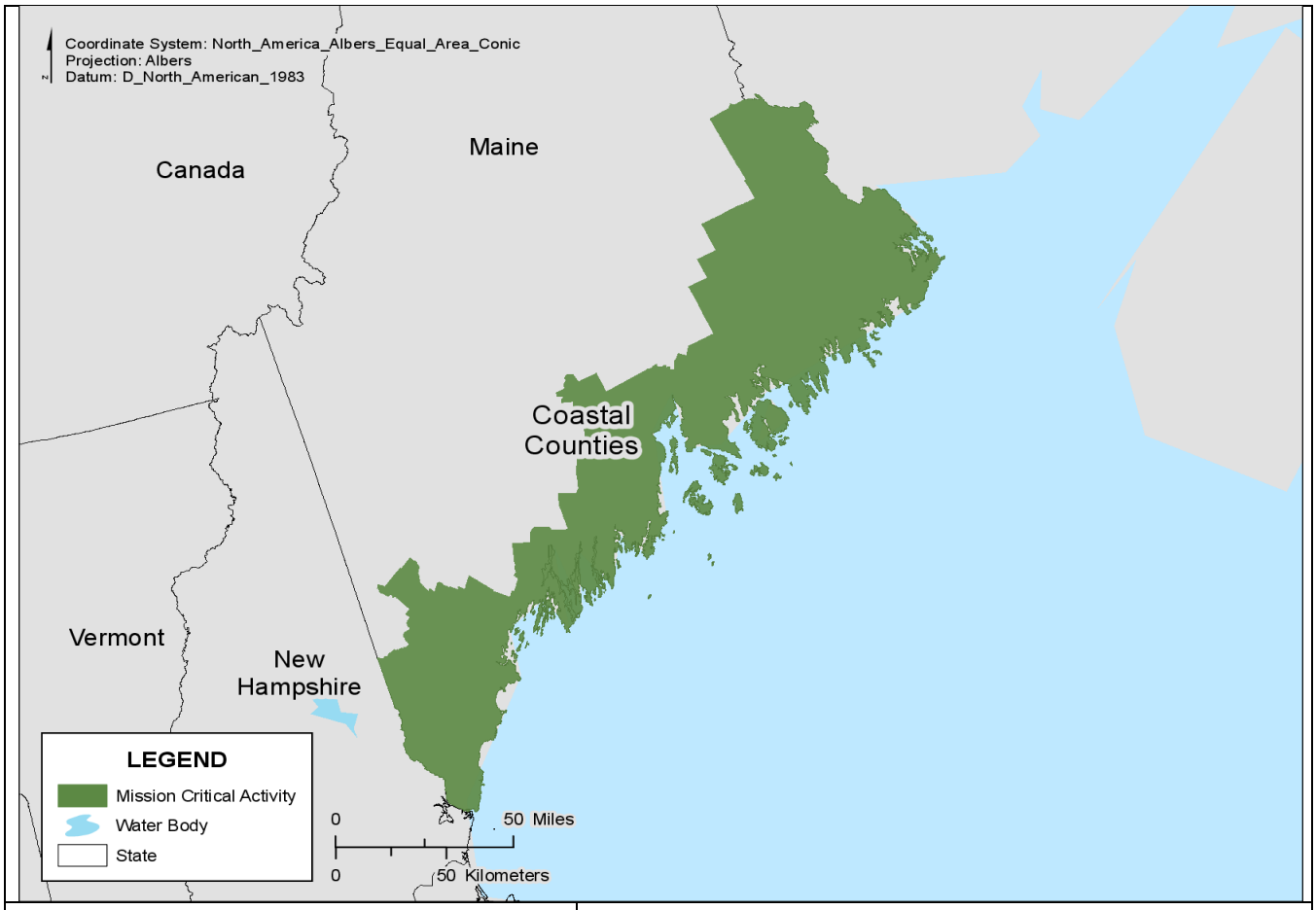
Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	More accurate watershed delineation. More accurate estimation of design flows. Easier/more timely assessment of intermittent vs. perennial streams.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3836990506_1
Organization Type:	State Government
Organization Name:	Department of Agriculture, Conservation and Forestry
Business Use:	Flood Risk Management
Area of Interest:	Statewide

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$280,000
Current Annual Benefits ($):	$280,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Major
Current Other Benefits:	

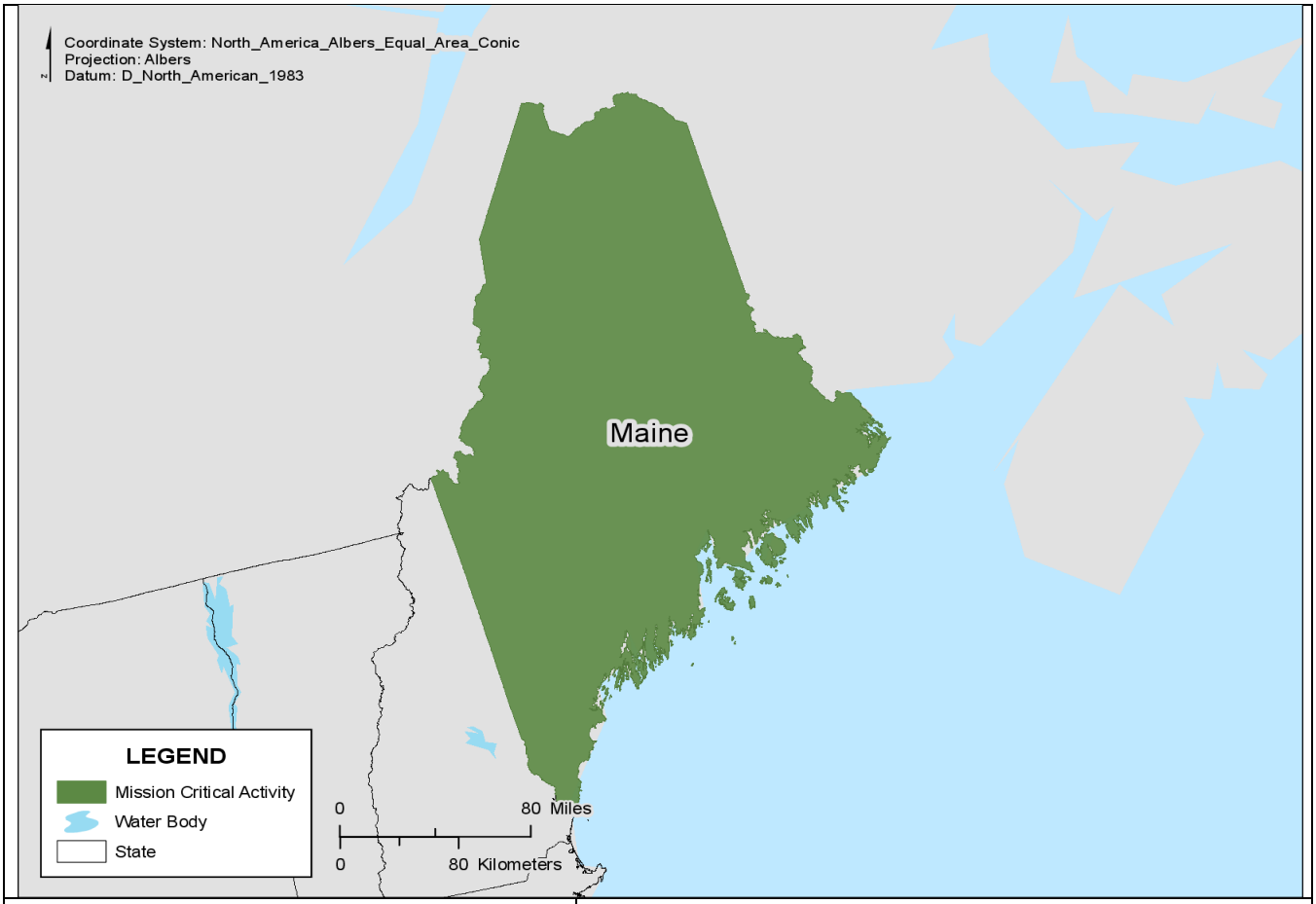
Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	Having high-resolution stream network data is critical to accurately mapping floodplains. This would increase the reliability of mapping boundaries and prevent development in hazardous areas.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Hydrologic and Hydraulic Design



Mission Critical Activity Title:	Hydrologic and Hydraulic Design
Mission Critical Activity Description:	Hydrologic/hydraulic design for fish passage at highway stream crossings.
MCA_ID:	3801925402_2
Organization Type:	State Government
Organization Name:	Maine Dept. of Transportation
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI.

Current Benefits	
Total Annual Program Budget:	$100 million
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50 million
Future Benefits Description:	Better assessment of intermittent/perennial streams. More accurate watershed delineation.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

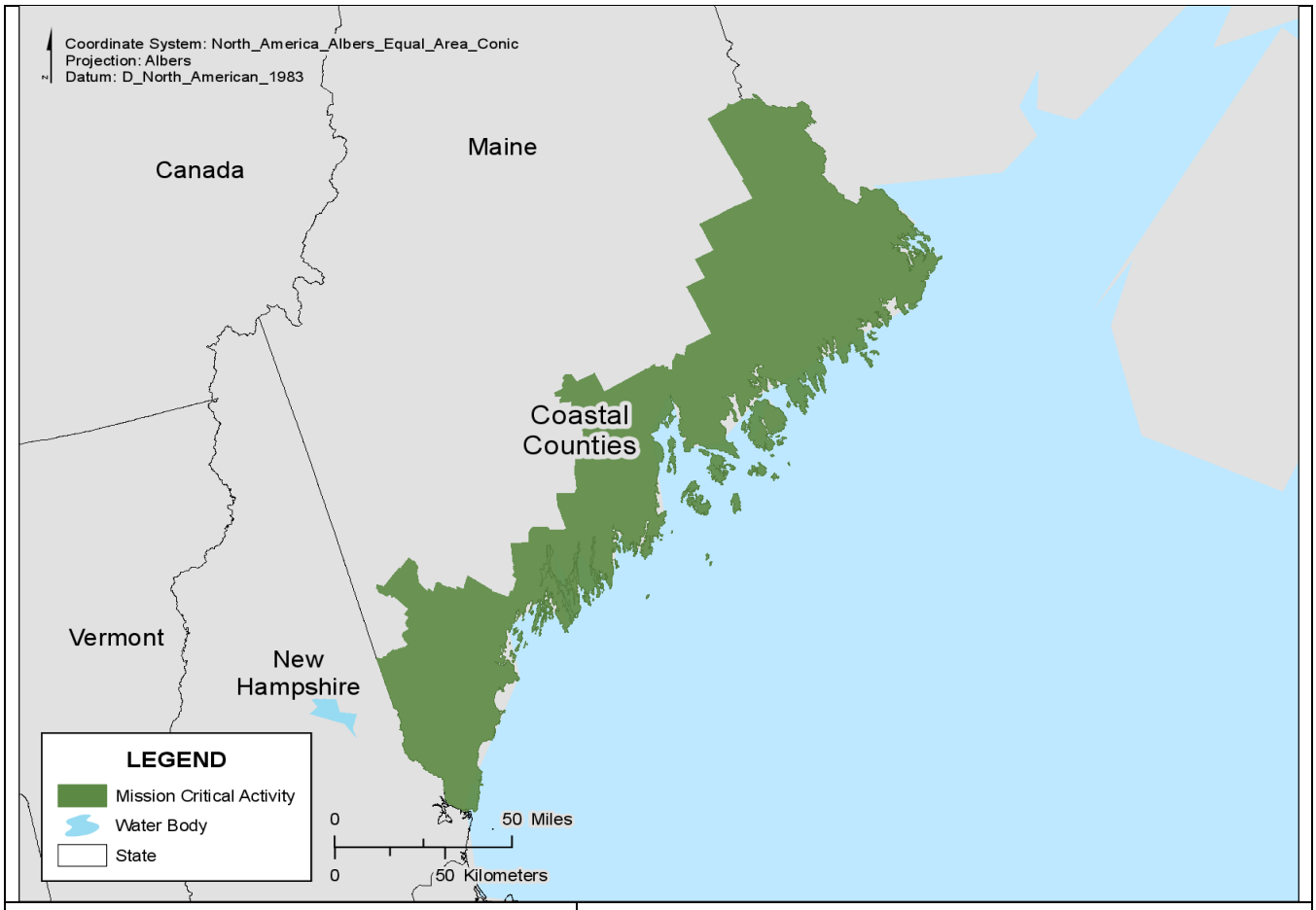
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Coastal Resiliency Studies



Mission Critical Activity Title:	Coastal Resiliency Studies
Mission Critical Activity Description:	Coastal resiliency studies.
MCA_ID:	3772854196_1
Organization Type:	State Government
Organization Name:	Maine Geological Survey
Business Use:	Sea Level Rise and Subsidence
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	More timely and accurate analysis of storm surge from potential storms. Better communication with emergency responders and the public.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

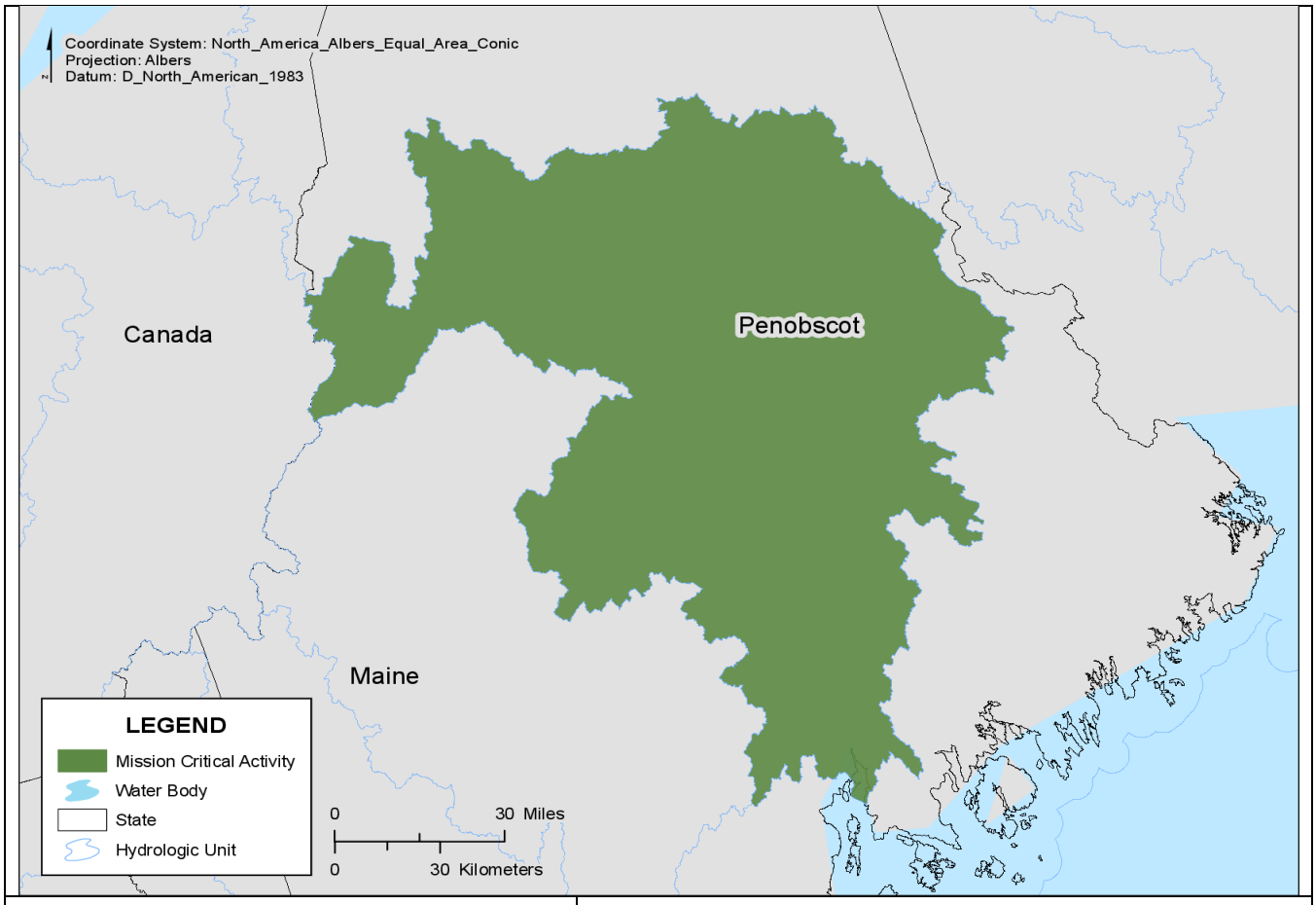
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring



Mission Critical Activity Title:	Water Quality Monitoring
Mission Critical Activity Description:	Water quality monitoring.
MCA_ID:	3812011575_1
Organization Type:	Tribal Government
Organization Name:	Penobscot Indian Nation
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2,000
Current Annual Benefits ($):	$500
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$200
Future Benefits Description:	Save a lot of time, improved response, and timeliness.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	

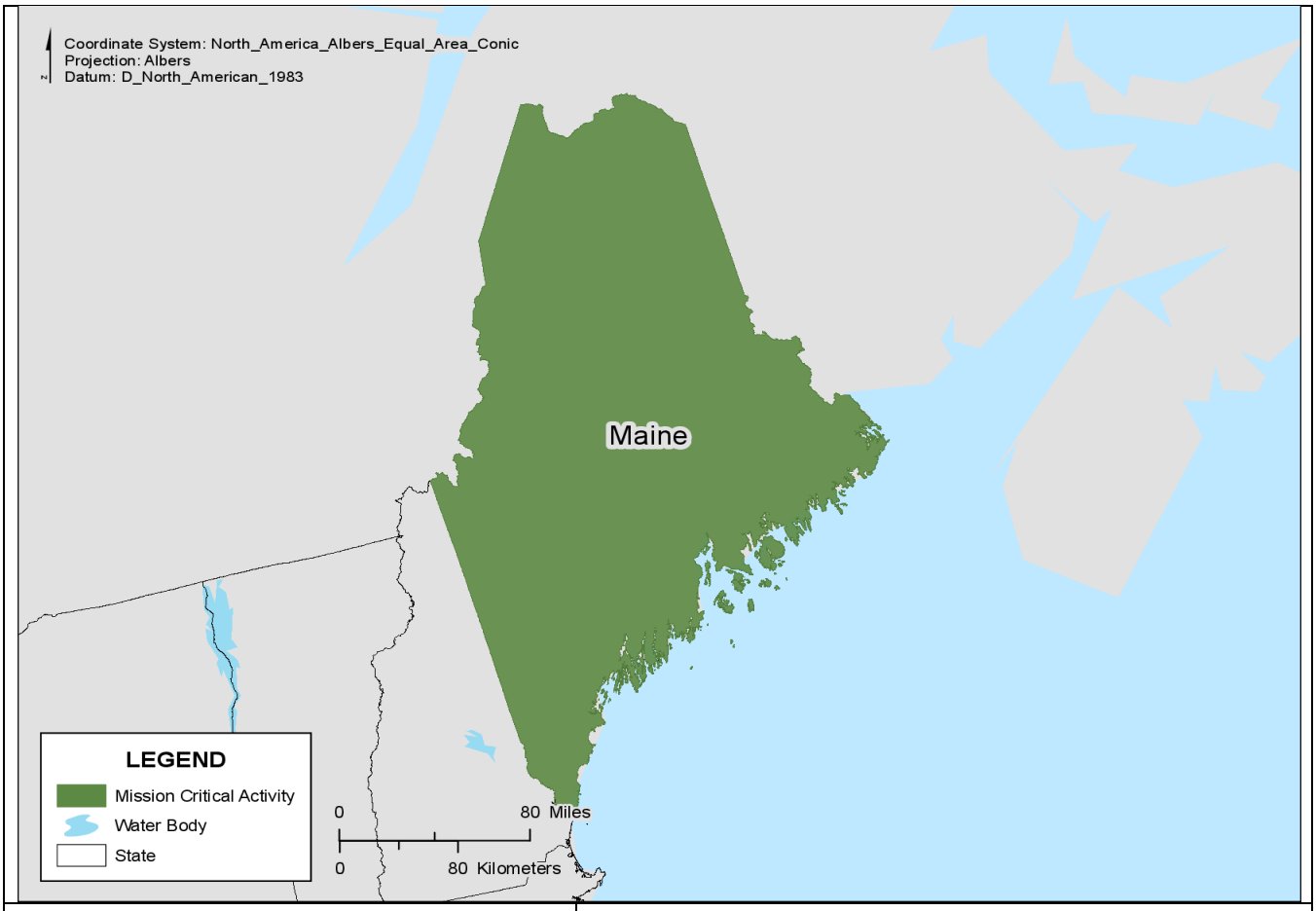
Required Characteristics	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Management



Mission Critical Activity Title:	Water Quality Management
Mission Critical Activity Description:	The primary goal of the Division of Environmental Assessment is to assess and manage ambient surface water quality (in rivers, streams, wetlands, lakes, ponds, marine and estuarine waters) as required by various state and Federal directives, especially the Clean Water Act. We characterize the baseline quality and status of state waters in order to understand trends in water quality changes and determine stress factors that impact water quality. The NHD is the fundamental hydrography layer for these applications, and is also used in determining contributing watersheds for sampling sites and other locations of concern.
MCA_ID:	3825944156_1
Organization Type:	State Government
Organization Name:	Maine Department of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI.

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	The primary savings would be in staff time and salary devoted to carrying out GIS analysis such as watershed delineation and hydrologic analysis. These in turn would result in increased efficiency of delivery of water quality monitoring data under state and Federal requirements.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

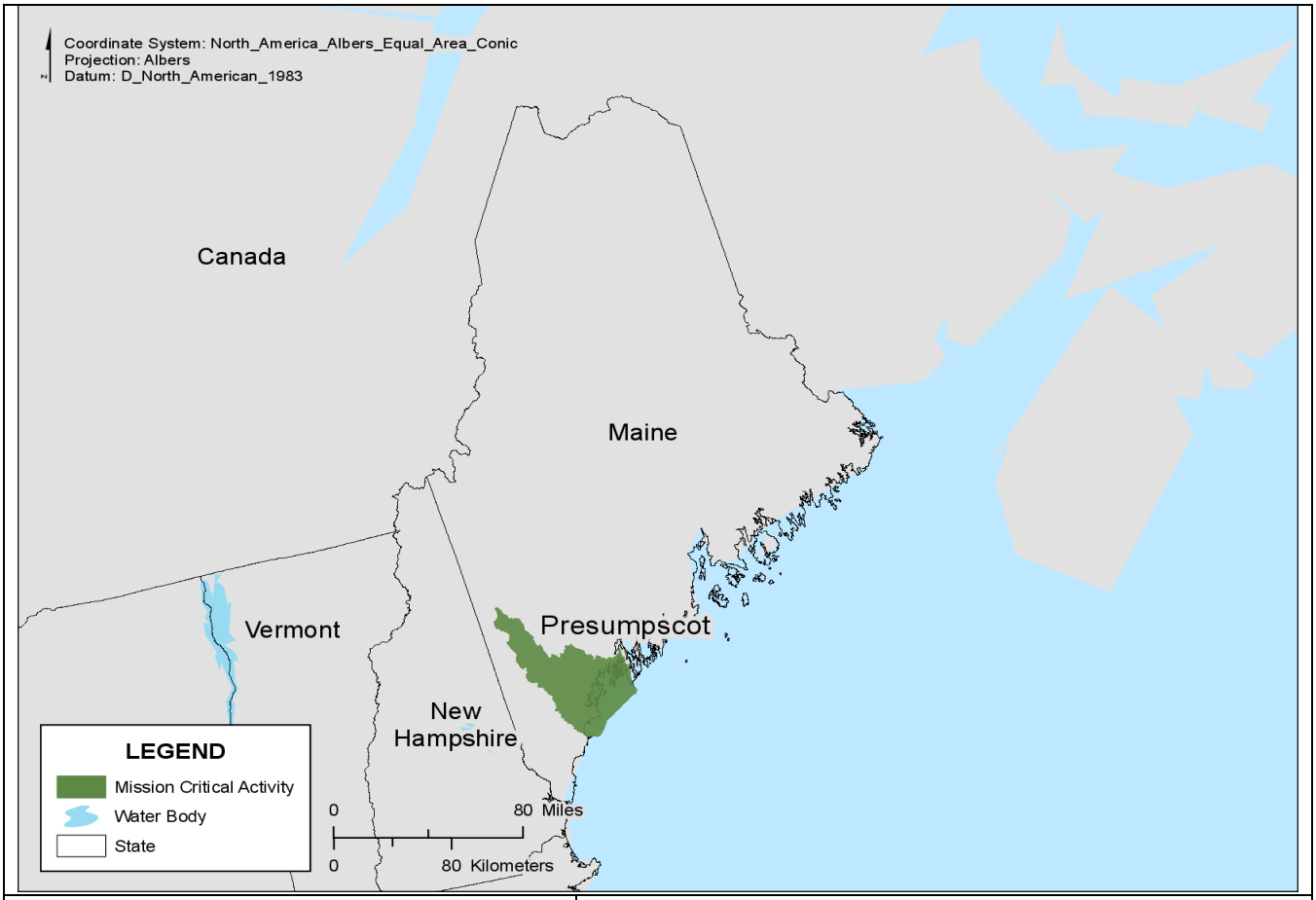
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Drinking Water Supply and Protection



Mission Critical Activity Title:	Drinking Water Supply and Protection
Mission Critical Activity Description:	Our MCA is providing high-quality drinking water and wastewater services to 200,000 people in Southern Maine.
MCA_ID:	3776344378_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Portland Water District
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USGS lake level.

Current Benefits	
Total Annual Program Budget:	$39 million
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Minor benefits.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

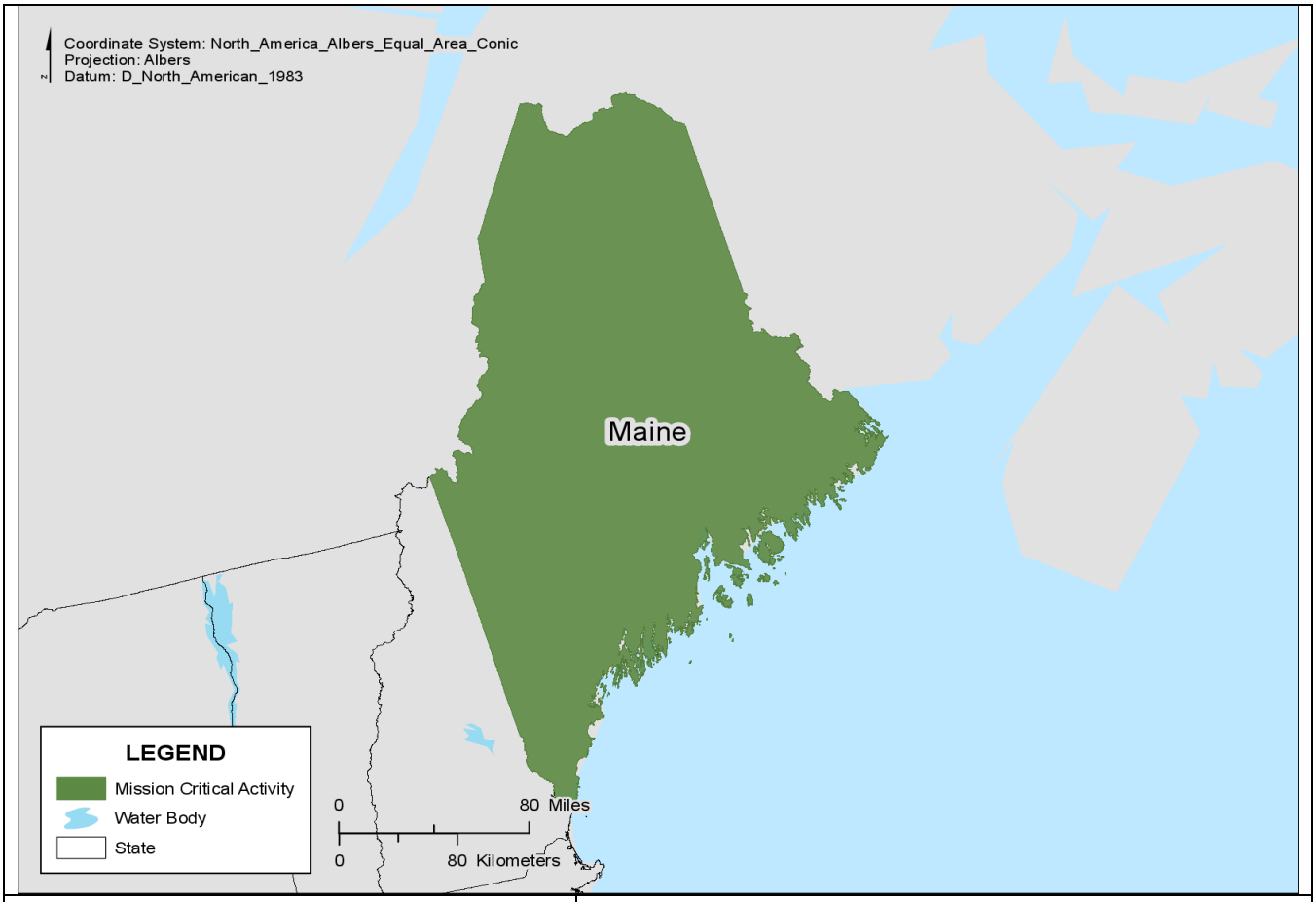
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Nice to Have	Associate Selected Data Type
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Resource Investigations



Mission Critical Activity Title:	Water Resource Investigations
Mission Critical Activity Description:	Water availability and planning.
MCA_ID:	3836990507_1
Organization Type:	State Government
Organization Name:	Maine Geological Survey
Business Use:	Water Resource Planning and Management
Area of Interest:	Statewide

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	Improved water supply and demand analyses.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

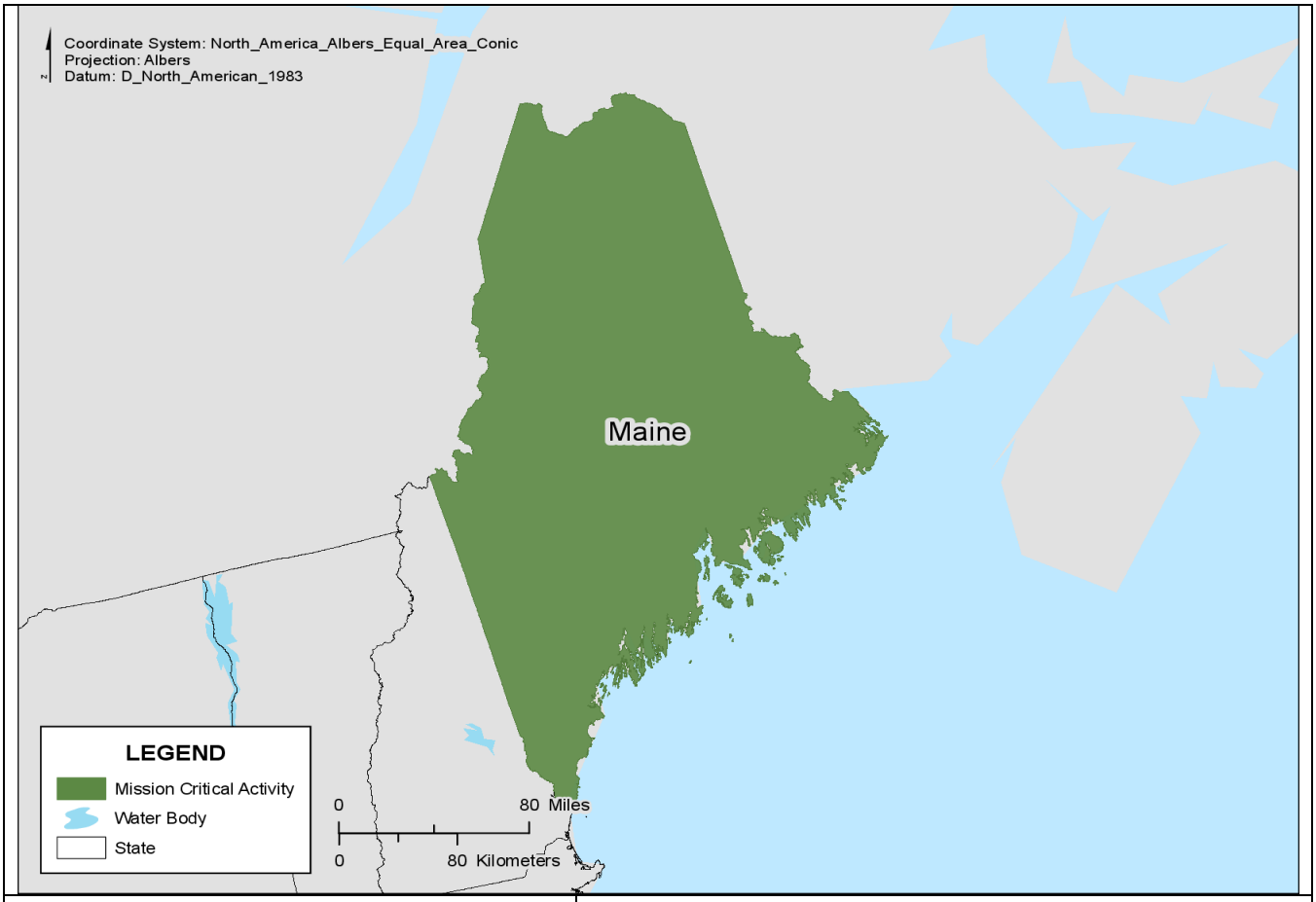
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers		
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Wildlife Management



Mission Critical Activity Title:	Wildlife Management
Mission Critical Activity Description:	Wildlife management.
MCA_ID:	3803657758_1
Organization Type:	State Government
Organization Name:	Maine Department of Inland Fisheries and Wildlife
Business Use:	Wildlife and Habitat Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI.

Current Benefits	
Total Annual Program Budget:	$20 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Greater accuracy in mapping and evaluation of regulatory wildlife habitats.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Required	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Maryland

The Maryland Department of Natural Resources (DNR) is a steady user of the National Hydrography Dataset (NHD) and Watershed Boundary Dataset (WBD), using hydrography data in selecting and planning community restoration of shoreline, submerged aquatic vegetation, wetlands, and forest habitat, and the preservation of existing identified natural resources. DNR provides scientific information to the Chesapeake Bay Program and the Maryland Department of the Environment for their regulatory activities, such as the Water Quality Tier 2 303d integrated report. The Maryland Department of the Environment (MDE) is the NHD/WBD steward for Maryland, and is the regulatory agency in terms of permitting construction near the coastline, waterways, wetlands, and habitats designated by DNR for preservation. MDE also contains the flood mitigation group for the state. Local-resolution NHD will support flood mitigation projects in Washington County and serve as the model for expansion to the rest of the state. A similar project is planned for the Federally-recognized urban waterway - the Anacostia River Watershed in Montgomery and Prince George's Counties. These data will be integrated with the District of Columbia local-resolution NHD project. Local-resolution NHD and WBD data will help with stormwater modeling to the catchment level of detail and siting of Best Management Practices (BMPs). It will also improve the efficiency of permitting due to the ability to relate to parcel-level data and orthoimagery. The Maryland State Highway Administration (SHA) uses NHD data for reporting TMDL figures and planning stormwater BMPs for surface transportation infrastructure. The move to 1:2,400-scale NHD data will benefit SHA for the scale of the areas they need to plan for.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓					✓							

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, streamgages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

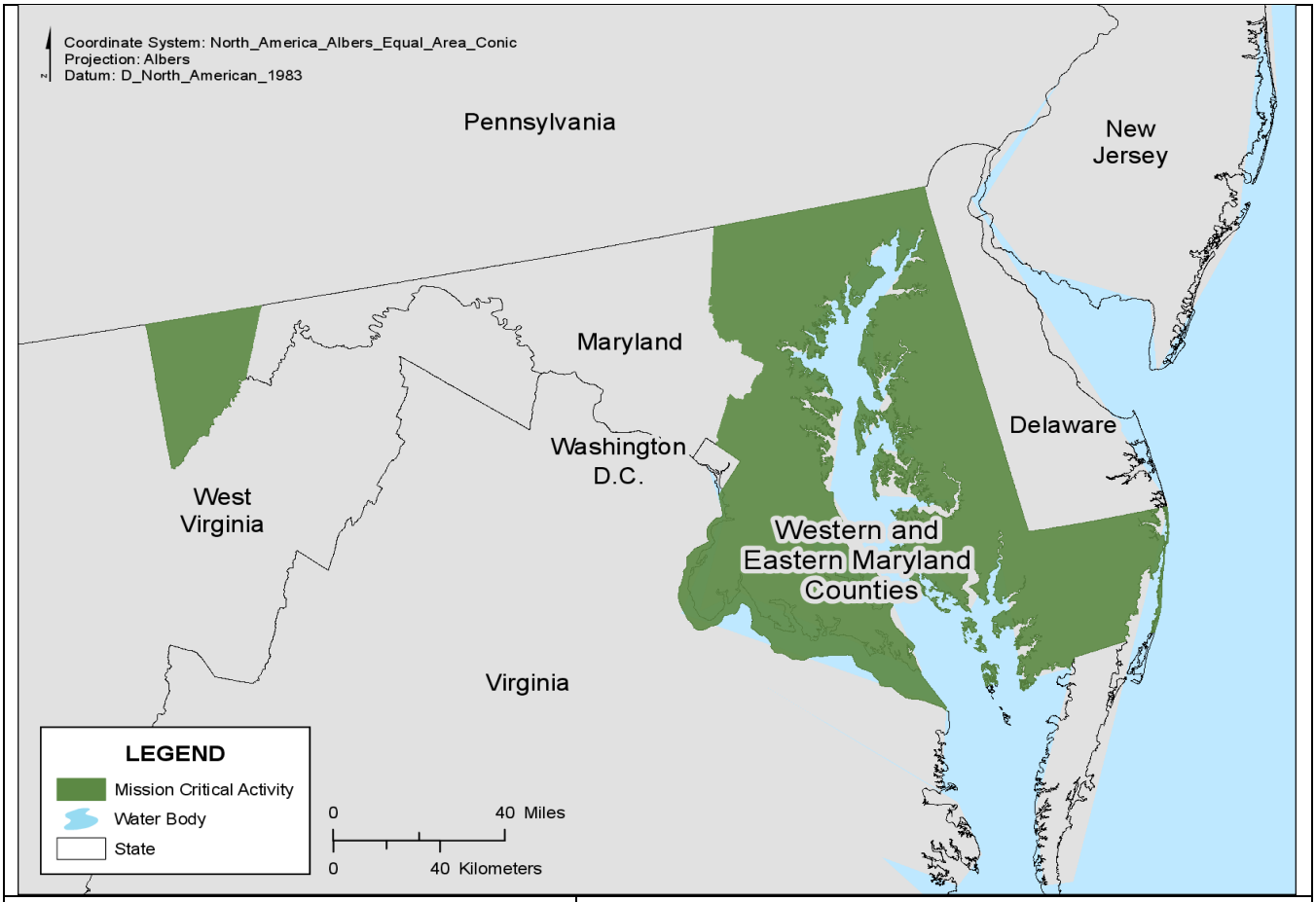
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Maryland managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Preparation for Short and Long-Term Events Affecting Waterways



Mission Critical Activity Title:	Preparation for Short and Long-Term Events Affecting Waterways
Mission Critical Activity Description:	Maryland's Chesapeake & Coastal Service assists the state and local communities in restoring waterways; preparing for storm events, shoreline change, and sea level rise; and protecting habitats and fostering clean coastal industries.
MCA_ID:	3822862574_2
Organization Type:	State Government
Organization Name:	Maryland Department of Natural Resources
Business Use:	Coastal Zone Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$45 million
Current Annual Benefits ($):	$5 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2.5 million
Future Benefits Description:	More recent and consistent hydrographic information will lead to better decisions regarding coastal hazards.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

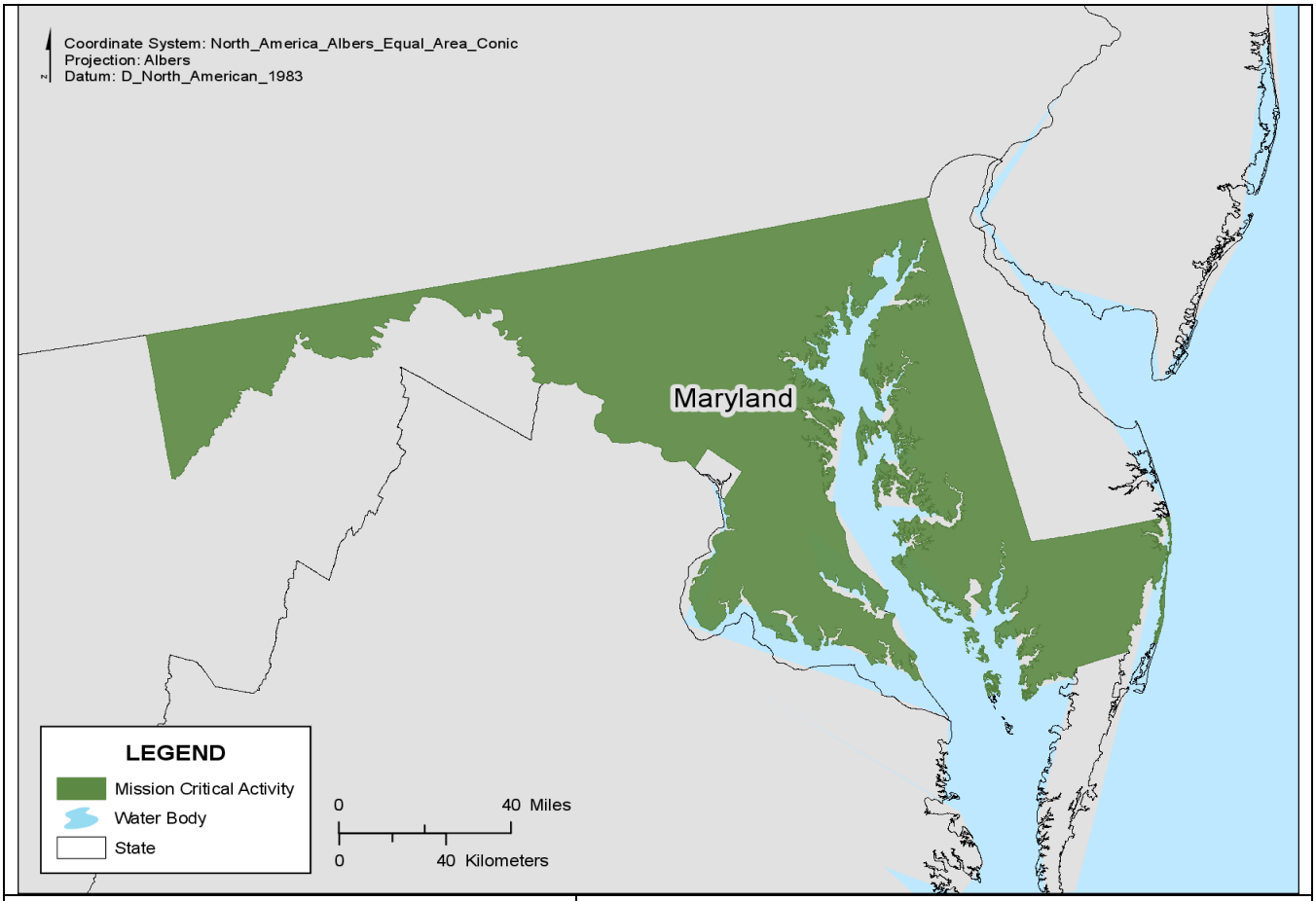
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Science Strategy and Support for Protecting and Enhancing Natural Resources



Mission Critical Activity Title:	Science Strategy and Support for Protecting and Enhancing Natural Resources
Mission Critical Activity Description:	The Department of Natural Resources leads Maryland in securing a sustainable future for our environment, society, and economy by preserving, protecting, restoring, and enhancing the state's natural resources.
MCA_ID:	3822862574_1
Organization Type:	State Government
Organization Name:	Maryland Department of Natural Resources
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200 million
Current Annual Benefits ($):	$5 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2.5 million
Future Benefits Description:	All benefits would be improved by availability of the most current and consistent data.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major

Future Benefits	
Future Other Benefits:	

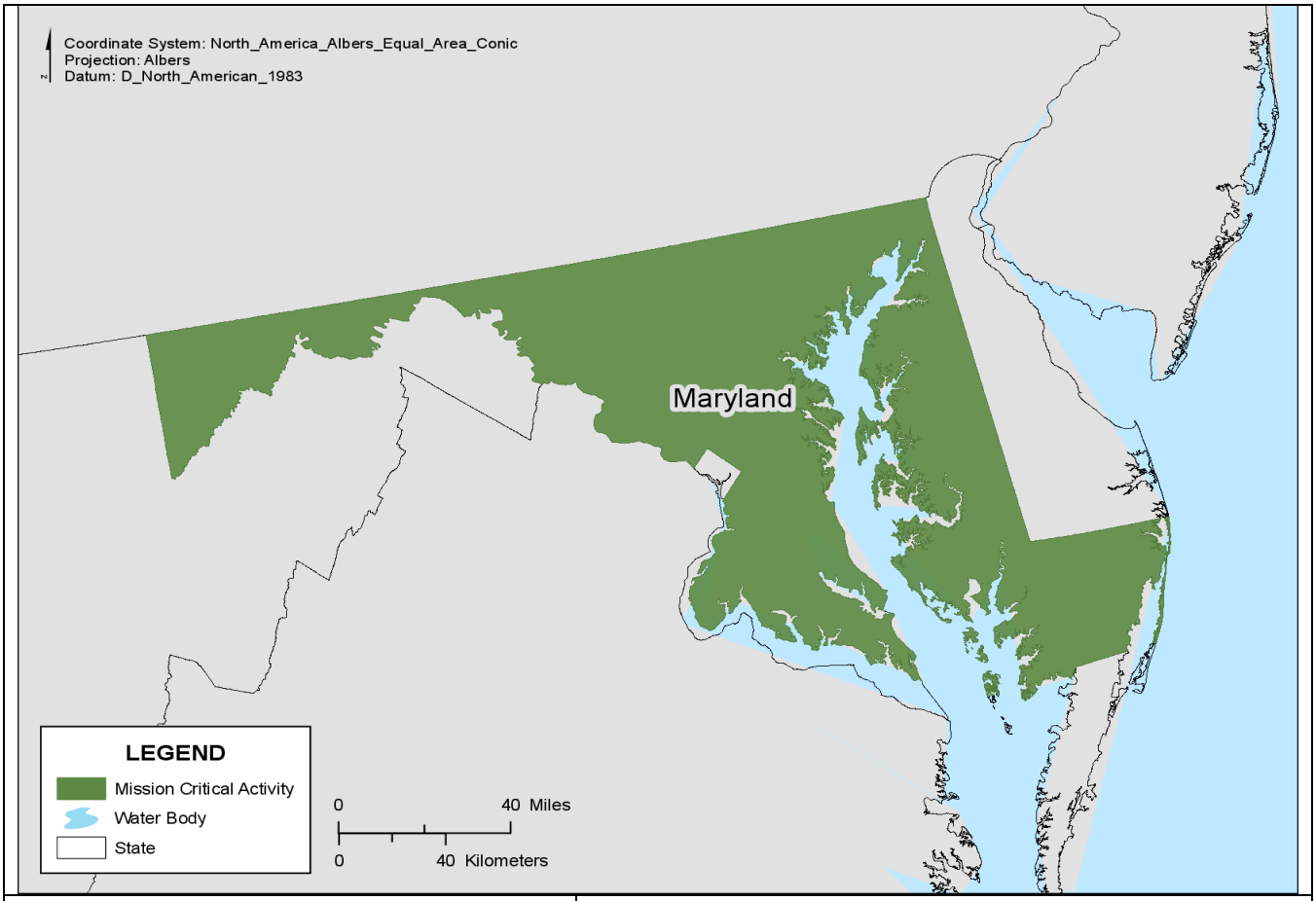
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

TMDL and Stormwater Planning and Mitigation for Surface Transportation Infrastructure



Mission Critical Activity Title:	TMDL and Stormwater Planning and Mitigation for Surface Transportation Infrastructure
Mission Critical Activity Description:	GIS support of Maryland State Highway Administration.
MCA_ID:	3773416116_1
Organization Type:	State Government
Organization Name:	Maryland State Highway Administration
Business Use:	Sea Level Rise and Subsidence
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	USACE Tide guidance for Sea level Change - developed internally.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	More accurate and geospatially-related data would improve our highway designs, roadway safety, TMDL program, and H&H modeling.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes

Required Analytical Functions	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Massachusetts

The citizens of the State of Massachusetts depend on a reliable and constant source of high-quality surface water. The state has more than 3,000 lakes and ponds, approximately 1,500 miles of coastline, and 8,200 miles of rivers and streams. The major withdrawals from surface water are for domestic and commercial uses, industry, thermoelectric power generation, mining, and agriculture. Surface water is a major source for public water supplies in Massachusetts, particularly in older, urban communities. Important in-stream uses include recreation and aquatic habitat, navigation, hydroelectric power generation, and waste assimilation.

Information gathered from state and local officials identified several Mission Critical Activities (MCAs) that require access to GIS-based hydrographic data. There was some overlap, and two new activities - Flood Risk Mapping and Bridge and Culvert Design - were identified during a subsequent meeting of survey participants. The following summarizes the Massachusetts MCAs:

- Management of marine and freshwater fisheries, wildlife species, and natural communities
- Ensuring clean air and water, safe management and recycling of solid and hazardous wastes, timely cleanup of hazardous waste sites and spills, and the preservation and restoration of wetlands and coastal resources
- Water supply evaluation, planning, protection, and allocation
- Monitoring drought conditions and potential effects on water supplies, fire protection, and aquatic ecosystems
- Flood risk minimization, including mapping tools, assessment of culvert vulnerability, and regression equations for peak flows
- Evaluation of climate change impacts on water resources to support state and local planning and adaptation initiatives.

A dominant issue facing state and local officials in Massachusetts that requires high-quality digital hydrographic data is climate change adaptation. Understanding the effects of changing hydrology and geomorphology as it relates to water supply evaluation, planning and allocation; flood risk mapping; habitats management; maintaining water quality; and recreational opportunities are key issues. Detailed maps of coastal and inland hydrography and surrounding topography and accurate surface water characteristics including flow and storm surge are required by Massachusetts decision-makers. Other important cross-agency issues needing quality hydrographic data include stormwater management, habitat restoration and improvement, and dam removal.

While specific responses vary, the median response from those taking the survey on update frequency indicates that a four- to five-year update cycle for the data is required. The median response for required positional accuracy was +/- 33 feet and “less than an acre” for smallest mapped waterbody. Major and moderate current and future benefits were reported across all three survey categories.

Unmet needs for water data/information in the state and coordination include:

- River basin coordination between states
- Support using wetlands data with the National Hydrography Dataset (NHD)
- Stream mapping – omissions, correcting errors and mapping at a larger scale

- Integrate groundwater divides with Watershed Boundary Database
- Lake/pond bathymetry
- Improve watershed boundaries in flat areas of southeastern Massachusetts
- Improvement and updating of existing tools
- Support for creating and using point and linear events with NHD data

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓				✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

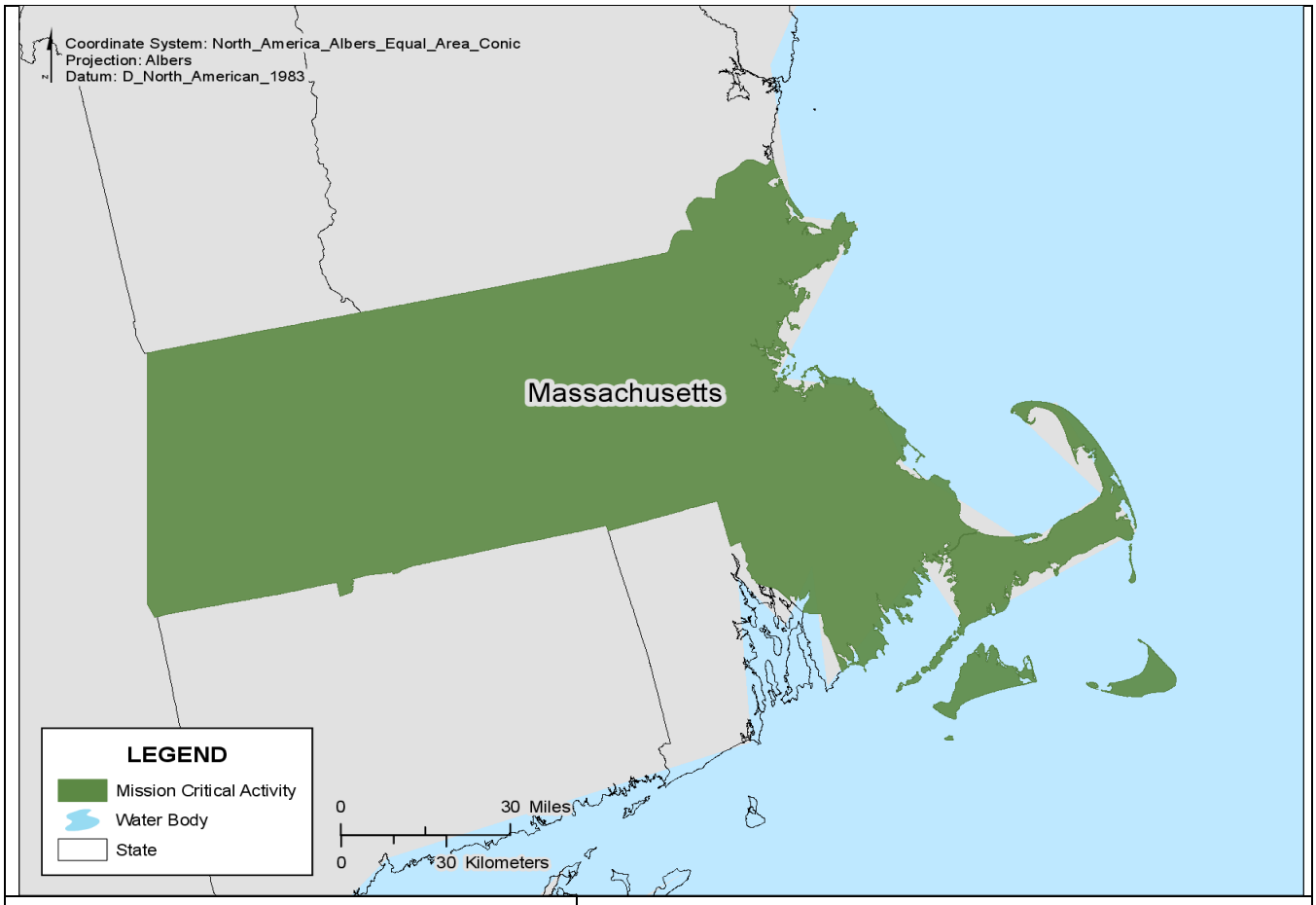
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Massachusetts managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Fish and Game



Mission Critical Activity Title:	Fish and Game
Mission Critical Activity Description:	The Department of Fish and Game works to preserve the state's natural resources and people's right to conservation of those resources. The Department exercises responsibility over the Commonwealth's marine and freshwater fisheries, wildlife species, plants, and natural communities, as well as the habitats that support them.
MCA_ID:	3773516193_1
Organization Type:	State Government
Organization Name:	Massachusetts Department of Fish and Game
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We use our own 1:25,000 USGS/MassDEP Hydrography; we plan at some point to update the NHD based on this dataset.

Current Benefits	
Total Annual Program Budget:	$15 million
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	Would improve our ability to produce high-quality information to the public which they rely on for recreational use. Also, improve our ability to analyze water usage and habitat impacts or potential improvement.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

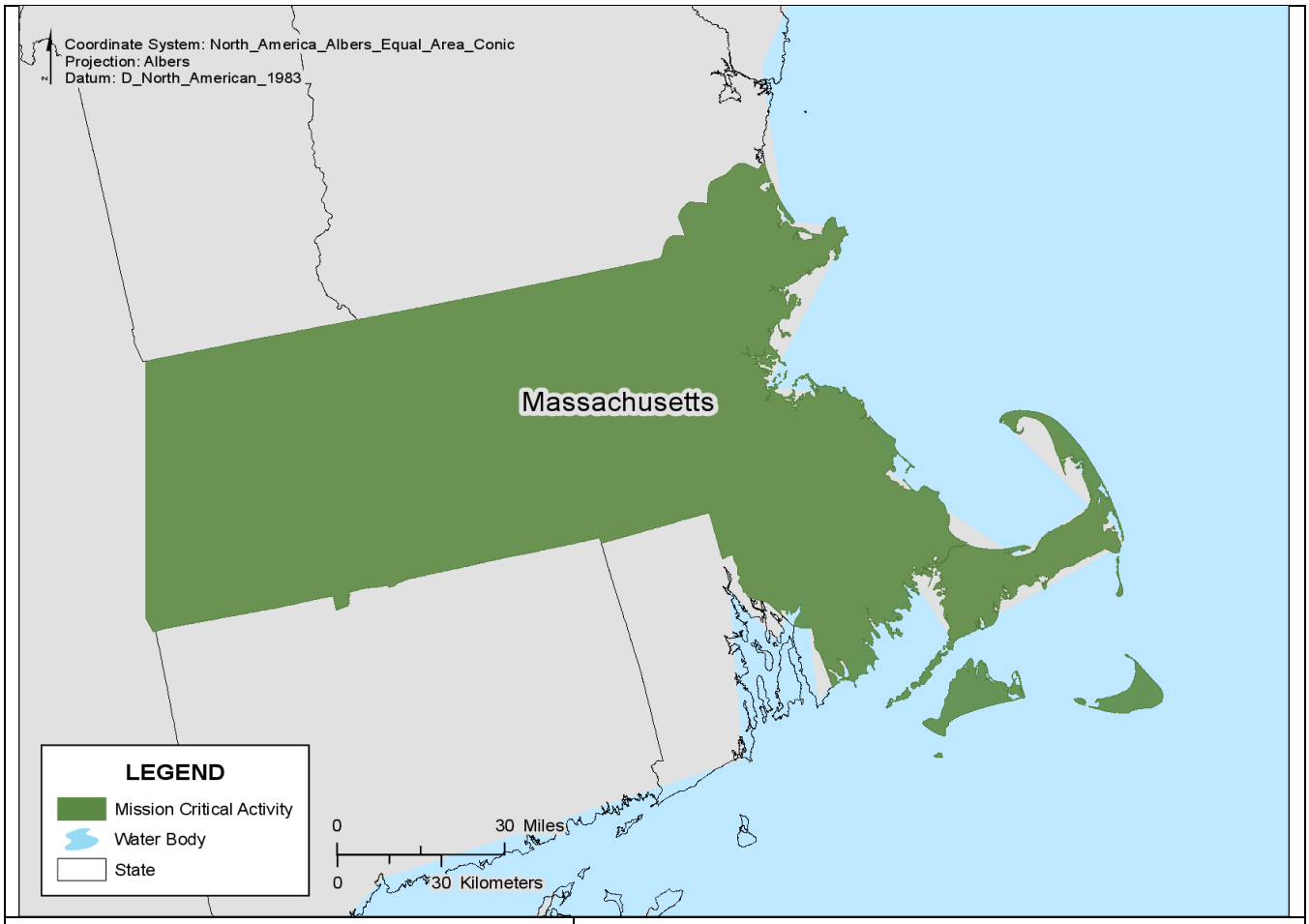
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes

Required Analytical Functions	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Environmental Protection



Mission Critical Activity Title:	Environmental Protection
Mission Critical Activity Description:	Mass DEP is responsible for ensuring clean air and water, safe management and recycling of solid and hazardous wastes, timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources.
MCA_ID:	3776484269_1
Organization Type:	State Government
Organization Name:	Massachusetts Department of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We have enhanced the USGS 1:25,000 hydro to 1:5000 in public water supply watersheds, mapped wetlands at 1:12,000.

Current Benefits	
Total Annual Program Budget:	Approximately $2.3 million.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$150,000
Future Benefits Description:	A stable NHD at a scale of 1:5000 or better would standardize our base map and reporting mechanism, and allow better communications of assessment results.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	

Future Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

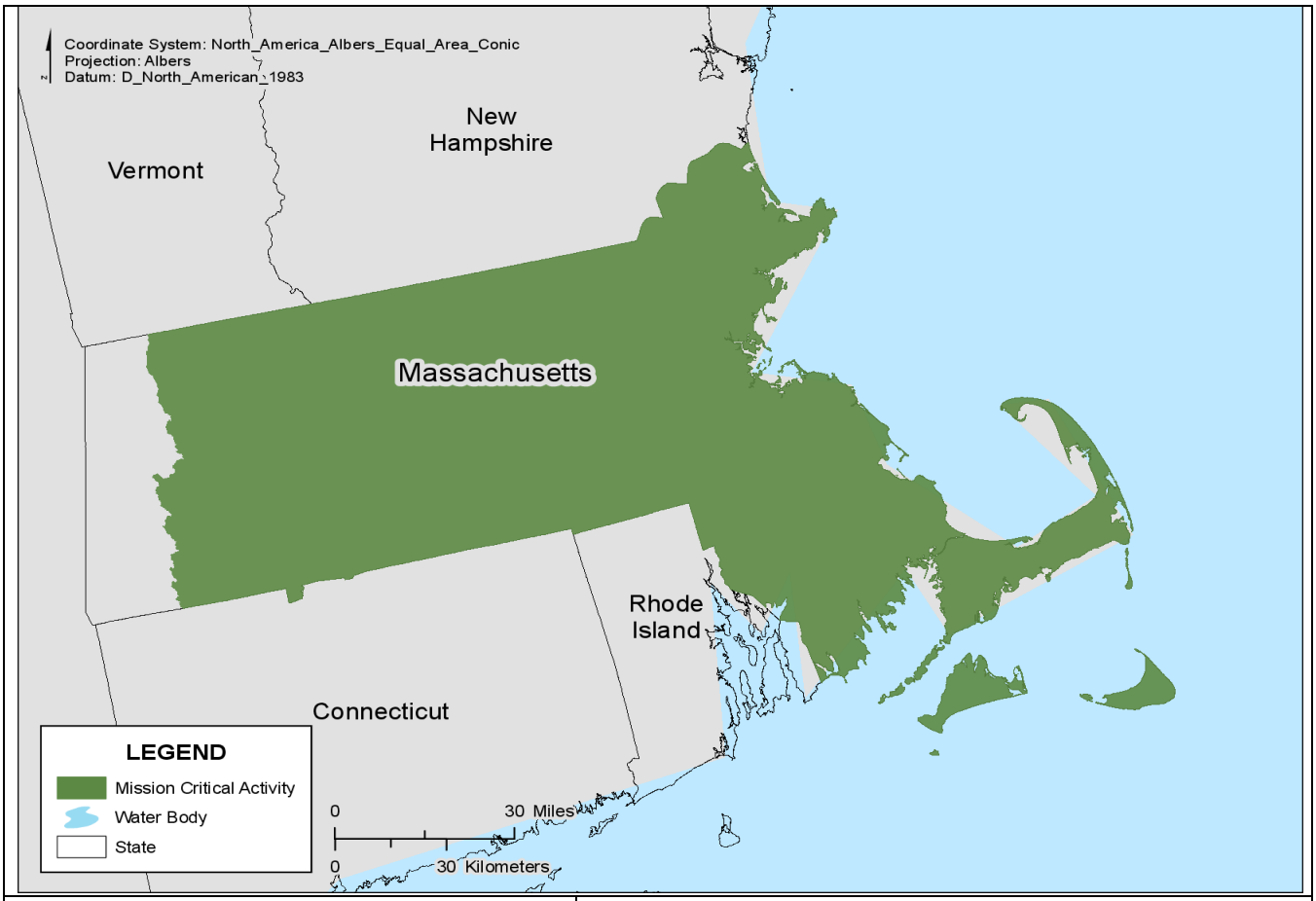
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice to Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Supply System Evaluation



Mission Critical Activity Title:	Water Supply System Evaluation
Mission Critical Activity Description:	Water supply system evaluation.
MCA_ID:	3771684589_1
Organization Type:	State Government
Organization Name:	Massachusetts Water Resources Authority
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 to 2 million
Current Annual Benefits ($):	$200,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$150,000
Future Benefits Description:	Our organization is a water and sewer services wholesaler with minimal customer interface. The major benefits are time or cost savings due to timely access to data needed to model the safe yield of our supply system.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

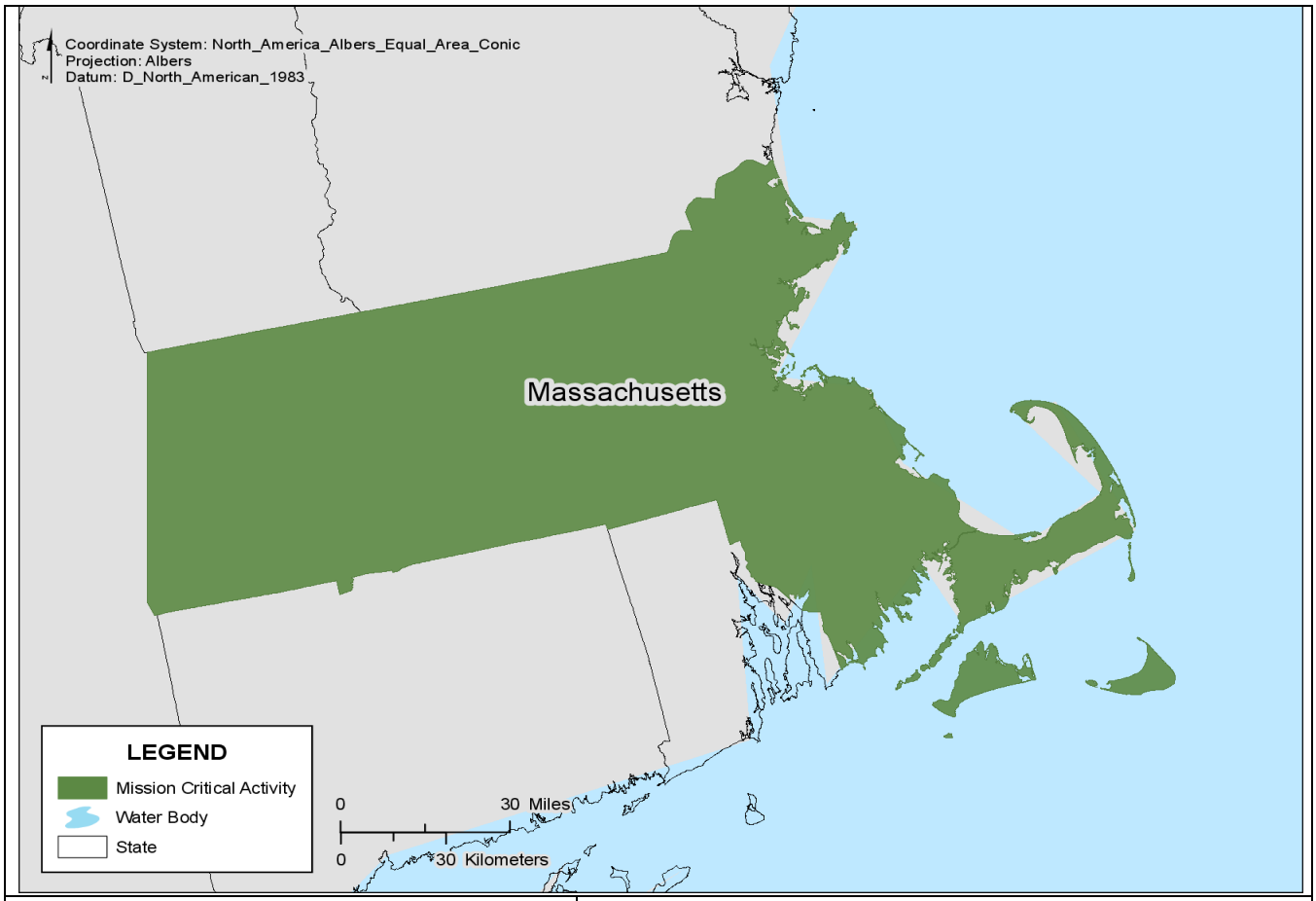
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Visual Inspection
Climate	Required	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

State Water Resource Management



Mission Critical Activity Title:	State Water Resource Management
Mission Critical Activity Description:	State water resources management and planning.
MCA_ID:	3795155926_1
Organization Type:	State Government
Organization Name:	Department of Conservation and Recreation
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	MassGIS provides state services and data layers.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

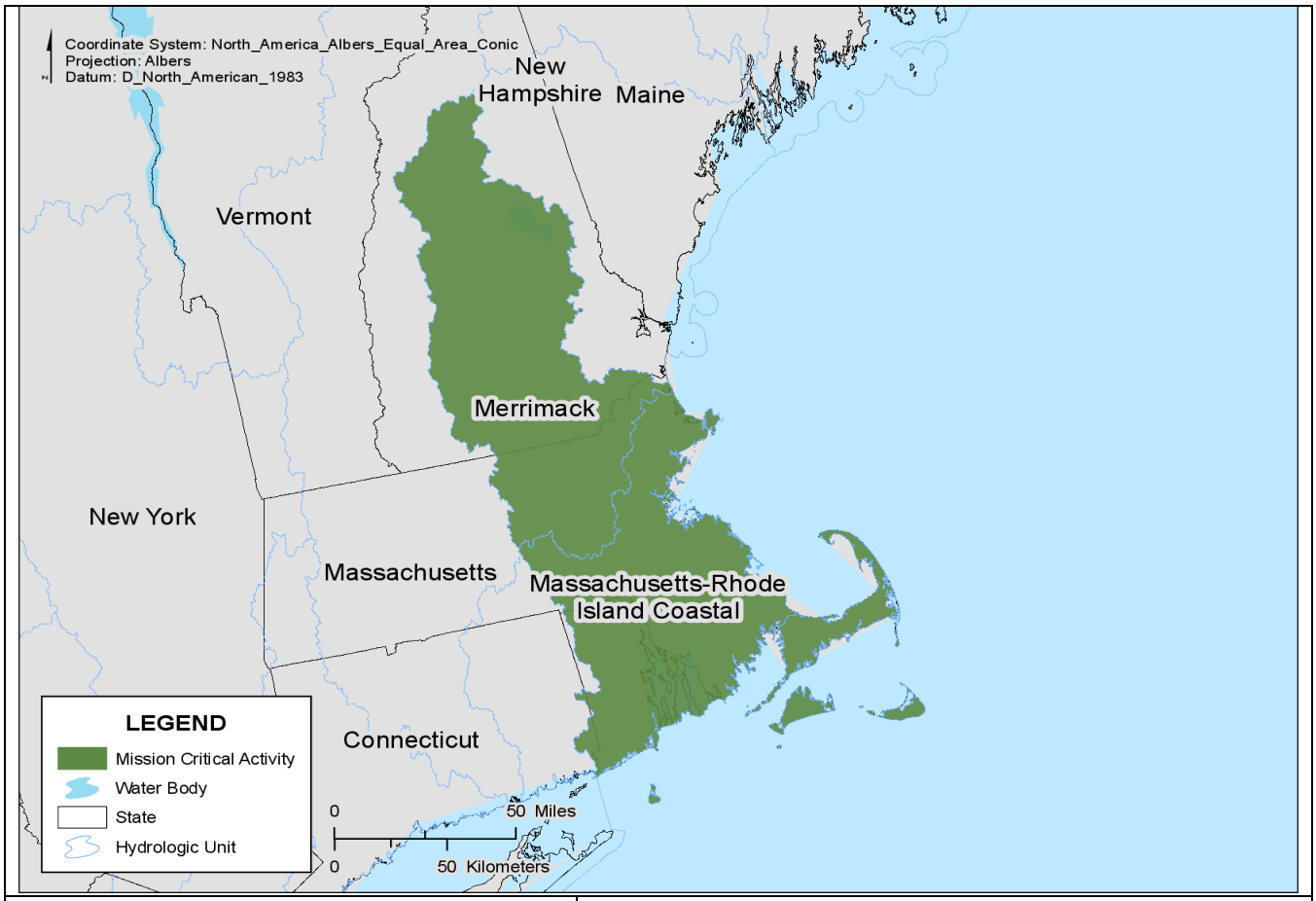
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Regional Water Resource Planning



Mission Critical Activity Title:	Regional Water Resource Planning
Mission Critical Activity Description:	Water resources planning at the regional and watershed scale, including sustainable stormwater management, nonpoint source pollution control, water supply and conservation, and Low Impact Development/Green Infrastructure.
MCA_ID:	3795847349_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Metropolitan Area Planning Council
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	Improved access to hydrographic data that are formatted for ready use in planning analyses, problem identification within watersheds, and prioritizing recommendations for improved water resources management.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Required	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Nice to Have	Visual Inspection
Climate	Required	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Michigan

Many agencies and groups in the state of Michigan have requirements for more complete and current hydrography geographic data that are integrated with other framework layers.

Michigan has opportunities to realize significant benefits from coordinated framework hydrography data, maintained at the local level (e.g. drain commissions, National Forests), matching new lidar-based elevation data, and endorsed and shared among state and Federal agencies.

The initial Hydrography Requirements and benefits Study (HRBS) survey results for Michigan noted critical requirements for improved and coordinated hydrography data supporting the following Mission Critical Activities (MCAs):

- County and Inter-County Drain Management
- Stormwater Mapping and Management
- Flood Mapping and Loss Prevention
- Mineral and Environmental Resource Management
- Hydrographic Flow Analysis
- Authoritative Reference Layer for Statewide Enterprise Geographic Framework

Subsequent Michigan meetings with key hydrography stakeholders identified additional critical activities with many similar requirements for improved hydrography framework data. These include the following:

- Fisheries management
- Forest management
- Watershed management
- Conservation planning
- Land use change and vulnerability risk assessment
- Water withdrawal assessment and groundwater protection
- Water quality
- Recreation
- Cross-agency integration based on common data

A recent study by the Michigan Association of County Drain Commissioners (MACDC) recommends greater local sub-stewardship and use of the National Hydrography Dataset (NHD) as the common hydrography basemap for Michigan. Work is underway by MACDC and their partners for a comprehensive inventory of drains on a statewide basis.

The State of Michigan, Department of Technology Management and Budget (DTMB), Center for Shared Solutions (CSS) is the formal data steward for NHD for Michigan, but needs active regional and local or county sub-stewards. Current sub-stewards include the U.S. Forest Service for Huron, Manistee, Ottawa, and Hiawatha National Forests.

Access to more accurate spatial data for rivers, streams, drains, lakes, ponds, wetlands, watershed boundaries, and related features that are maintained at the local or county level and supported as

authoritative data among state and federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Michigan managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Drain and Stormwater Management for County Development

Mission Critical Activity Title:	Drain and Stormwater Management for County Development
Mission Critical Activity Description:	We manage stormwater in approximately 630 county drains for flood control and overall development of land.
MCA_ID:	3826186570_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Clinton County Drain Commissioner
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We've developed our own GIS map of our drainage infrastructure.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Greater access to hydrologic information outside county boundary.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice to Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Lidar-Based Flood Map Improvement

Mission Critical Activity Title:	Lidar-Based Flood Map Improvement
Mission Critical Activity Description:	We deal with FEMA's flood maps and would like to see those updated using readily-available lidar elevation data.
MCA_ID:	3826186570_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Clinton County Drain Commissioner
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Our own GIS maps of our drainage network.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$20,000
Future Benefits Description:	Accurate flood maps would be helpful to county residents.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Nice to Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Petro and Mineral Resource and Environmental Management

Mission Critical Activity Title:	Petro and Mineral Resource and Environmental Management
Mission Critical Activity Description:	Oil, gas, mining, and minerals exploration and production. The Michigan Department of Environmental Quality manages and overseas the environmental resources of the state. With this we need accurate hydrology data.
MCA_ID:	3803520101_1
Organization Type:	State Government
Organization Name:	Michigan Department of Environmental Quality
Business Use:	Oil and Gas Resources
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	We will be able to make better decisions with better data.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

Future Benefits	
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Management Cross Boundary

Mission Critical Activity Title:	Stormwater Management Cross Boundary
Mission Critical Activity Description:	Maintenance and improvement of intercounty drains (stormwater management).
MCA_ID:	3803991190_1
Organization Type:	State Government
Organization Name:	Michigan Department of Agriculture and Rural Development (MDARD)
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$450,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	MDARD currently has no ability to use any GIS system. Having NHD data at the level of inventoried drainage infrastructure in Michigan would very likely spur the department to remedy this situation.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

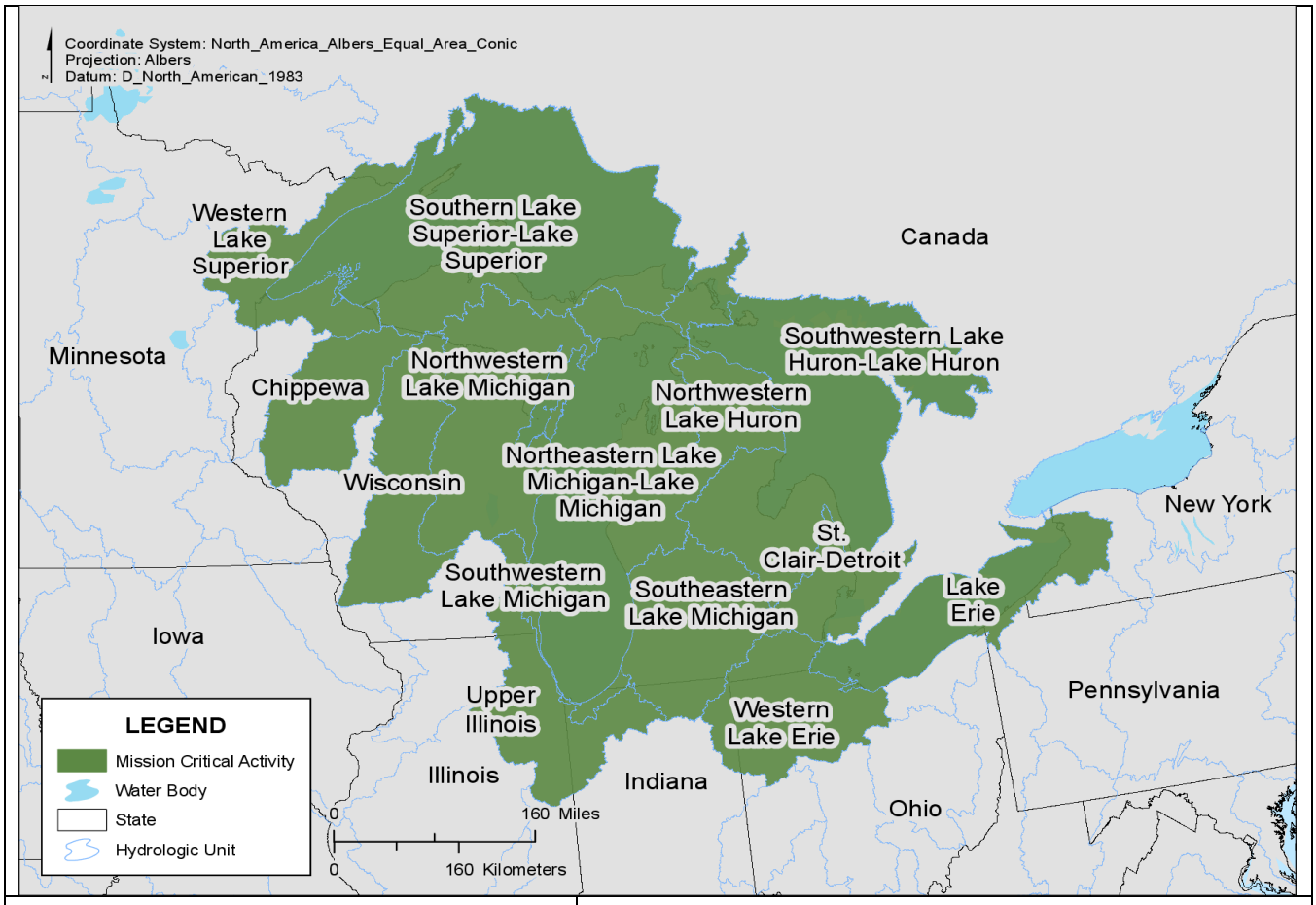
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Required	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Base Mapping



Mission Critical Activity Title:	Base Mapping
Mission Critical Activity Description:	Authoritative base map features to support the state's enterprise GIS.
MCA_ID:	3791095433_1
Organization Type:	State Government
Organization Name:	State of Michigan
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Michigan Geographic Framework.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrographic information as an enhancement to the base map and enterprise GIS.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Major
Future Other Benefits:	

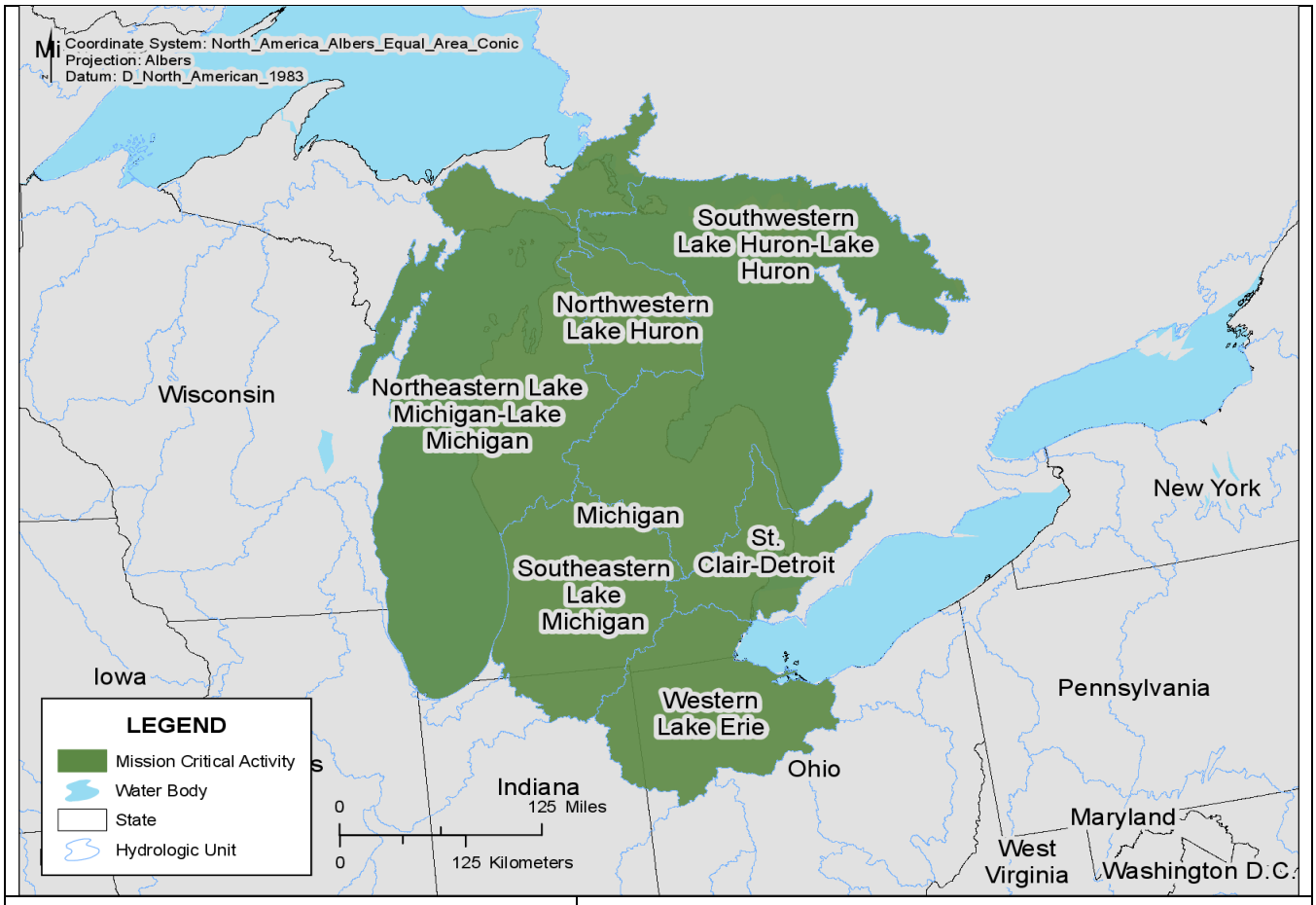
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Hydro Flow Analysis and Watershed Delineation



Mission Critical Activity Title:	Hydro Flow Analysis and Watershed Delineation
Mission Critical Activity Description:	The Hydrologic Studies Program of the Water Resources Division calculates flood and low flow discharges and conducts other types of hydrologic analyses in support of the department's water-related programs.
MCA_ID:	3786791301_1
Organization Type:	State Government
Organization Name:	Michigan Department of Environmental Quality
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Michigan develops its own water data shapefiles.

Current Benefits	
Total Annual Program Budget:	$63.5 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Will make better decisions with better data.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Minnesota

Water is one of Minnesota's most abundant and treasured natural resources. It is critical to the state economy and defines the state's image as the "Land of 10,000 Lakes." A testimony to citizens' concerns over this resource came in 2008 when voters easily passed the Clean Water, Land, and Legacy Amendment to the Minnesota Constitution. This action increased the sales tax and dedicated much of these extra funds to help protect, enhance, and restore lakes, rivers, streams, and groundwater. The fact that this was passed during an economic recession further demonstrates the commitment of Minnesota citizens to working to preserve this precious resource.

Minnesota currently uses two distinct spatial datasets representing the state's surface water hydrography. One is the MN Department of Natural Resources (DNR) Enterprise Hydrography Dataset maintained by the Minnesota DNR; the other is the National Hydrography Dataset (NHD) maintained by USGS with state assistance through its stewardship process. Each dataset has unique characteristics that were developed to meet the business needs of the organizations that rely on the information. Some agencies have a business requirement to use one dataset over the other. Others have a historical familiarity with one dataset, while still others find that neither dataset contains the features necessary to fully represent Minnesota's hydrographic resources. Users are often confused as to why there are two datasets, why the features and attributes differ, and how to choose the dataset to best meet their business needs. Agencies maintain these datasets separately and need to cross-reference their data to different systems, resulting in challenges for data sharing and a duplication of efforts. These problems would be solved with a single, centralized "best features" hydrography dataset. Minnesota continues to look for opportunities to resolve this issue.

A total of nine Minnesota organizations representing state, regional, and local government responded to the HRBS survey. Not all of these organizations currently use the NHD but the 11 Mission Critical Activities (MCAs) that were identified still reflect the broad spectrum of MCAs that need to be supported by any hydrographic data source. The 11 MCAs that were identified related to the following seven Business Uses: Natural Resources Conservation (2); Water Quality (2); Water Resource Planning and Development (2); River and Stream Flow Management (2); Urban Planning; Infrastructure and Construction Management; and Agriculture and Precision Farming.

Respondents identified a current benefit of $2.5 million with an additional possible future benefit of $4.6 million. The value for the current benefit was lower than might be expected due to the fact that several of the responding organizations don't currently use the NHD and therefore don't currently recognize a financial benefit from it. The largest potential future benefit ($3 million) would come if future changes would allow Minnesota agencies not to have to maintain other hydrographic layers to meet existing agency business needs.

Overall respondents expressed a high need for being able to integrate the hydrographic data with other data, particularly wetlands, soils, land cover, and elevation. Users also expressed a strong need for being able to perform a variety of analytical functions, particularly up and downstream navigation, obtaining watershed characteristics, and drainage area calculations.

These summary results are not a comprehensive list of all hydrography requirements within the state, but represent a subset of program activities provided via this survey. There are potentially additional requirements that could be documented in the future with further inquiry and investigation.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

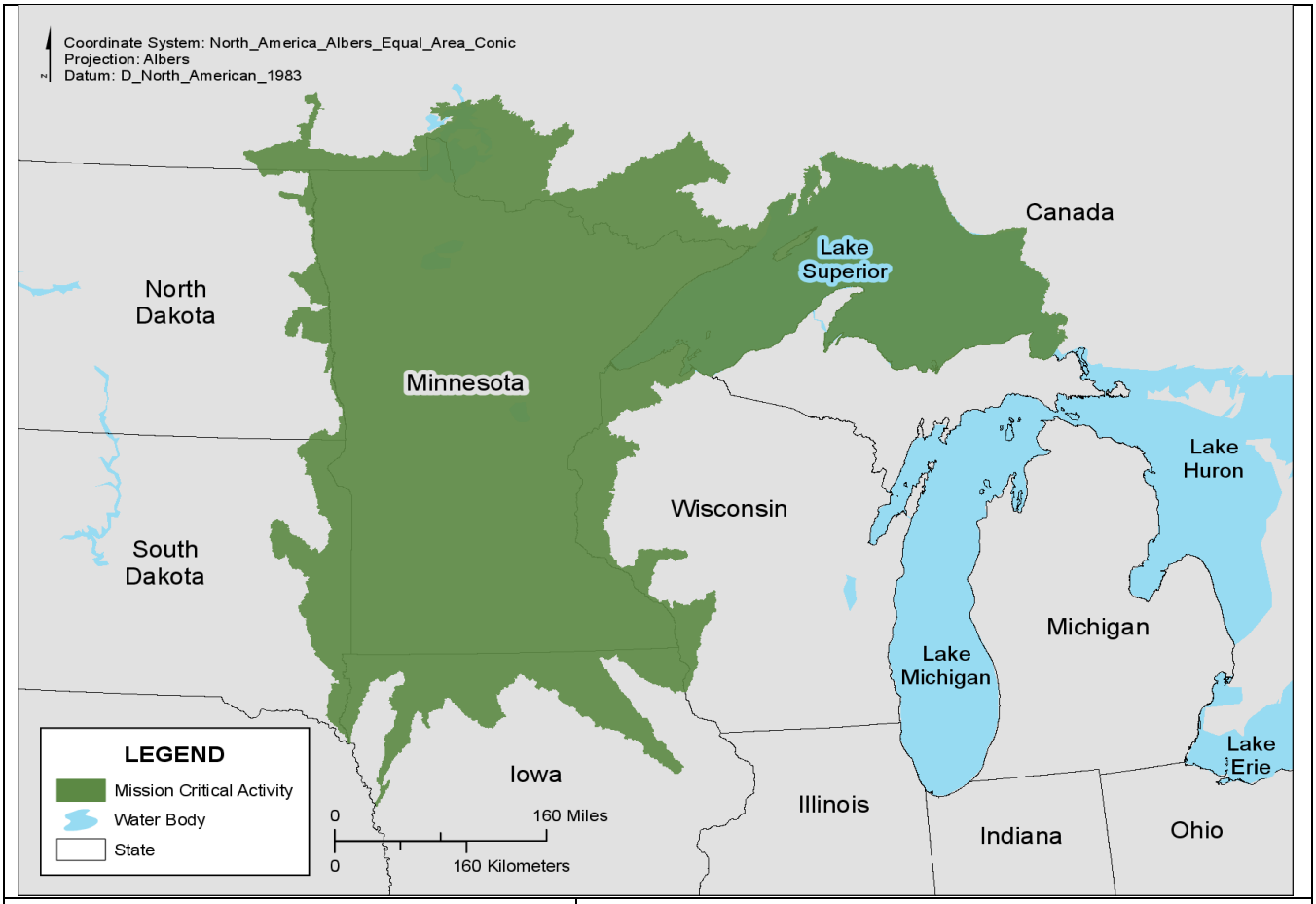
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Minnesota managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Watershed Protection and Management



Mission Critical Activity Title:	Watershed Protection and Management
Mission Critical Activity Description:	Watershed protection and management, including erosion mapping and surface water hydrologic modeling.
MCA_ID:	3771846122_1
Organization Type:	State Government
Organization Name:	Minnesota Department of Agriculture
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Data obtained from MN DNR Data Deli and include DNR watersheds – DNR Level 08 – all catchments, DNR 24 K Streams, DNR 100 K Hydrography.

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,200
Future Benefits Description:	Improving stream network accuracy and representation on a semi-annual basis would be an improvement.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

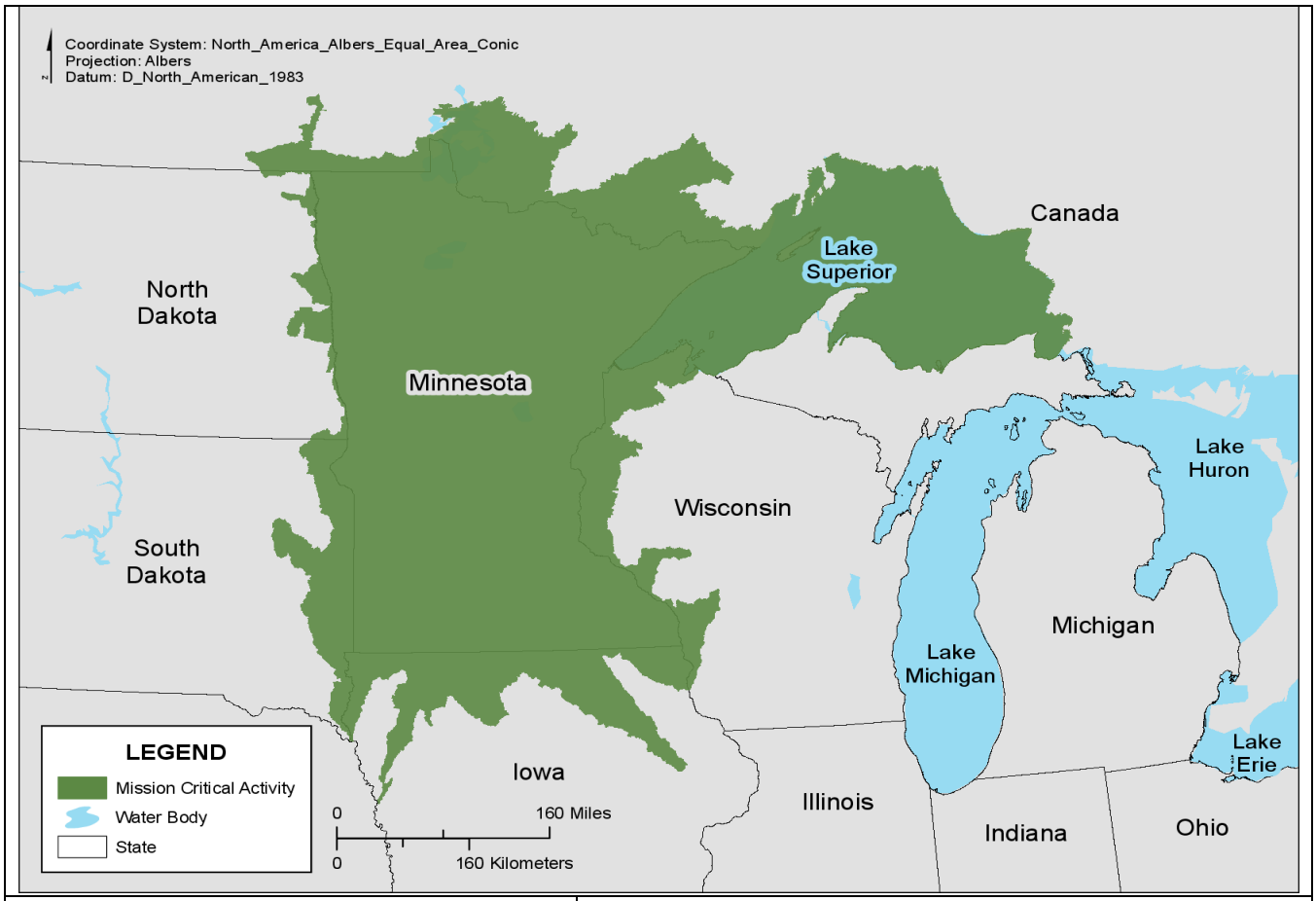
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Transportation System Design and Operation



Mission Critical Activity Title:	Transportation System Design and Operation
Mission Critical Activity Description:	Design and operate transportation systems - includes designing major structures (bridges and large culverts) to pass design flood events, design roadway overtopping elevations, design bridges and culverts to withstand extreme flood events.
MCA_ID:	3769793235_1
Organization Type:	State Government
Organization Name:	Minnesota Dept. of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We use StreamStats extensively, not sure exactly what datasets that incorporates; also use the river flow measurement datasets extensively.

Current Benefits	
Total Annual Program Budget:	$4.6 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$300,000
Future Benefits Description:	Improved hydrography data would help decrease time to produce designs and improve quality.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

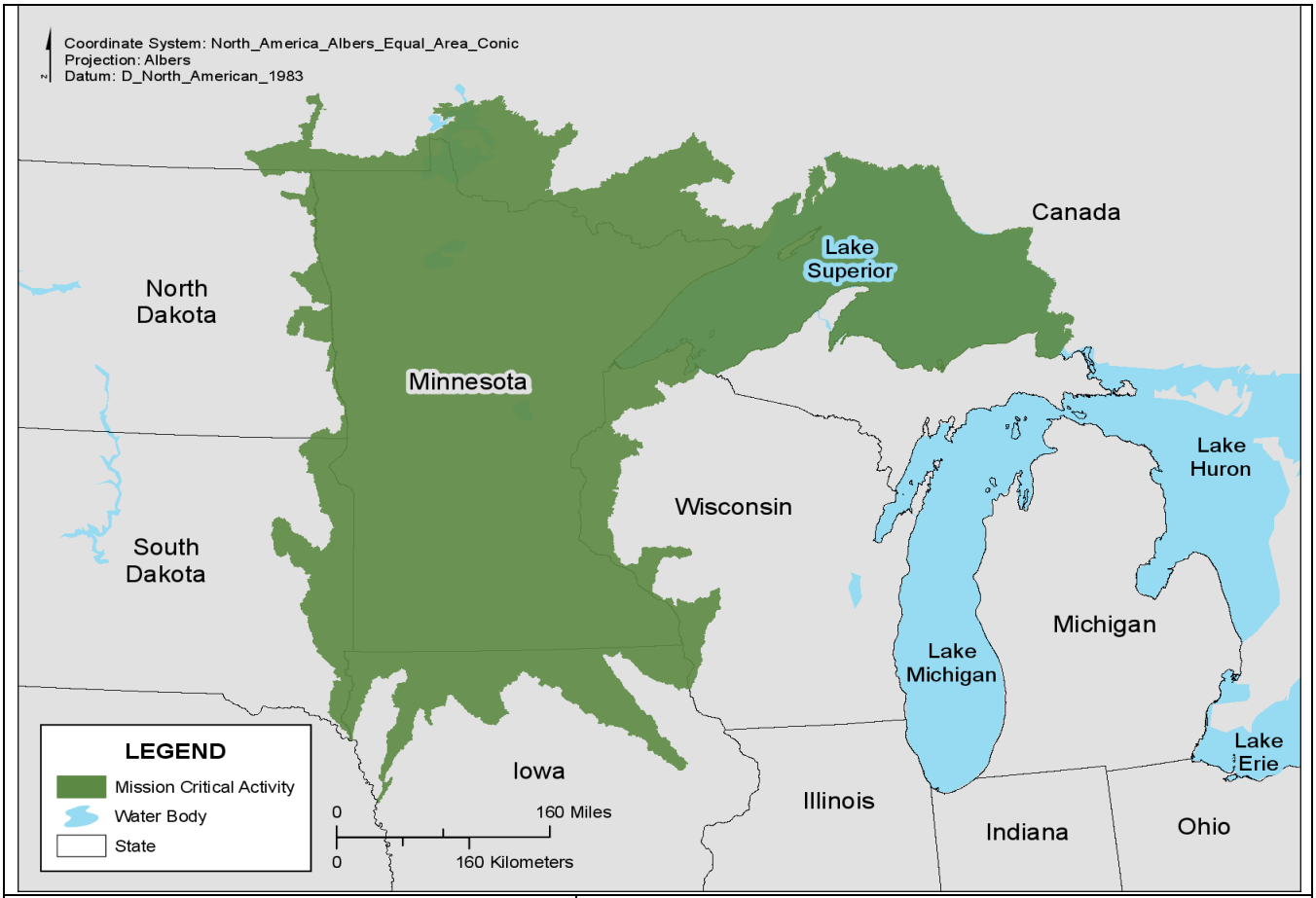
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

BMP Implementation Assistance



Mission Critical Activity Title:	BMP Implementation Assistance
Mission Critical Activity Description:	Providing data analysis and map products to agency staff that will assist units of local government in implementing best management practices on primarily private lands using state funding sources. Data and map products using hydrologic data are often used by agency staff to help guide where conservation practices should be implemented within the landscape. For example, distinguishing public watercourses from non-public watercourses to assist locating areas to be addressed under the Governor's recent buffer initiative.
MCA_ID:	3823755635_1
Organization Type:	State Government
Organization Name:	MN Board of Water and Soil Resources
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	DNR lakes, wetlands, and watercourse data. DNR watershed suite.

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	N/A
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	

Future Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

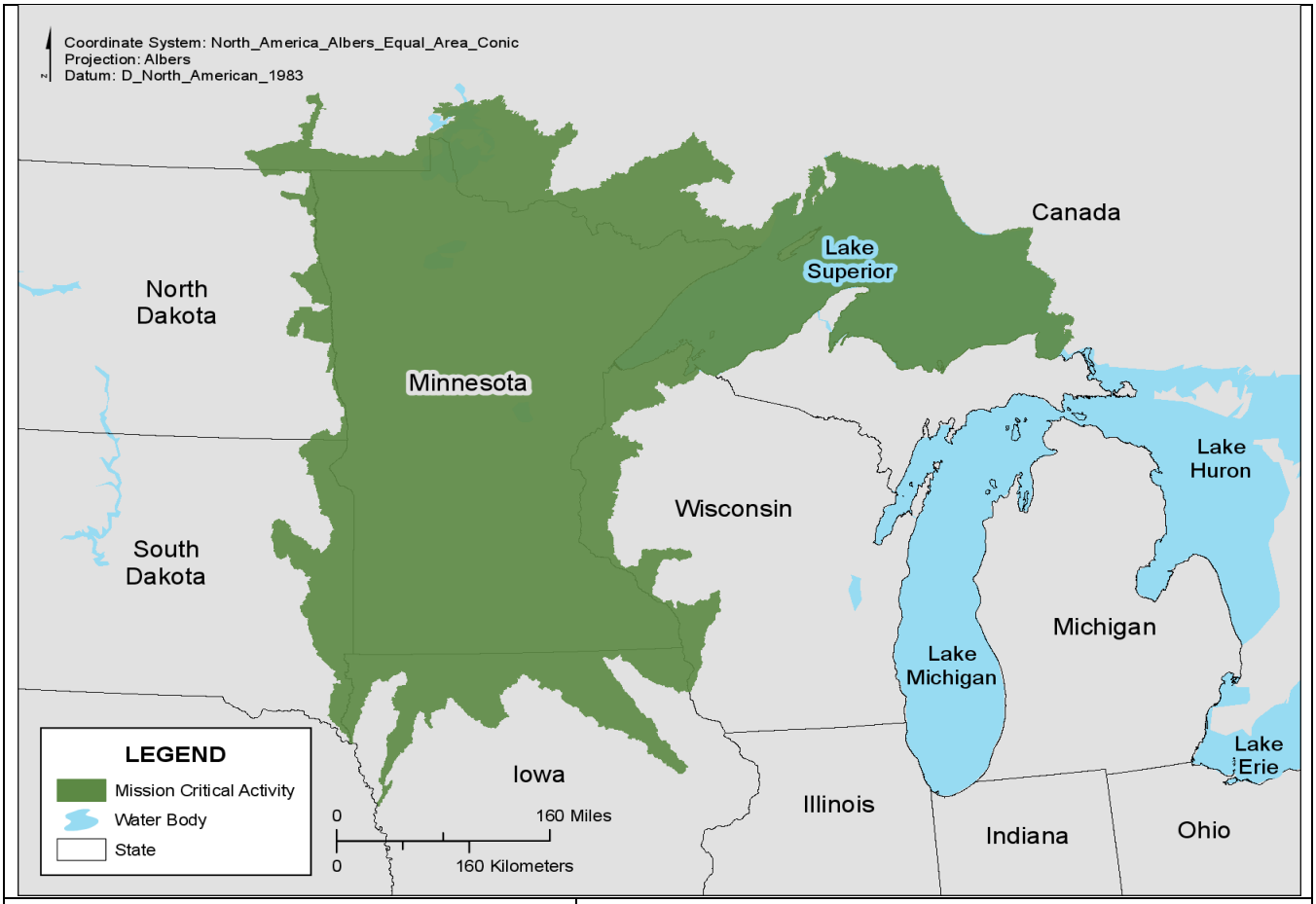
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice To Have	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Regulatory Mapping



Mission Critical Activity Title:	Regulatory Mapping
Mission Critical Activity Description:	Regulatory mapping: mapping of regulated waters for permitting and/or allowed uses as defined in Minnesota statute.
MCA_ID:	3827225862_1
Organization Type:	State Government
Organization Name:	Minnesota Department of Natural Resources (MN DNR)
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	State-produced hydrography datasets developed and maintained in-house.

Current Benefits	
Total Annual Program Budget:	$115 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Improved representation of hydrographic features would prevent the need for our agency to maintain our own hydrographic layers to meet business needs.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

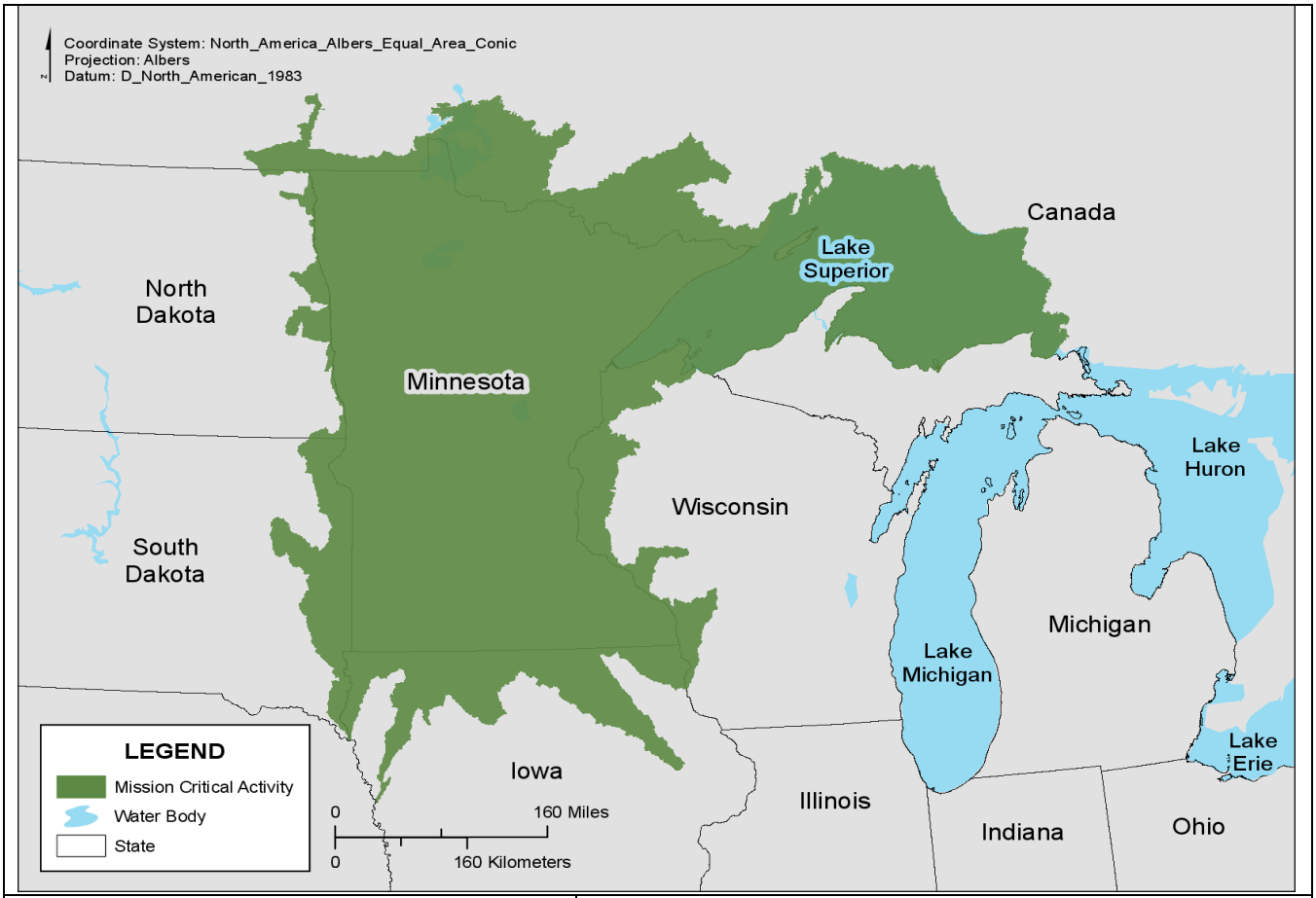
Future Benefits	
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Accurate stream centerlines and lake shorelines.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Not Required	None
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Fisheries Management



Mission Critical Activity Title:	Fisheries Management
Mission Critical Activity Description:	Fisheries management, including species population assessment, distribution, health, habitat assessments and protection/restoration/acquisition.
MCA_ID:	3827225862_2
Organization Type:	State Government
Organization Name:	Minnesota Department of Natural Resources (MN DNR)
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	10 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Statewide hydrography dataset developed and maintained in-house.

Current Benefits	
Total Annual Program Budget:	$106 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	We currently develop and maintain our own hydrographic data in-house because the current NHD data for MN is not kept current and accurate enough for our needs. Having a readily-available, up to date dataset would improve business functions and save money currently used to maintain our own data.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Water flow direction and connectivity to basins and wetlands; watersheds specific to points of interest.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	

Required Analytical Functions	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Not Required	None
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Stormwater Management

Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3792910679_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Ramsey-Washington Metro Watershed District
Business Use:	River and Stream Flow Management
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Lidar, privately-surveyed data done by BARR Engineering.

Current Benefits	
Total Annual Program Budget:	$7 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	The NHD in its current availability and presumably even in an improved condition would still serve as an initial reference dataset. For all of our projects, our engineering contractors do up-to-date, high-accuracy surveys to ensure what we think we know is true.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know

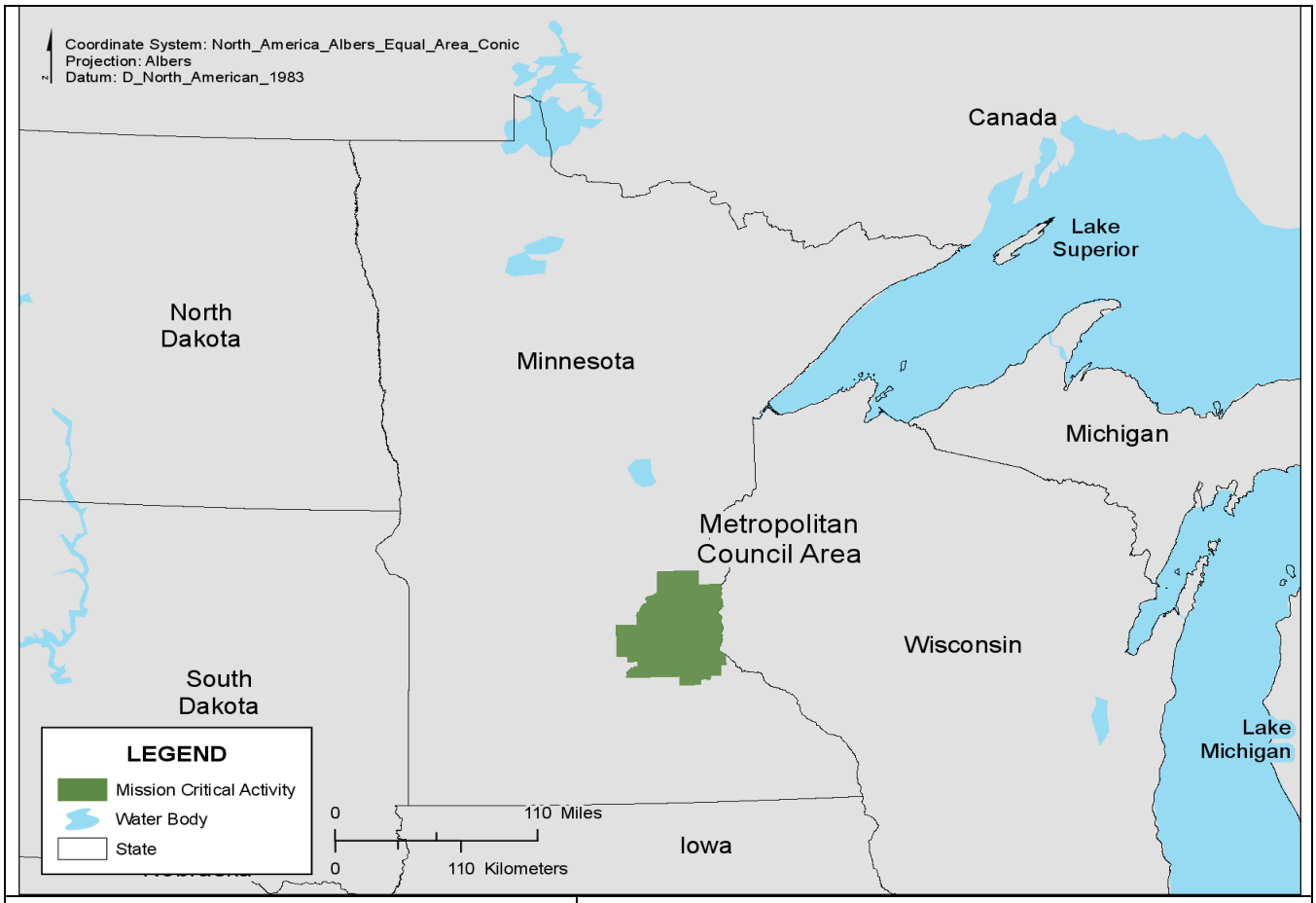
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Monitoring, Planning, and Permit Review



Mission Critical Activity Title:	Water Monitoring, Planning, and Permit Review
Mission Critical Activity Description:	Regional planning, wastewater treatment, and water supply planning for seven metropolitan counties in Minnesota; environmental monitoring of surface and sub-surface water quality; permit review and approval for industrial storm water discharge.
MCA_ID:	3802316167_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Metropolitan Council
Business Use:	Urban and Regional Planning
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase.

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$245,000
Future Benefits Description:	Providing our GIS staff the ability to model water scenarios effectively and the large public education and outreach possible with good data. Ability for all governmental agencies at any level city, county, region, and state to be using consistent data is crucial for shared success and forward momentum on projects.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

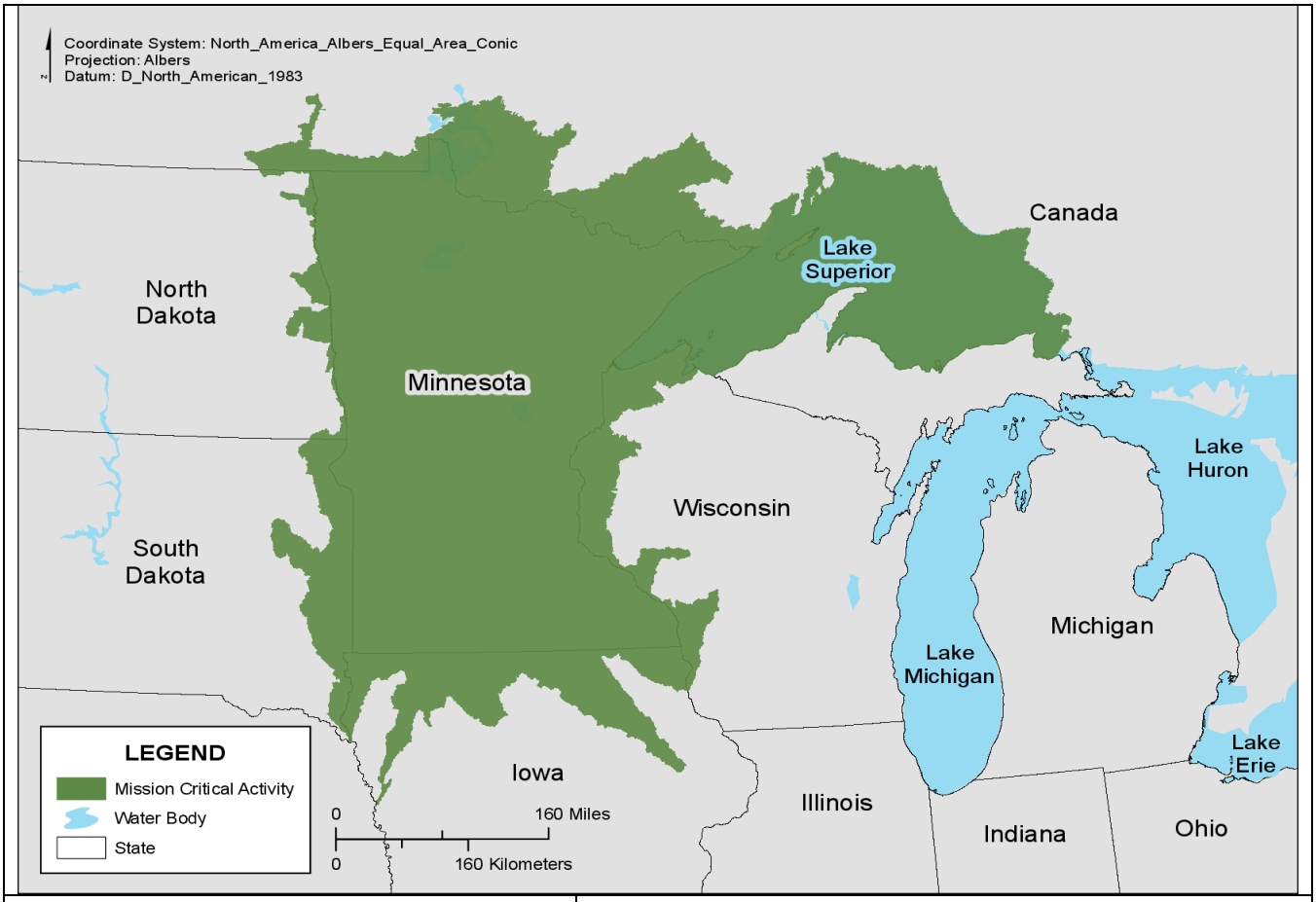
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Topological alignment with discharge outfalls.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring and Assessment



Mission Critical Activity Title:	Water Quality Monitoring and Assessment
Mission Critical Activity Description:	MPCA has primary responsibility for protecting surface waters from pollution by chemicals, microorganisms, or other substances that degrade water quality. MPCA uses a watershed approach to protecting and restoring water quality. This allows the agency to better identify water quality problems, work with communities to establish shared goals and priorities, and develop effective pollutant-reduction strategies.
MCA_ID:	3772643927_1
Organization Type:	State Government
Organization Name:	MN IT Services @ Minnesota Pollution Control Agency
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$30 million
Current Annual Benefits ($):	$2 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$300,000
Future Benefits Description:	Reduced possibility of errors; more reliable data would result in higher confidence in results; reduced labor costs resulting from less need to enhance these data or integrate with other data; enhanced cooperation from other agencies; ability to turn permits around more quickly.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Infiltration to Sanitary Sewers

Mission Critical Activity Title:	Stormwater Infiltration to Sanitary Sewers
Mission Critical Activity Description:	Regional planning, water quality protection, wastewater treatment, and identification and mitigation of inflow and infiltration of stormwater into sanitary sewer systems.
MCA_ID:	3802316167_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Metropolitan Council
Business Use:	Water Quality
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase.

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.36 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$350,000
Future Benefits Description:	Stronger modeling, empirical analysis, and usability of data and findings.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know

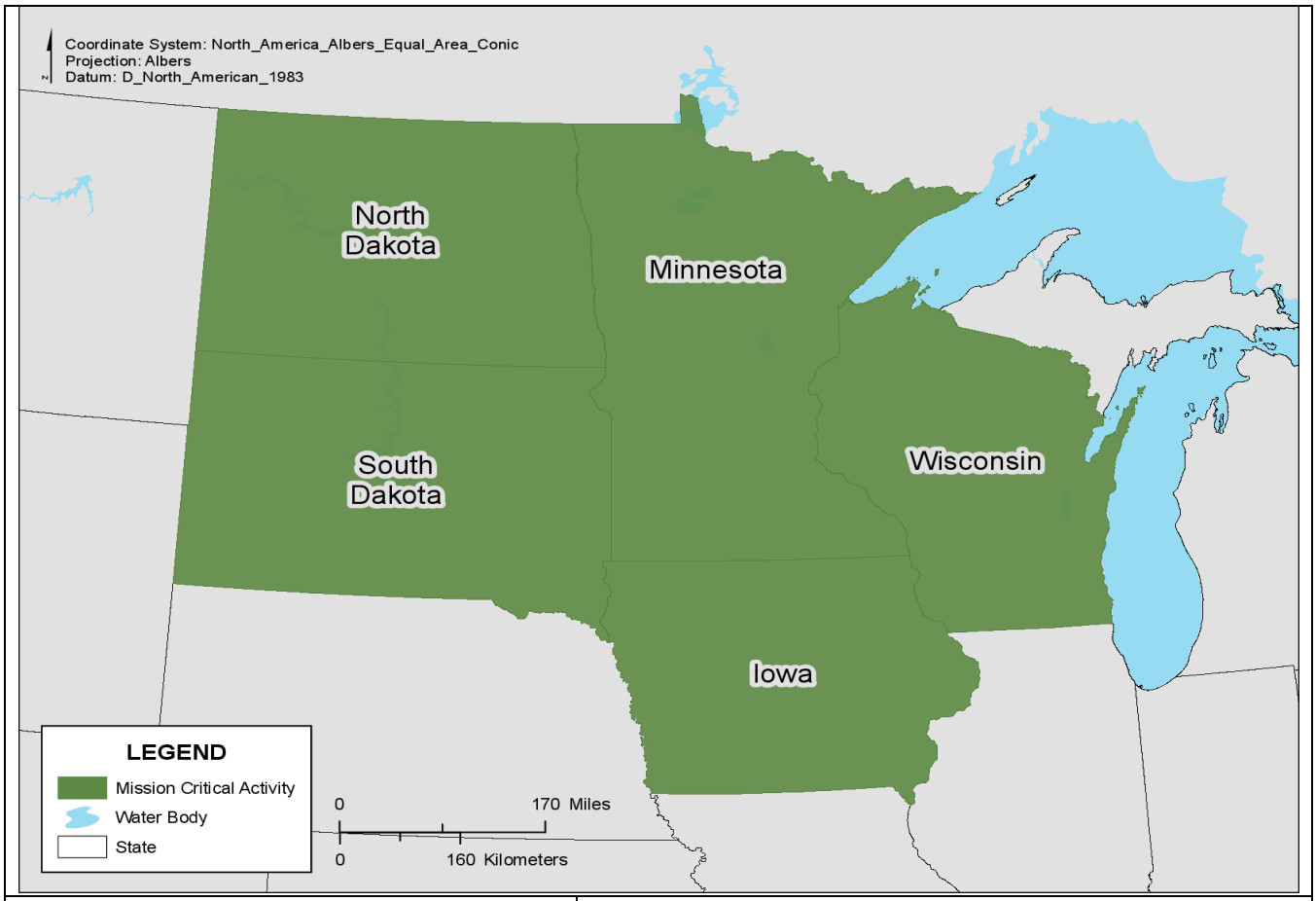
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Resource Planning and Management



Mission Critical Activity Title:	Water Resource Planning and Management
Mission Critical Activity Description:	Protect drinking water from contamination.
MCA_ID:	3789502741_1
Organization Type:	State Government
Organization Name:	Minnesota Department of Health
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$300,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$300,000
Future Benefits Description:	Calibration of groundwater flow models would improve; both in terms of quality of the model, and the reduced staff time required to prepare datasets.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

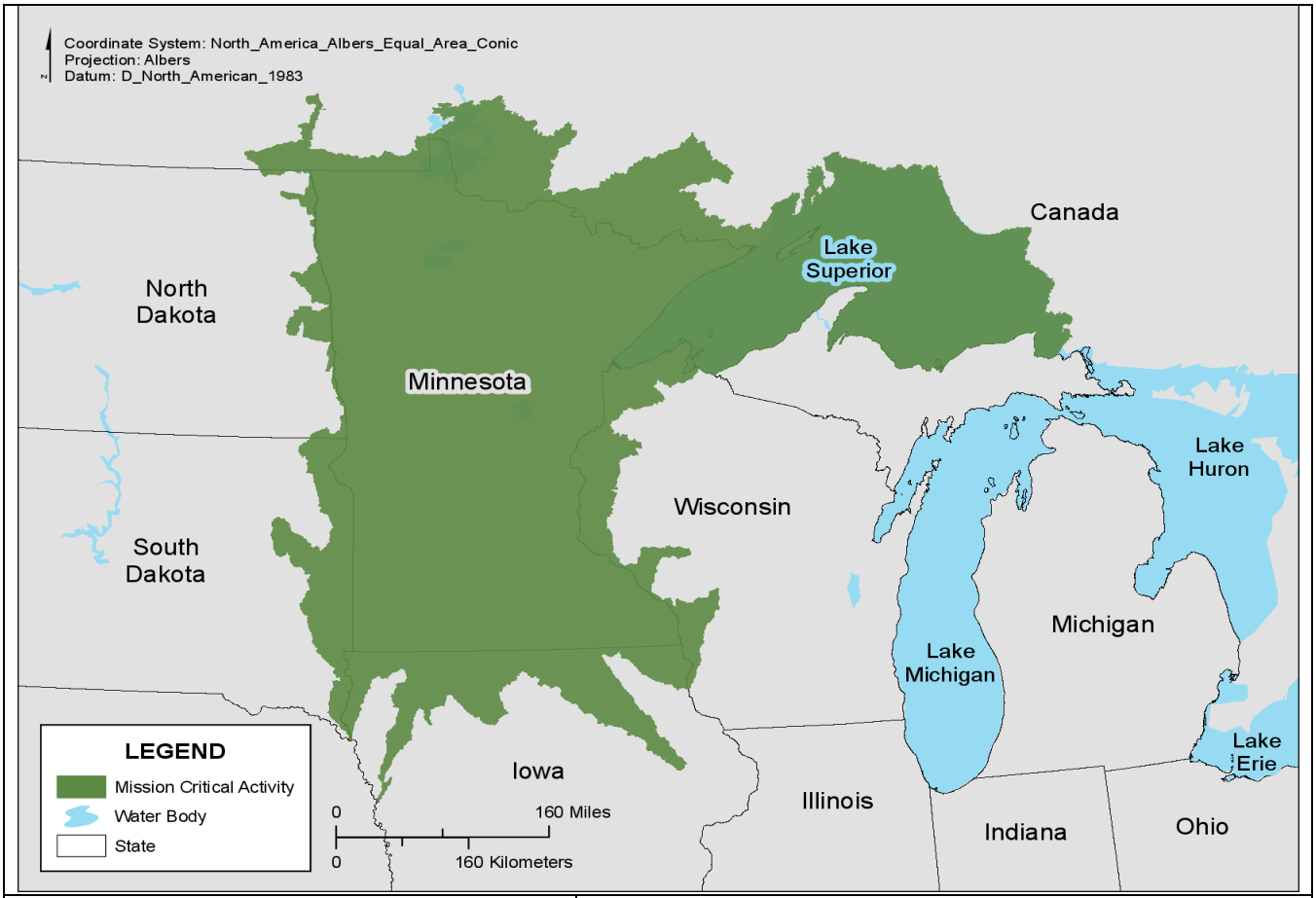
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Statewide Geospatial Data Coordination and Management



Mission Critical Activity Title:	Statewide Geospatial Data Coordination and Management
Mission Critical Activity Description:	Coordinating development, implementation, support, and use of geospatial technology in Minnesota. Guiding data investments, developing and promoting data standards, and coordinating data management and distribution. Coordinating state technology investments, technical standards, and facilitating resource sharing. MnGeo is not a line water management agency.
MCA_ID:	3804943653_1
Organization Type:	State Government
Organization Name:	MN.IT Services/Minnesota Geospatial Information Office (MnGeo)
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	State datasets, primarily the MN DNR Hydrography Geodatabase and DNR Watershed Suite. Older, legacy data (1:100,000-scale DLG and state River Kilometer Index data) are used less and less.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Unable to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	Because I am referencing uses in many organizations, not specifically MnGeo, it is impossible to answer these quantitative benefits questions.

Future Benefits	
Future Annual Benefits ($):	Unable to quantify.
Future Benefits Description:	Because I am referencing uses in many organizations, not specifically MnGeo, it is difficult to answer this. I am just guessing that improvements to currency of data, resolution of data, additional features and attributes, and links to additional data.
Future Operational Benefits	
Future Time/Cost Savings:	Major

Future Benefits	
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	Because I am referencing uses in many organizations, not specifically MnGeo, it is impossible to answer these quantitative benefits questions.

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Seamless integration between MN DNR catchments (small drainage area) and WBD HUCs (we have done this once). Seamless integration between DNR Hydrography and NHD data. We realize that this is something the state has to maintain.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes

Required Analytical Functions	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Other (please specify the importance and highest analysis level):	Just a comment that I checked a lot of these because I am responding based on needs other MN organizations have asked us about, or known needs in other MN organizations. MnGeo is not a direct user of all of these; may need some for a specific project.	Just a comment that I checked a lot of these because I am responding based on needs other MN organizations have asked us about, or known needs in other MN organizations. MnGeo is not a direct user of all of these; may need some for a specific project.

Mississippi

The state of Mississippi benefits from the use of national hydrography data in a variety of ways, from simple cartographic uses to more complex activities such as creating mapping applications, managing data, and performing geospatial analysis. Eight organizations participated in the online survey and/or workshop. These study respondents were from government agencies at multiple levels and private industry: city, county, regional, and state. Respondents to the survey were chosen to represent current public sector users of hydrography data, with needs and applications that span a wide diversity of technical sophistication and deployment in business applications and processes. The results of the survey indicate current and future uses for hydrographic data, provide opportunities for greater speed and efficiency of information delivery, reduction of costs, and the ability to make sound decisions on the best available information and data.

Many agencies and groups within the state of Mississippi have requirements for more complete and current hydrography geographic data that are integrated with other framework layers, including improved alignment with soon-to-be-complete statewide lidar elevation data. State and local governments have reported that the current high-resolution NHD data are not detailed enough for their work. Additional details on the features, data density, and scales for local-resolution NHD would be beneficial. Differences in the density of the stream network currently being shown in high resolution NHD data causes concern in how to best collect data and in using the NHD as a reference and cartographic layer.

Mississippi has been progressive as an investor in statewide lidar-based elevation data which can be of great value as a reference for an improved hydrography geo-data framework. Presently, Mississippi Department of Environmental Quality is investing in using this data to update the NHD in Mississippi.

The initial Hydrography Requirements and benefits Study (HRBS) survey results for Mississippi noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Flood Risk Management
- Storm Surge Inundation Prediction
- Design, Permitting, and Implementation of Coastal Restoration
- Dam Breach Modeling
- Dam Inventory Management
- Hydraulic Design for State-Maintained Roadways
- Clean Water Act Reporting
- Ground and Surface Water Supply for Agriculture

Subsequent Mississippi meetings with key hydrography stakeholders have identified additional critical activities with many similar requirements for improved hydrography framework data. These include the following:

- Fisheries Management
- Forest Management
- Watershed Management
- Conservation Planning

- Land Use Change and Vulnerability Risk Assessment
- Water Withdrawal Assessment and Groundwater Protection

Future benefits in Mississippi include more accurate and enhanced NHD due to ongoing efforts to use lidar to update the NHD, cost saving to the government, increased information sharing opportunities, better quality and improved data access, and market competitiveness. As the quality, usages, and requirements of the NHD evolve, there will be an increasing demand for database updates and accuracy. Access to more accurate spatial data for rivers, streams, drains, lakes, ponds, wetlands, watershed boundaries, and related features that are maintained at the local or county level and supported as authoritative data among state and Federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required

Data or Service Access Method	Requirement
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

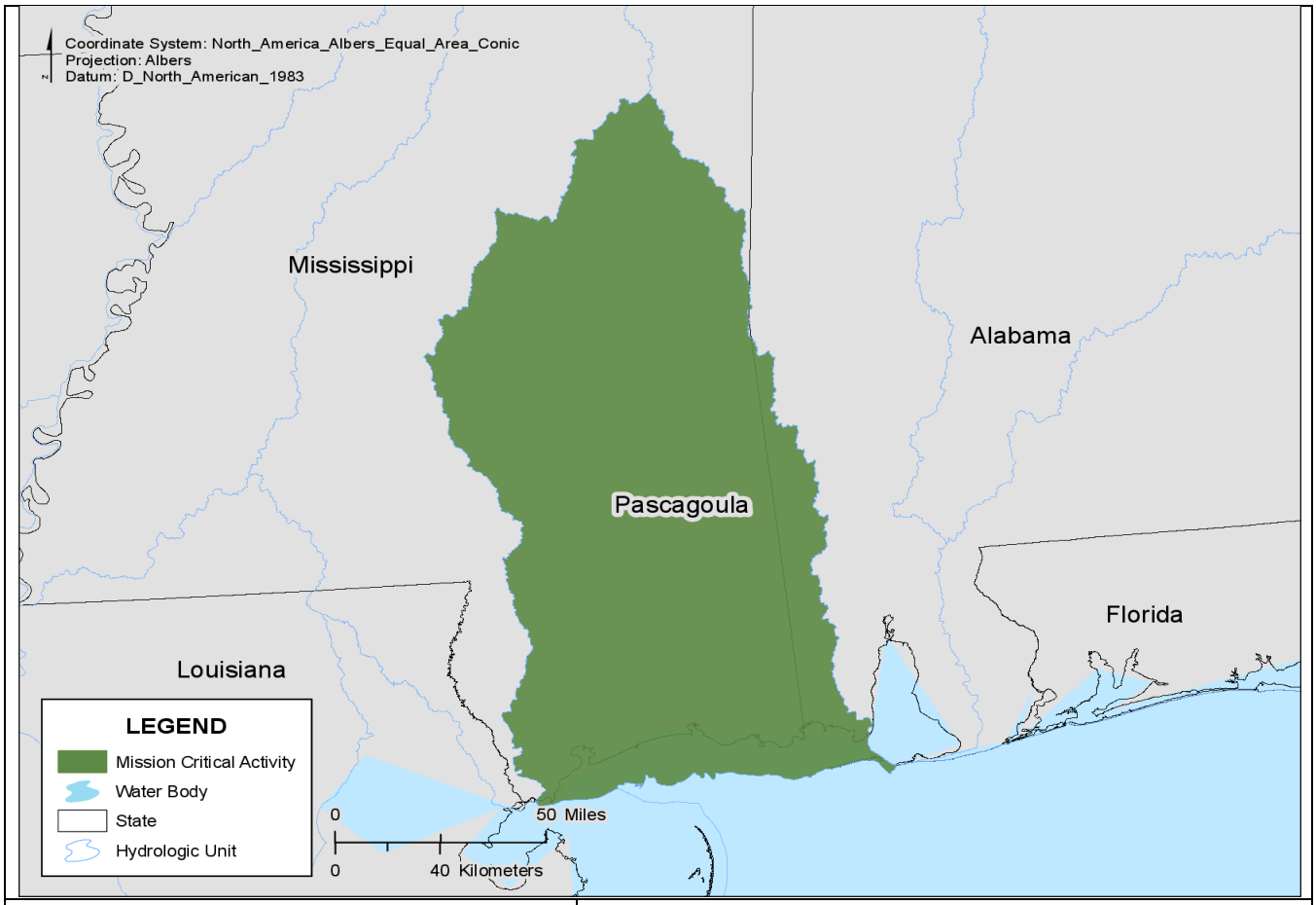
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Maybe

Mission Critical Activities

Mississippi managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Storm Surge Inundation Prediction



Mission Critical Activity Title:	Storm Surge Inundation Prediction
Mission Critical Activity Description:	Storm surge inundation prediction and mapping
MCA_ID	3781091341_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Harrison County, Mississippi
Business Use:	Coastal Zone Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	Helps in quantifying post-disaster losses (floods, droughts, hurricanes, salinity events).

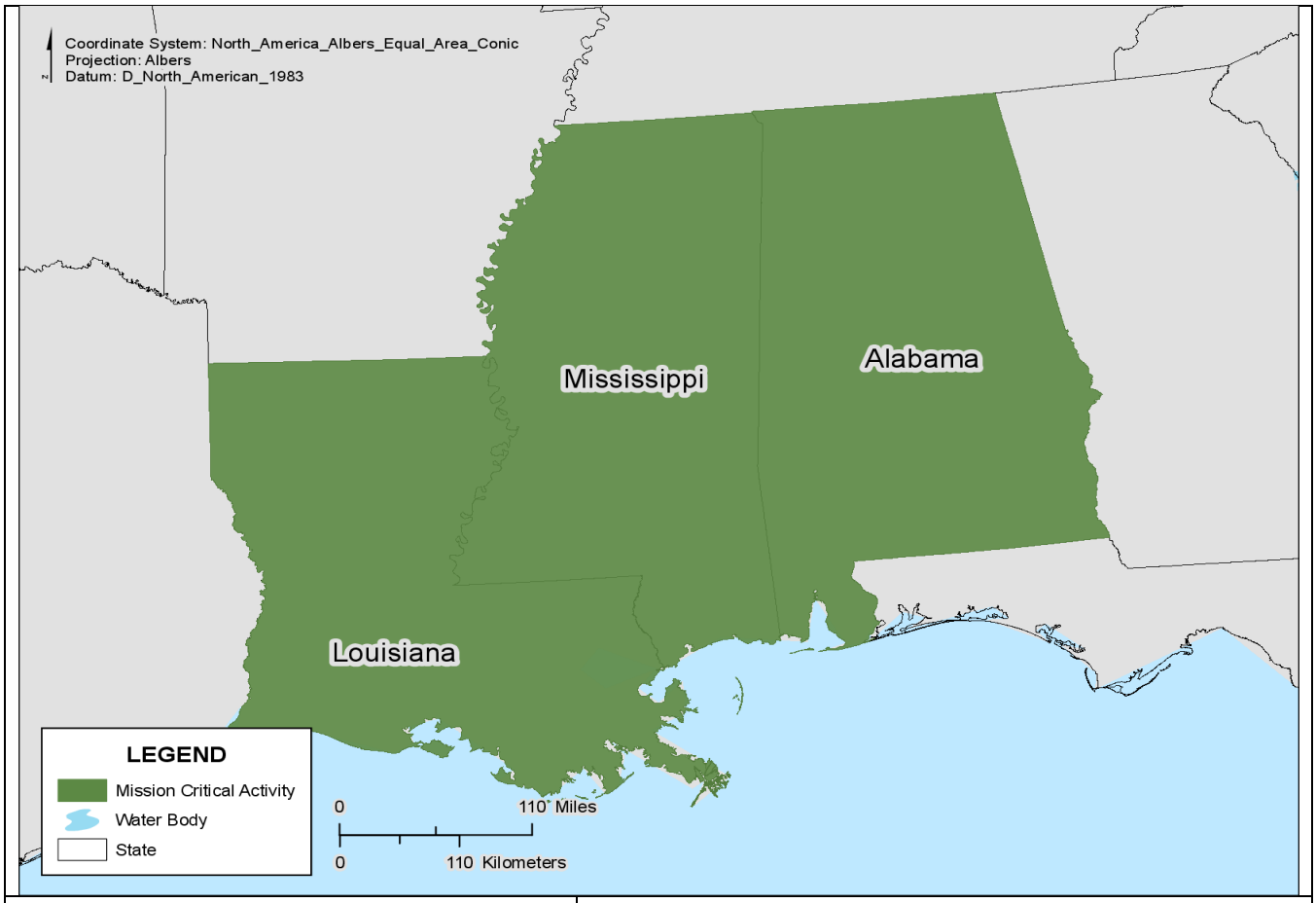
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Helps in quantifying post-disaster losses (floods, droughts, hurricanes, salinity events).
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Design, Permitting, and Implementation of Coastal Restoration



Mission Critical Activity Title:	Design, Permitting and Implementation of Coastal Restoration
Mission Critical Activity Description:	Design, permitting, and implementation of coastal restoration to support the resilience of Mississippi's natural and built environments, particularly marine fisheries, coastal habitats, human use and infrastructure.
MCA_ID:	3804082792_1
Organization Type:	State Government
Organization Name:	Mississippi Department of Marine Resources
Business Use:	Coastal Zone Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$3 million
Current Annual Benefits ($):	$5 to 10 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	Helps in quantifying post-disaster losses (floods, droughts, hurricanes, salinity events).

Future Benefits	
Future Annual Benefits ($):	$1.5 to 3 million dollars
Future Benefits Description:	Reduction or elimination of data gaps due to budgetary or other lapses.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate

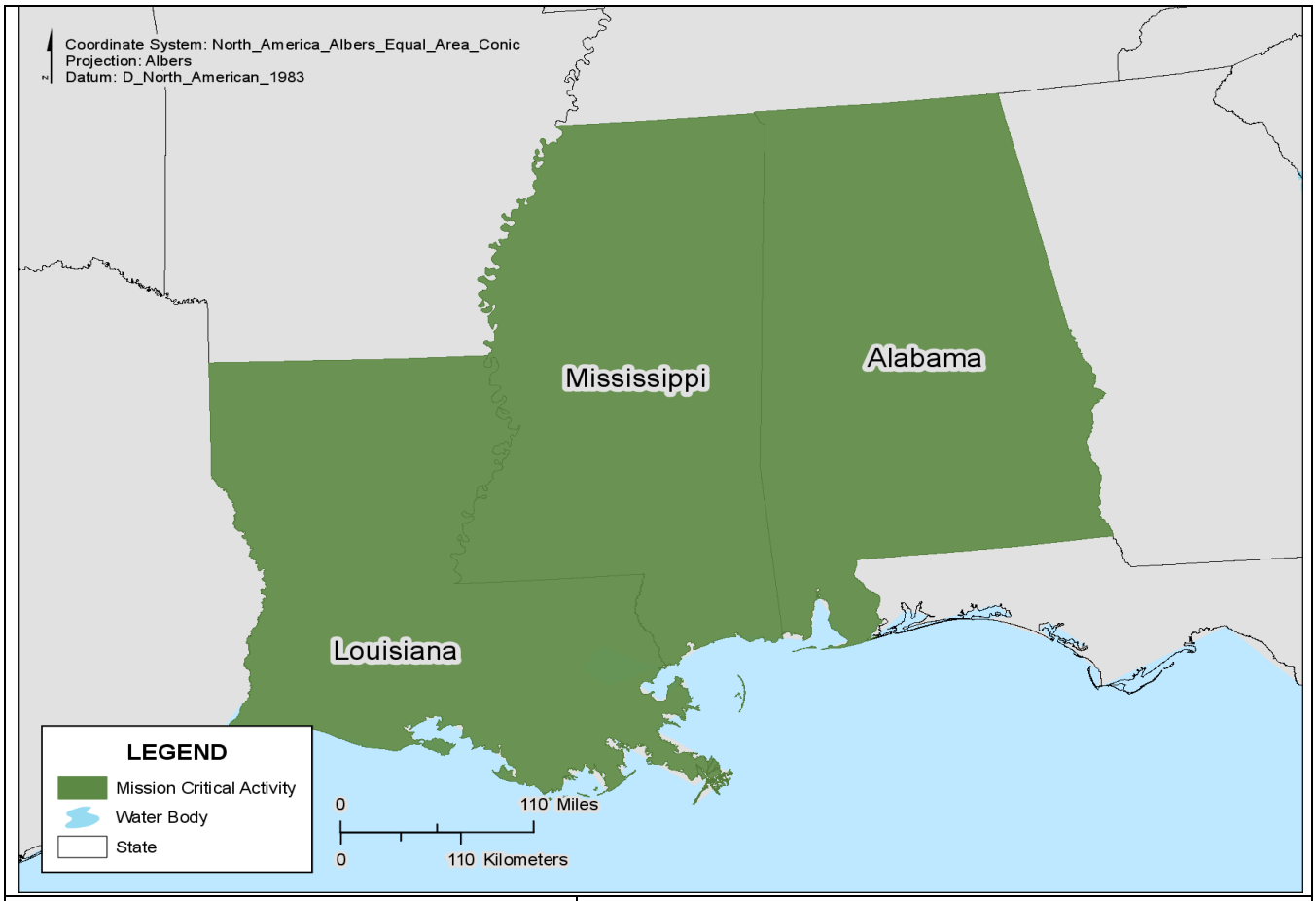
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3769809331_1
Organization Type:	Private or Commercial
Organization Name:	Waggoner Engineering
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Not Sure.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$700,000
Future Benefits Description:	Unsure.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

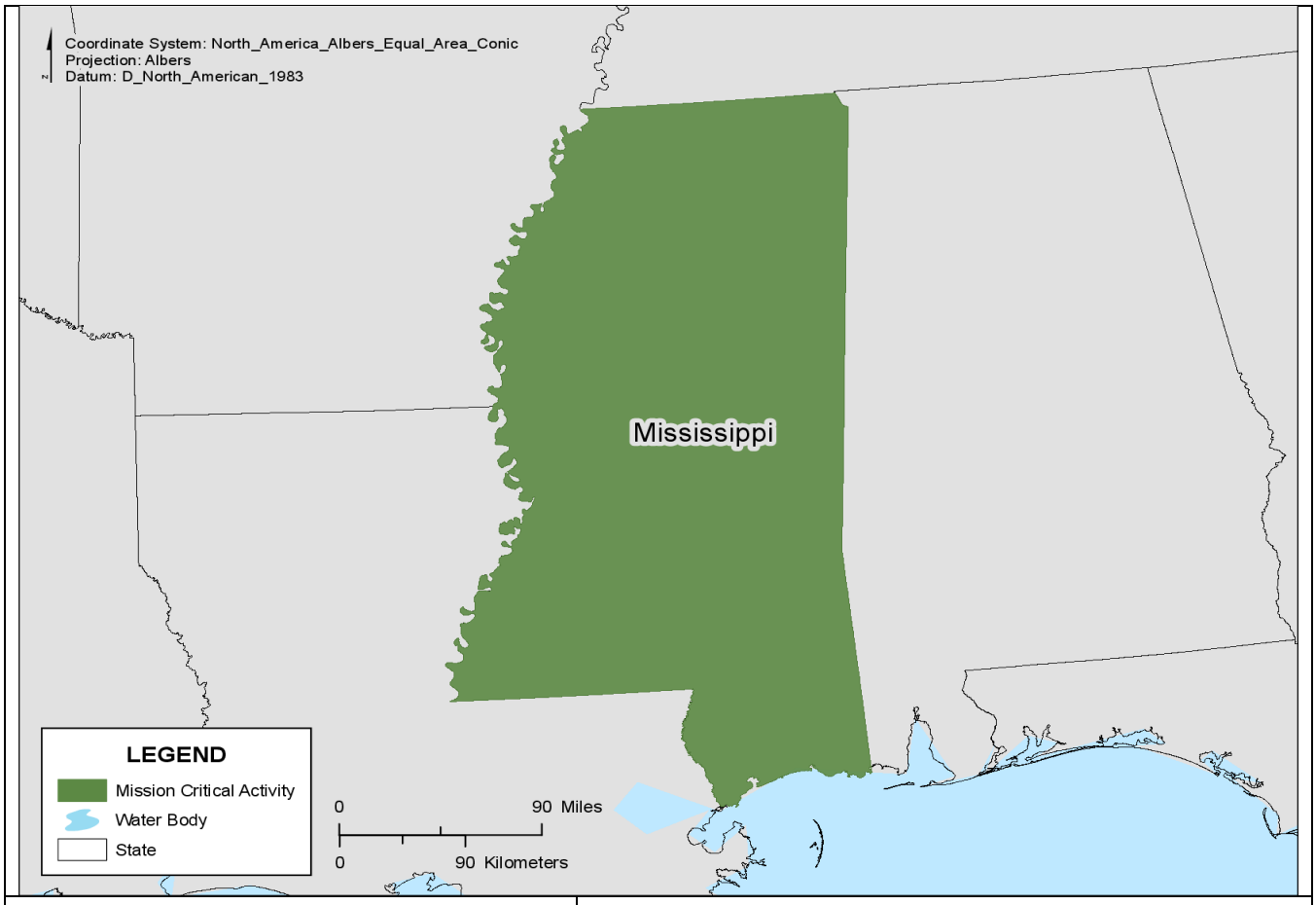
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Dam Breach Modeling



Mission Critical Activity Title:	Dam Breach Modeling
Mission Critical Activity Description:	Dam breach modeling.
MCA_ID:	3802866992_1
Organization Type:	State Government
Organization Name:	MS Dept. of Environmental Quality
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$750,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Improved data would allow us to do our job more efficiently and increase output of breach inundation models.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Minor
Future Other Benefits:	

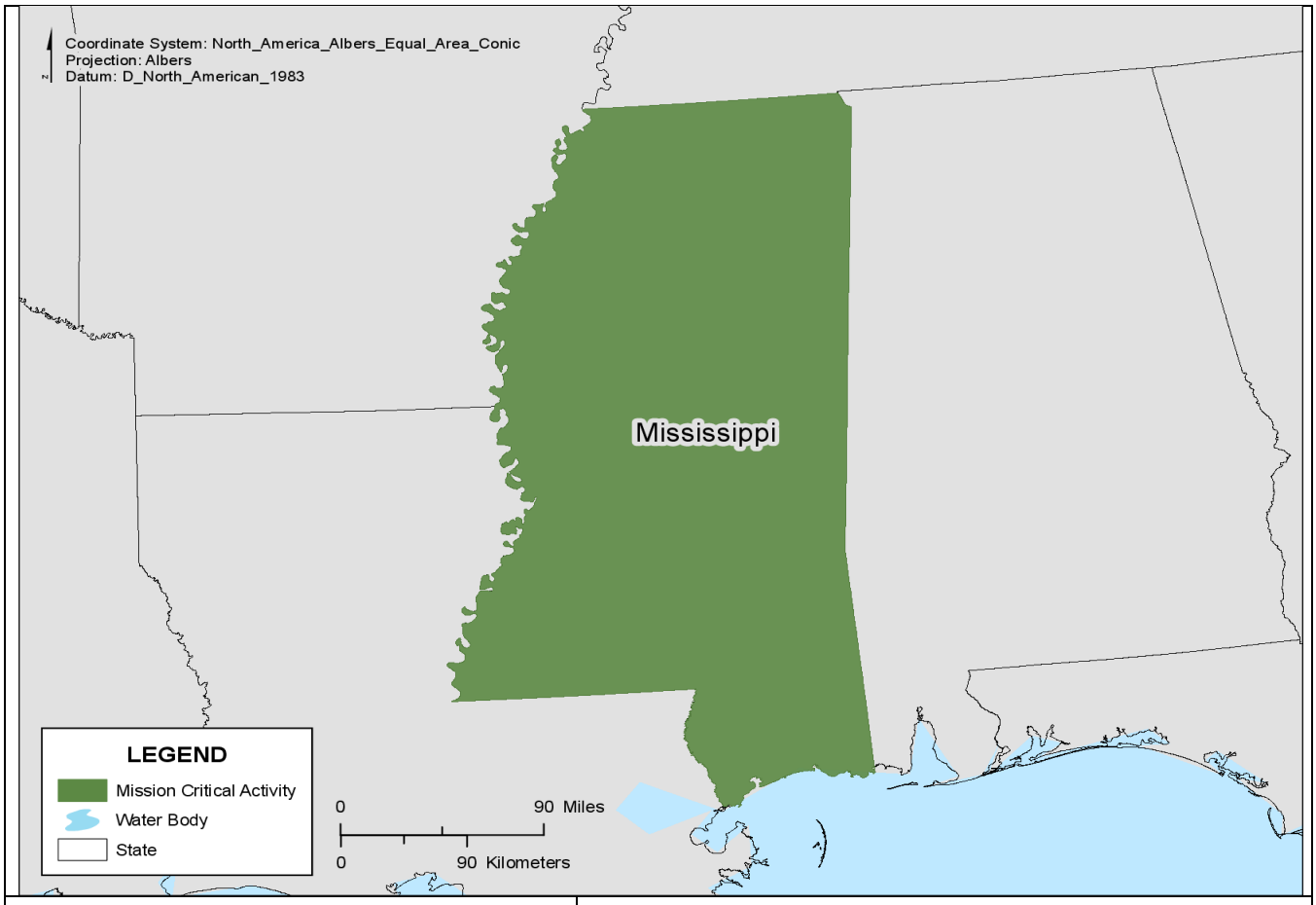
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Dam Inventory Management



Mission Critical Activity Title:	Dam Inventory Management
Mission Critical Activity Description:	Dam inventory management.
MCA_ID:	3802866992_2
Organization Type:	State Government
Organization Name:	MS Dept. of Environmental Quality
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$750,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Improved and more frequently updated data would allow us to update and keep our inventory of dams current. We are currently updating our inventory based on the best available hydrography data that are nine years old. By the time we are complete, dams that were built without authorization will be at least 10 years old.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Moderate
Future Other Benefits:	

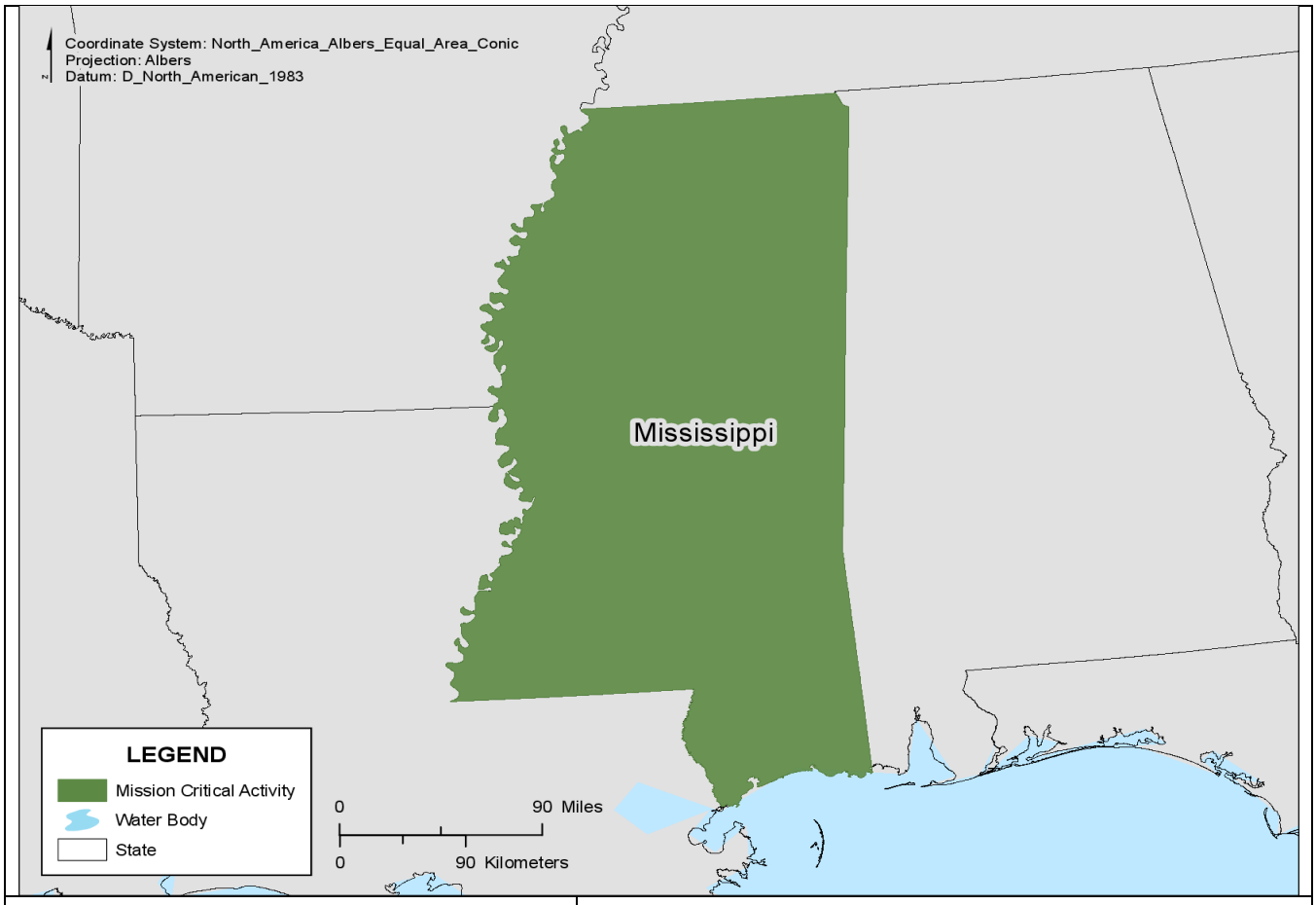
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Not Required	None
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Hydraulic Design for State-Maintained Roadways



Mission Critical Activity Title:	Hydraulic Design for State-Maintained Roadways
Mission Critical Activity Description:	Provide hydraulic design for state-maintained roadways, ensuring that any water in contact with those roadways is handled in a safe, effective manner and is compliant with federal, state, and local regulations.
MCA_ID:	3797365533_1
Organization Type:	State Government
Organization Name:	MS Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	10 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Site studies conducted by our local USGS office.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

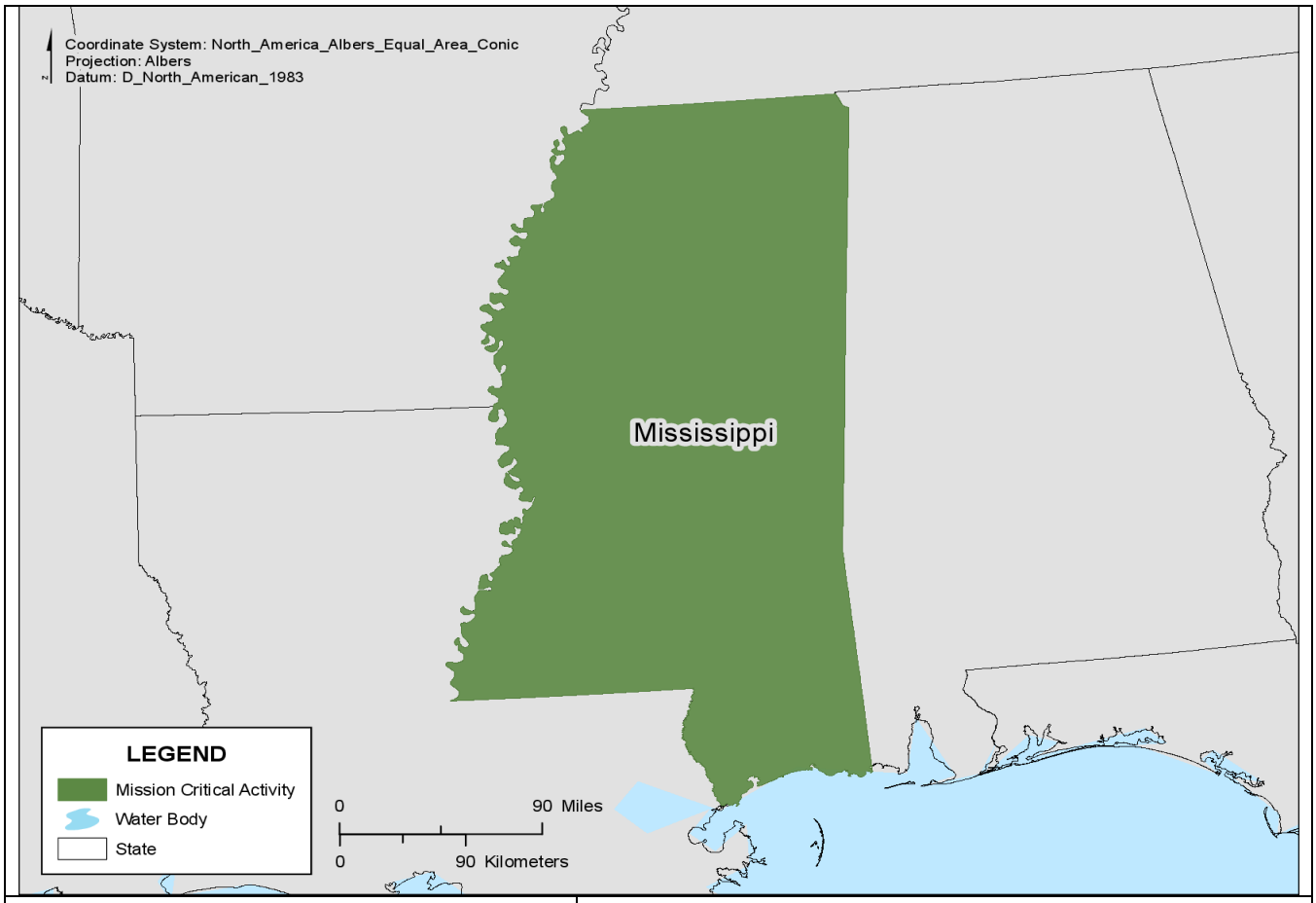
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Clean Water Act Reporting



Mission Critical Activity Title:	Clean Water Act Reporting
Mission Critical Activity Description:	Clean Water Act reporting (106, 305b, 303d, 303c, 401, 402, 319), emergency response mapping.
MCA_ID:	3829734934_1
Organization Type:	State Government
Organization Name:	MDEQ
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	MDEM Hydrography (1:4,800) that is uploaded into the High Resolution NHD.

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	The selections made for mission-critical needs do no currently exist in the NHD or they are inaccurate and cannot be used.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

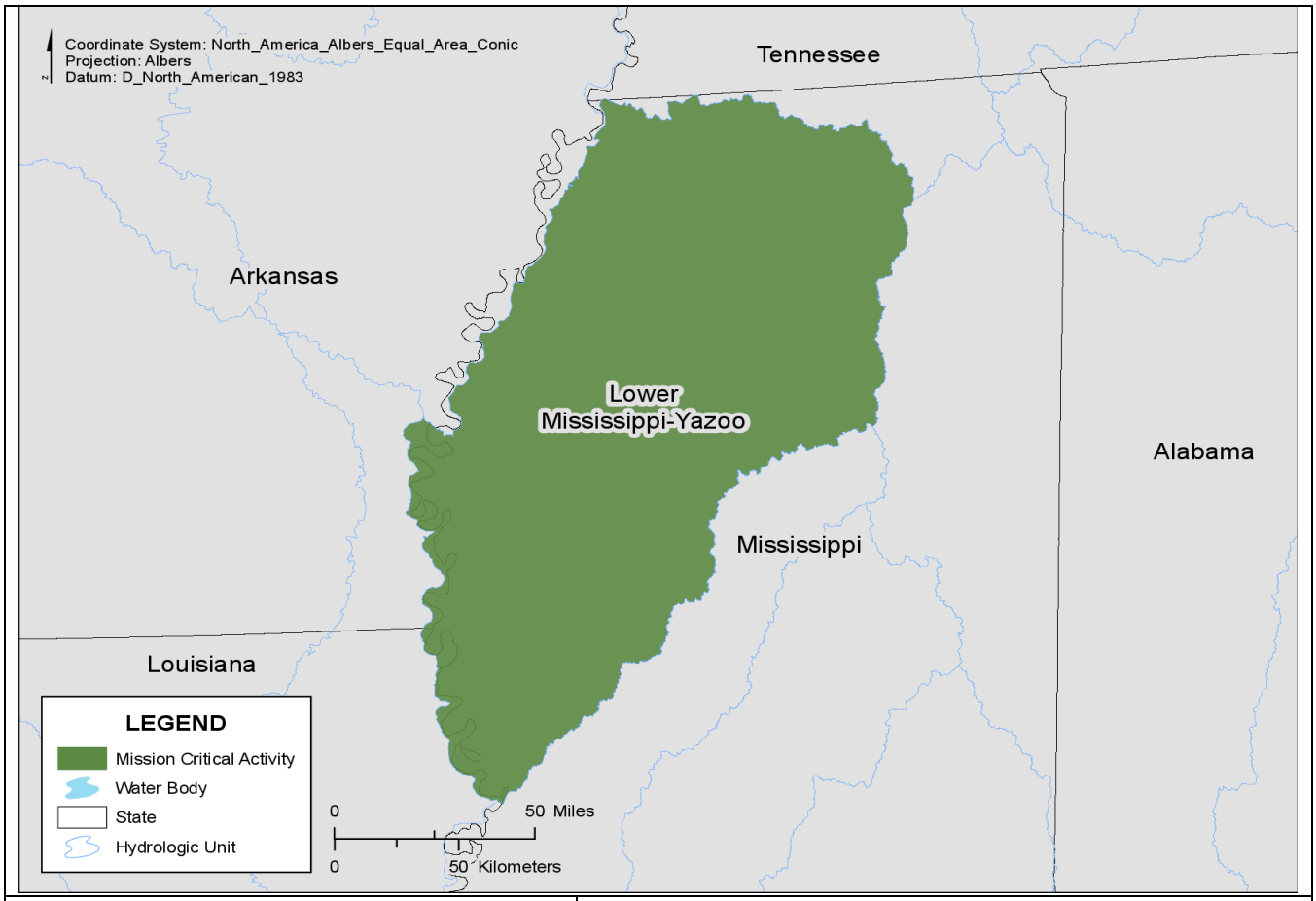
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Highly Desirable	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Ground and Surface Water Supply for Agriculture



Mission Critical Activity Title:	Ground and Surface Water Supply for Agriculture
Mission Critical Activity Description:	Ground and surface water supply for agriculture and in-stream aquatic habitat benefits.
MCA_ID:	3803011285_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Yazoo-Mississippi Delta (YMD) Joint Water Management District
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.3 million
Current Annual Benefits ($):	$1 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Additional stream gage sites with more water quality monitoring.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Missouri

The state of Missouri benefits from the use of national hydrography data in a variety of ways, from simple cartographic uses to more complex activities such as creating mapping applications, managing data, and performing geospatial analysis. Hydrography data have capabilities to assist statewide users in a myriad of activities including: emergency planning and response; floodplain and wetland mapping; land use and transportation planning and development; stormwater and nonpoint source management; watershed analysis of aquatic habitats; water quality monitoring and analysis; and providing safe drinking water. This study was conducted with representation from government agencies at multiple levels: city, county, and state. Respondents to the survey were chosen to represent current public sector users of hydrography data, with needs and applications that span a wide diversity of technical sophistication and deployment in business applications and processes. The results of the survey indicate current and future uses for hydrographic data, provide opportunities for greater speed and efficiency of information delivery, reduction of costs, and the ability to make sound decisions on the best available information and data.

The adoption of the National Hydrography Dataset (NHD) as base data has allowed one state agency to geospatially store and share data, and automate a time-consuming permitting process, thus reducing waste and improving efficiency, transparency, and customer service. This success is currently being translated into new and expanded applications. The adoption of the NHD as base data is key to supporting this data integration, and in the near future should lead to an even greater ability to address real world problems through enhanced geospatial analysis.

While adoption of the NHD as base data makes sense for users requiring statewide extent (e.g. state government), it is not extremely useful for those entities that work at a localized scale (e.g. local government or site-specific applications). The consensus among study participants is that, in addition to small-scale statewide data, end users in the state of Missouri have a need for up-to-date base data that includes an accurate, local-resolution hydrography dataset with features captured from best-available source data (lidar, aerials, etc.). The hydrography dataset should accurately map features so that it can be adopted as a reliable base dataset by organizations at all levels within the state. Local-level organizations expressed that they currently rely on in-house data due to the limitations of national data to capture many features that exist at the local scale. All organizations surveyed expressed the need to enhance or relate any national dataset with features and applicable data collected in the field. The ability to add missing features that are of interest, or to supplement features with field data, will greatly enhance the use of the national dataset.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	*

*ERDAS Imagine

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, streamgages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Minor problem – requires some intervention
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Missouri managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Localized Flood Mitigation

Mission Critical Activity Title:	Localized Flood Mitigation
Mission Critical Activity Description:	Flood risk mapping and flood plain administration.
MCA_ID:	3802020425_1
Organization Type:	City Government
Organization Name:	City of Columbia
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Watershed boundaries and hydrography data from city projects and studies; USGS stream gage information, FEMA DFIRM.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$14,500
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Denser and more consistent accurate data throughout central region of Missouri; more current and quicker turn-around time on mapping and determinations.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate

Future Benefits	
Future Human Lives Saved:	Minor
Future Other Benefits:	

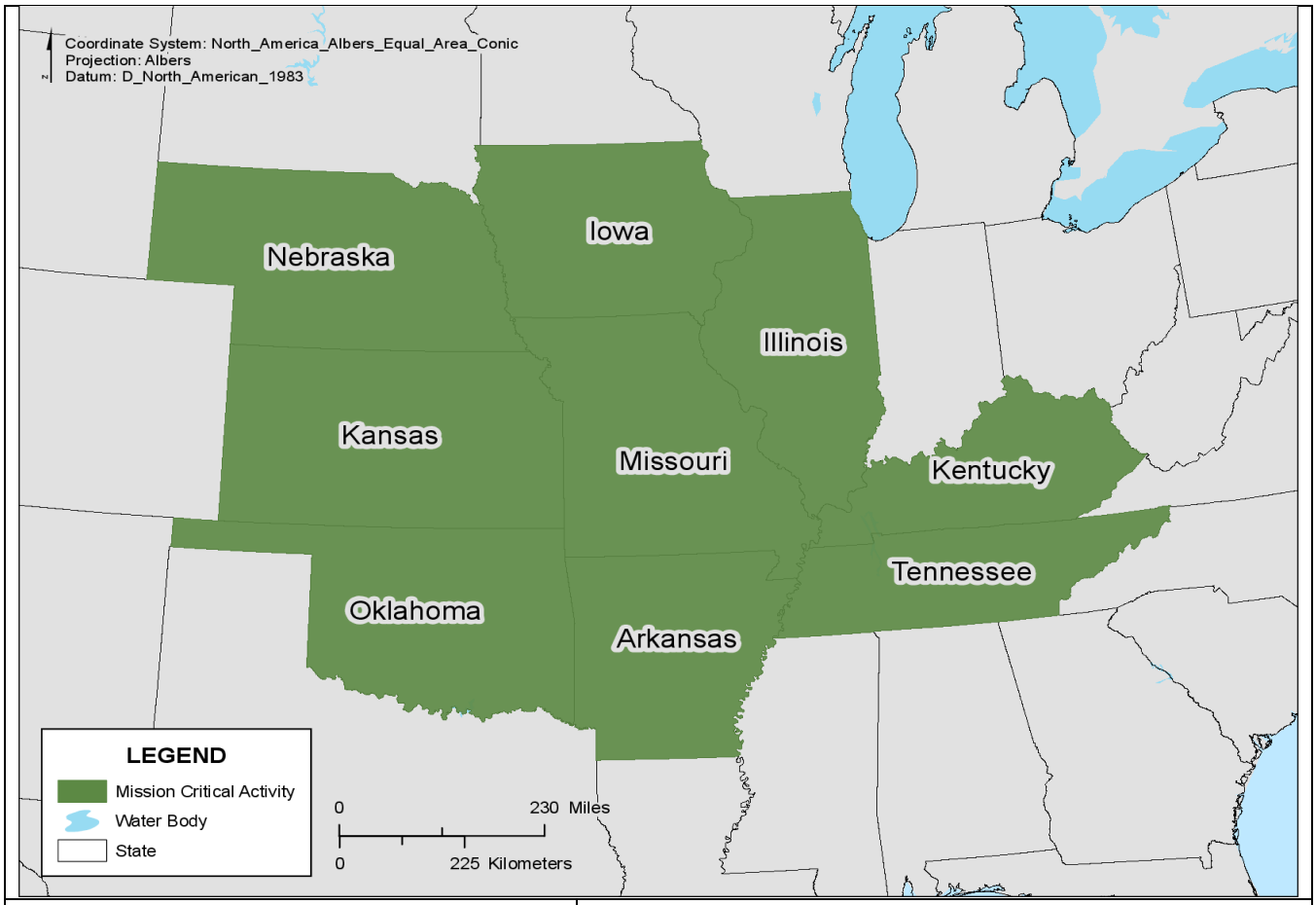
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Required	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice To Have	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	FEMA regulatory boundaries – Required, Perform Geospatial Analysis	FEMA regulatory boundaries – Required, Perform Geospatial Analysis

DOT Hydraulics



Mission Critical Activity Title:	DOT Hydraulics
Mission Critical Activity Description:	Design and maintain state transportation system.
MCA_ID:	3771821313_1
Organization Type:	State Government
Organization Name:	Missouri Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI, Floodplain (FEMA/NFIP), USFWS Endangered Species Critical Habitat, TMDL and 303(d) (which are created using NHD and WBD), priority watersheds created from MoRAP's Ecological Drainage Units.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Enhanced topographic, bathymetric, and stream data would reduce the amount of field survey work required and allow the use of 2-D modeling for hydraulic design and environmental clearance to a greater extent.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Major
Future Other Benefits:	

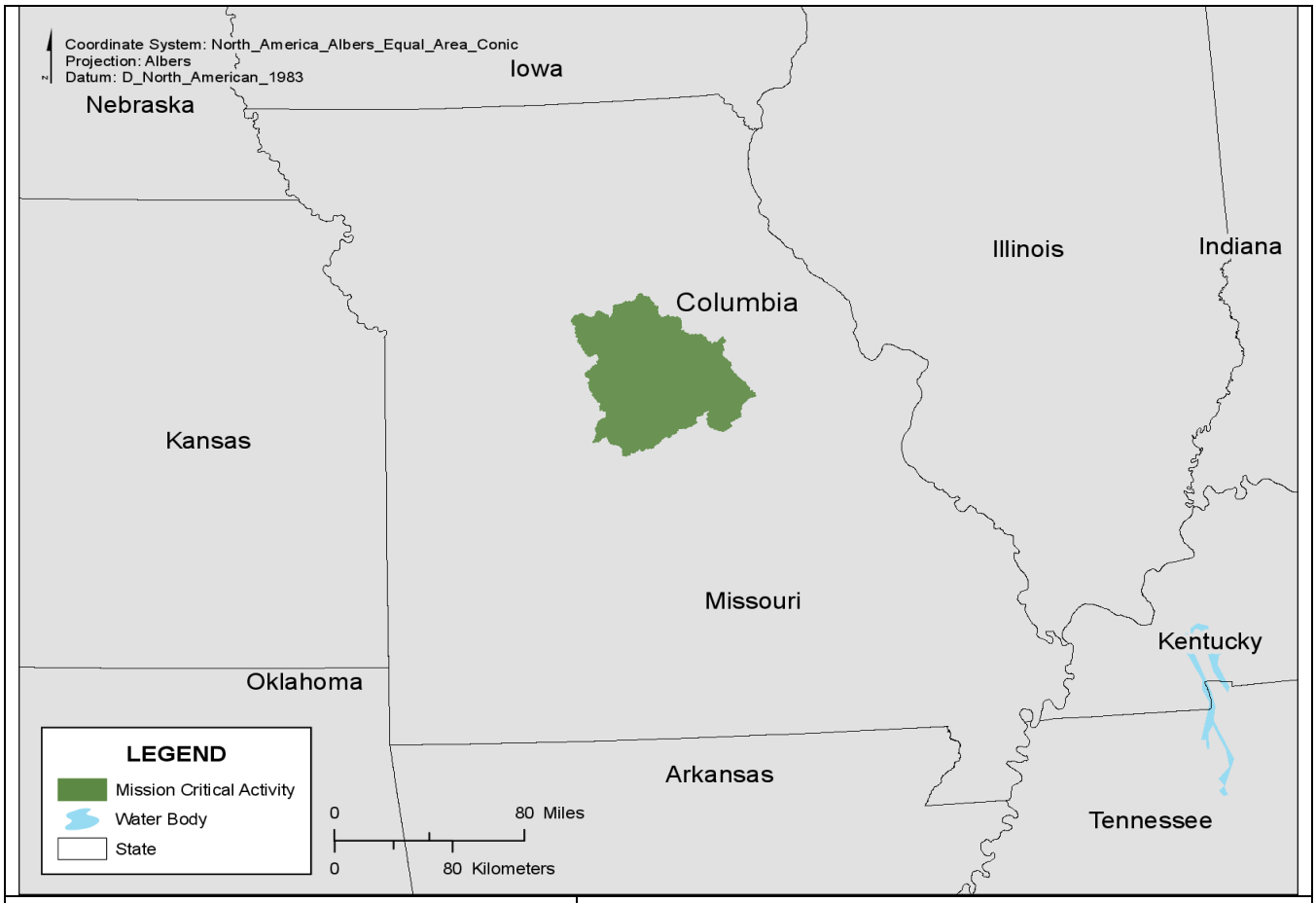
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Sinkholes, lake bathymetry. NOTE: springs are identified as leakage points but are needed as a layer.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Required	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Stormwater



Mission Critical Activity Title:	Stormwater
Mission Critical Activity Description:	Stormwater, hydrologic design, and construction and other infrastructure projects.
MCA_ID:	3802020425_2
Organization Type:	City Government
Organization Name:	City of Columbia
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Watershed boundaries and hydrography data from city projects and studies; USGS stream gage information; FEMA DFIRM.

Current Benefits	
Total Annual Program Budget:	$400,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Denser and more consistent accurate data throughout central region of Missouri; more current and quicker turn-around time on mapping and determinations.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

Future Benefits	
Future Human Lives Saved:	Minor
Future Other Benefits:	

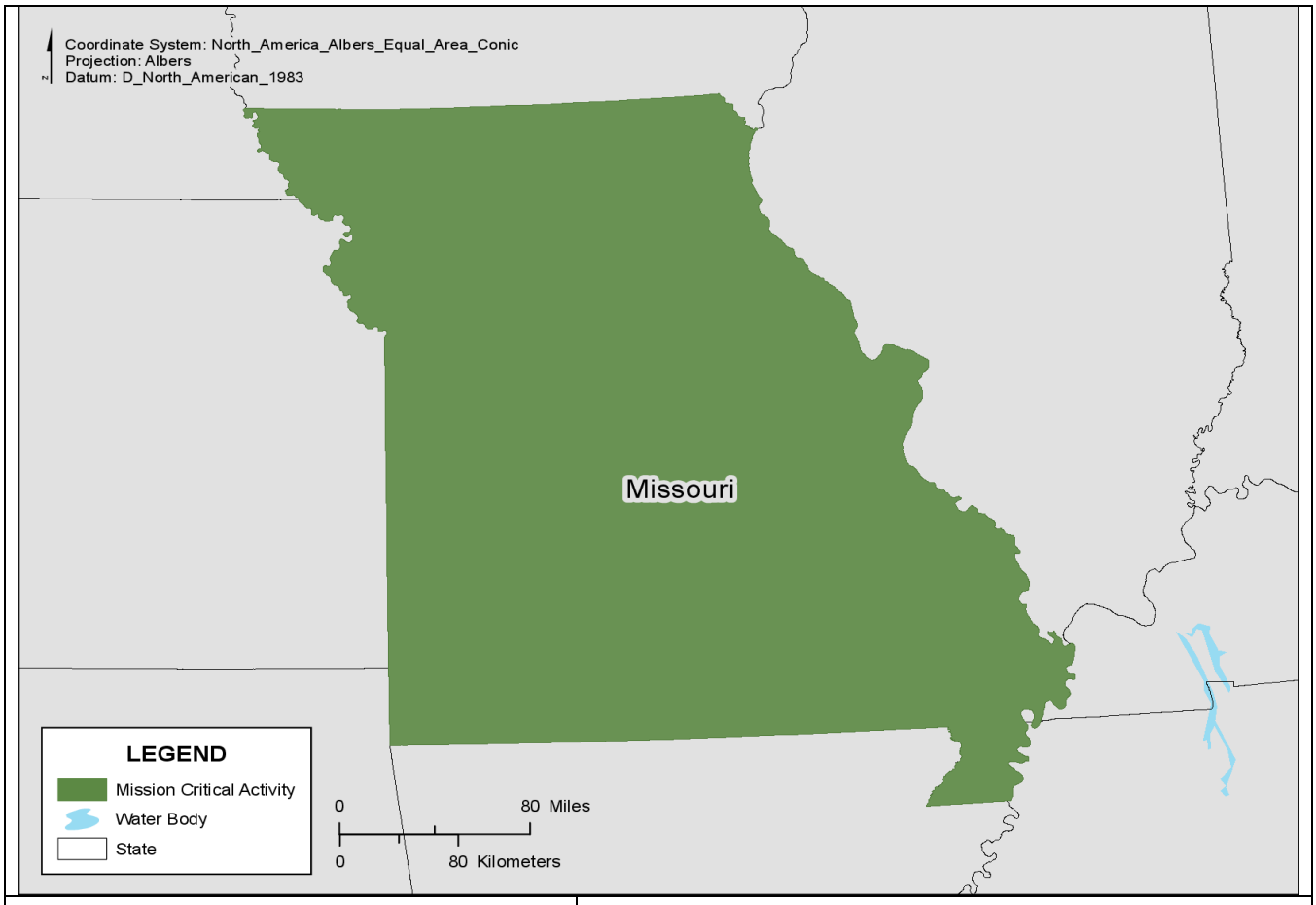
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Sinkholes.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Required	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Ecosystem Management



Mission Critical Activity Title:	Ecosystem Management
Mission Critical Activity Description:	Fisheries management and watershed protection.
MCA_ID:	3786924703_1
Organization Type:	State Government
Organization Name:	Missouri Department of Conservation
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally collected major and minor stream networks, MORAP AES and VST (Aquatic Ecologic systems and Valley Segment Types).

Current Benefits	
Total Annual Program Budget:	$11.0 million
Current Annual Benefits ($):	$45,000-$225,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$110,000-$550,000
Future Benefits Description:	Benefits of improved hydrographic data include: time savings (watershed analyses, digitization, feature editing etc.), increased analytical opportunities, quality of analytical products, accuracy of public facing information (area maps, fishing guides etc.), and improved interactive mapping applications. Improved data would increase the benefits greatly as staff would take less time to accomplish tasks and could conduct analyses that currently are not attempted due to the time currently required to accomplish them.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

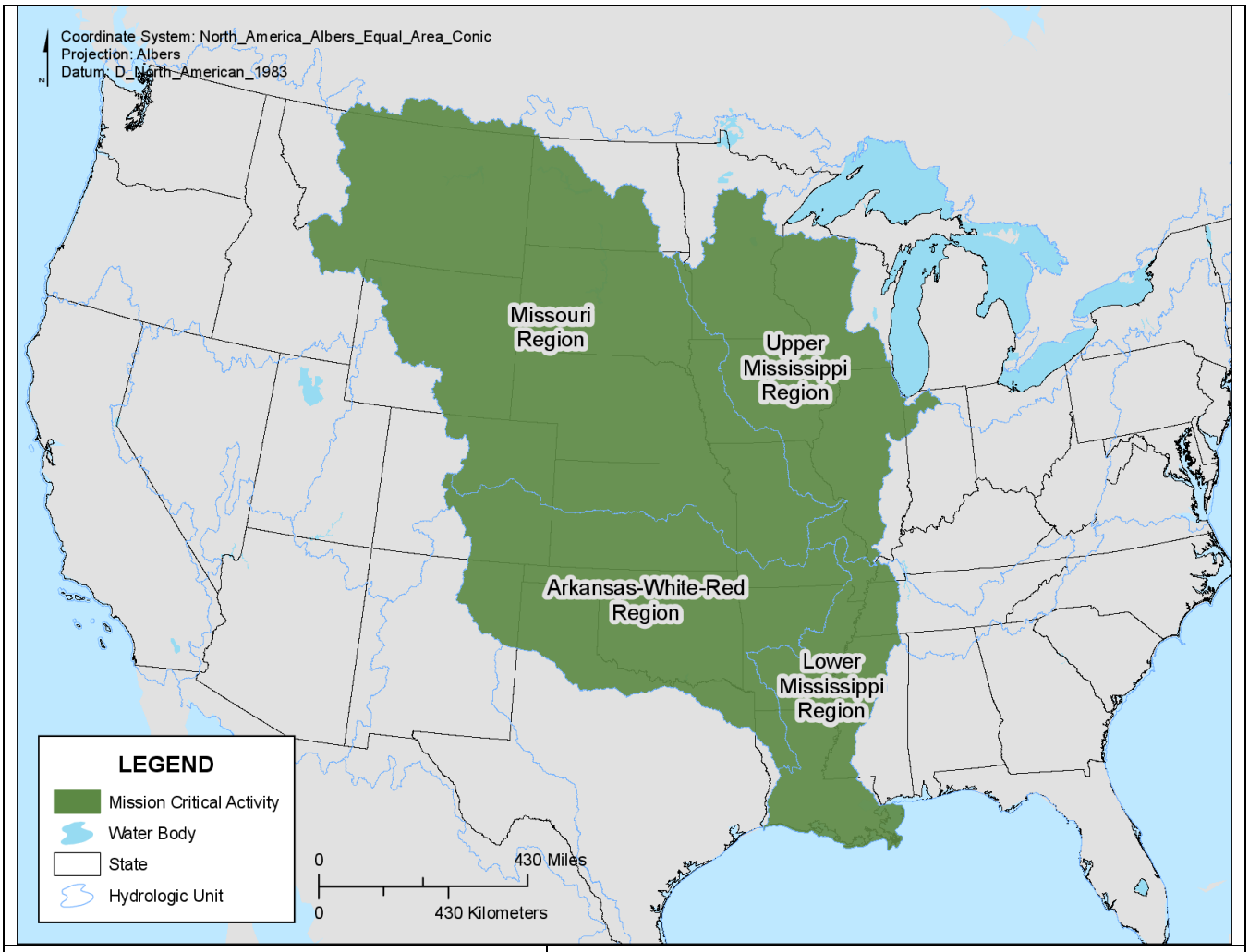
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

State Flood Mitigation and Water Supply Management



Mission Critical Activity Title:	State Flood Mitigation and Water Supply Management
Mission Critical Activity Description:	We provide hydrologic, engineering and water policy expertise on flooding, water supply, water monitoring, wetlands, dam safety and interstate water issues.
MCA_ID:	3787386487_1
Organization Type:	State Government
Organization Name:	Missouri Department of Natural Resources
Business Use:	River and Stream Flow Management
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FEMA DFIRM.

Current Benefits	
Total Annual Program Budget:	$3.5 million
Current Annual Benefits ($):	$1.9 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved hydrographic information will benefit our wetland studies/Clean Water Act duties. Dataset improvements will benefit water supply studies and watershed planning activities.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Land Use Permitting/Hydrologic Design and Construction

Mission Critical Activity Title:	Land Use Permitting/Hydrologic Design and Construction
Mission Critical Activity Description:	Hydrologic design and construction (infrastructure related) stormwater management - BMP design, land use permitting, riparian corridor identification, flood risk mapping.
MCA_ID:	3777514906_1
Organization Type:	County Government
Organization Name:	County of Boone
Business Use:	Urban and Regional Planning
Area of Interest:	County

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Boone County Hydrology Datasets.

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$150,000
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

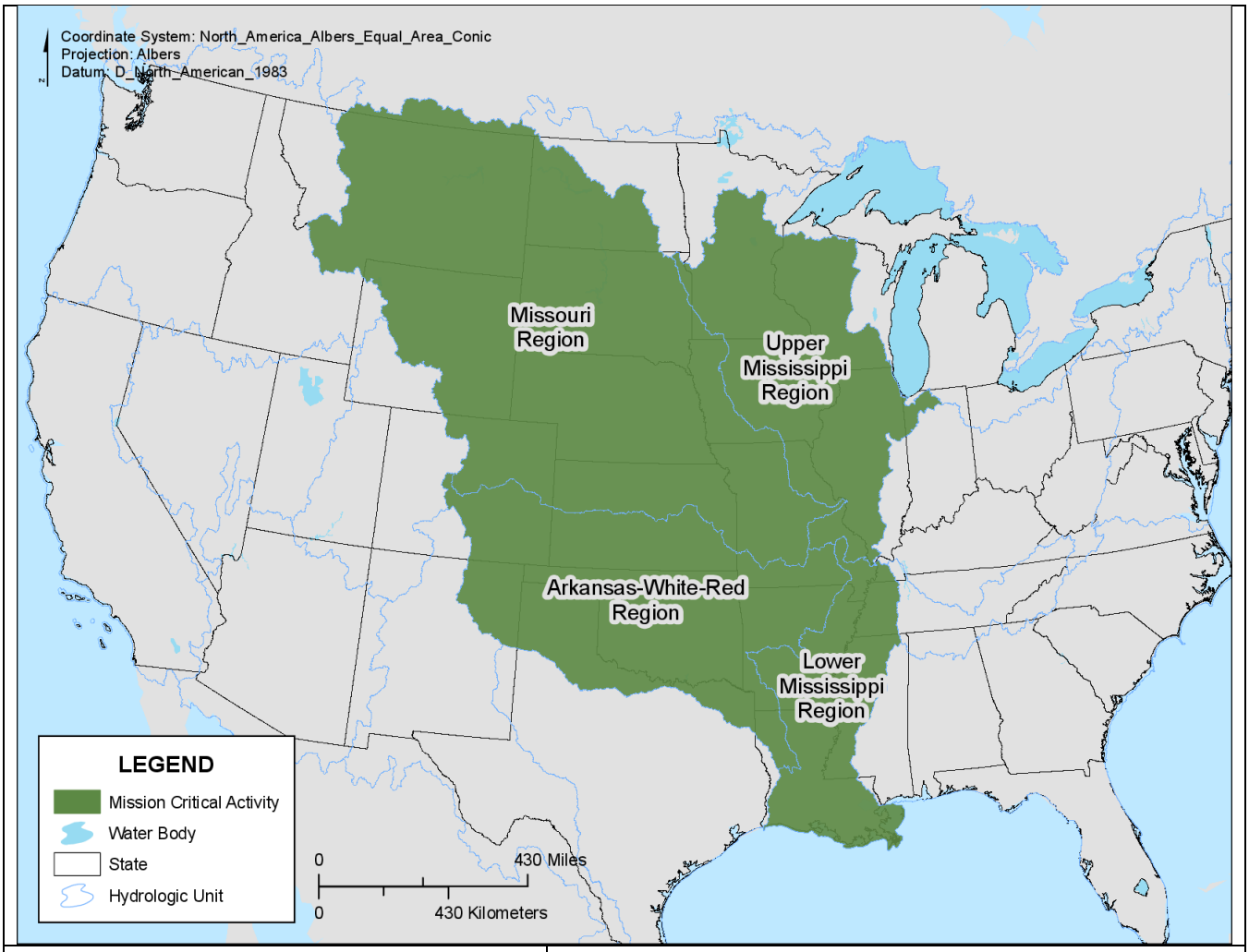
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Unnecessary to update local dataset.
Future Operational Benefits	
Future Time/Cost Savings:	Not Applicable
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

State Watershed Management



Mission Critical Activity Title:	State Watershed Management
Mission Critical Activity Description:	Watershed protection through implementation of regulatory and voluntary programs that protect, restore, and maintain the physical, chemical, and biological integrity of the state's and nation's waters to ensure public health and safety.
MCA_ID:	3787452805_1
Organization Type:	State Government
Organization Name:	Missouri Department of Natural Resources
Business Use:	Water Quality
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Missouri Resource Assessment Partnership's (MORAP) Ecological Classification System for Riverine Ecosystems (watersheds and flowlines), NWI.

Current Benefits	
Total Annual Program Budget:	$353.3 million
Current Annual Benefits ($):	$32 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$31.9 million

Future Benefits	
Future Benefits Description:	Improved hydrographic data would advance the department's custom applications used for data maintenance in order to increase accountability, accuracy, and integration of department data. The creation or use of possible applications would provide the ability to perform spatial analysis for planning and implementation of water quality programs. We could continue improving customer service with new online applications that reduce time and effort for customers while creating transparency.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes

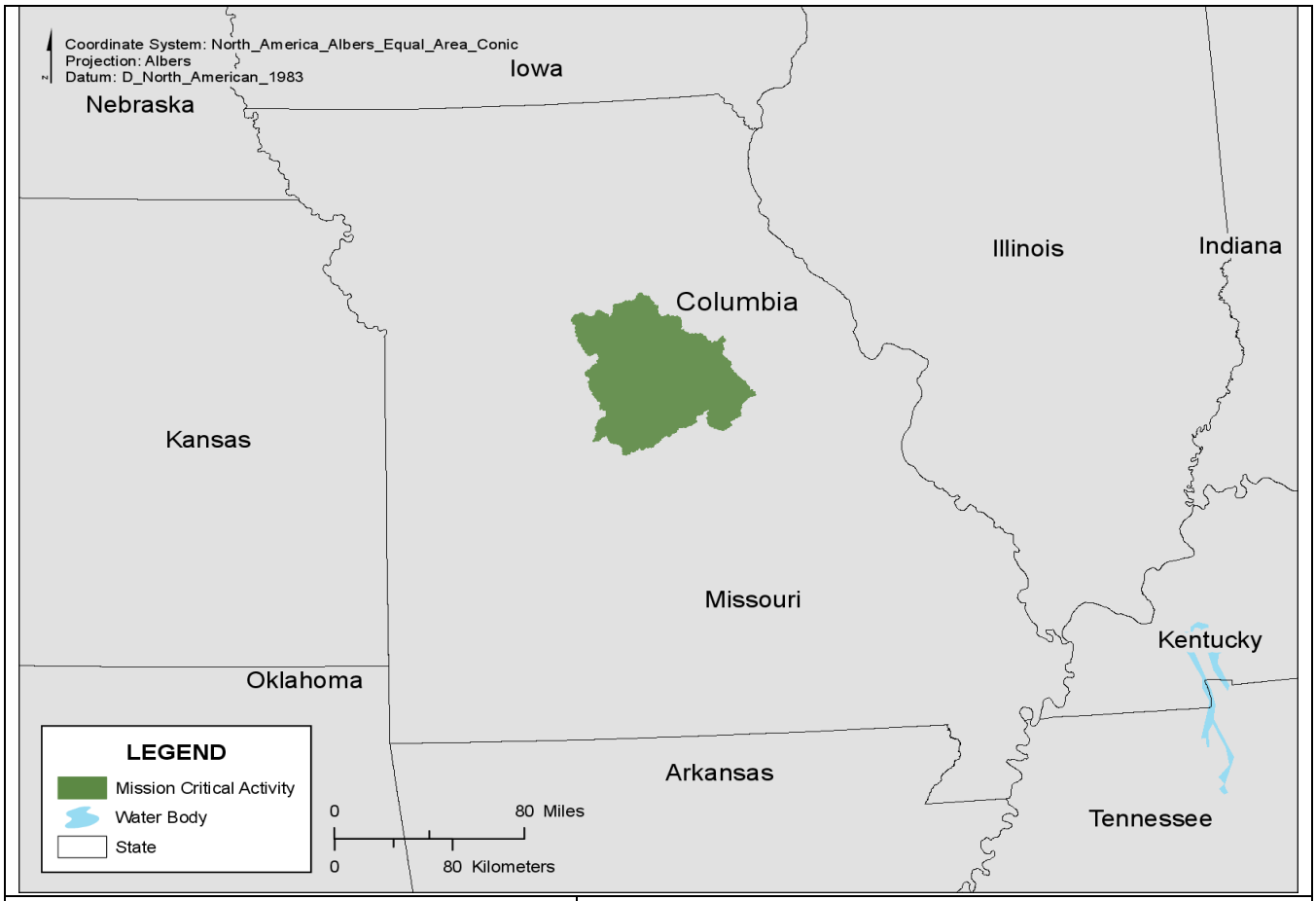
Required Characteristics	
Badlands	
Other	Yes
	Lake bathymetry.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Municipal Separate Storm Sewer System (MS4) for NPDES (National Pollutant Discharge Elimination System).
MCA_ID:	3802020425_3
Organization Type:	City Government
Organization Name:	City of Columbia
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Watershed boundaries and hydrography data from city projects and studies; USGS stream gauge information, FEMA DFIRM.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Denser and more consistent accurate data throughout central region of Missouri; more current and quicker turn-around time on mapping and determinations.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

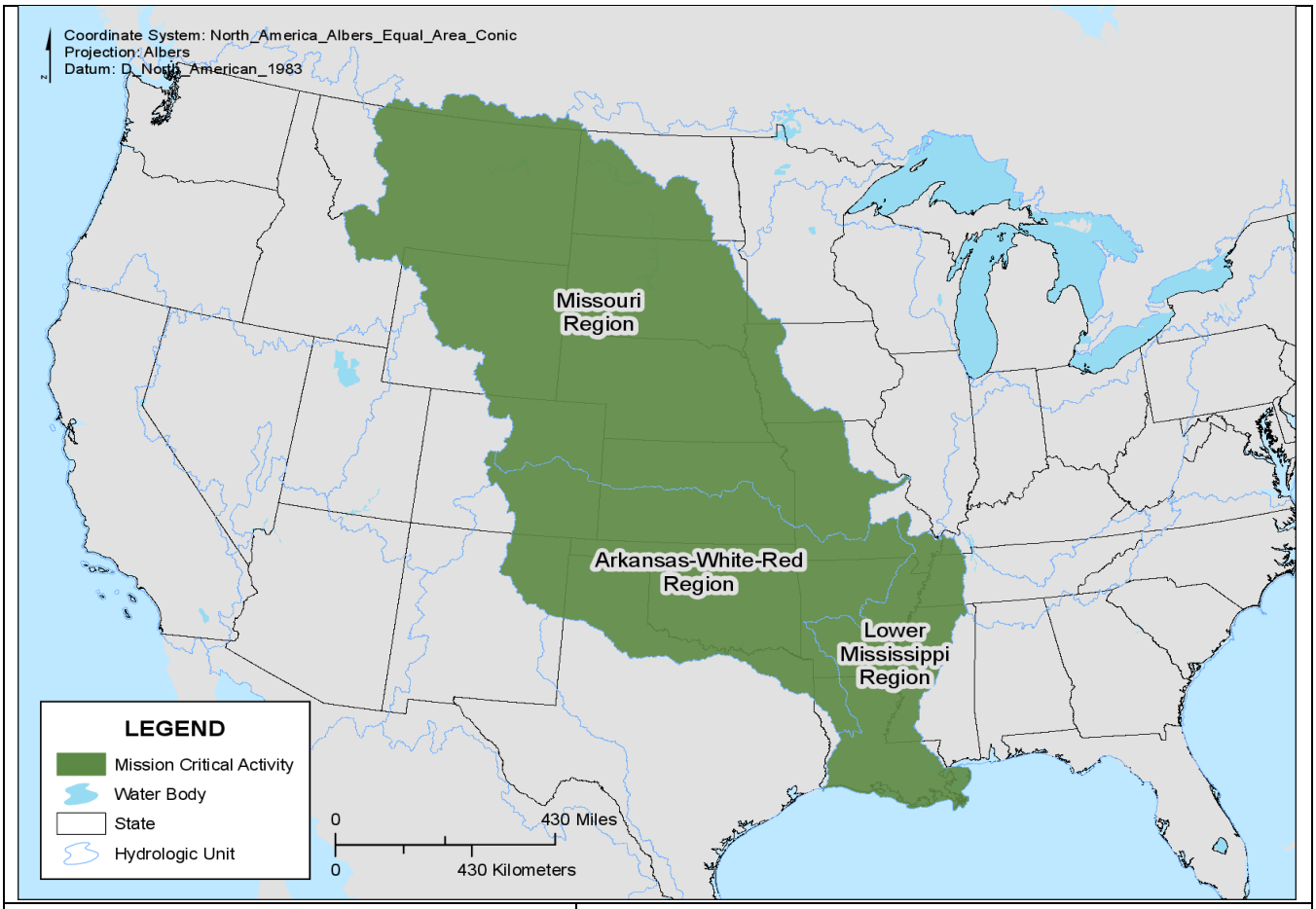
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Sinkholes.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	WBD; Perform Geospatial Analysis	WBD; Perform Geospatial Analysis

Resource Planning



Mission Critical Activity Title:	Resource Planning
Mission Critical Activity Description:	We provide hydrologic, engineering and water policy expertise on flooding, water supply, water monitoring, wetlands, dam safety and interstate water issues.
MCA_ID	3787386487_2
Organization Type:	State Government
Organization Name:	Missouri Department of Natural Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Wetlands Inventory.

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved hydrographic information will enhance the water resource planning process and help to better inform the public/customers about the issues faced.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	

Required Analytical Functions	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Montana

The state of Montana has requirement for more complete and current hydrography geographic data.

Hydrography Requirements and Benefits Study (HRBS) survey results for Montana noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Fish, wildlife, and natural resources conservation
- Water quality planning and protection
- Water resources planning and development
- Water rights administration (permitting new rights and reviewing changes to existing rights)
- Implementing, monitoring, and regulating Montana Compact and Tribal Water Code
- Understanding the distribution of water from Montana's streams (flow, diversion, water use, and return)

In order to satisfy these requirements, Montana needs statewide spatial hydrography data that: are of high positional accuracy (>1:24,000-scale); are reviewed and updated on a near annual basis, especially after high-water or other events; are available in Esri formats; are readily available for download at various geographic extents and as web services; include small impoundments (<1 acre), diversions, intakes, leakage, ditches and canals, and other hydrographic features and structures that may not be discernable on aerial imagery; and provide stream order, whole stream identifiers, names (including GNIS and alias names), streamflow statistics, and accurate flow periodicity (perennial, intermittent, ephemeral).

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	*

*Web map services

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Montana managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Rights

Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	Water rights administration. Permitting and changes.
MCA_ID:	3772280965_1
Organization Type:	State Government
Organization Name:	State of Montana Natural Resources Conservation - Water Resources
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have

Requirements	
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Cannot determine budget as it relates specifically to hydrography data.
Current Annual Benefits ($):	Cannot determine.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.

Future Benefits	
Future Benefits Description:	Having better, more accurate information is always better and would always benefit the DNRC in their capacity to manage and conserve water resources. That said, one of the issues we are faced with is linking water rights data with NHD data; it is nearly impossible to do effectively and greatly limits our ability to interact with the NHD and use things like flowline modeling.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	

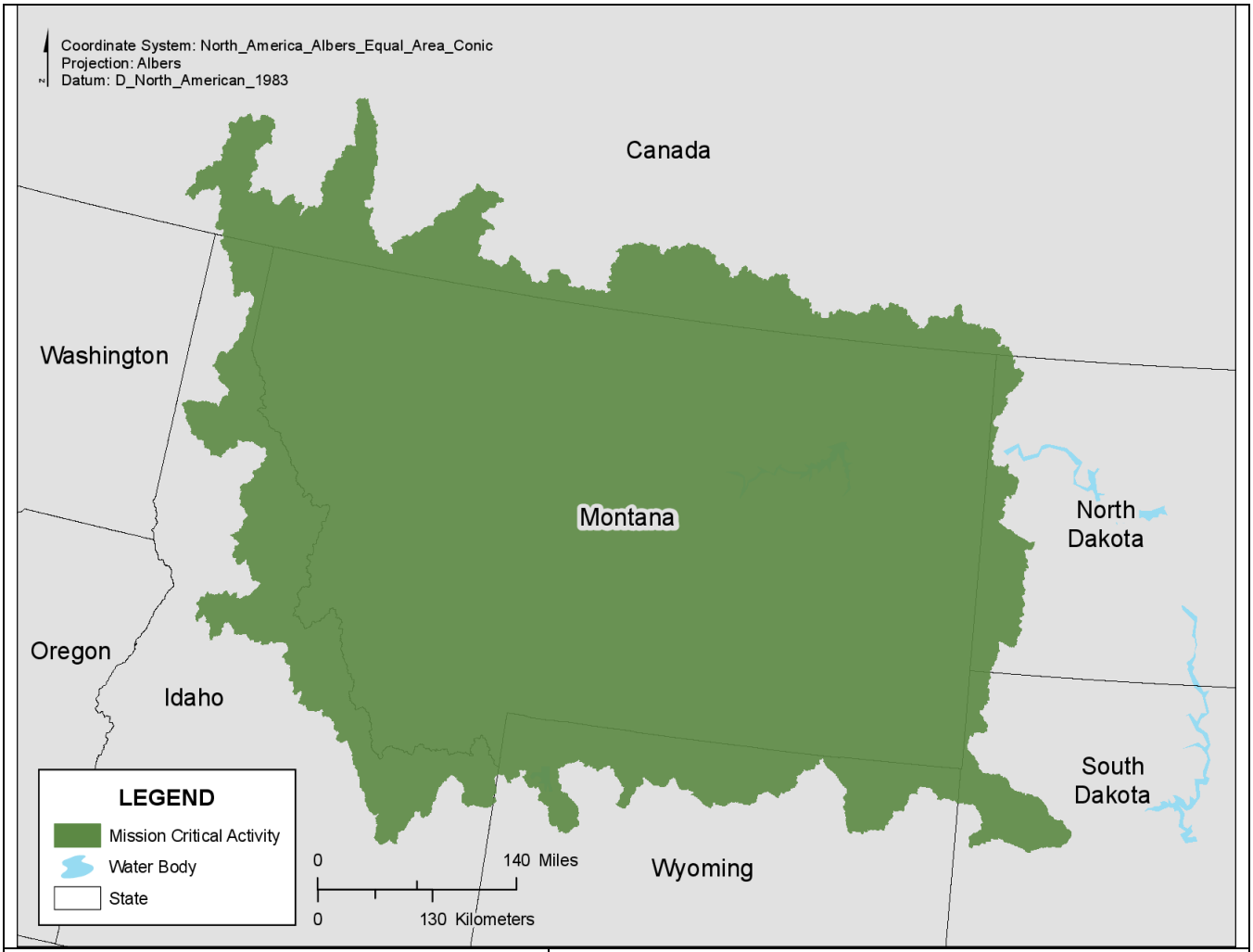
Required Characteristics	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	None
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	None
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Data Management



Mission Critical Activity Title:	Water Data Management
Mission Critical Activity Description:	Fish and wildlife data management and dissemination.
MCA_ID:	3797173893_1
Organization Type:	State Government
Organization Name:	Montana Fish, Wildlife and Parks
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	We use a mixed scale hydro based on the 1:100 NHD with some 24k streams stitched in. Major difference is our hydro layer needs to contain whole stream identifiers.

Current Benefits	
Total Annual Program Budget:	Cannot determine budget as it relates specifically to hydrography data.
Current Annual Benefits ($):	Cannot determine.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Cannot estimate.
Future Benefits Description:	
Future Operational Benefits	

Future Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Whole stream identifiers.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	

Required Analytical Functions	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	None
Climate	Nice To Have	None
Contaminant Sources	Nice To Have	None
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	None
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Permit Approval

Mission Critical Activity Title:	Permit Approval
Mission Critical Activity Description:	Analysis and approval of applications under Montana's Natural Streambed and Land Preservation Act.
MCA_ID:	3787023560_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Montana Association of Conservation Districts
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$160,000
Current Annual Benefits ($):	$160,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$40,000
Future Benefits Description:	Better baseline discharge data or more reliable statistical discharge information lessens the analysis time for permit applications. Also, customers are more confident in the reliability of USGS-based data than locally-derived data.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable

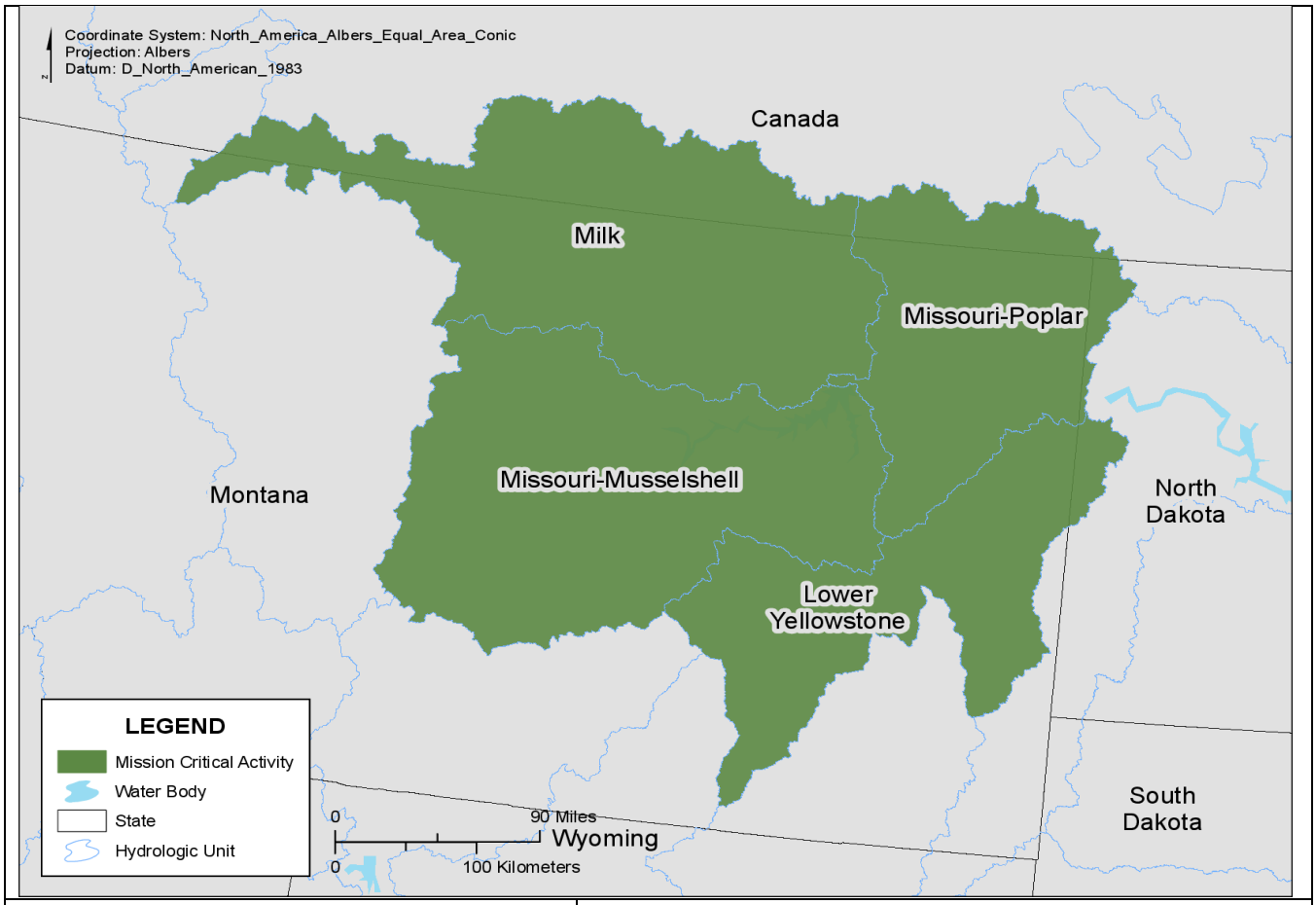
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Visual Inspection
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Rights



Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	Implementing, monitoring, and regulating (managing) the Fort Peck - Montana Compact and Tribal Water Code by drainage basin within the exterior boundaries of the reservation using hydrologic modeling of surface and ground water in comparison to the adjudicated water rights reservation-wide and in cooperation with the USGS stream gaging, BMBG ground water programs, and other monitoring efforts in the state of Montana.
MCA_ID:	3804065688_1
Organization Type:	Tribal Government
Organization Name:	Fort Peck Assiniboine and Sioux Tribes
Business Use:	River and Stream Flow Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Currently developing our own dataset for our needs, using components from all available data.

Current Benefits	
Total Annual Program Budget:	$80,000
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	Cost savings to us, as all our project needs are based on special funding on a yearly basis; no funds, no benefits.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

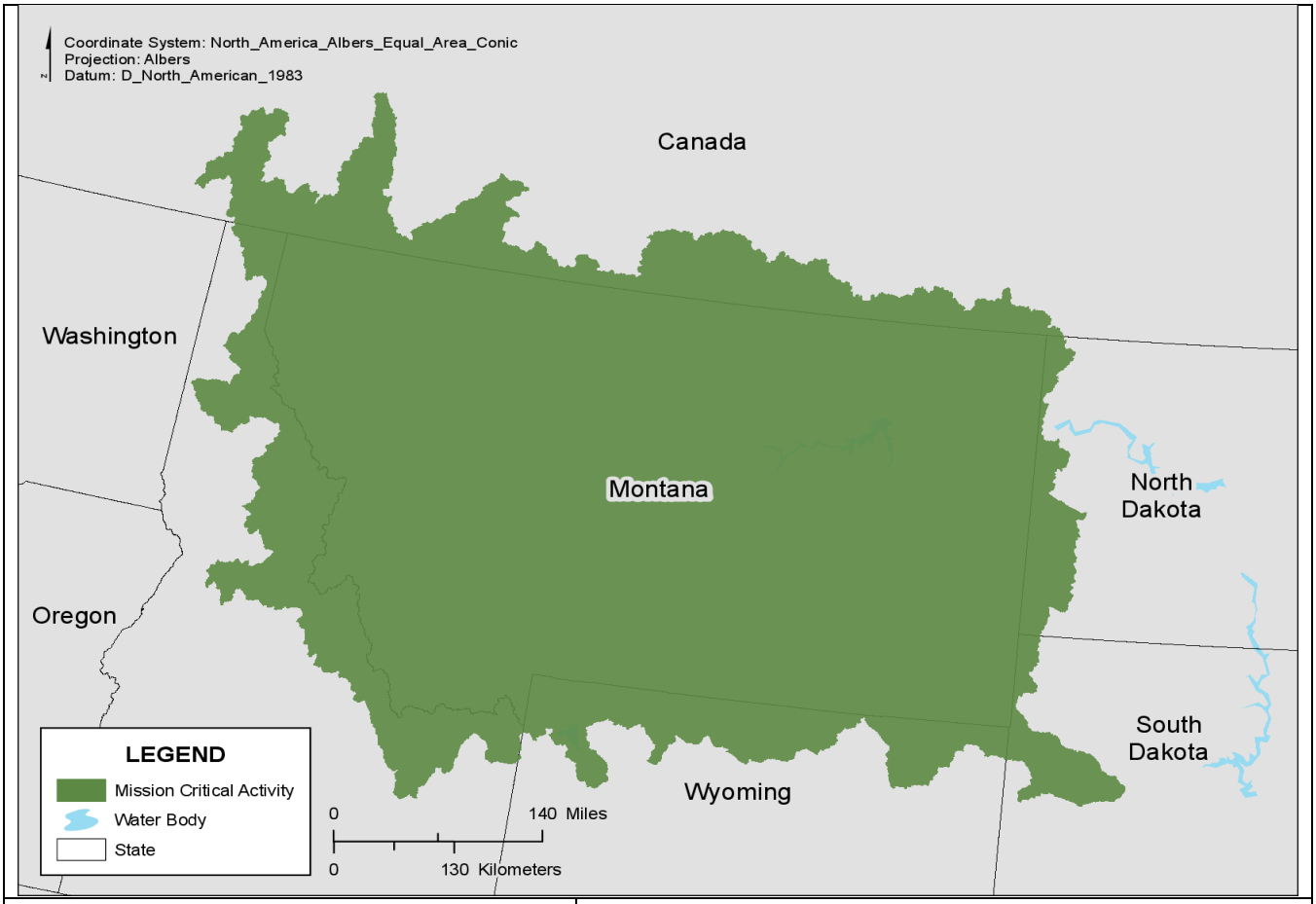
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	The Water Management Bureau of DNRC supports other Bureaus within the agency as well as water users, irrigation districts, and watershed groups regarding the evaluation of surface and ground water right applications, streamflow measurement, and forecasting related to the management of state water projects. The planning section works with water users and groups in the facilitation and resolution of complicated water resource issues and provides technical expertise associated to the interpretation and presentation of water resource data.
MCA_ID:	3807051637_1
Organization Type:	State Government
Organization Name:	State of Montana Natural Resources Conservation - Water Resources
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$25,000-$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Difficult to answer since that really depends on what you mean by "improved" hydrographic information. If we are talking about 1:6,000 or better resolution for the line work in the NHD, that would provide significant benefits through our ability to develop accurate representations of where water is diverted, used, and returned. Better spatial data; better modeling.

Future Benefits	
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

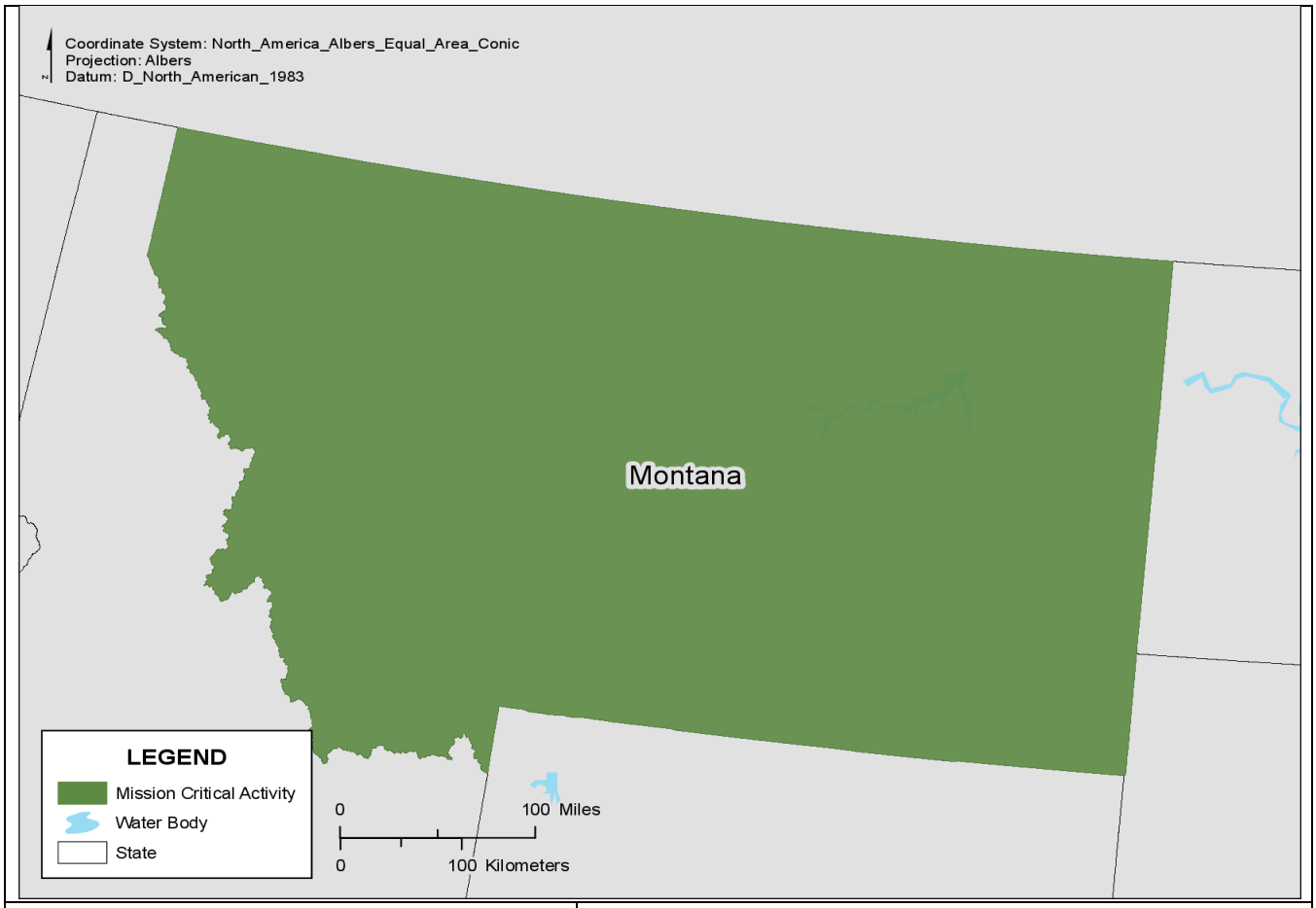
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Protect, restore, and maintain water quality through standards, assessment, reporting, planning, and permitting.
MCA_ID:	3802085380_1
Organization Type:	State Government
Organization Name:	Montana DEQ
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$9 million
Current Annual Benefits ($):	$50,000 (or less)
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Ability to identify and access state water/water quality related events along flowlines; improved communication of information to stakeholders; improved accuracy of analysis and reporting.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

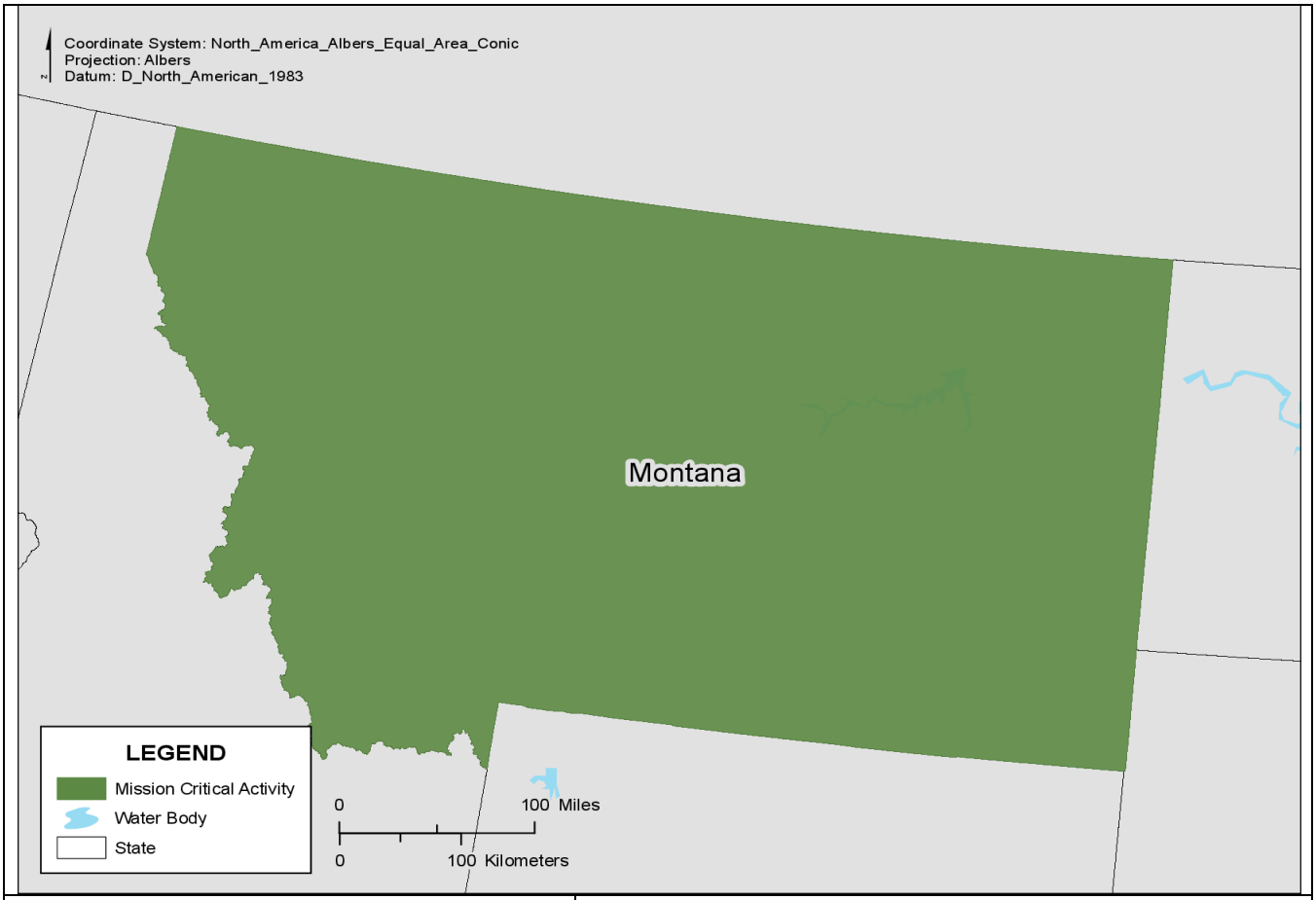
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Flow periodicity is required, in particular improved attribution of intermittent vs. ephemeral.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Nice To Have	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Conservation and Watershed Planning



Mission Critical Activity Title:	Water Conservation and Watershed Planning
Mission Critical Activity Description:	Assistance in the distribution of water from Montana's streams.
MCA_ID:	3787023560_2
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Montana Association of Conservation Districts
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$450,000
Current Annual Benefits ($):	$150,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$45,000
Future Benefits Description:	The division of water could be administered in a more timely and responsive way with improved spatial discharge data, particularly seepage and inflow components. Over the next 10 years, Montana's general water rights adjudication will be completed in most regions. This will increase the opportunity and need for the administration of the state's water on a broader scale than discussed above.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Not Applicable

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Nebraska

Many water programs within the state of Nebraska have requirements for more complete and current hydrography geographic data that is integrated with other framework layers, including improved alignment with statewide lidar elevation data.

The initial HRBS survey results for Nebraska and subsequent discussions with key hydrography stakeholders noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- River and Stream Flow Management
- Water Quality
- Water Resources Planning and Management
- Flood Risk Management (Floodplain Mapping and Safety of Dams)

Access to more accurate spatial hydrography data that are maintained and supported as authoritative data among state and federal agencies and by the public will allow managers to make better decisions based on better data and will support better service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required

Data or Service Access Method	Requirement
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

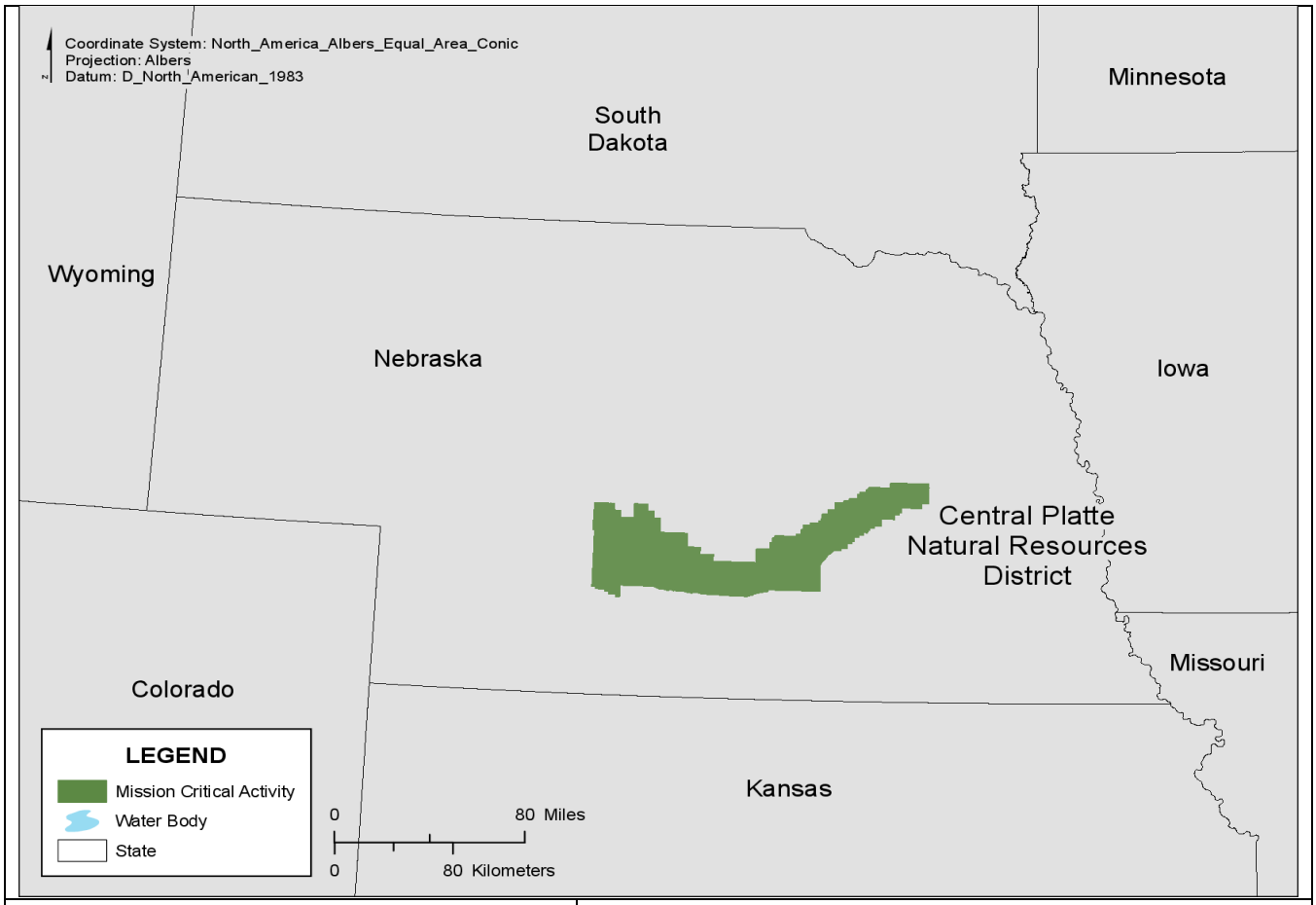
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Minor problem, requires some intervention
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Nebraska managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Groundwater Management



Mission Critical Activity Title:	Groundwater Management
Mission Critical Activity Description:	Ground water management supporting the integrated management plan for the Platte River Basin.
MCA_ID:	3834026693_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Central Platte Natural Resources District
Business Use:	River and Stream Flow Management
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$6.5 million
Current Annual Benefits ($):	$40,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	The data by itself is the biggest benefit, it goes hand in hand with the potential time or cost savings.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable

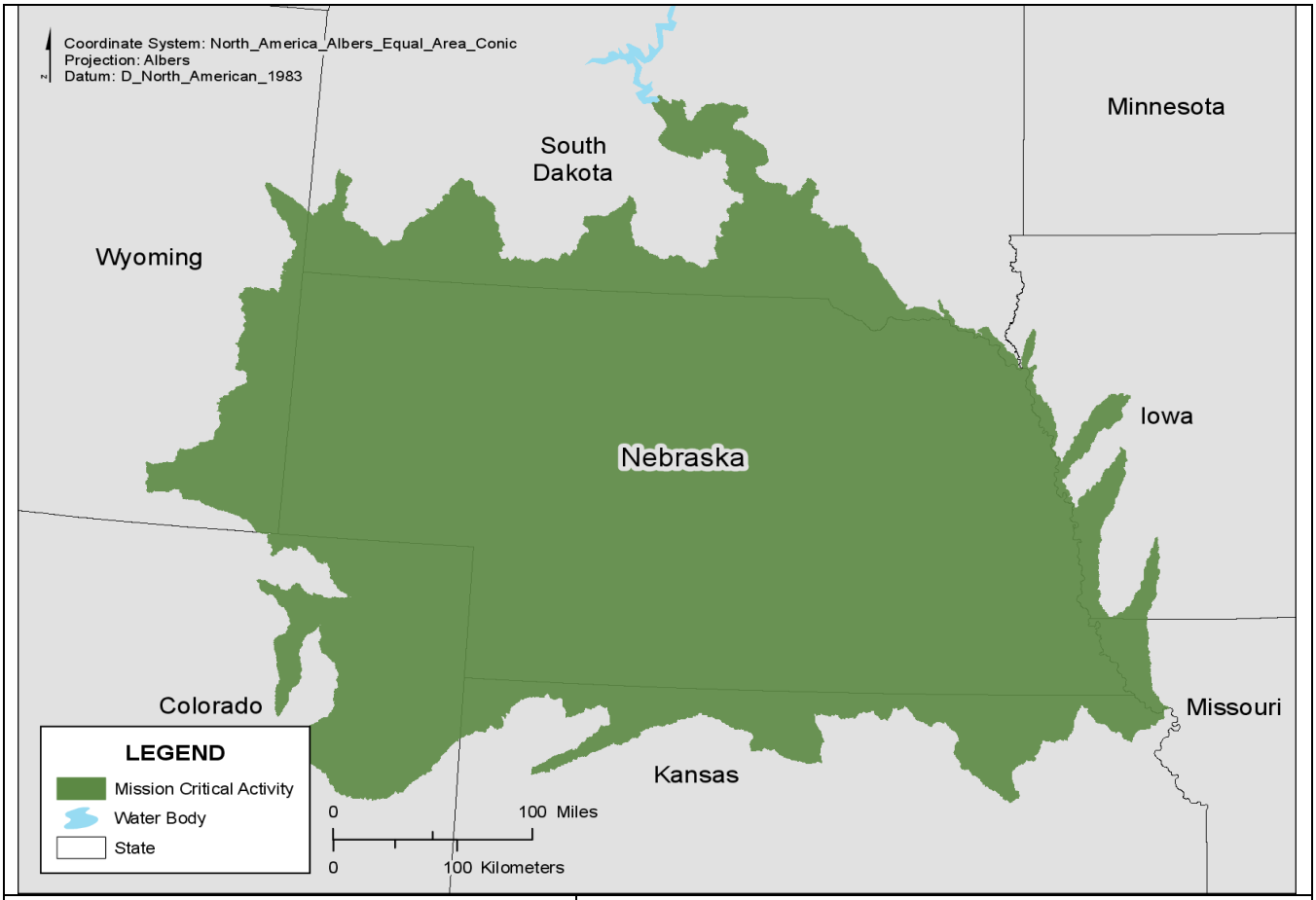
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Management



Mission Critical Activity Title:	Water Quality Management
Mission Critical Activity Description:	Water quality program management under the Clean Water Act. NDEQ has responsibility for all aspects of Clean Water Act programs (permitting, monitoring, assessment, grants, etc.) except Section 404 dredge and fill.
MCA_ID:	3772362766_1
Organization Type:	State Government
Organization Name:	Nebraska Department of Environmental Quality
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$4 million
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Most of the information we need is available; however, time savings would be realized if integrated with NHD.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable

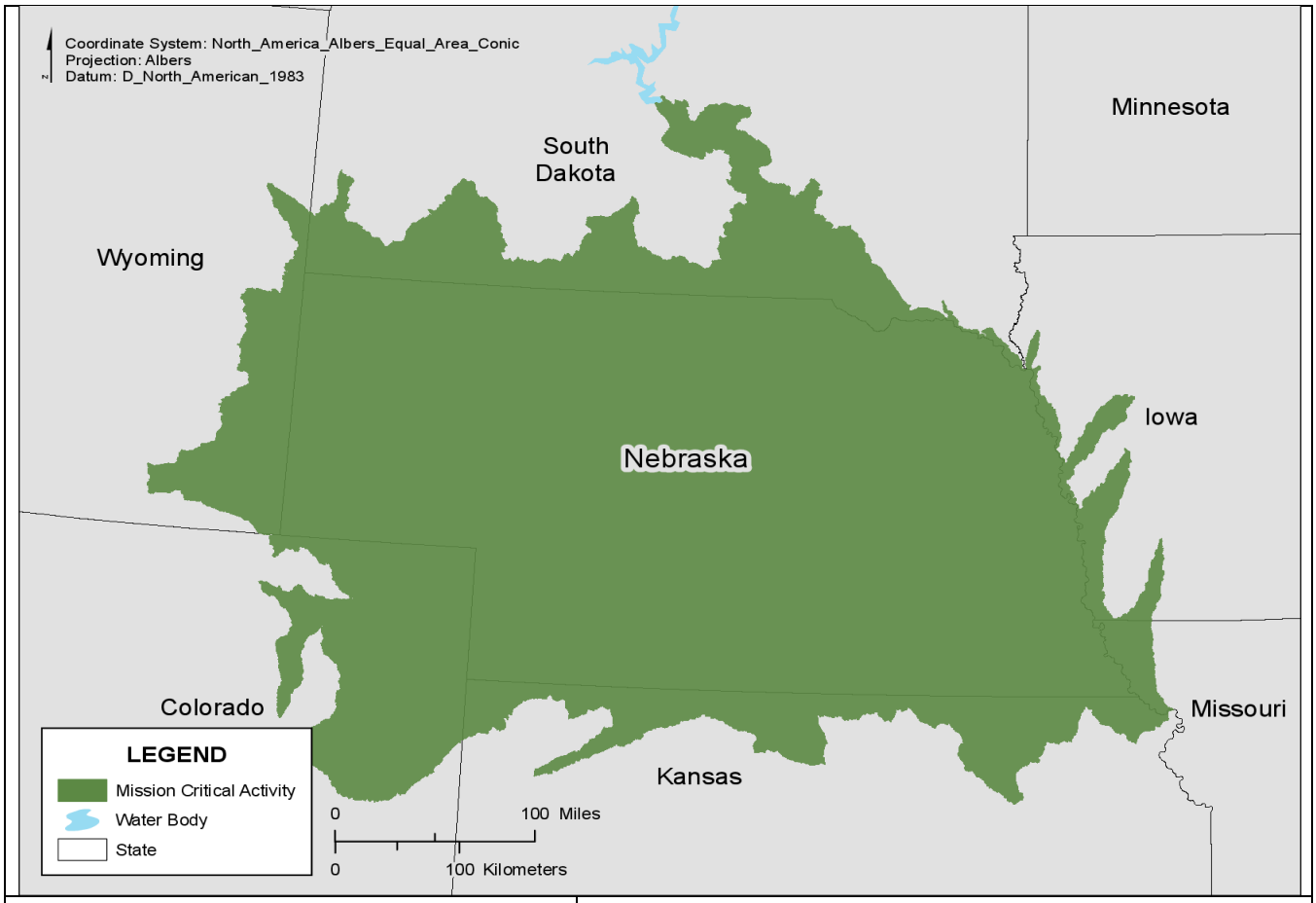
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Visual Inspection
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Integrated Water Management and Floodplain Management



Mission Critical Activity Title:	Integrated Water Management and Floodplain Management
Mission Critical Activity Description:	The Department of Natural Resources Floodplain Section handles floodplain management matters for the state of Nebraska. Our section is responsible for coordinating an overall program aimed at addressing the wise use of land that is subject to flooding. We accomplish this by: providing technical assistance to communities, state agencies, Federal agencies, and the public on floodplain management; identifying and delineating floodplains and floodways; providing state coordination for the National Flood Insurance Program; providing technical assistance and coordinating Federal funding to communities for the development of local hazard mitigation plans.
MCA_ID:	3792061391_1
Organization Type:	State Government
Organization Name:	NDNR
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$600,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	If the dataset had an easy way of querying out canals, etc., it could have a huge impact on floodplain mapping, allow for timely response, significantly reduce approximate H&H efforts, and provide accurate maps. Being able to calculate up and down stream would be a huge impact on time for our surface water permitting group.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left right/bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	None
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Nevada

Nevada has identified six Mission Critical Activities (MCAs) that fall into five primary Business Uses as defined by the USGS National Geospatial Program: Agriculture and Precision Farming; Flood Risk Management; Geologic Resource Assessment and Hazard Mitigation; Water Quality, and Water Resource Planning and Development. Programmatic requirements across interviewed agencies in Nevada require improved hydrography data for flood management, water quality, and water availability and delivery to support agriculture and urban needs. The prolonged and severe drought in the western U.S. exacerbates the economic and day-to-day challenges around diminishing water availability, delivery, wetland health, and farming and ranching needs. Flood risk mapping and floodplain delineation are critical to the timely and effective planning and mitigation of at-risk areas of the state, and this mapping depends on a robust and well-maintained hydrography dataset.

State and municipal governments, as well as private sector hydrologists, rely on hydrography data for flood mapping and risk assessment. While Nevada is prone to very dry conditions for most of the year, extreme flooding events occur annually, including flash floods from highly-localized storm cells and periodic El Niño conditions. Flooding has resulted in more injuries and fatalities in the state than any other natural disaster. Floodplain mapping, analytical modeling of flood scenarios, post-event response and analysis, and paleo-flood studies would benefit from higher-resolution and fully-maintained hydrography data that accurately align with elevation models. An additional statewide need is the full development and integration of StreamStats with the NHD. StreamStats is a USGS Web application that provides hydrography data and analytical tools including real time gaging data and stream flow statistics for ungaged catchments. Implementation of StreamStats in the state will greatly enhance the ability of practitioners to make flood risk assessments in both small local catchments and regional basins.

Economic growth for Nevada is dependent upon efficient and sustainable usage and transport of water resources. The effective management of water infrastructure in the state depends on accurate and up-to-date hydrography data. The integration of groundwater data with the NHD was identified as a tool that would greatly enhance water resource assessments. Water quality is of primary concern to those agencies responsible for the establishment of water quality standards, Environmental Protection Agency reporting, remediation, understanding environmental quality for species of concern, and understanding the quality of rural and tribal drinking water and wetland environments.

Ancillary data that inform and supplement the NHD are also critical. Stream flow information, as mentioned earlier, soils data, riverine and lake bathymetry, climate, contaminant sources, land cover, elevation, census, aquifers, discharge points, diversions, and data coming from other Federal agencies (EPA, USACE, USDA, USFWS) are all identified as important ancillary data.

Requirements for and benefits of improved hydrography presented here represent a snapshot of Nevada's needs. Further outreach and analysis is needed in the area of development and protection of critical infrastructure—water delivery, hydroelectric, ranching and agricultural needs, bridges and culverts—with respect to surface water flow and condition. Understanding how the NHD can inform critical groundwater recharge and management is also of critical importance during prolonged drought.

The hydrography user community in Nevada intends to reach out to additional agencies to further understand needs for Nevada.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

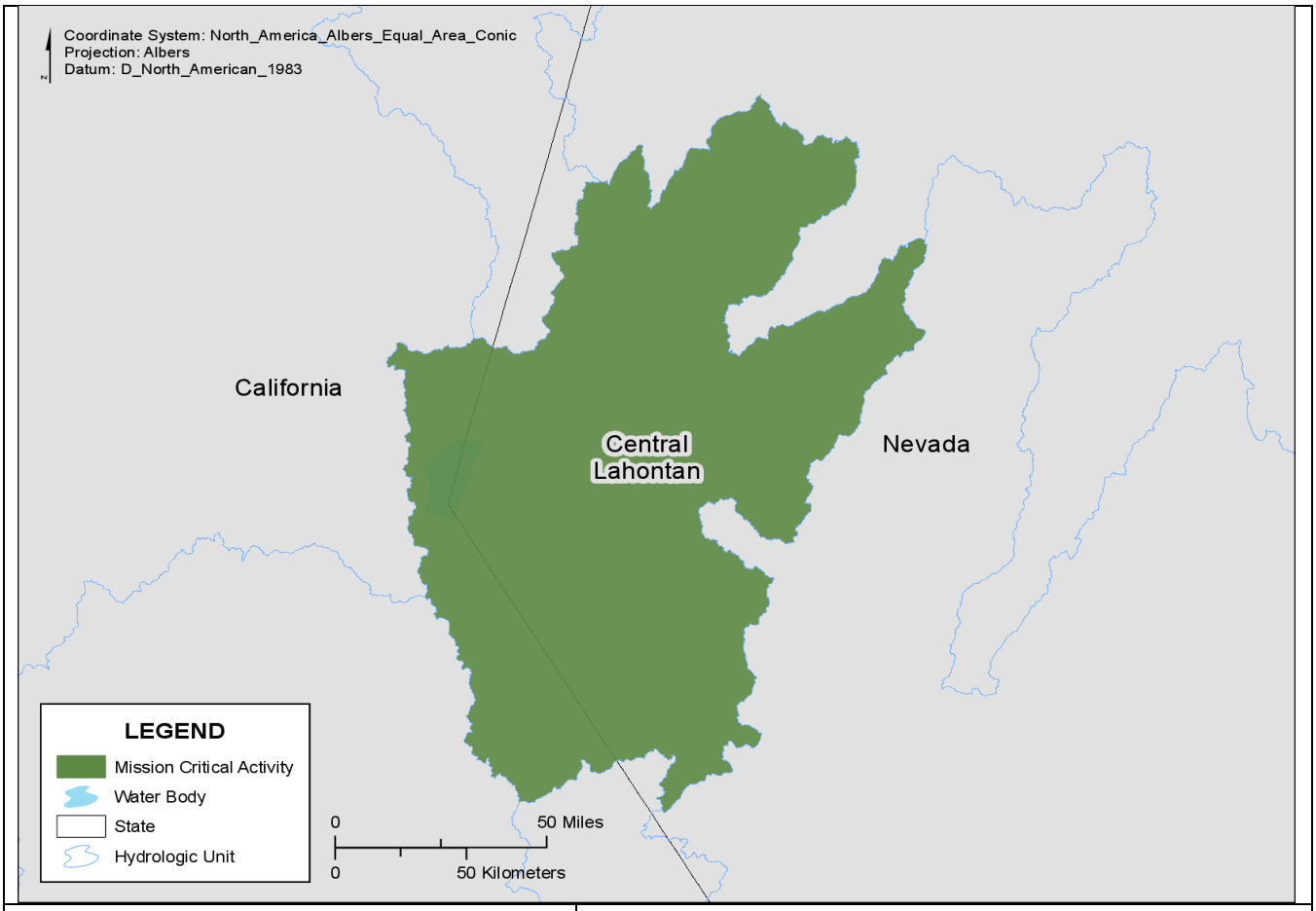
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Nevada managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Agriculture, Water Availability



Mission Critical Activity Title:	Agriculture, Water Availability

Mission Critical Activity Description:	The Fallon Paiute-Shoshone Reservation (FPSR) was originally established in 1890, comprising 196 160-acre allotments. In 1907, the reservation was reduced significantly from 31,000 acres to 4,640 acres in 10-acre allotments with perpetual paid-up water rights for agriculture. The FPSR was made part of the Newlands Reclamation Project, which was established in 1902 as the first Federal reclamation project. The Tribe has been able to maintain approximately 3,000 acres in agriculture production and, based on the original purpose for setting aside this land for the reservation, agriculture remains the primary use of the reservation lands. The management of entitled water rights and having an adequate and sufficient irrigation delivery system is paramount to water management and to the conservation of tribal natural resources. The FPSR also includes a wetland area from which the Tribe has acquired water rights for a water supply to the tribal wetlands. The Tribe intends to acquire additional water rights for continued support of its wetlands, which are in part used for cattle grazing management.
MCA_ID:	3807926484_1
Organization Type:	Tribal Government
Organization Name:	Fallon Paiute-Shoshone Tribe
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$336,000
Current Annual Benefits ($):	$150,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	It would provide information that will improve planning and development of program objectives. The direct benefit to the Tribe will be to know that the revenue-generating functions will be affected by having access to improved hydrographic information.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes

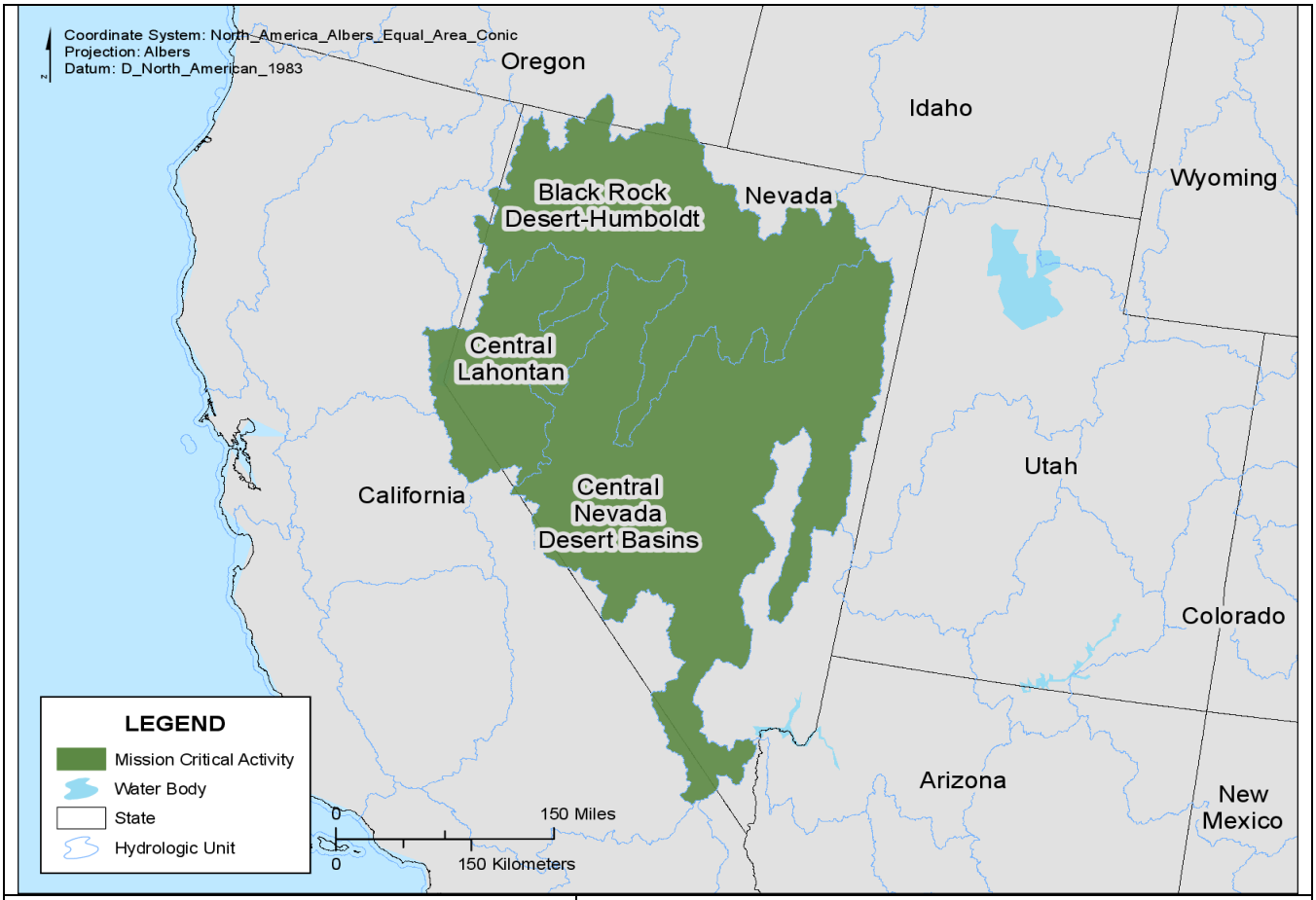
Required Characteristics	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Flood Hazards



Mission Critical Activity Title:	Flood Hazards
Mission Critical Activity Description:	Flood risk mapping and floodplain delineation. Clients are primarily land developers and local government agencies. All levels of government (local, state, Federal) may review them.
MCA_ID:	3797117361_1
Organization Type:	Private or Commercial
Organization Name:	DEW Hydrology
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	The new hydrographic dataset would allow me to evaluate existing and future flooding conditions more quickly and accurately, thereby reducing the time and cost in producing the floodplain report.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Visual Inspection
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Hazards

Mission Critical Activity Title:	Flood Hazards
Mission Critical Activity Description:	Geologic mapping, geologic hazard assessment and characterization.
MCA_ID:	3785765583_1
Organization Type:	State Government
Organization Name:	Nevada Bureau of Mines and Geology
Business Use:	Geologic Resource Assessment and Hazard Mitigation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$350,000
Current Annual Benefits ($):	$35,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved hydrography data would reduce the number of hours spent performing data collection and analyses of stream and catchment data during responses to flood events, characterization of flood hazards, and paleo flood studies. Integration of StreamStats would greatly enhance the evaluation of flood risk in ungaged catchments. Enhanced hydrography data can also be applied to geologic mapping activities including the characterization of a region's geomorphic setting and surficial geologic deposits.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

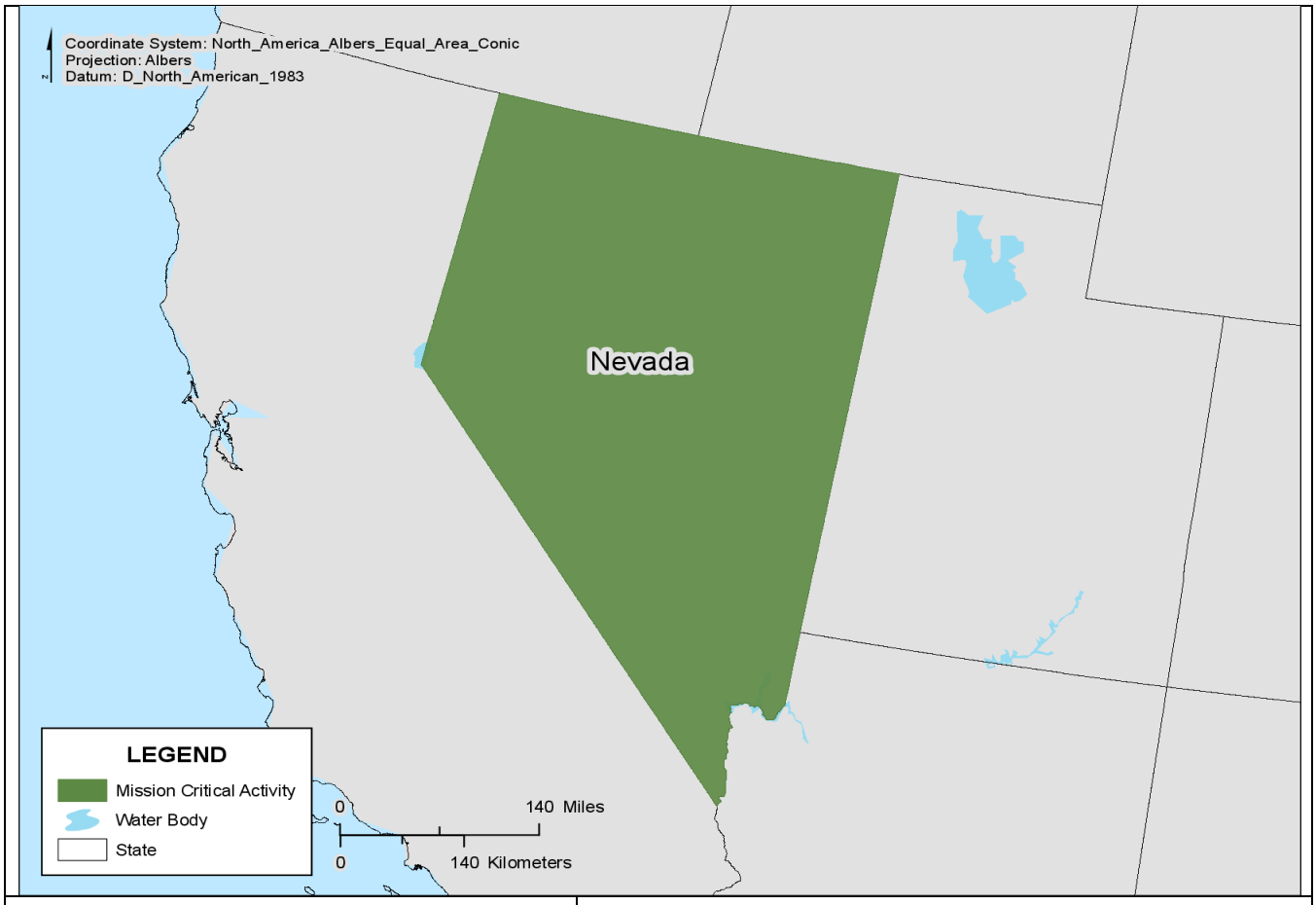
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Establish Surface Water Quality Standards - responsible for developing and reviewing surface water quality standards, administering the total maximum daily load (TMDL) program, and generating the Nevada Water Quality Integrated Report.
MCA_ID:	3820901607_1
Organization Type:	State Government
Organization Name:	Nevada Division of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrography would provide information that will enhance the Bureau of Water Quality Planning's (BWQP's) program objectives. Water quality standards are the scientific and regulatory foundation of water quality protection programs under the Clean Water Act and state statutes and regulations. Appropriate standards are needed to ensure that subsequent actions such as water quality assessments, TMDLs, watershed plans, NPS implementation projects, and discharge permits are adequate to protect and restore water quality. The Nevada NPS program implements TMDLs, watershed-based plans, and other NPS control projects to restore impaired waters.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate

Future Benefits	
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

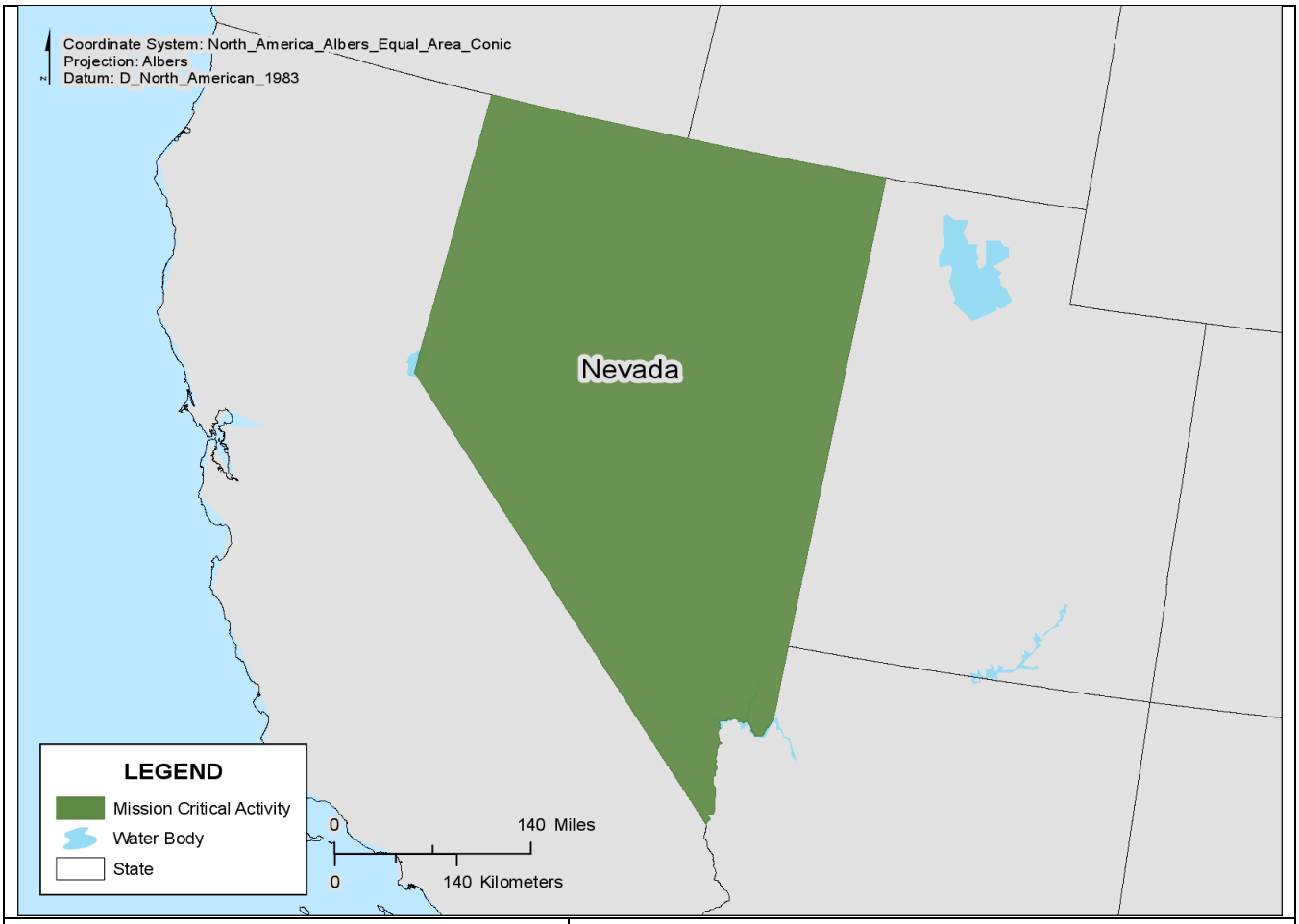
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Surface Water Quality Monitoring - responsible for the collection and management of surface water quality data, which are used to support other BWQP water quality management programs for example, expanding water quality standard coverage, TMDL development and monitoring, and assessment requirements for 303(d)/305(b) reports.
MCA_ID:	3820901607_2
Organization Type:	State Government
Organization Name:	Nevada Division of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrography would provide information that would be a value to the Bureau of Water Quality Planning's water quality monitoring program objectives, enabling more reliance on the hydrography data and less on the costly field work currently necessary in Nevada to identify perennial/intermittent/ephemeral streams.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor

Future Benefits	
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

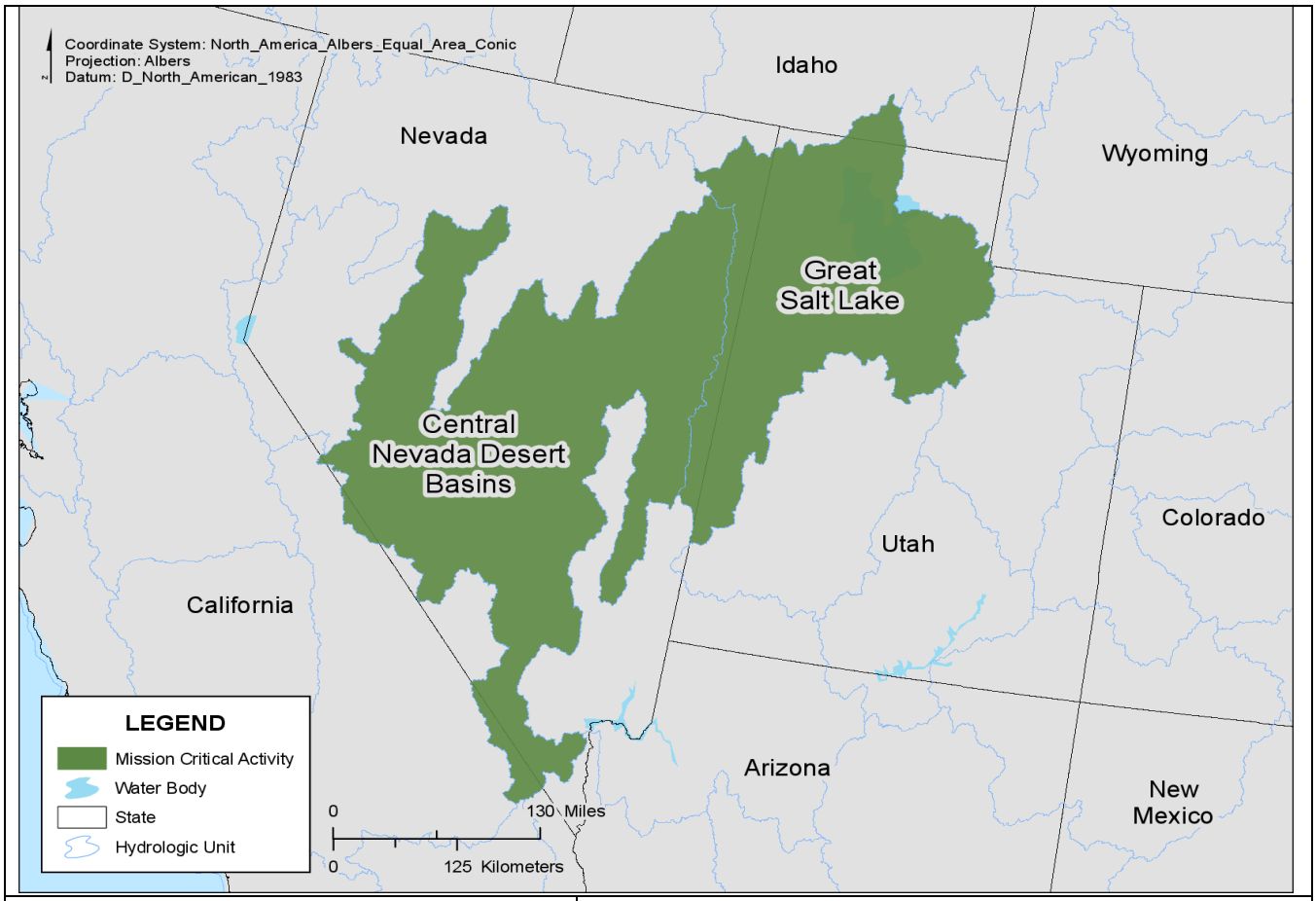
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice to Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Not Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Management, Infrastructure



Mission Critical Activity Title:	Water Management, Infrastructure
Mission Critical Activity Description:	The conservation of water for both outdoor irrigation and indoor use, and managing diminishing water resources available for the region.
MCA_ID:	3788069279_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Southern Nevada Water Authority (SNWA)
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Nevada Division of Water Resources Administrative Groundwater Basins data layer used to manage both groundwater and surface water rights granted to SNWA, following format designated by NV State Engineer's Office.

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	Under $250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	Helps customers and population of the region understand challenges of water availability and how precious of a resource it is to the region.

Future Benefits	
Future Annual Benefits ($):	Estimated over $1 million.
Future Benefits Description:	Time and cost savings would be impactful, due to the vastness of the area of interest, difficulty moving in and around the area, having real-time stream data availability to save staff time for trips into the field, and the ever increasing water issues caused by ongoing major drought in western U.S.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	Water availability to increasing population, reliable water quality delivered to customers, assisting agricultural interests in determining available water run-off from snow melt, and reducing water being used for non-beneficial activities.

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

New Hampshire

The seven New Hampshire respondents to the survey represent Mission Critical Activities (MCAs) that can be summarized as follows: Water Resources, Natural Resources, Transportation, and Planning. The Business Uses (BUs) represent four general categories: Education, Natural Resources, Water Resources, and Urban and Regional Planning. Approximately $1,435,000 in current annual benefits is estimated and a future annual benefit of $570,000 is estimated.

GRANIT reported requirements of better positional accuracy and stream density, and reported major current benefits in five categories. The Nature Conservancy has requirements of higher stream density and positional accuracy than currently provided, and one major current benefit. The NH Fish and Game Department's requirements are currently being met by the NHD positional standards, with no major benefits from the NHD. Rockingham Planning Commission has the positional requirements met by the current NHD and one major current benefit, with a minor benefit to human lives saved. The NH Office of Energy and Planning reports six major current benefits and a minor benefit to human lives saved, and have requirements for higher resolution and accuracy than is currently provided by the NHD. NHDOT reports no major benefits from the NHD and is satisfied with the current scale of mapping; in fact, they rely on the predecessor to the NHD. The Watershed Management Bureau reports two major current benefits and their needs are met by the current mapping scale.

No specific long-term issues were identified by any respondents.

Three of the seven respondents require greater stream density than is currently and a different group of three respondents require smaller waterbodies than are currently mapped. Three respondents require greater positional accuracy than is currently maintained. Current characteristics that are required but not supported by the NHD are floodplain boundaries (five respondents); coastal bathymetry (four respondents); and bridges and culverts (four respondents). Current analytical functions that are supported by StreamStats, but not the NHD, are drainage area (six respondents) and stream distance to points (five respondents).

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓		✓	

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required

Data Type	Elevation Data Integration	Requirement
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful

Quality Issue	Impact
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

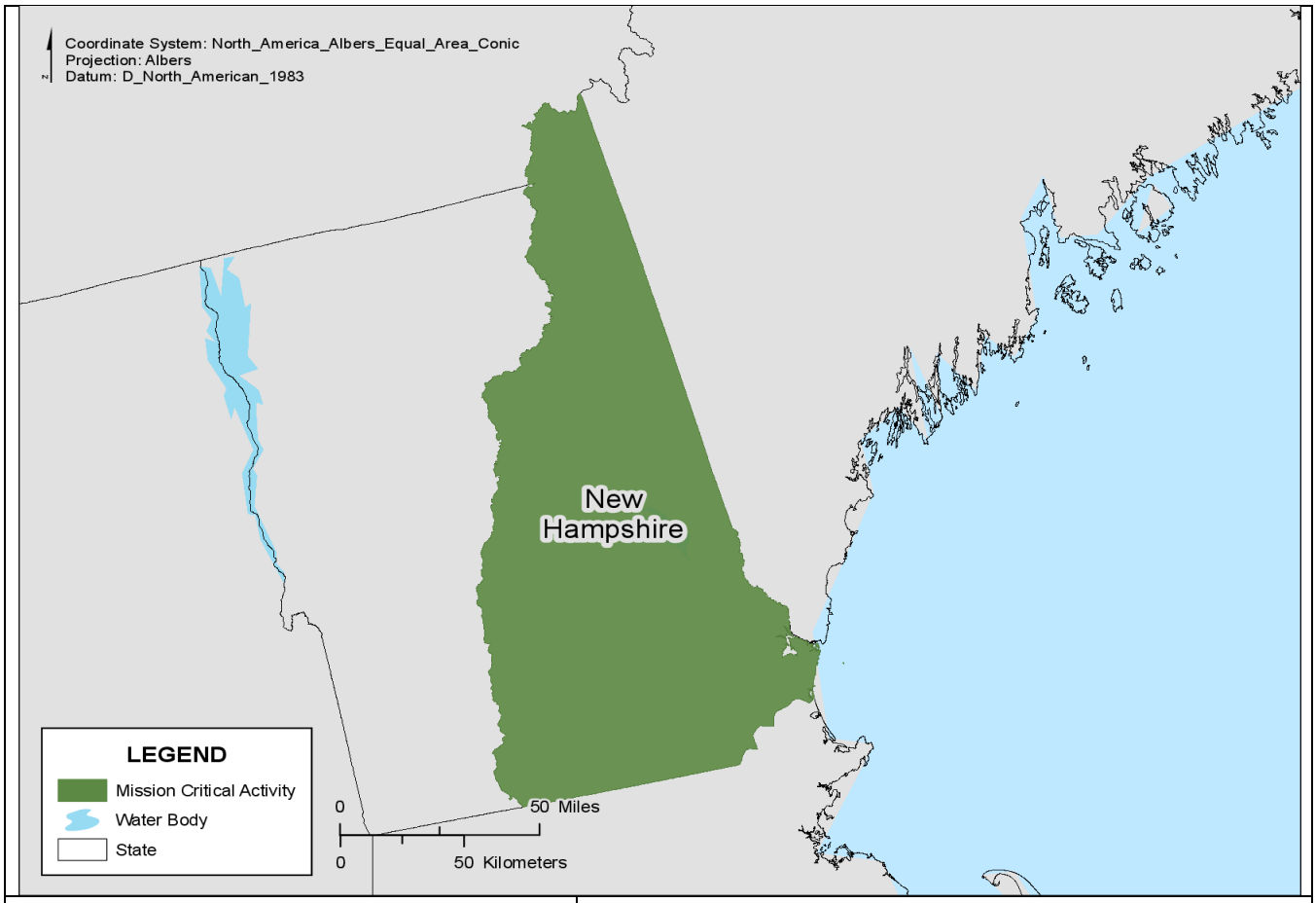
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

New Hampshire managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Geospatial Data Distribution



Mission Critical Activity Title:	Geospatial Data Distribution
Mission Critical Activity Description:	Primary mission is to develop, host, and distribute geospatial data to constituents in NH. We are involved in a range of activities listed below, including water resource planning/management, natural resources conservation, flood risk management, forest resources management, and coastal zone management. Because of our role at the University, I selected the educational business use below.
MCA_ID:	3769767480_1
Organization Type:	State Government
Organization Name:	University of New Hampshire
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$25,0000
Future Benefits Description:	This and prior questions are difficult to answer in any detail, as the data we host and distribute support a broad range of applications in the state and region - many of which we are unaware of.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

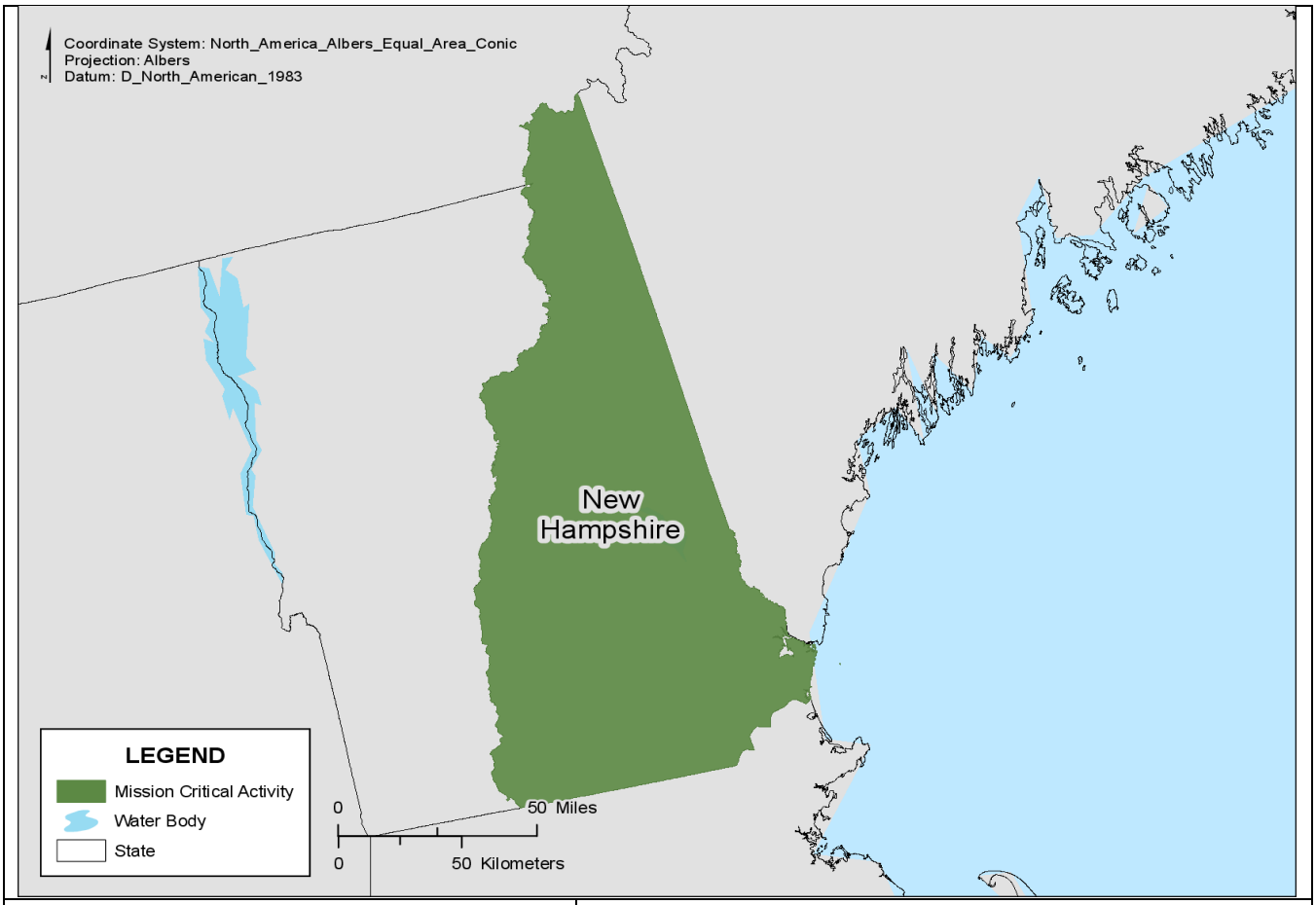
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Associate Selected Data Type
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Habitat Protection



Mission Critical Activity Title:	Habitat Protection
Mission Critical Activity Description:	Protect the lands and waters upon which all life depends. Includes protecting aquatic systems for nature (biodiversity) and people (drinking water supply, flood risk mitigation).
MCA_ID:	3828734985_1
Organization Type:	Not for Profit
Organization Name:	The Nature Conservancy, NH
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	New Hampshire Hydrography Dataset.

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

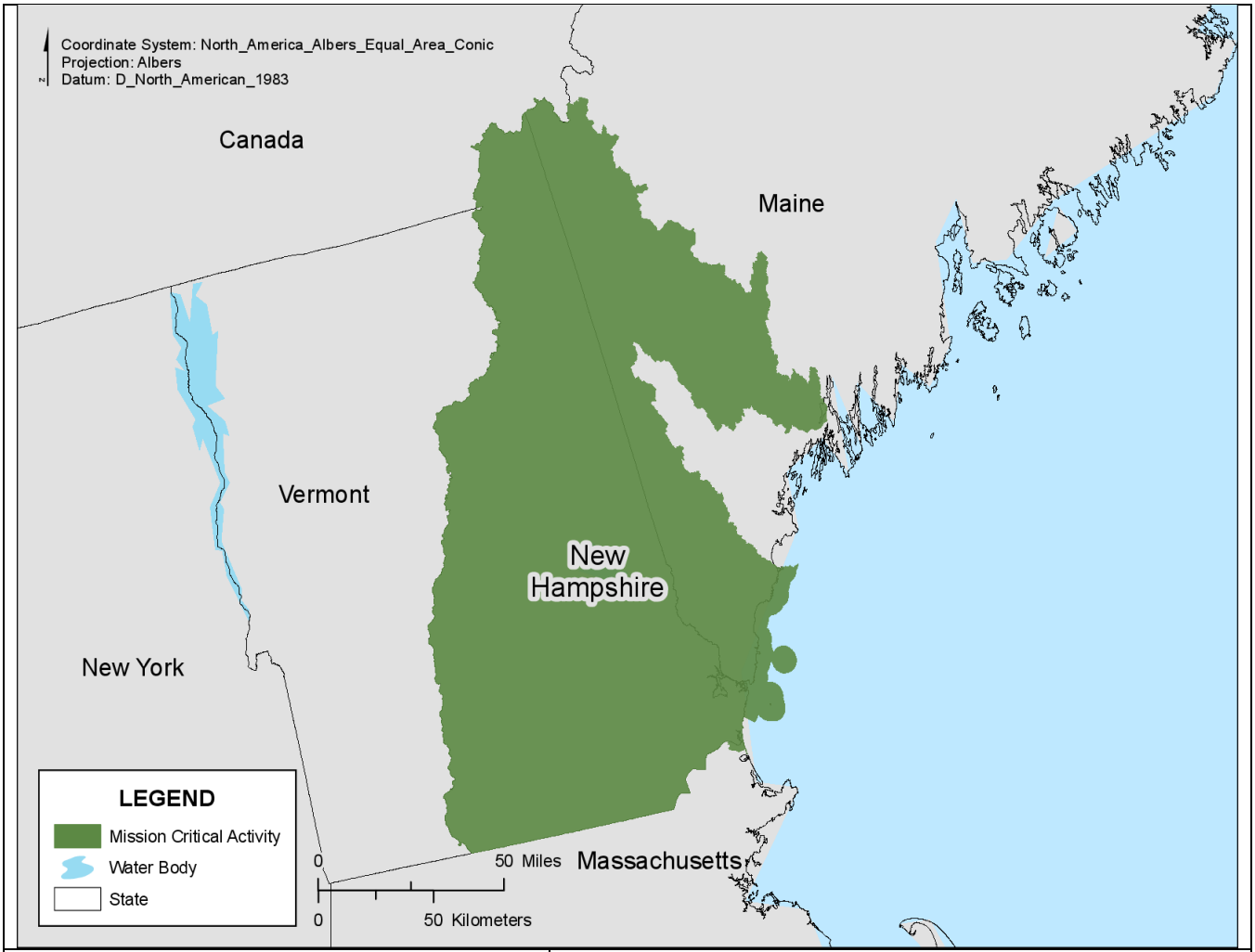
Future Benefits	
Future Annual Benefits ($):	$25,000
Future Benefits Description:	Ability to conduct more accurate/robust spatial analyses.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Wildlife Protection



Mission Critical Activity Title:	Wildlife Protection
Mission Critical Activity Description:	Conservation, management, and protection of the state's fish, wildlife, and marine populations and their habitats.
MCA_ID:	3773280503_1
Organization Type:	State Government
Organization Name:	NH Fish and Game Department
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

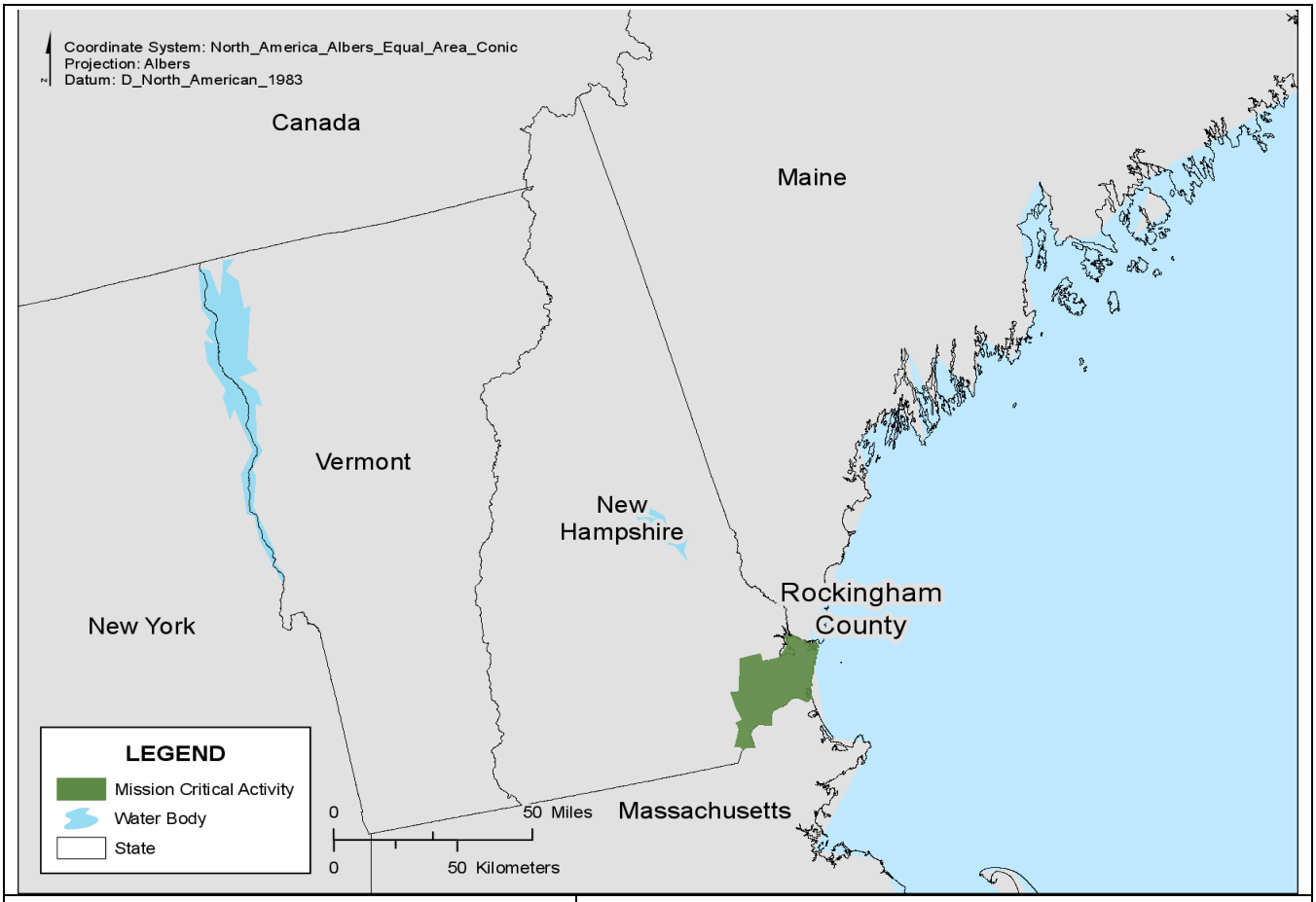
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved data accuracy.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Gradient; stream order.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Nice to Have	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	Visual Inspection
Other (please specify the importance and highest analysis level):		

Transportation Planning



Mission Critical Activity Title:	Transportation Planning
Mission Critical Activity Description:	Transportation planning.
MCA_ID:	3776571876_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Rockingham Planning Commission
Business Use:	Urban and Regional Planning
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Base hydrography made in house that predates NHD.

Current Benefits	
Total Annual Program Budget:	$775,000
Current Annual Benefits ($):	$775,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$45,000
Future Benefits Description:	As the current data are how we define our work products, the data are often the limitation to the extent/budget of the work products. Because of this we wouldn't see an increase with better data per se, but our work would become more comprehensive. In other words, as data are refined so is our product.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate

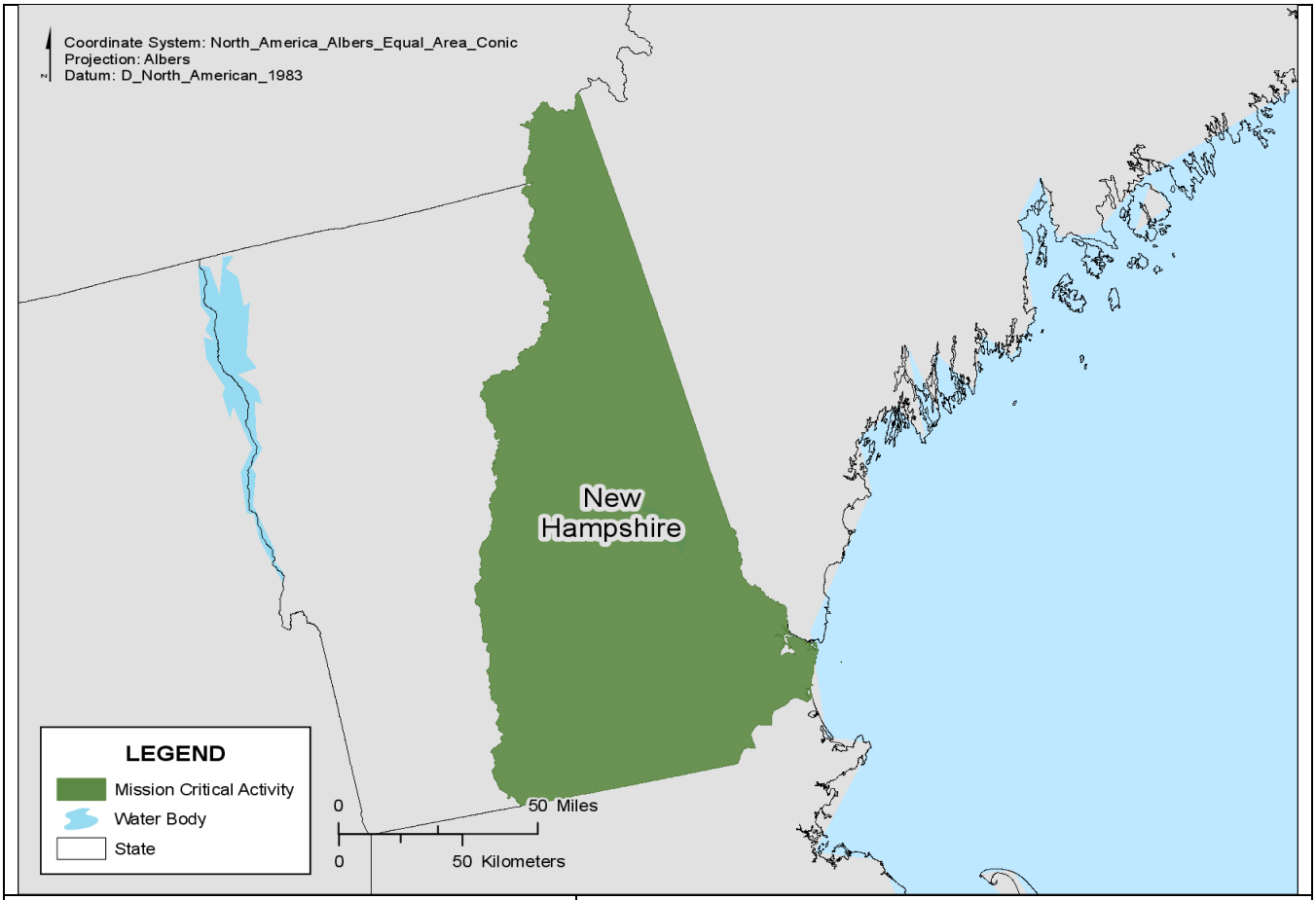
Future Benefits	
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Associate Selected Data Type
Aquifers	Required	Visual Inspection
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Land Use Planning



Mission Critical Activity Title:	Land Use Planning
Mission Critical Activity Description:	Supporting municipal and regional land use planning activities.
MCA_ID:	3776632221_1
Organization Type:	State Government
Organization Name:	NH Office of Energy and Planning
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Better land use planning decisions made, down to the property owner level. Less time needed to review data at the large mapping scales we would need. Better ability to tie hydrographic data to other geographic data needed for land use planning.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

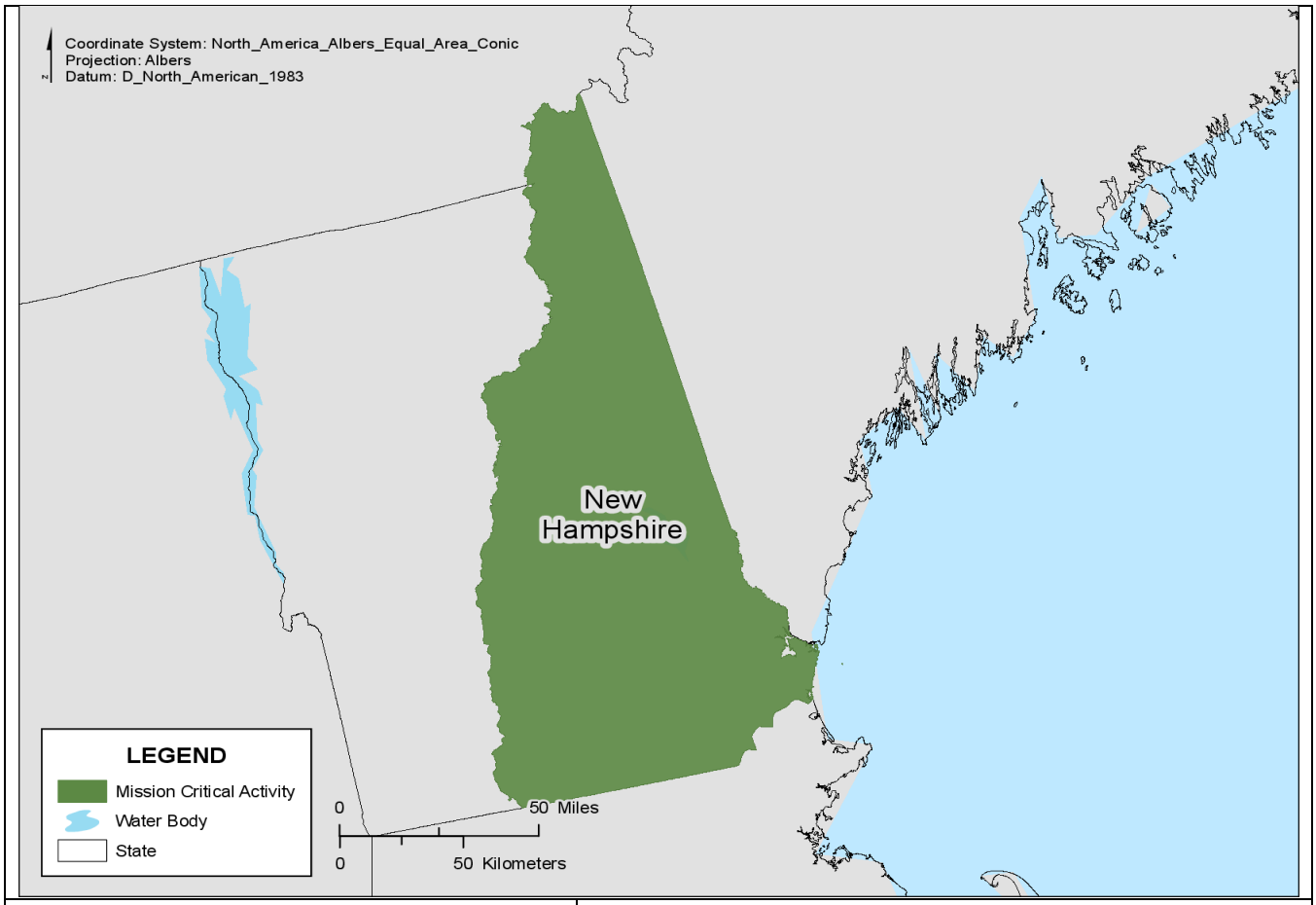
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Transportation Planning



Mission Critical Activity Title:	Transportation Planning
Mission Critical Activity Description:	I assess the impact of highway project on rivers, streams and brooks. Knowing where these features are is critical.
MCA_ID:	3791896305_1
Organization Type:	State Government
Organization Name:	NHDOT
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	More detailed mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

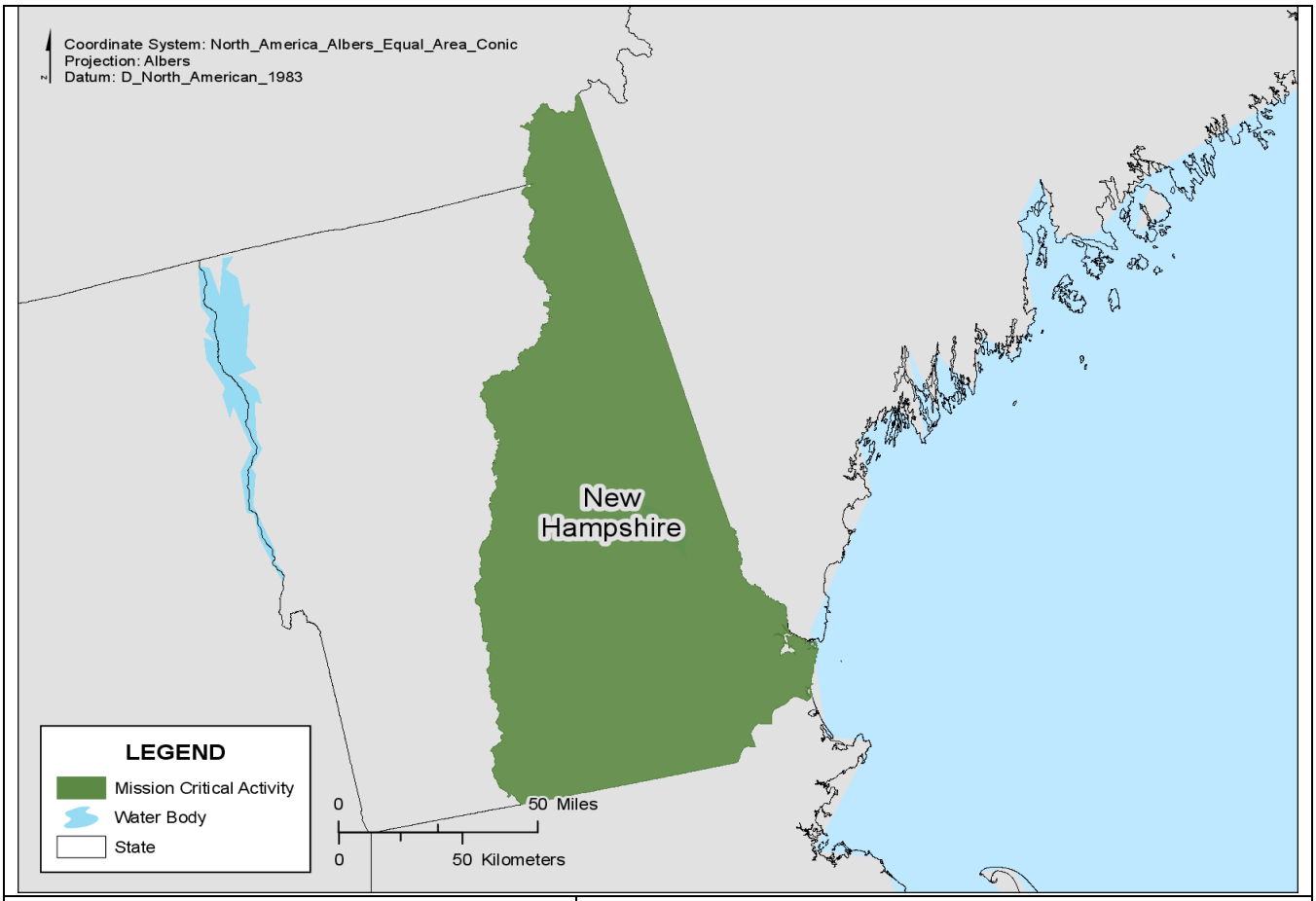
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Nice to Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	The Watershed Management Bureau (WMB) uses a holistic and integrated approach to achieve clean water goals. Both regulatory and non-regulatory programs work together within the WMB to integrate science, policy, planning, and education to address nonpoint source pollution, stormwater, and exotic species. There are over 20 programs and activities within the WMB.
MCA_ID:	3777422760_1
Organization Type:	State Government
Organization Name:	NH Dept. of Environmental Services
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$75,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Faster and better updates to the Clean Water Act Assessment Unit IDs (AUID). AUIDs then rapidly displayed on web mapping application for user access to assessments. Custom models constructed to delineate watersheds for AUIDs.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor

Future Benefits	
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice to Have	Associate Selected Data Type
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice to Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

New Jersey

As the most densely populated state in the nation, New Jersey has a critical need to monitor water supply and water quality. The New Jersey Department of Environmental Protection (NJ-DEP) needs detailed hydrography for issuing permits for building structures, and needed hydrography data that would relate to a scale useful for the permitting function. This need drove NJ-DEP, the National Hydrography Dataset (NHD)/Watershed Boundary Dataset (WBD) State Steward, to enhance their NHD coverage in 2008 to 1:2,400-scale statewide from an orthoimagery source, so water features could be identified, linked, and maintained to the five-year state orthoimagery cycle. Also key was linking water data down to the parcel level so that local application of regulations could be engaged effectively both in a data representation sense with orthoimagery and lidar source elevation data. Another a key factor for water features in New Jersey was high property loss due to flooding, and the high level of flood mitigation activity in both coastal and inland areas. The state has a very active flood mitigation membership and program. NJ-DEP has a large water quality staff and as such uses the NHD and WBD data to a high degree. NJ-DEP is a large agency with many responsibilities and lists six of nine Mission Critical Activities (MCAs) for the state. NJ-DEP also manages land cover mapping for the state, and Superfund site remediation. Other agencies consuming NHD data in New Jersey are the Office of Homeland Security & Preparedness, the Delaware River Basin Commission, FEMA Region II, NRCS, and the U.S. Army Corps of Engineers. NHD research is taking place in the Raritan River Basin: NJ-DEP and the New Jersey Water Science Center are cooperating on year two of a two-year project to extract head-water streams from lidar data. If successful, lidar data would replace orthoimagery as the primary source for NHD positional updates, and add/connect small streams in headwater areas with existing local-scale hydrography in a largely computer-automated process.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓				✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
		✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Somewhat Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

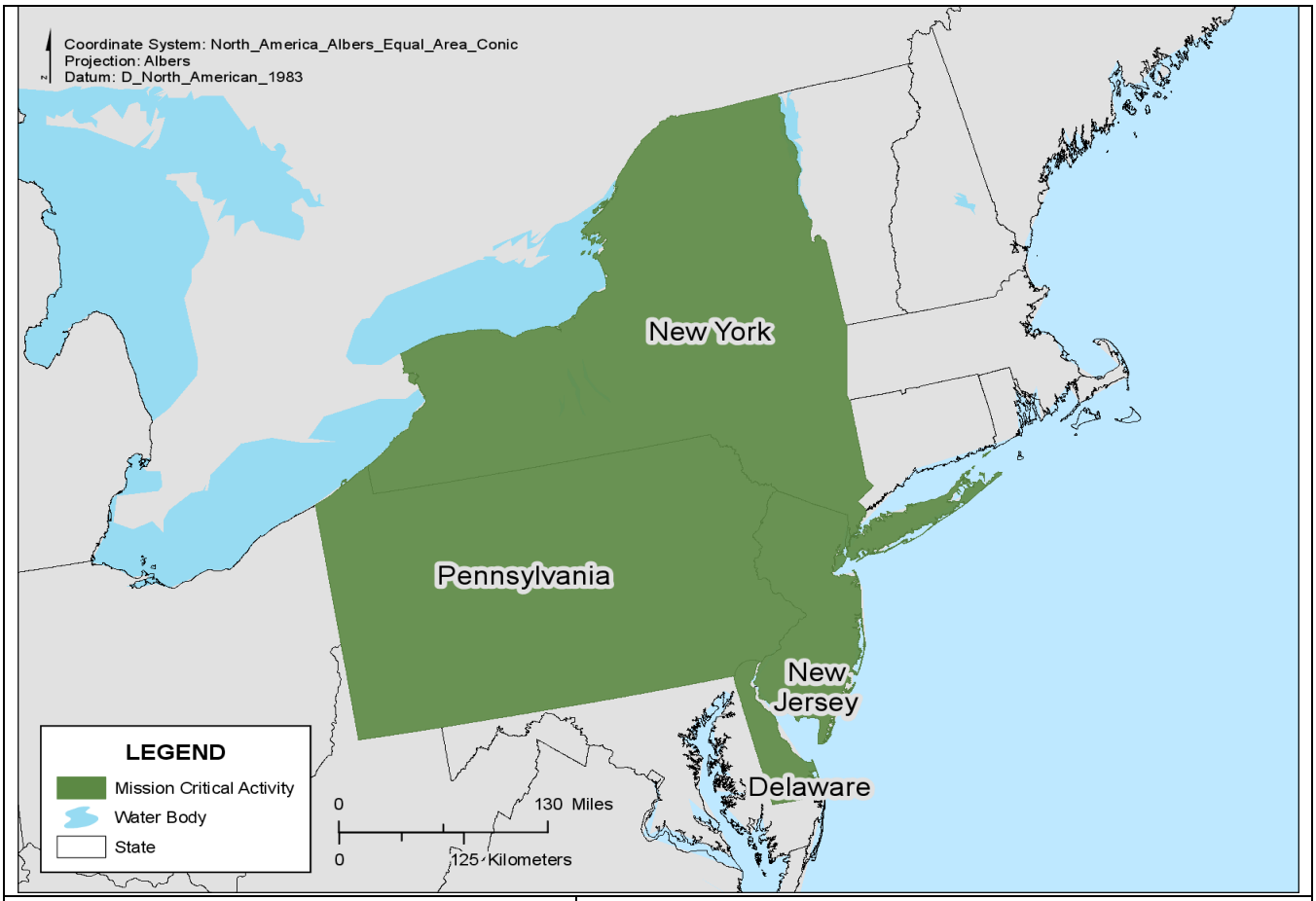
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

New Jersey managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Hazard Mitigation Planning



Mission Critical Activity Title:	Flood Hazard Mitigation Planning
Mission Critical Activity Description:	The Bureau of Geographic Information Systems (BGIS) manages the GIS data for all NJDEP activities. BGIS provides direct support for emergency response and hazard mitigation planning. Emergency response includes flood impact mapping, model downstream flow for impacts to sensitive receptors, and storm surge impact mapping. Hazard mitigation planning includes flood risk mapping, storm surge risk mapping, and sea level rise risk mapping.
MCA_ID:	3829462891_1
Organization Type:	State Government
Organization Name:	New Jersey Department of Environmental Protection
Business Use:	Flood Risk Management

Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NJDEP watershed boundaries, which are provided to WBD.

Current Benefits	
Total Annual Program Budget:	$250,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Higher quality spatial analysis will provide higher resolution answers to decision makers for emergency response activities.
Future Operational Benefits	

Future Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

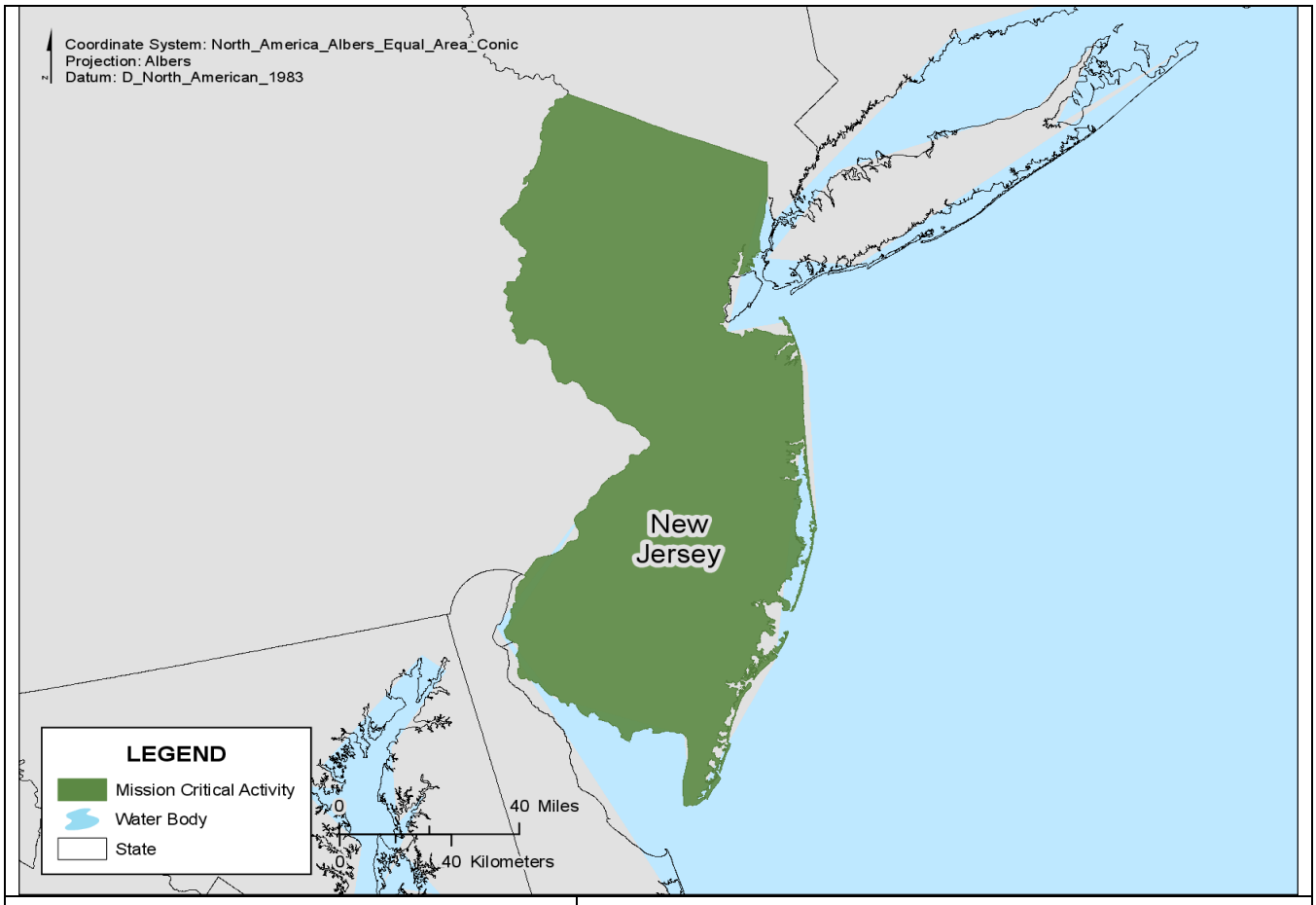
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes

Required Analytical Functions	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Infrastructure Protection and Disaster Preparedness



Mission Critical Activity Title:	Infrastructure Protection and Disaster Preparedness
Mission Critical Activity Description:	Critical infrastructure protection and disaster preparedness. Work with owner/operators of CIKR to model potential disaster scenarios including hurricane and flooding events so they can develop a plan of action for such an event.
MCA_ID:	3829610350_1
Organization Type:	State Government
Organization Name:	New Jersey OHSP
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	SLOSH models (MOMs).

Current Benefits	
Total Annual Program Budget:	Don't know.
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know.
Future Benefits Description:	Less time spent finding or creating similar data. The rest stems from that.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Not Applicable

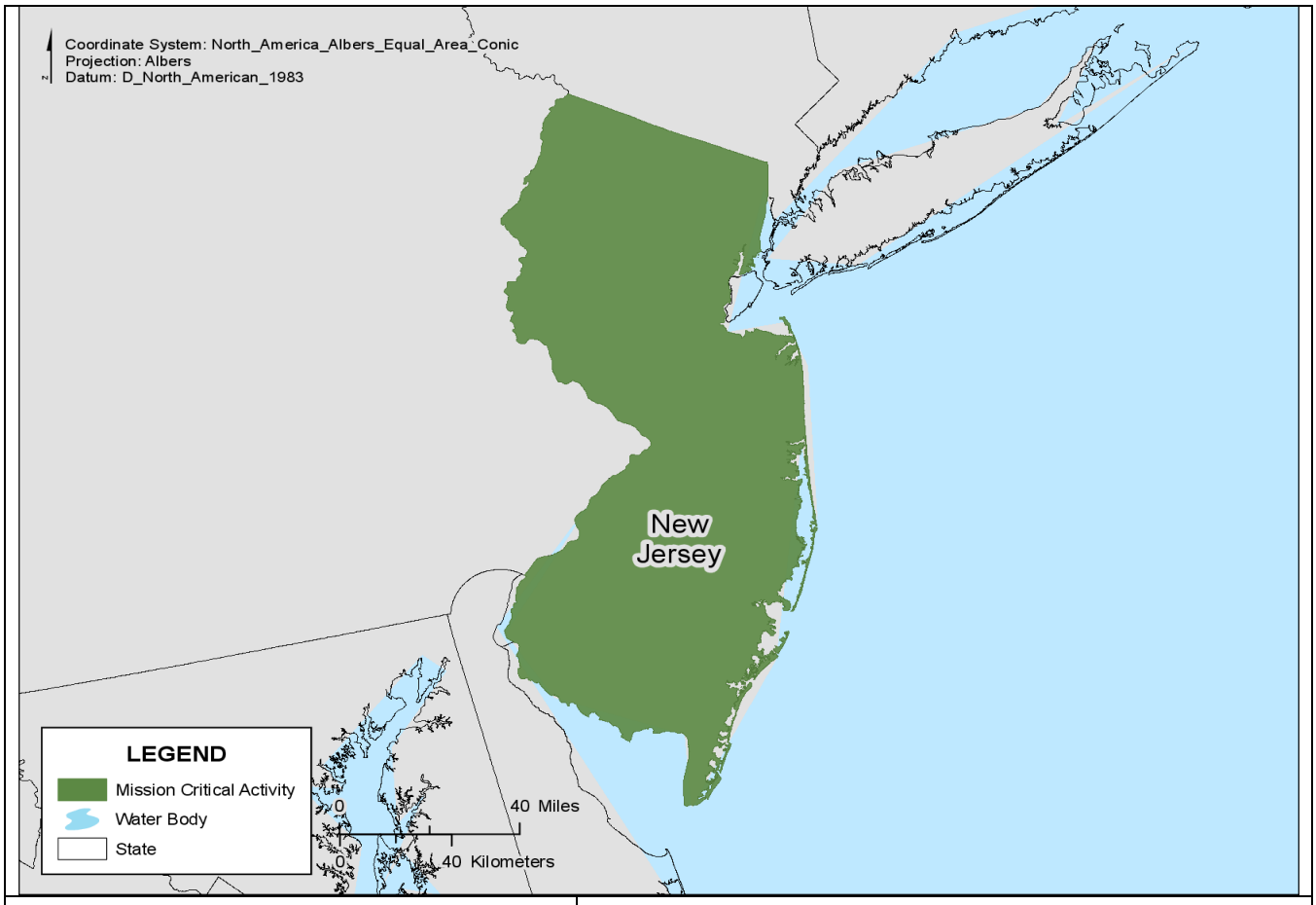
Future Benefits	
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	SLOSH modeling, especially MOMs.	SLOSH modeling, especially MOMs.

Conservation



Mission Critical Activity Title:	Conservation
Mission Critical Activity Description:	Land and water conservation.
MCA_ID:	3769888057_1
Organization Type:	State Government
Organization Name:	NRCS-New Jersey
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	HUC14 for NJ.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

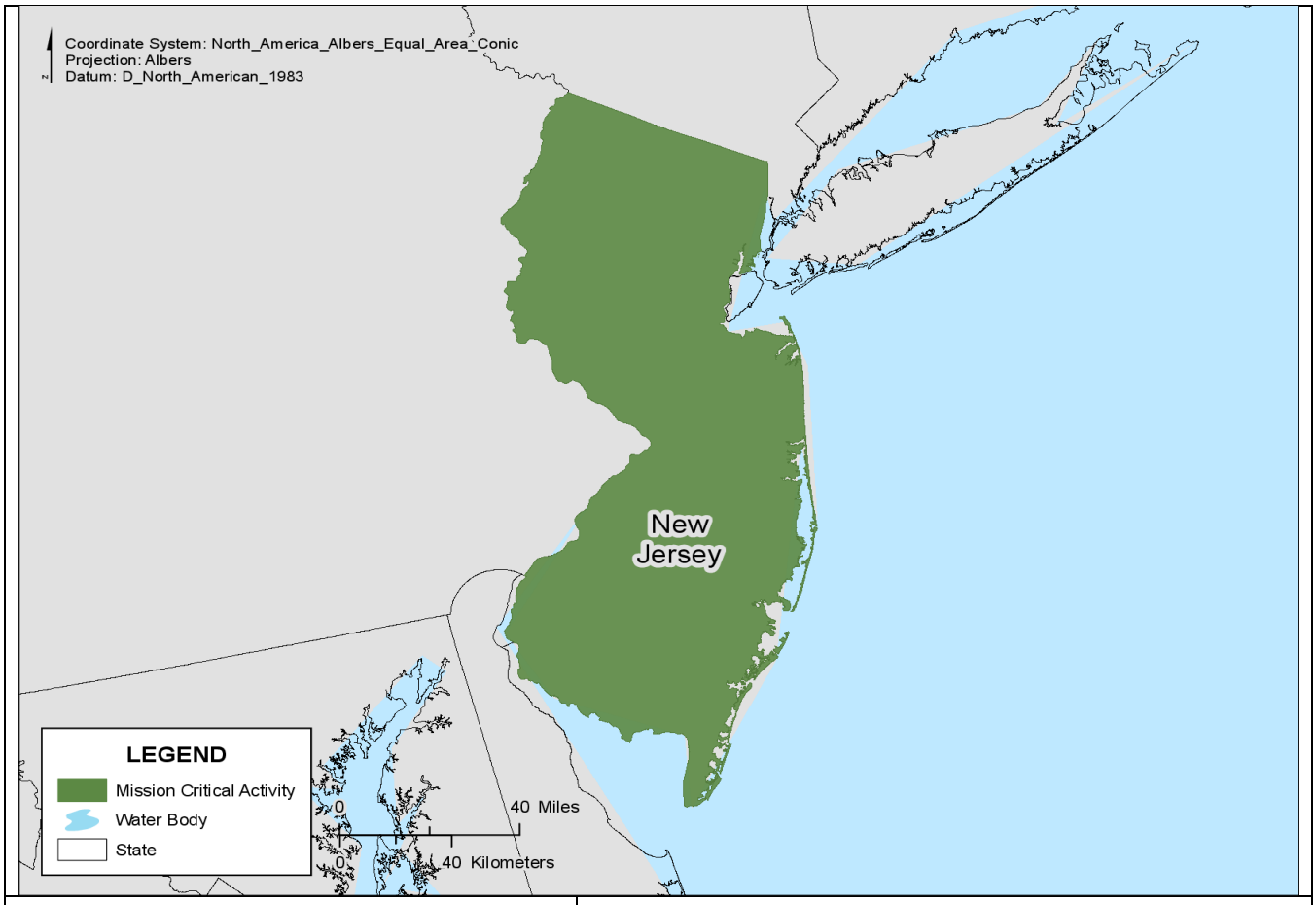
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Not Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Land Use/Land Cover



Mission Critical Activity Title:	Land Use/Land Cover
Mission Critical Activity Description:	We are responsible for mapping the land use/land cover GIS data layer and associated water features. All agencies use the data we provide.
MCA_ID:	3828409298_4
Organization Type:	State Government
Organization Name:	NJ Department of Environmental Protection
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$120,000
Current Annual Benefits ($):	$120,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	We are aware of benefits and are currently working to Improve our NHD data statewide. Preparation is underway for a new conflation effort. This will make NHD data current with imagery and other land use mapping.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

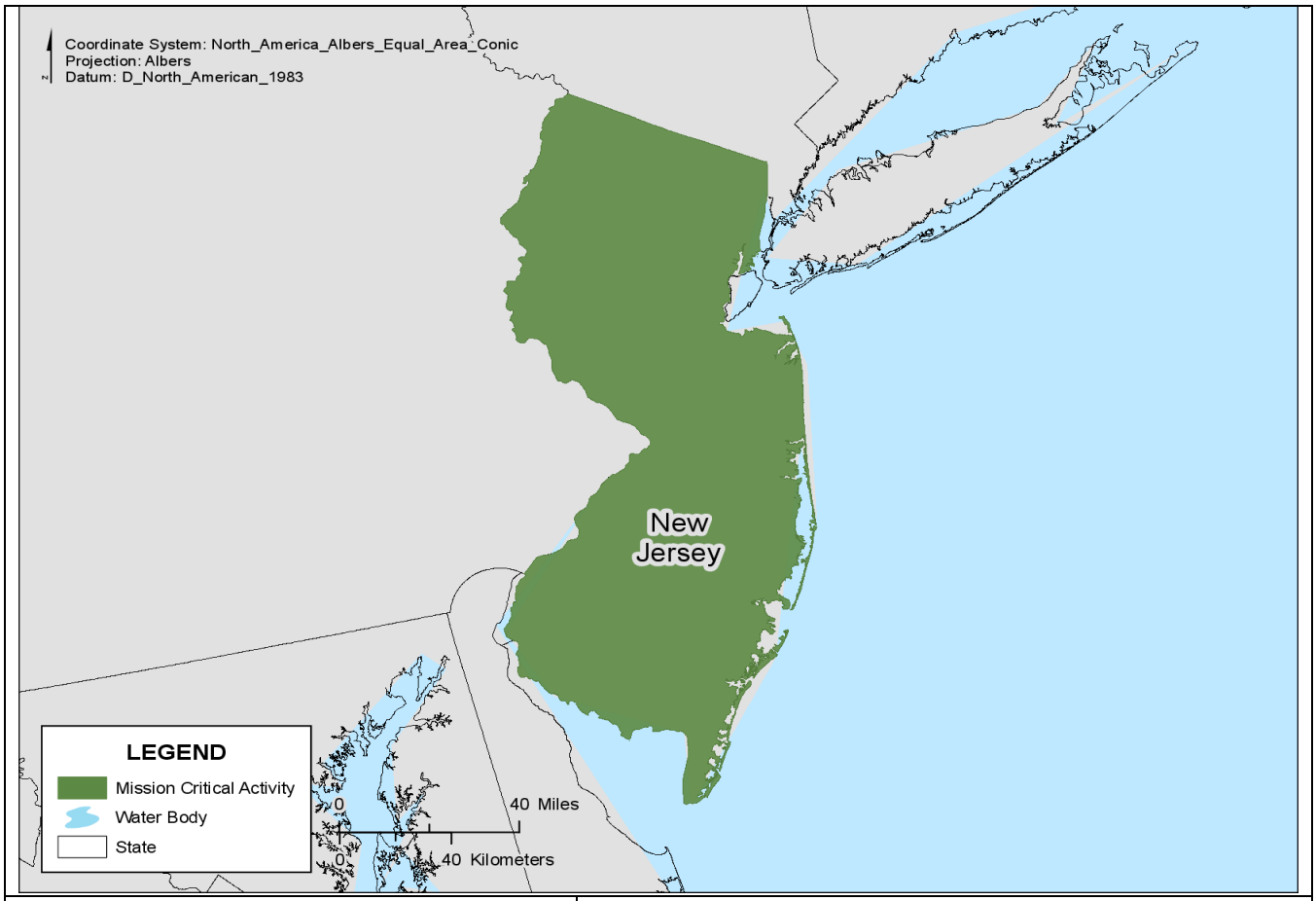
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Permitting and Regulation



Mission Critical Activity Title:	Permitting and Regulation
Mission Critical Activity Description:	Provide GIS information to users of mapping information across a wide range of programs, platforms, and disciplines. Primary focus is to develop and manage GIS data so consumers can conduct analyses and create informative decisions based on accurately-mapped features. The Department has many agencies with more specific missions. Our goal is to provide the GIS information and support that meets the informational needs and publication requirements of these programs. Programs we support include flood risk mapping, water and hazardous material sampling, monitoring and reporting, and storm water management. Additional responsibilities include developing data identified in the state's Strategic Plan as framework data layers. NJ BGIS is directly involved with the development of imagery, elevation data, land use/land cover, and hydrography GIS data statewide.
MCA_ID:	3828409298_1
Organization Type:	State Government

Organization Name:	NJ Department of Environmental Protection
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Develop GIS water features as part of state wide land use mapping from air photo interpretation as imagery is completed.

Current Benefits	
Total Annual Program Budget:	$350,000
Current Annual Benefits ($):	$75,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$200,000
Future Benefits Description:	We are using NHD stream network (flow tracing) to relate water discharges to water intakes; relate dams to stream rivers and water bodies; relate storm water outfalls to rivers and water monitoring/sampling locations points (NWIS).
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

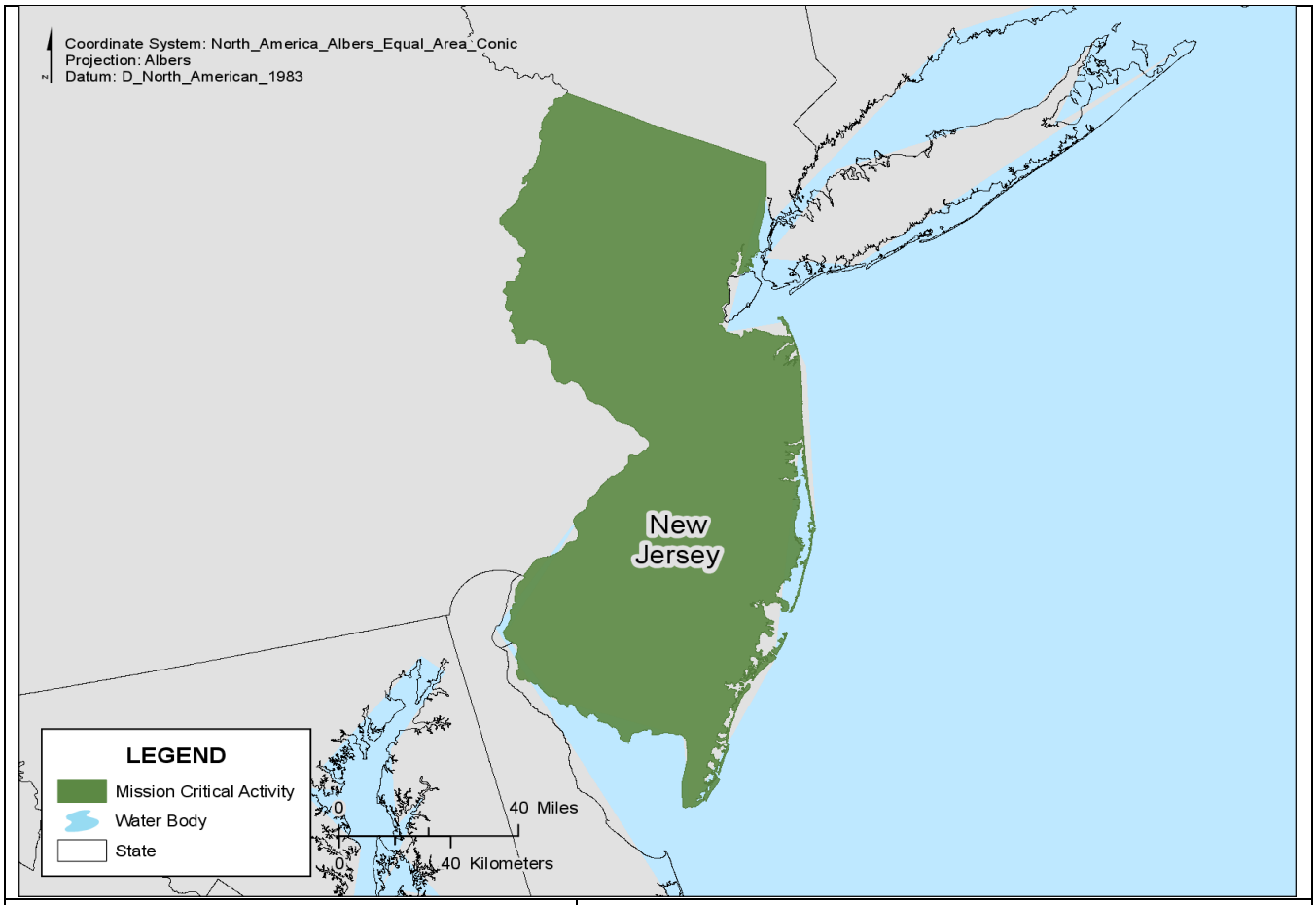
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes

Required Analytical Functions	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Natural Resource Management



Mission Critical Activity Title:	Natural Resource Management
Mission Critical Activity Description:	There are many agencies in the department we serve by having standard, accurate stream and waterbody features with information. Each agency can relate their specific program activities to a common water data source. We get involved with assisting all of the agencies in the department with their individual missions which include flood and coastal management, water supply, water monitoring, storm water management, and fisheries. Our mission is to provide the common water features for Business Use (BU) 01 so the other agencies can accomplish theirs. Other relevant BUs: BU 02, BU 03, BU 04, BU 05, BU 06, BU 18, and BU 19.
MCA_ID:	3828409298_2
Organization Type:	State Government
Organization Name:	NJ Department of Environmental Protection
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Our bureau is becoming more involved in emergency response to events such as storms, hazardous material spills, flooding related to services such as sewer pump stations and water intakes. Having accurate DEMs, associated rasters, and stream connectivity is critical to conducting analysis and providing emergency response recommendations.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

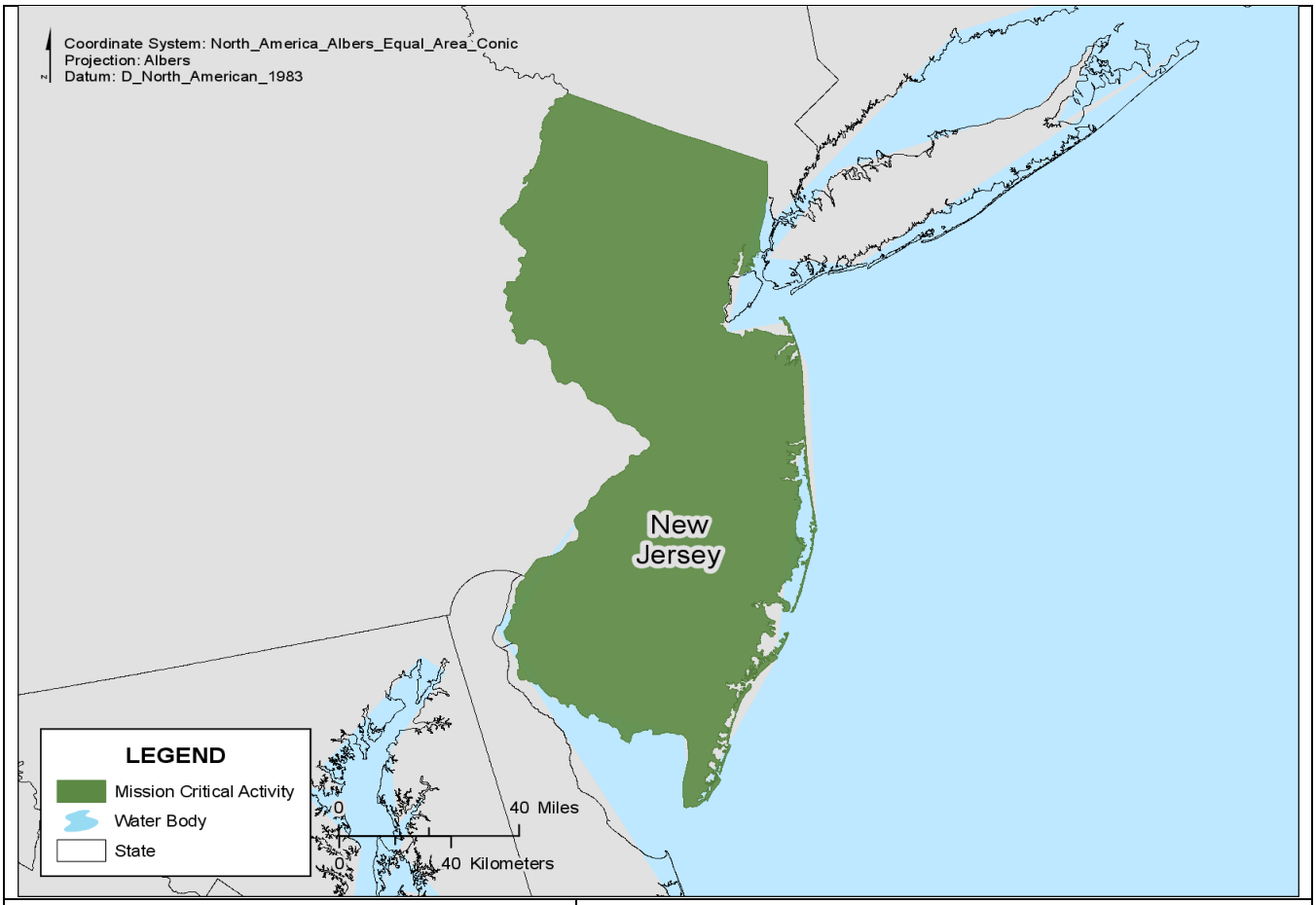
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Supply and Water Quality



Mission Critical Activity Title:	Water Supply and Water Quality
Mission Critical Activity Description:	We support agencies that collect NWIS data and other water related information. These data are used to make recommendations or restrictions based on stream quality. Several of the BUs are missions of agencies we serve.
MCA_ID:	3828409298_3
Organization Type:	State Government
Organization Name:	NJ Department of Environmental Protection
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

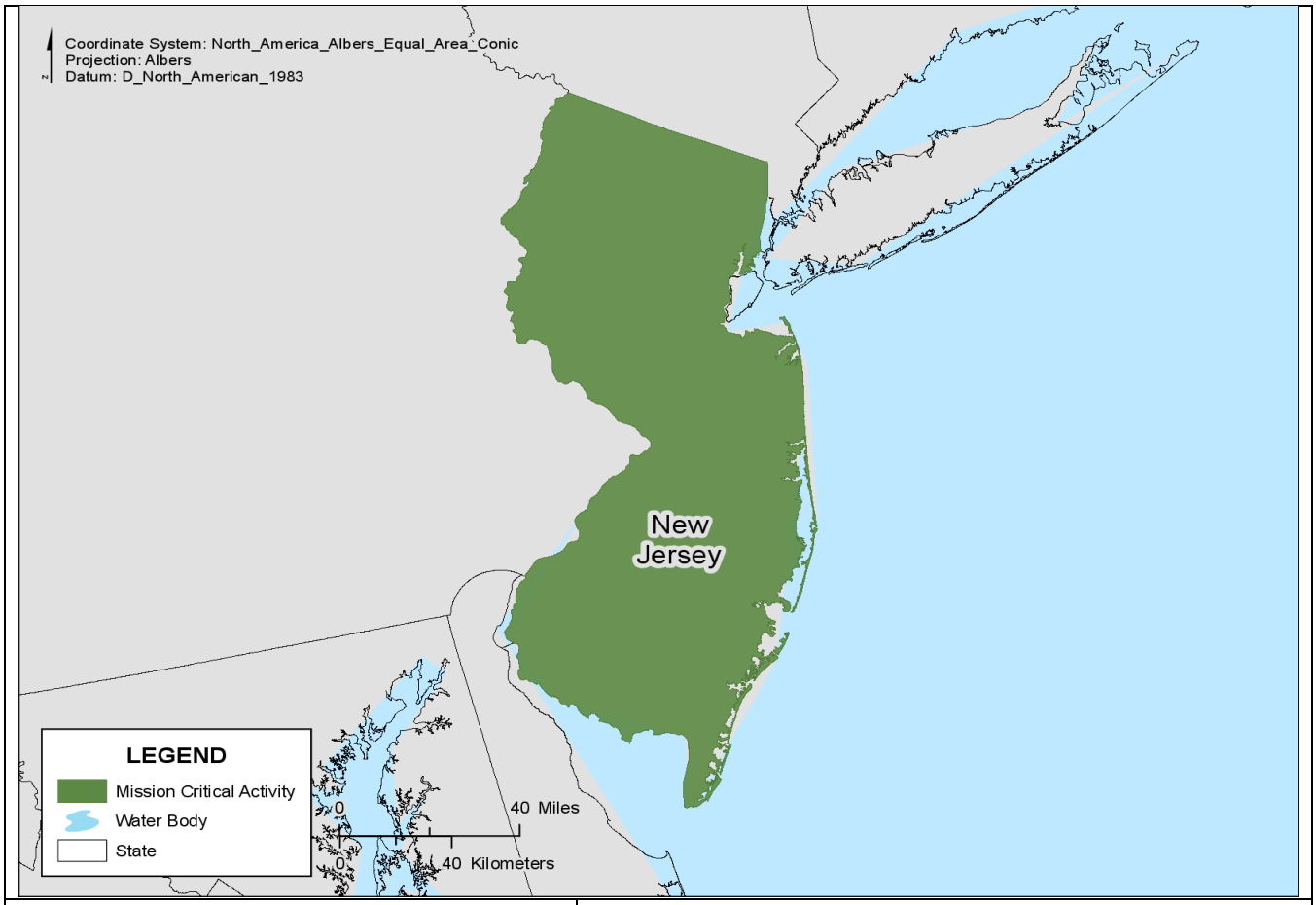
Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	We see the benefits and are currently updating the NHD waterbody features.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Environmental Monitoring and Remediation



Mission Critical Activity Title:	Environmental Monitoring and Remediation
Mission Critical Activity Description:	All agencies in DEP require accurate hydrography and expect it on their mapping applications. It is critical to keep hydrography accurate for analysis, such as remediation of Superfund sites.
MCA_ID:	3828409298_5
Organization Type:	State Government
Organization Name:	NJ Department of Environmental Protection
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

New Mexico

Ten New Mexico state, Federal, and local entities participated in the USGS Hydrography Requirements and Benefits Study (HRBS). HRBS collected data from numerous contributors across the country to assist USGS in determining requirements to generate and improve quality and access to public domain hydrographic data.

Respondents in New Mexico defined business requirements for more current and complete hydrography data to augment analysis integrating other framework layers, including higher-resolution NHD stream data and alignment to lidar elevation data as they become more readily available.

The initial HRBS survey results for New Mexico noted requirements for improved and coordinated hydrography data covering a range of activities in support of the following:

- Geographic education and research, most of which involves regional water resources
- Flood mapping and loss prevention
- Monitoring and assessing surface water quality data against NM's most recent water quality standards
- Hydrographic flow analysis and an authoritative reference layer for the statewide enterprise geographic framework
- Water resource planning and management with regard to groundwater/surface water interaction
- Water rights administration
- Habitat modeling and restoration, storm water management, regional water planning
- State and Federal protection and regulation of environmental quality

Of the business uses reported by the 10 entities, all but one reported using the NHD as the definitive framework to conduct business. Six reported using NHD data to conduct water resource or habitat planning and development, two reported use to comply with standards regarding environmental quality, one used it to assess flood risk, and one used it to promote educational and outreach efforts related to water.

In terms of reporting current and future operational benefits applied to Mission Critical Activities (MCAs), most respondents rated the current time/cost savings to their activity as moderately beneficial. When questioned about meeting mission compliance, respondents were nearly evenly split, rating the NHD as either major or moderately beneficial. Customer service benefits related to products, timeliness of delivery, and customer experience were again split almost evenly between providing either a major or minor benefit. Societal benefits in all categories (public safety, environmental, and human lives saved) were rated as moderately beneficial.

Most respondents agree that improving the NHD and delivering accurate, high-quality data are of major importance to their work. To a large degree, ancillary national datasets such as the National Wetlands Inventory (NWI), STORET, National Agriculture Statistics Service (NASS), National Pollution Discharge Elimination System (NPDES), Watershed Boundary Dataset (WBD), and National Water Information System (NWIS) are used to augment modeling application needs for business requirements.

New Mexico is coordinating with state, Federal, tribal, and local agencies to prioritize and leverage resources to coordinate updates. Assistance from USGS in the form of grants and tool development greatly facilitates efforts to update the NHD. The opportunity to steward and coordinate with USGS and the NHD community and to further develop the NHD data model is important in keeping the database current and useful for New Mexico.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

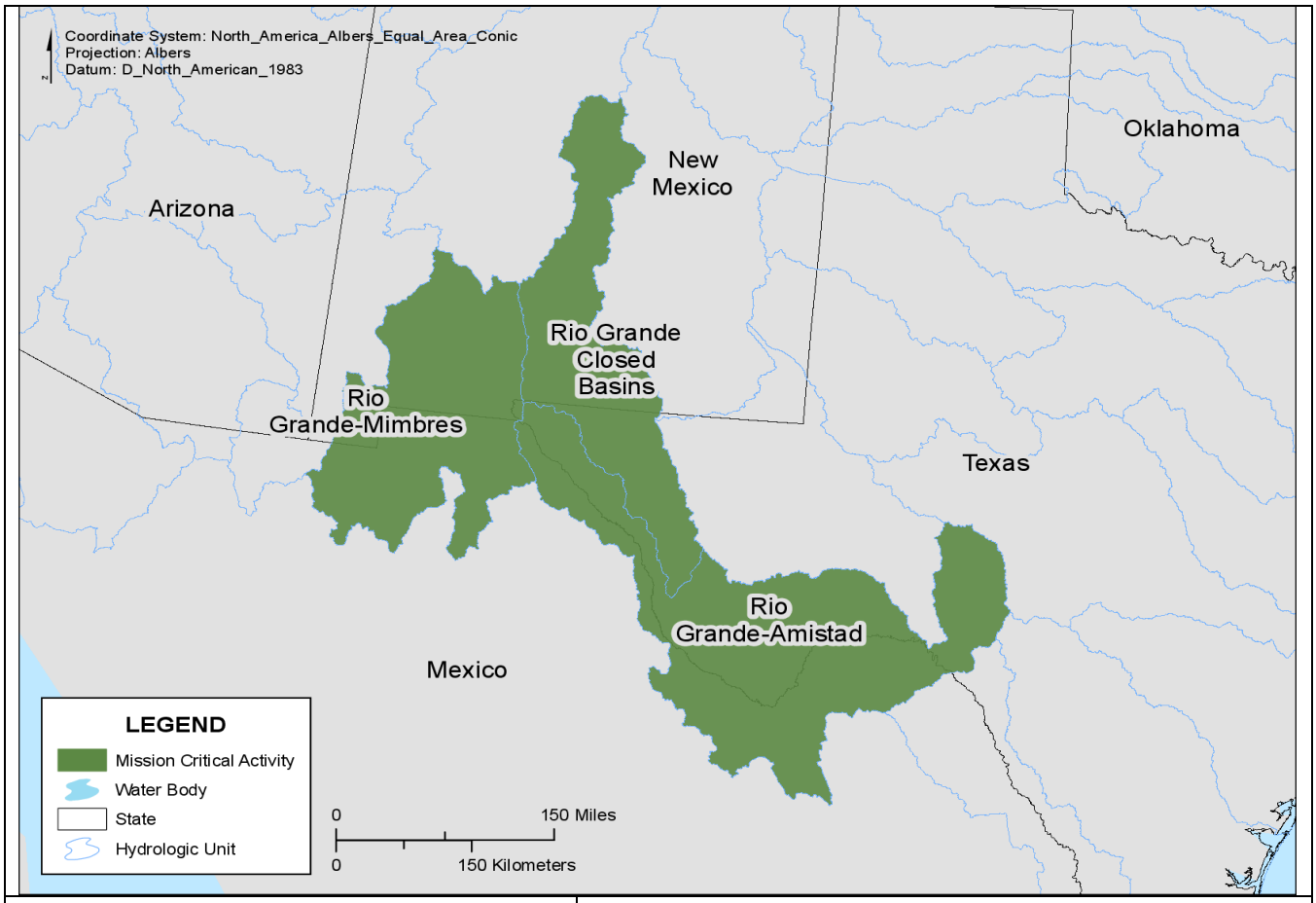
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

New Mexico managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Geographic Education



Mission Critical Activity Title:	Geographic Education
Mission Critical Activity Description:	Geographic education and research, some of which involves regional water resources.
MCA_ID:	3828847875_1
Organization Type:	State Government
Organization Name:	NMSU Department of Geography
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

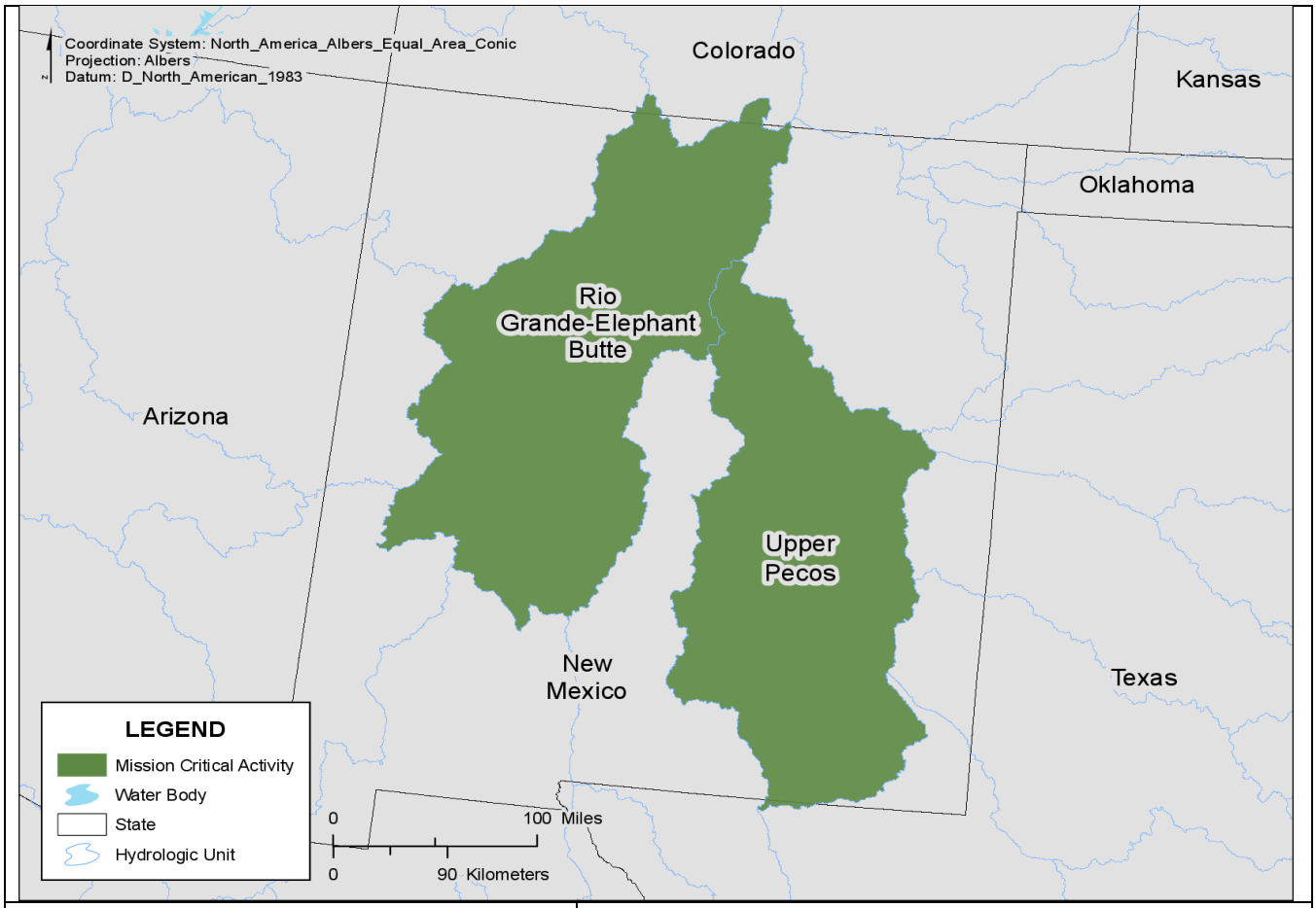
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Risk Analysis



Mission Critical Activity Title:	Flood Risk Analysis
Mission Critical Activity Description:	Provide geospatial technical support to New Mexico state agencies and local governments including data acquisition, processing, and analysis as needed and requested. Identify and coordinate the acquisition of geospatial vector and raster data, such as lidar, meeting the appropriate standards and specifications of program needs including NHD development and floodplain management.
MCA_ID:	3797224400_1
Organization Type:	State Government
Organization Name:	University of New Mexico
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Better data will result in improved floodplain mapping and improved mitigation planning at all levels.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

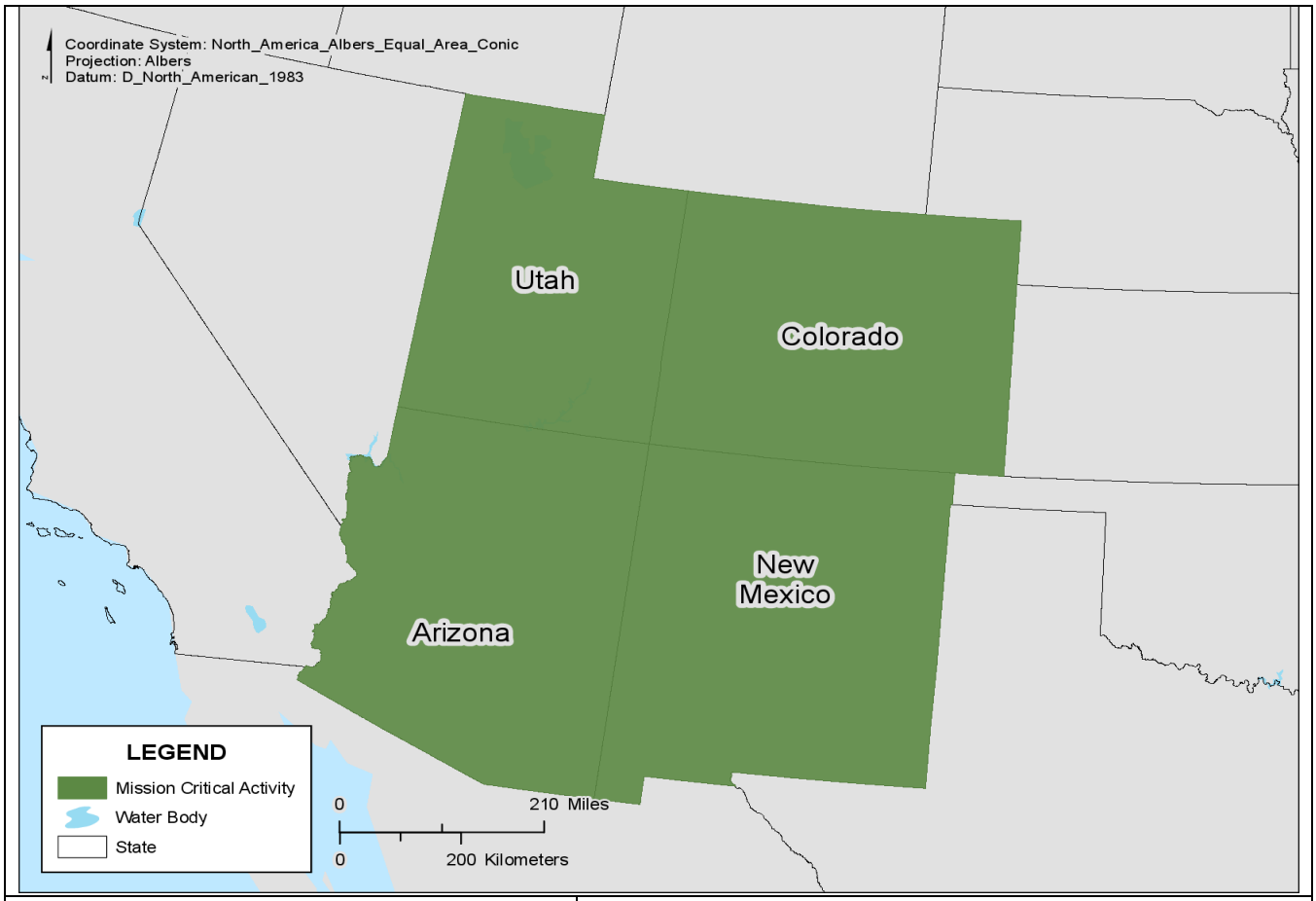
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Nice to Have	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Habitat Modeling



Mission Critical Activity Title:	Habitat Modeling
Mission Critical Activity Description:	Habitat modeling and restoration planning – review Hydro Modeling System (USACE). Effects on high-order streams and hydro affecting habitat (not so much sedimentation). Distance to water, slope, etc. The Gila Fire is an example.
MCA_ID:	3836990508_1
Organization Type:	Not for Profit
Organization Name:	UNM Department of Biology
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Elevation Dataset (NED) is other.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Improved modeling capabilities and improved confidence in output and resolution. Assists with management decisions and confidence levels.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

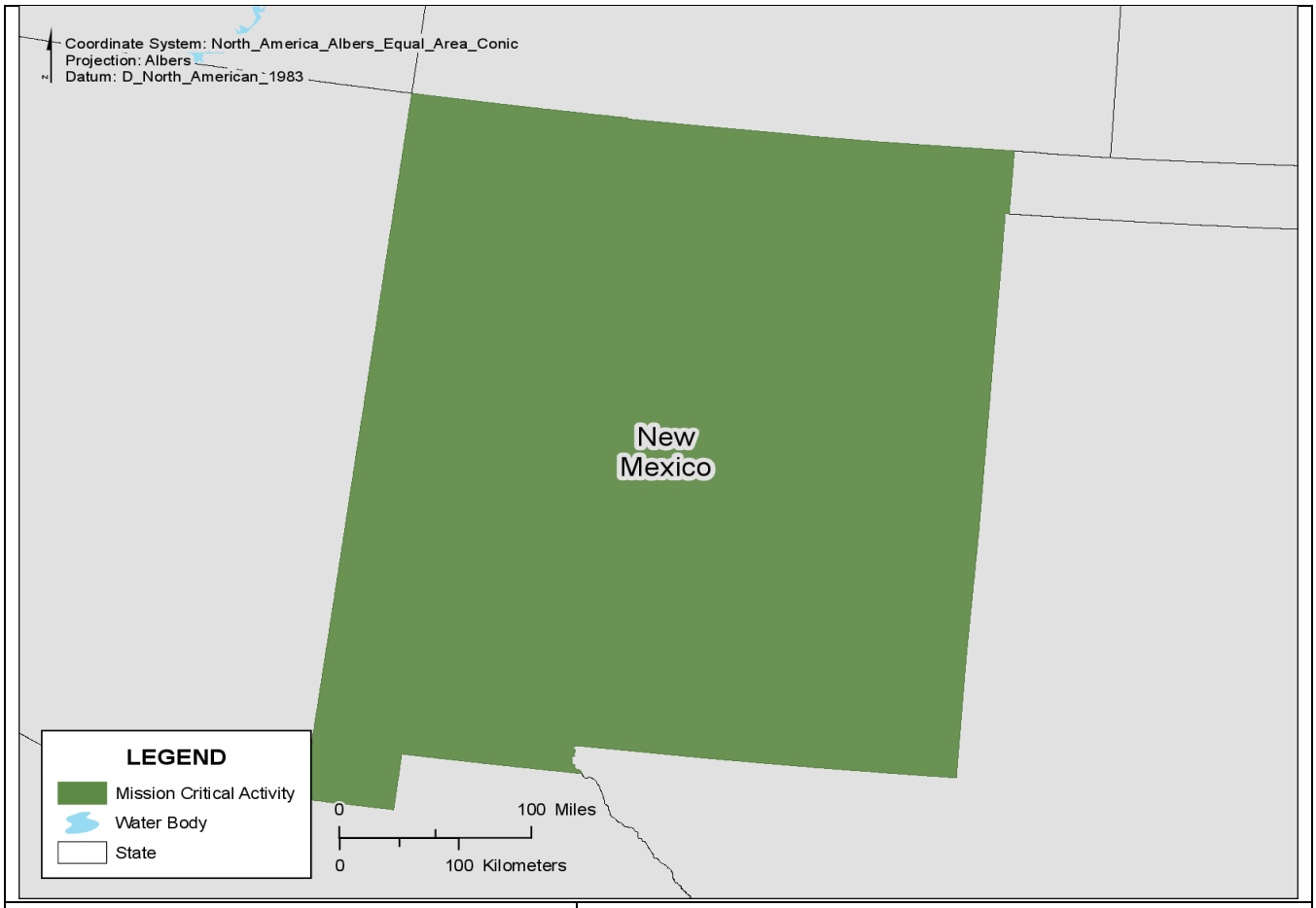
Future Benefits	
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Environmental Quality



Mission Critical Activity Title:	Environmental Quality
Mission Critical Activity Description:	Our primary mission is to support environmental regulation through the use of geospatial data in the following areas: Hazardous and Solid Waste, Surface Water, Groundwater, Air Quality, Drinking Water, and Health and Safety. Health and Safety includes Environmental Health Bureau (food, septic, and pools), Occupational Health and Safety Bureau (NM OSHA), and Radiation Control Bureau (medical, materials, and machines).
MCA_ID:	3805087303_1
Organization Type:	State Government
Organization Name:	New Mexico Environment Department
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have

Requirements	
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWI (contributor).

Current Benefits	
Total Annual Program Budget:	$1 million (multiple programs).
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	More accurate analyses in the regulatory environment; cooperation with other vendors/practitioners; response to public requests.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

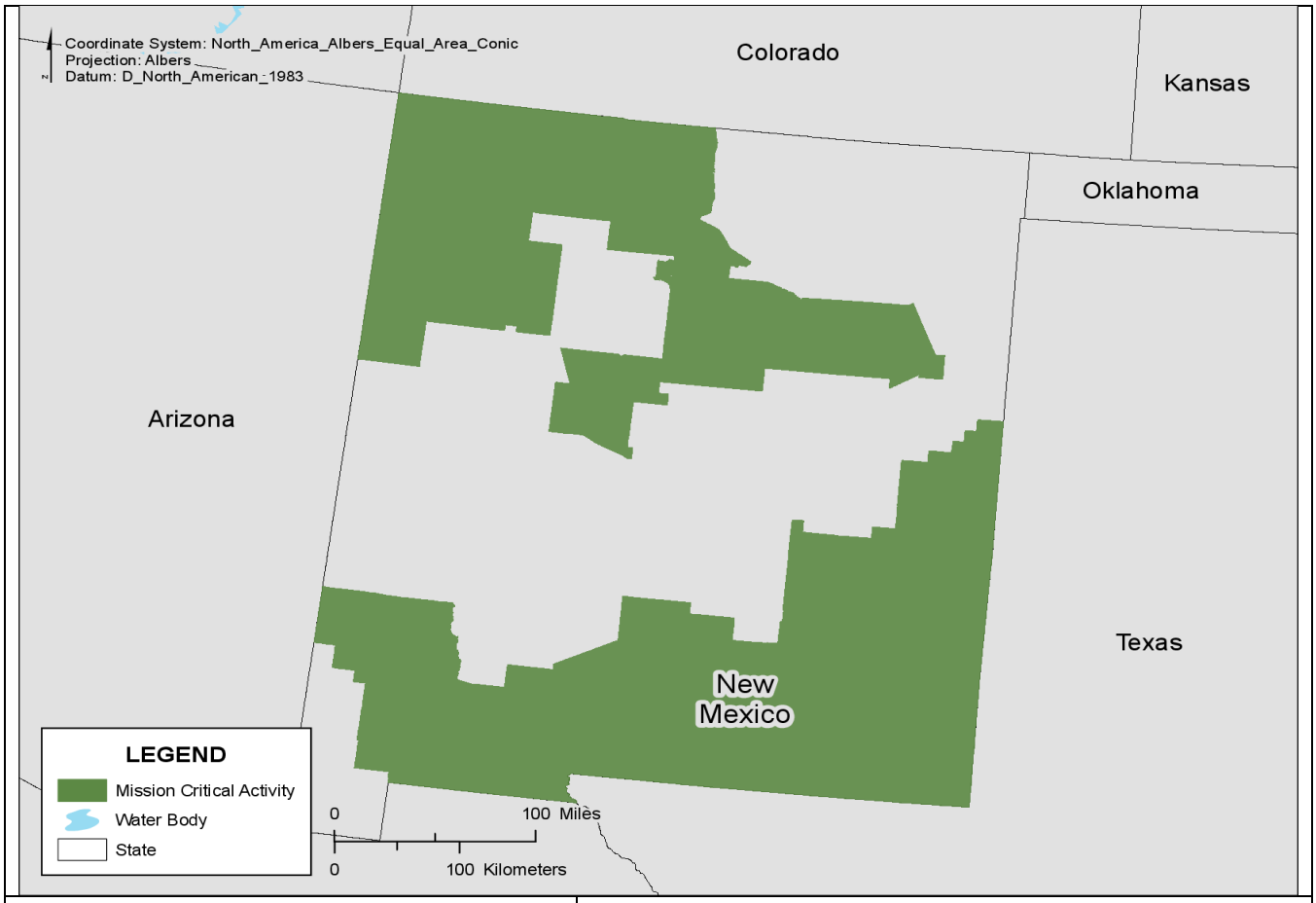
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	None
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice to Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Monitoring and assessing surface water quality data against NM's most recent water quality standards. Total Maximum Daily Load (TMDL) planning document development to address impaired waters.
MCA_ID:	3795093843_1
Organization Type:	State Government
Organization Name:	New Mexico Environment Department
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Would like to know more about StreamStats datasets as it seems useful for our mission.

Current Benefits	
Total Annual Program Budget:	$600,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$60,000 annually (1 additional FTE).
Future Benefits Description:	Improved hydrographic information would allow us to produce TMDLs and other related documents more quickly and efficiently, thus building capacity for other priorities.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

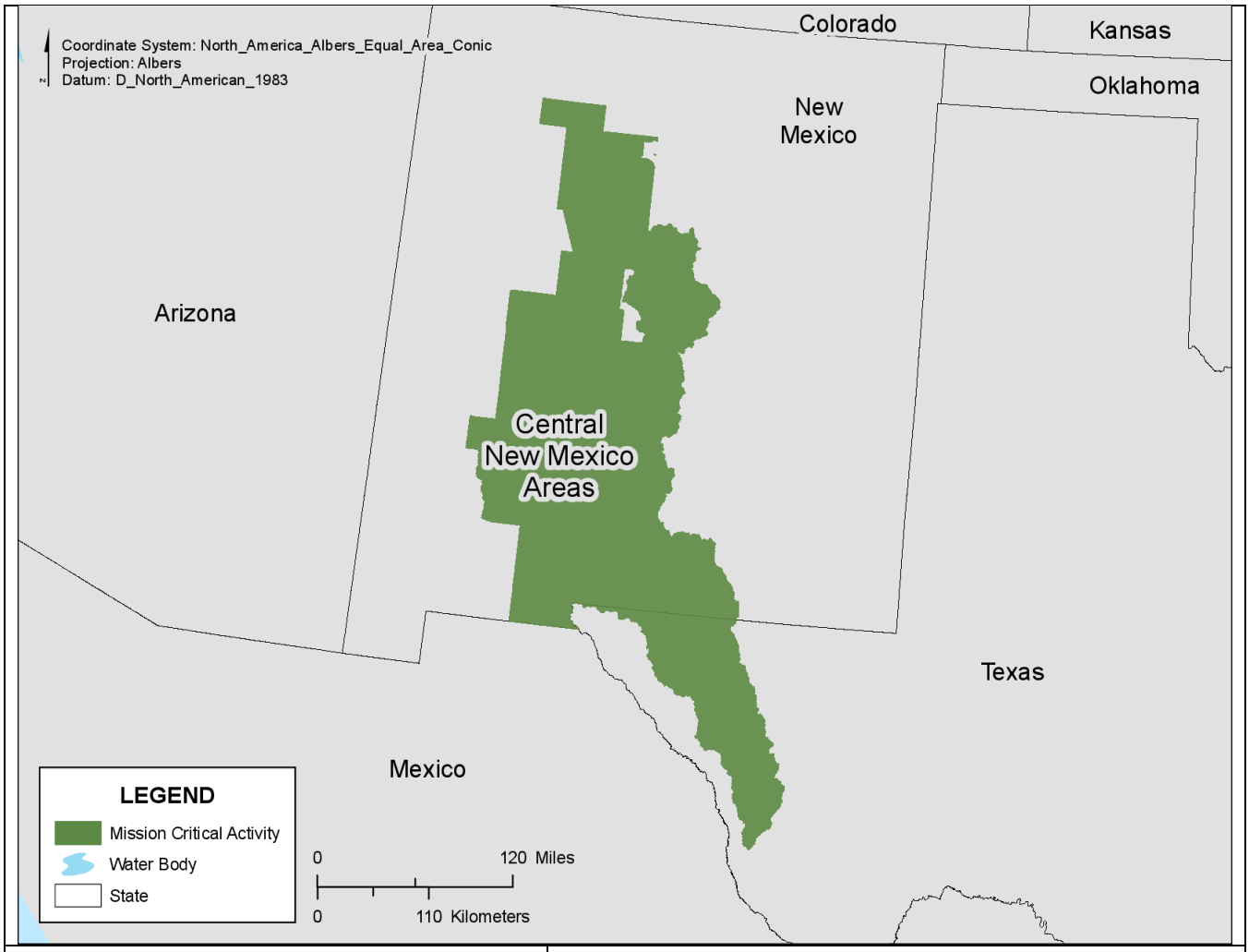
Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Required	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice to Have	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resource Planning



Mission Critical Activity Title:	Water Resource Planning
Mission Critical Activity Description:	Water resource planning and management with regard to groundwater/surface water interaction.
MCA_ID:	3789715672_1
Organization Type:	Private or Commercial
Organization Name:	Balleau Groundwater, Inc.
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Detailed, hydrologically-integrated product eliminates compilation tasks. USGS authority and science are a plus.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable

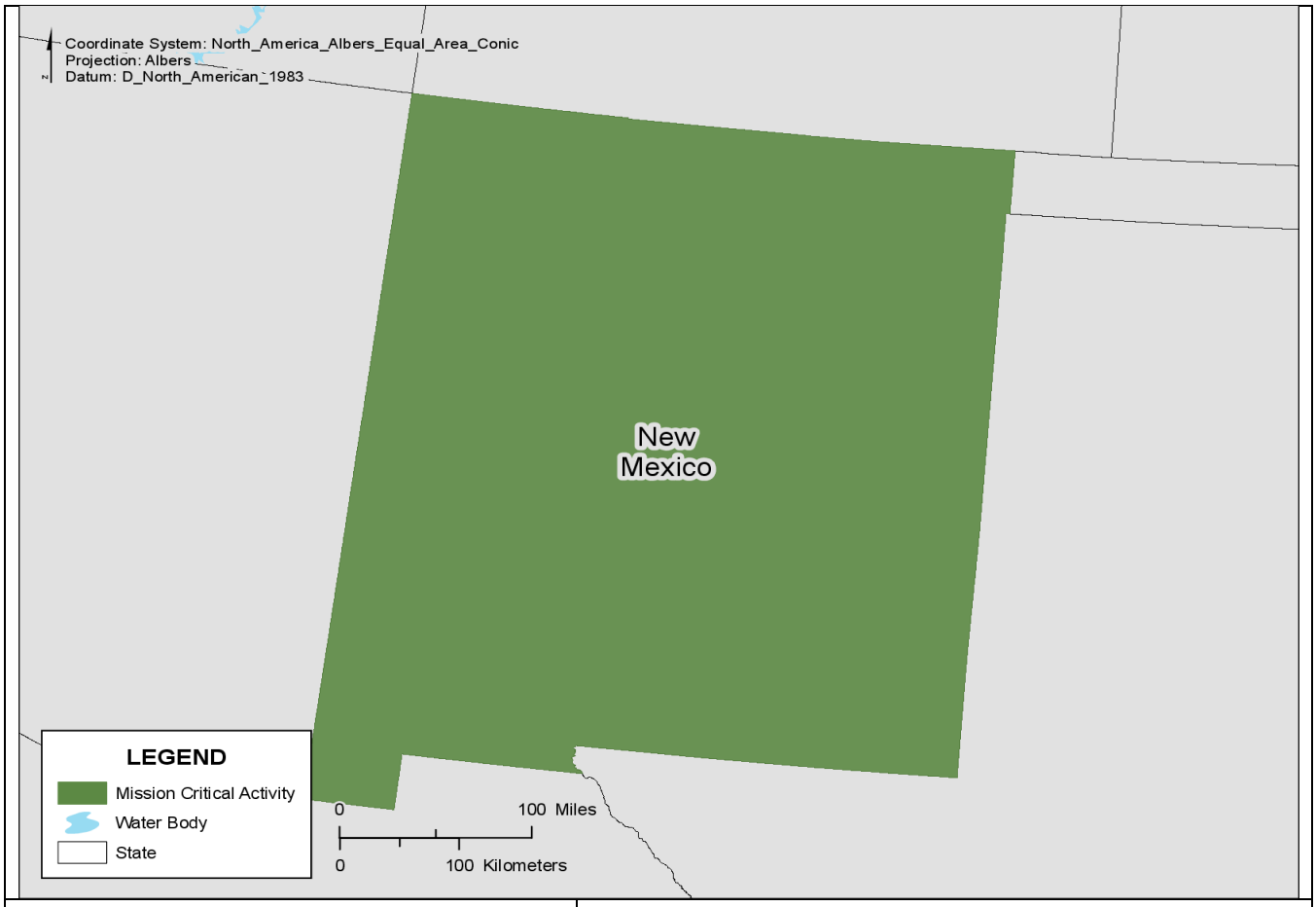
Future Benefits	
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Hydrologic Conditions



Mission Critical Activity Title:	Hydrologic Conditions
Mission Critical Activity Description:	Assessment of surface and groundwater supplies and availability for water rights administration.
MCA_ID:	3794640966_1
Organization Type:	State Government
Organization Name:	New Mexico Office of the State Engineer
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$1 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

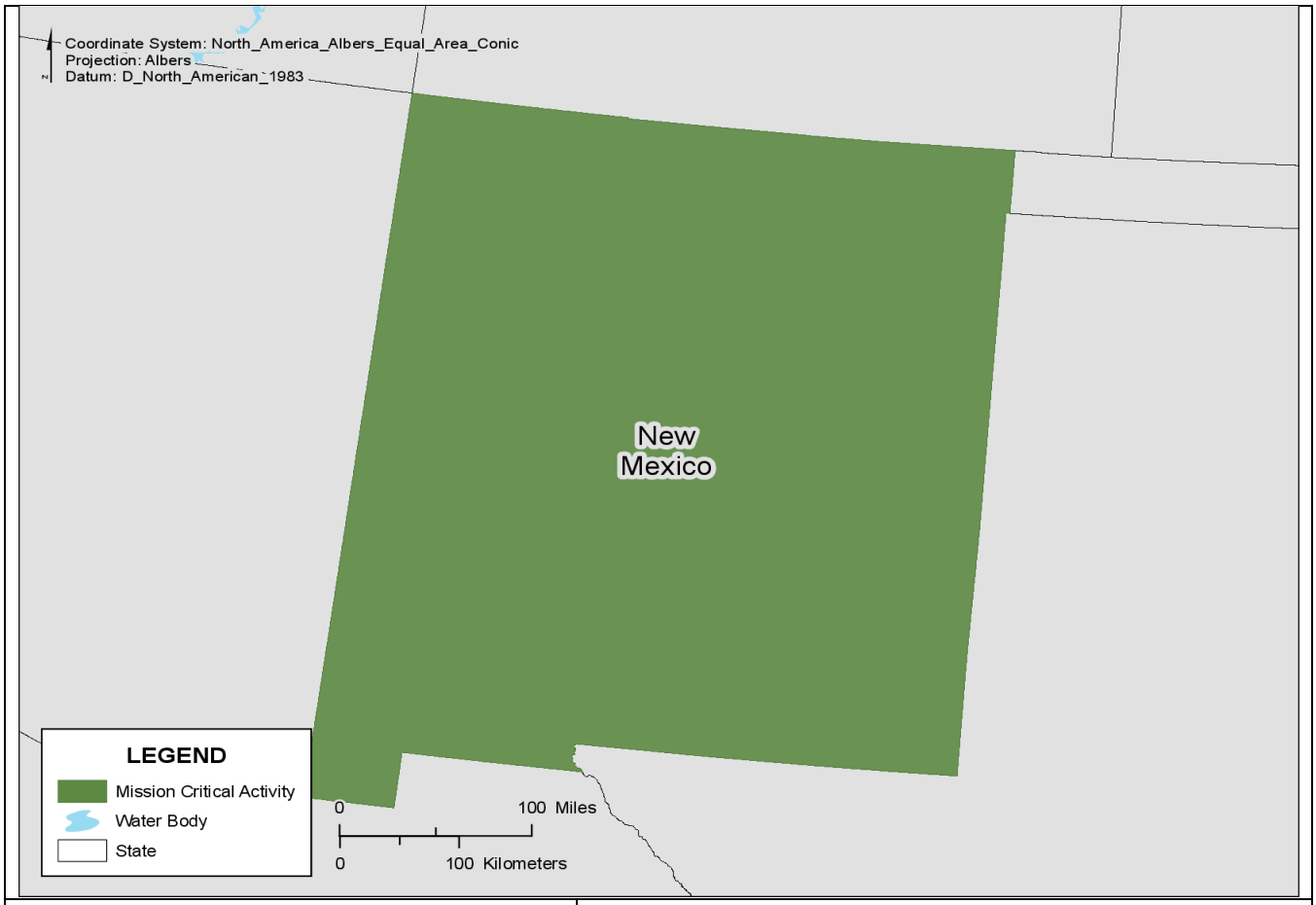
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Benefits would be major.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resource Management



Mission Critical Activity Title:	Water Resource Management
Mission Critical Activity Description:	The Mission of the New Mexico Office of the State Engineer is to administer and protect New Mexico's water resources. Maintaining the ability to maintain, administer, and protect water rights in the state and to ensure that New Mexico meets its obligations and receives obligations under Interstate Stream Compacts.
MCA_ID:	3797246666_1
Organization Type:	State Government
Organization Name:	New Mexico Office of the State Engineer
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2,000
Current Annual Benefits ($):	$1 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Having available high-quality data in order to complete geospatial analysis would greatly benefit the people of the State of New Mexico as it would allow for a higher order of resource management for a limited resource; allow for greater public education on the status of water resources; and allow for a greater role in planning, conservation, and protection of the water resources of the state.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

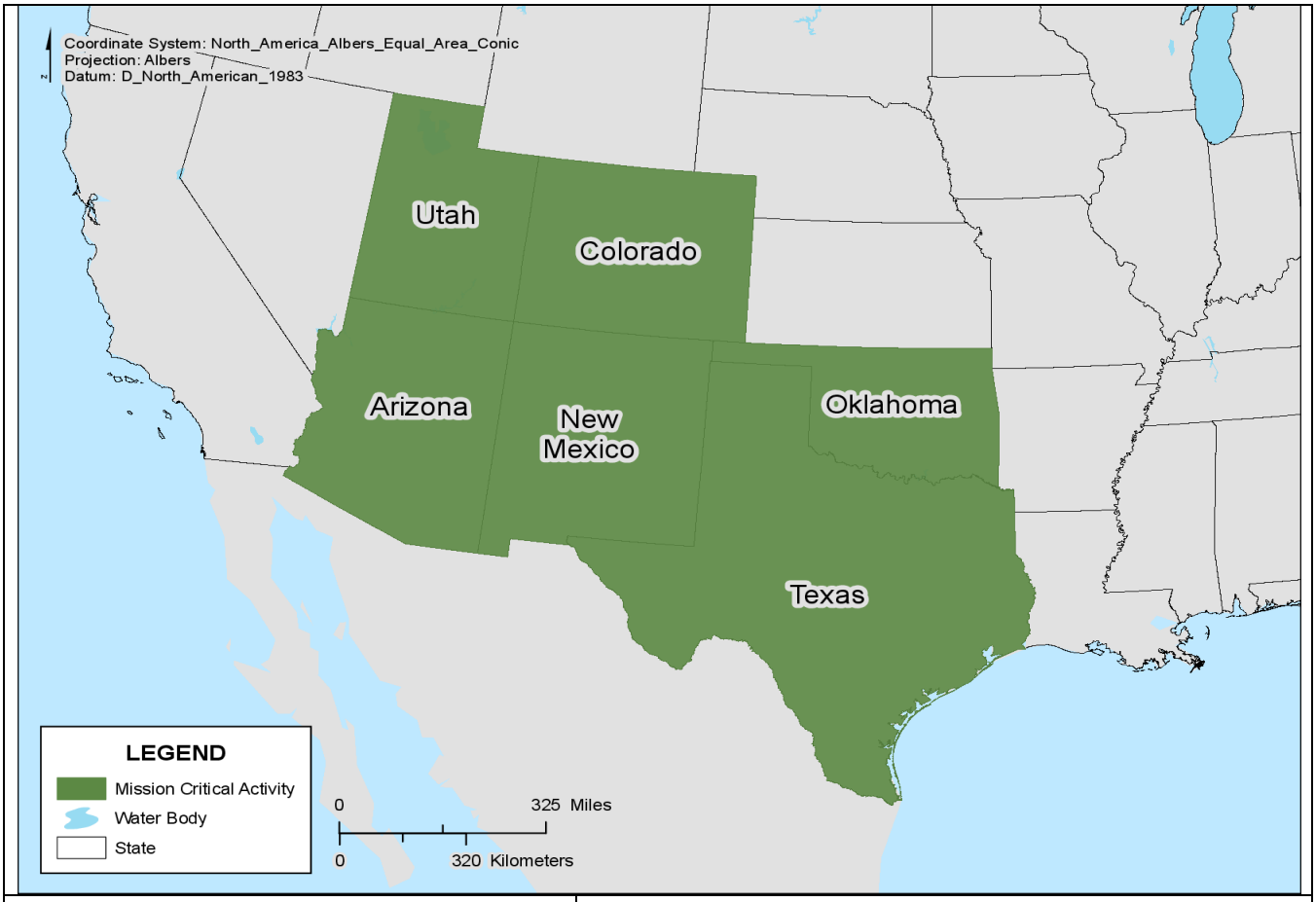
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Research



Mission Critical Activity Title:	Water Research
Mission Critical Activity Description:	We develop and disseminate information to the public of New Mexico and the nation for solutions to water problems. Research is funded and administered through the organization for projects that deal with a number of water resource concerns.
MCA_ID:	3801536974_1
Organization Type:	Not for Profit
Organization Name:	New Mexico Water Resources Research Institute
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	StreamStats, NWIS, EBID-WRIS, Data.gov, EPA-EDG.

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved data would reduce the amount of time required to correct and would lead to faster response and happier customers.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	Yes
	Most of these have not been required so far, but any one of these could be a selection that a researcher or public entity may require us to deliver.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):	Required: These have been used in projects funded through our organization.	Required: These have been used in projects funded through our organization.

Hydrologic Engineering

Mission Critical Activity Title:	Hydrologic Engineering
Mission Critical Activity Description:	Watershed restoration, stormwater management, regional water planning.
MCA_ID:	3805303190_1
Organization Type:	Private or Commercial
Organization Name:	Daniel B. Stephens & Associates
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Less need to collect project-specific data, which increases the cost to the customer.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Required	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

New York

Nine entities—six state, regional, and local entities, one Department of Defense installation (Ft. Drum), and two private industry representatives—responded to the USGS Hydrography Requirements and Benefits Study (HRBS) survey and identified a total of 12 Mission Critical Areas (MCAs).

The HRBS survey results for New York noted requirements for improved and coordinated hydrography data covering a range of MCAs in support of the following:

- Water resource management with regard to monitoring and assessing both surface and ground water quality for environmental regulation
- Hydrographic mapping and analysis
- Flood mapping, flood risk management, and flood loss prevention
- Transportation and infrastructure planning and construction
- Stormwater management and regional water resource planning
- Watershed management and protection

The primary reported Business Uses (BUs) for Flood Risk Management, Urban and Regional Planning, Watershed or Stream Management, and Water Quality Monitoring are reflected in the MCAs. Most of the reporting entities have a working familiarity of the NHD and the Watershed Boundary Dataset (WBD). None reported using NHDPlus. USGS stream gage data, and especially flow periodicity, as well as floodplain boundaries, were seen as required data characteristics. One respondent was a heavy user of the NY StreamStats application. Other specialized hydrographic datasets were also used. In terms of integrating with other datasets, land cover, elevation, streamflow, and wetlands were rated as required by a majority of respondents. Finding upstream and downstream features, delineating catchments, and calculating drainage areas were the most common analytical functions. Most respondents favored the use of 12-digit HUCs as a management unit, and Esri shapefiles or geodatabases as the preferred file formats. To varying degrees, ancillary national datasets, such as the National Wetlands Inventory (NWI), STORET, National Agriculture Statistics Service (NASS), National Pollutant Discharge Elimination System (NPDES), and National Weather Information System (NWIS), as well as specialized state hydrography-related datasets are used to augment programmatic needs to meet business requirements.

For NY respondents, program budget information ranged from a high of $5 million to a low of $50,000, but many respondents were unsure of the exact amounts. Benefits, both current and future, were similarly difficult to ascertain in many cases, and formal budgetary cost-benefit analysis or return-on-investment scenarios have not been performed regarding hydrographic data specifically.

Most respondents agree that improving NHD data and stewardship will bring benefits to their work, such as providing better products and more value-added services to agency employees and the public, time savings for data management and revision, and improved data accuracy and spatial delineation for analysis and modeling purposes.

New York respondents defined business requirements for more current and complete hydrographic data to augment analysis integrating other framework layers that include improved alignment of NHD data with high-resolution elevation data (DEMs) as lidar elevation data become the increasingly available standard.

Previous work in completing the NHD for New York was done in cooperation with the New York State Department of Environmental Conservation (NYS-DEC) Division of Water, which has worked with USGS since 1993 for the production of Digital Line Graph (DLG) Hydrography and the NHD; however, since 2002, NYS-DEC has scaled back its NHD stewardship role in light of funding and staffing cutbacks. No other primary NHD steward POC has been identified and the NY Information Technology Service GIS Office is examining its role in future NHD stewardship.

New York currently has no systematic way to coordinate with state, Federal, tribal, and local agencies to collect and leverage resources to prioritize NHD updates. Increased educational outreach to state and local entities, as well as continued assistance from USGS in the form of grant awards and hydrographic mapping tools and application development would greatly improve efforts to update the NHD and to further develop and expand the use of the NHD for all sectors from local through Federal users. It is important for USGS to nurture and sustain broader stewardship opportunities with the New York water resource community to keep the NHD database current and relevant for users.

In addition to USGS sources, further information on other publicly-available hydrography-related datasets for New York can be found on the New York State GIS Clearinghouse website: https://gis.ny.gov/gisdata/inventories/results.cfm?SWIS=&sectorIDs=&themeIDs=13

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Nice To Have
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Not Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

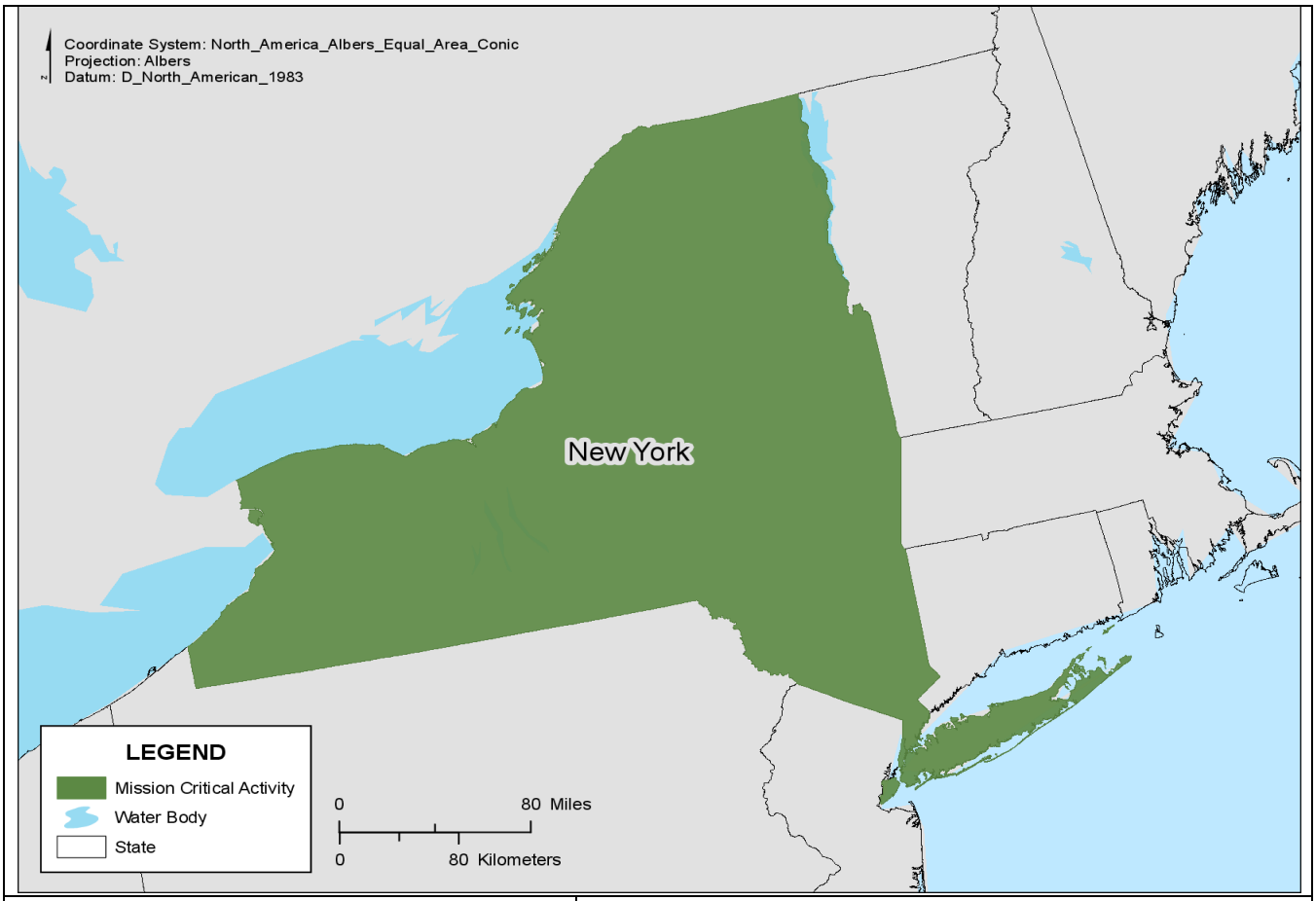
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Maybe

Mission Critical Activities

New York managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Construction Planning and Analysis



Mission Critical Activity Title:	Construction Planning and Analysis
Mission Critical Activity Description:	Hydrologic and hydraulic analysis for NYSDOT bridge replacements, stream channel restoration, and bridge scour retrofits; post-flood reconstruction (i.e. Hurricane Irene, Tropical Storm Lee 2011); planning and evaluation of hydrology options for addressing climate change in bridge design and construction.
MCA_ID:	3787219912_1
Organization Type:	State Government
Organization Name:	NYS Department of Transportation
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	StreamStats.

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$12,500
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Better assessment of evolving hydrology with climate change.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	

Future Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

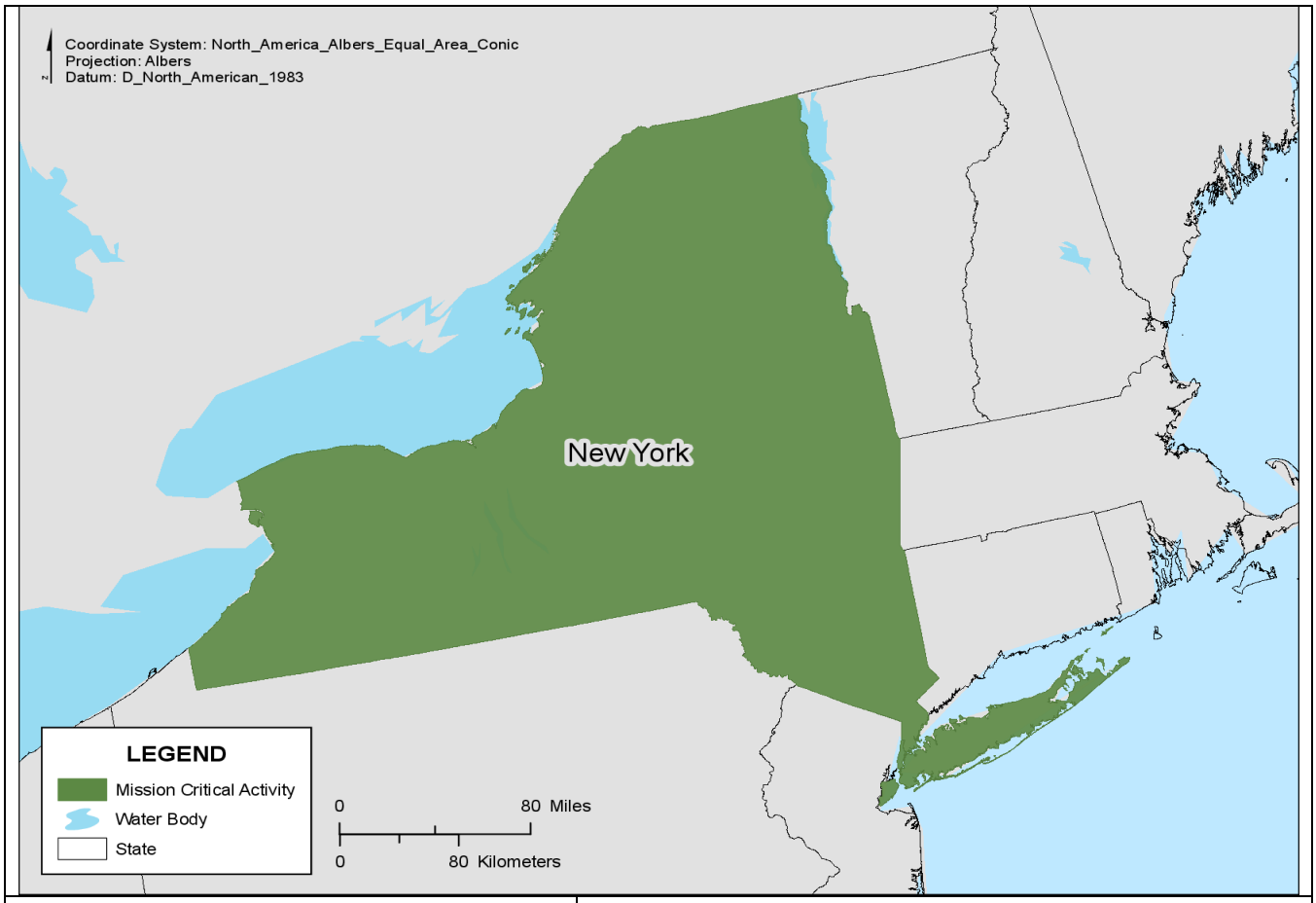
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Required	Associate Selected Data Type
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Riverine and coastal flooding: risk assessment, mitigation, response and recovery.
MCA_ID:	3787625577_1
Organization Type:	State Government
Organization Name:	NYS Division of Homeland Security and Emergency Services - Office of Emergency Management
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NYS-DEC 1:24,000 hydrography/hydro route; StreamStats.

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Improved flood forecasting and stage level projections combined with delineation of inundation extent and water depths associated with flood forecast will make significant contributions in reducing loss of life and property.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor

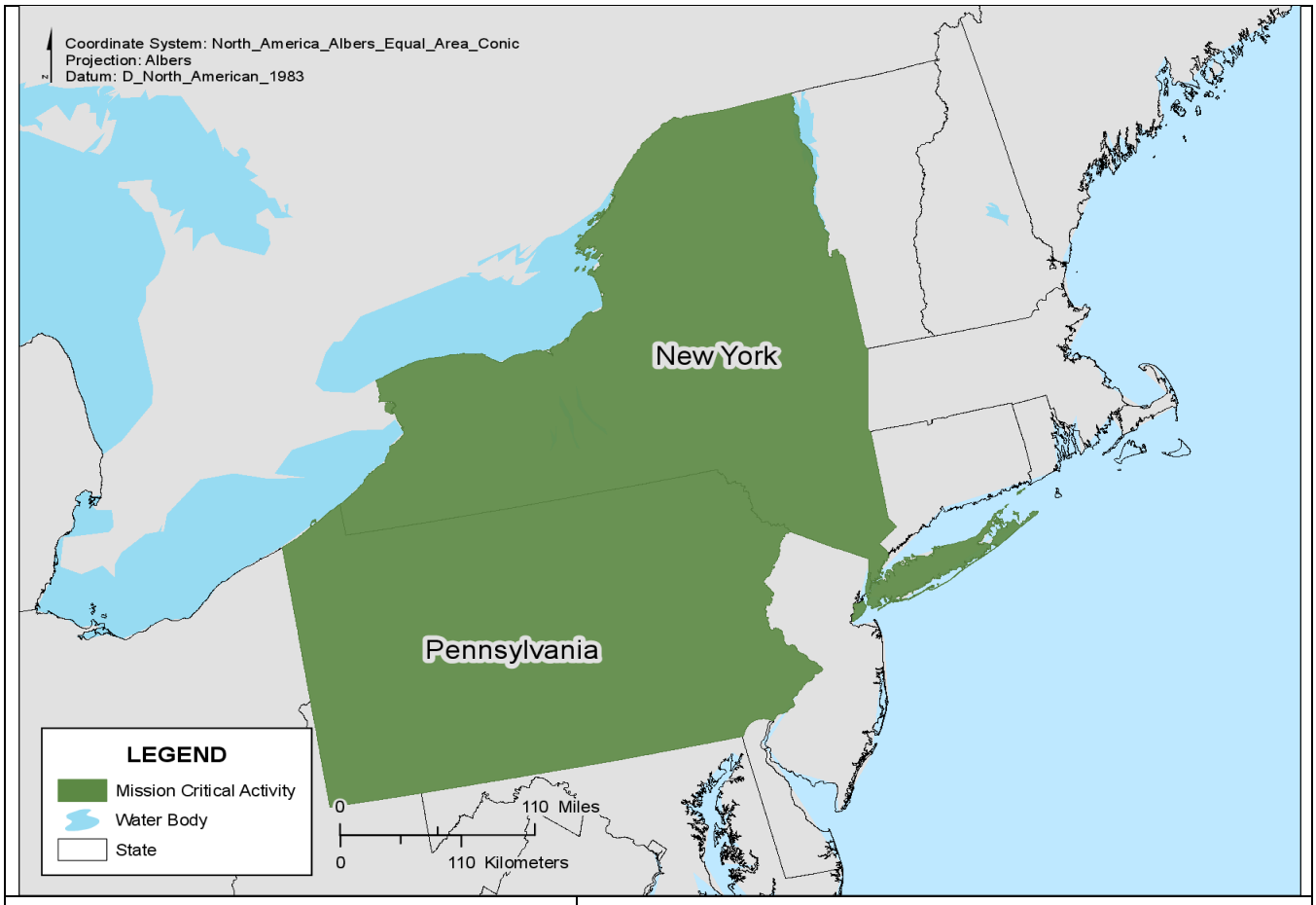
Future Benefits	
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones/coastal zones as buffers/navigable waters.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Flood-level determination, flood control, flood mitigation, flooding adaptation.
MCA_ID:	3809232845_1
Organization Type:	Private or Commercial
Organization Name:	CasaAlba Consulting
Business Use:	Flood Risk Management
Area of Interest:	New York, Pennsylvania

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FEMA, USACE, NWI, EPA data as needed.

Current Benefits	
Total Annual Program Budget:	$500,000 (projects in which I participate).
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000 (projects in which I participate).
Future Benefits Description:	Most would be in the value added services category, followed by operational efficiency and efficacy. Value added mostly through indexing of business data to the hydrography and service improvements/new made possible by the data. Integration is important to operational and programmatic efficiencies at all governmental levels.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate

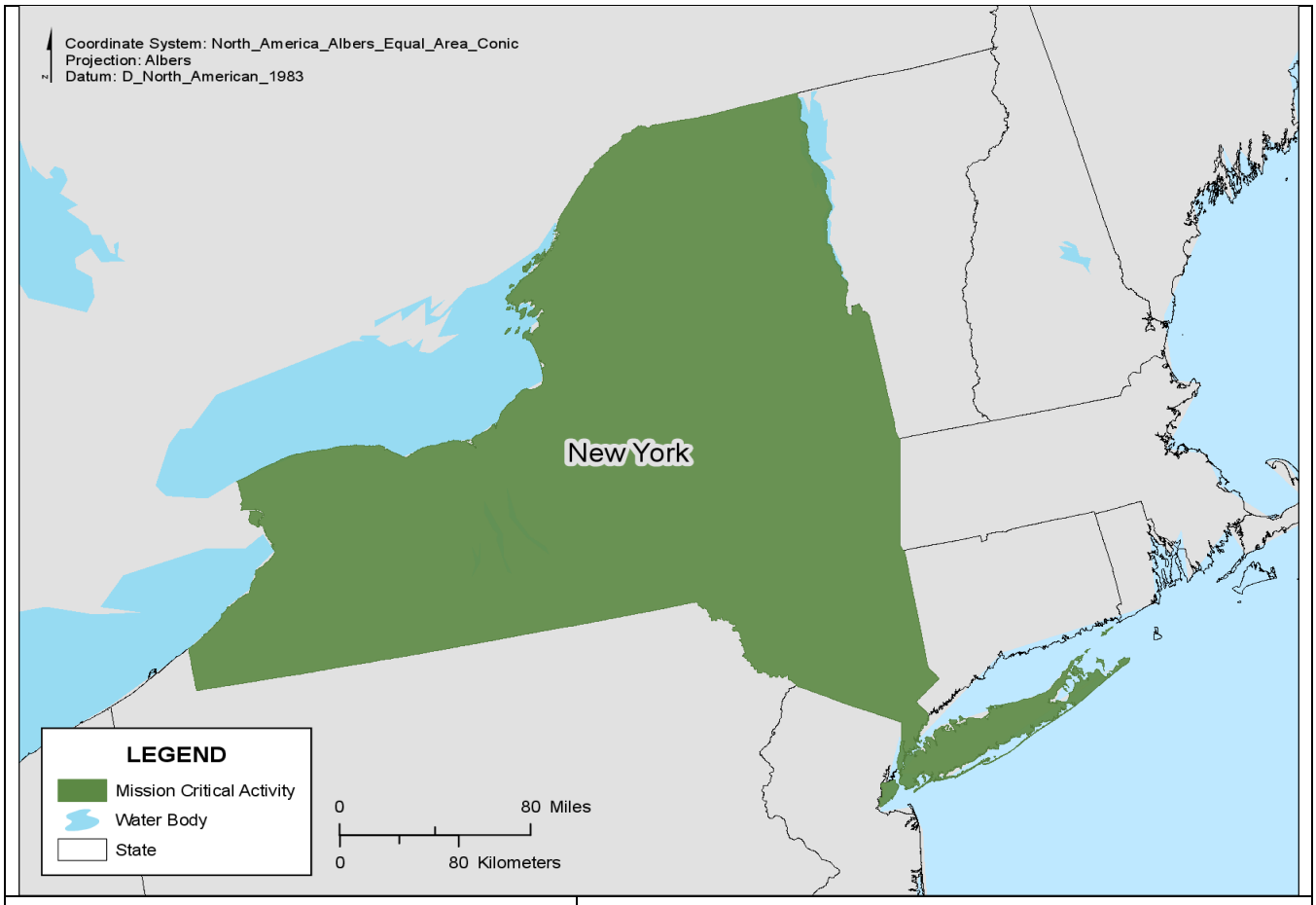
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian areas.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	State or local level water quality assessment	State or local level water quality assessment

Hydrographic Mapping and Analysis



Mission Critical Activity Title:	Hydrographic Mapping and Analysis
Mission Critical Activity Description:	Topographic mapping. We create DEMs and contours from airborne lidar.
MCA_ID:	3807440746_1
Organization Type:	Private or Commercial
Organization Name:	GroundPoint Technologies, LLC
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	State Environmental Quality Review Act (SEQRA), MS4, NWI.

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	If our customers demanded new hydrography data, we would not have to re-do topo maps. Improved customer experience would skyrocket.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

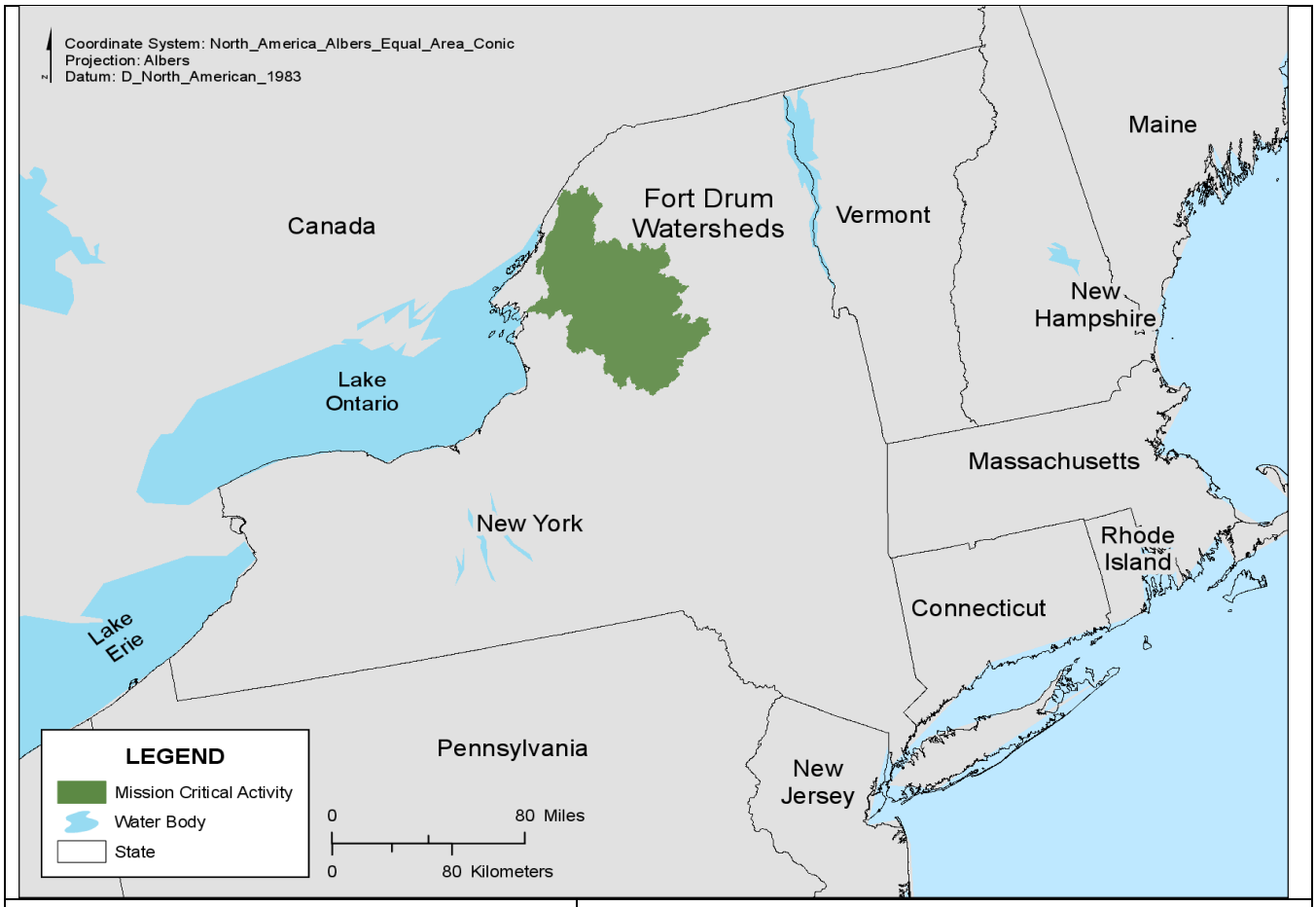
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice To Have	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	statewide or local orthoimagery	statewide or local orthoimagery

Ecosystem Management



Mission Critical Activity Title:	Ecosystem Management
Mission Critical Activity Description:	Wetland, stream, and deep water habitat management.
MCA_ID:	3824231668_1
Organization Type:	State Government
Organization Name:	Defense Installations Spatial Data Infrastructure (DISDI) USAG Fort Drum
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

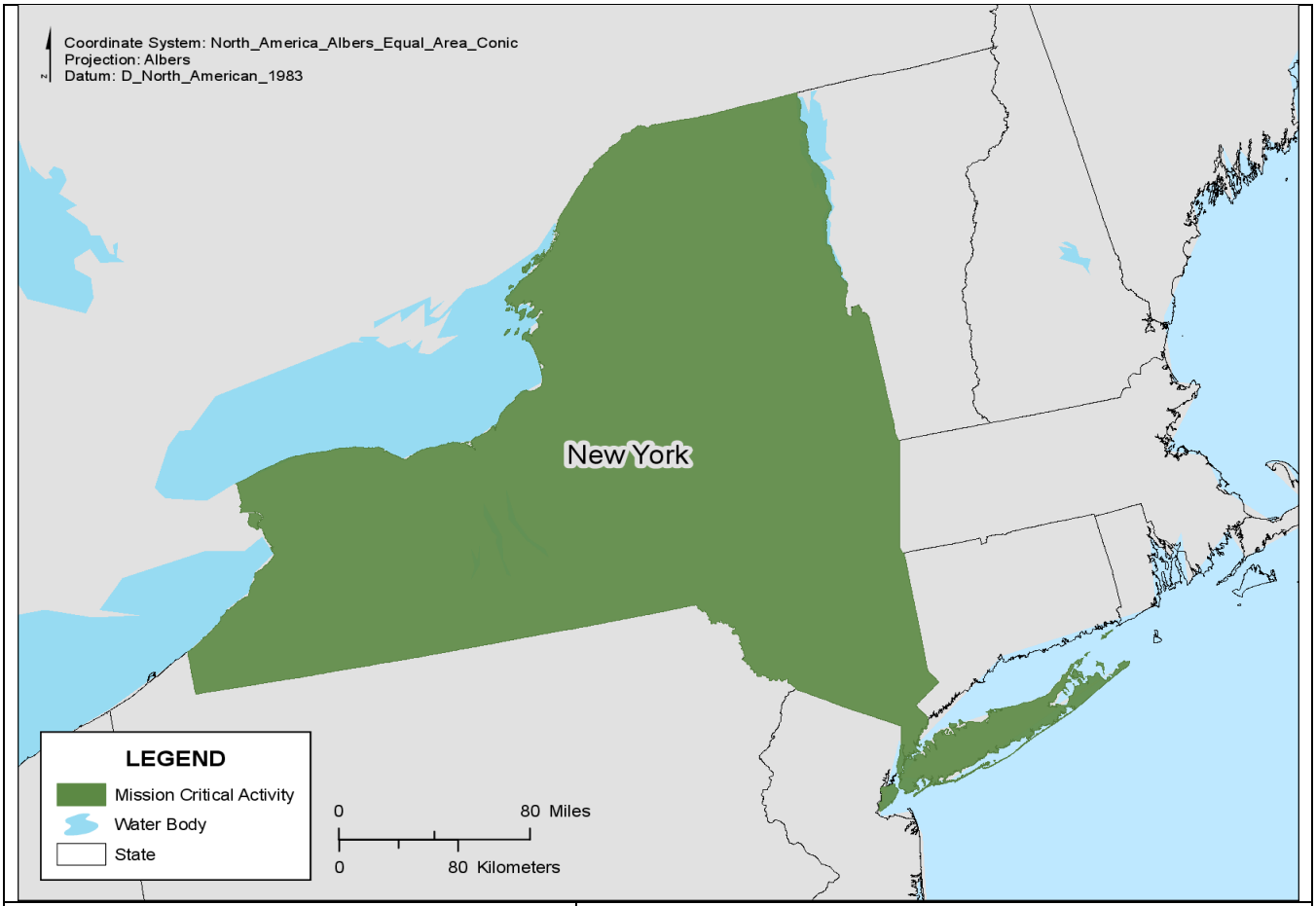
Future Benefits	
Future Annual Benefits ($):	$200,000
Future Benefits Description:	Time spent on data management would be shifted to actual data analysis.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	None
Climate	Nice To Have	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	Internal wetland determinations - Cowardin classification, Perform Geospatial Analysis	Internal wetland determinations - Cowardin classification, Perform Geospatial Analysis

Drought Management



Mission Critical Activity Title:	Drought Management
Mission Critical Activity Description:	Drought management.
MCA_ID:	3787625577_2
Organization Type:	State Government
Organization Name:	NYS Division of Homeland Security and Emergency Services - Office of Emergency Management
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NYS-DEC hydrography datasets.

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

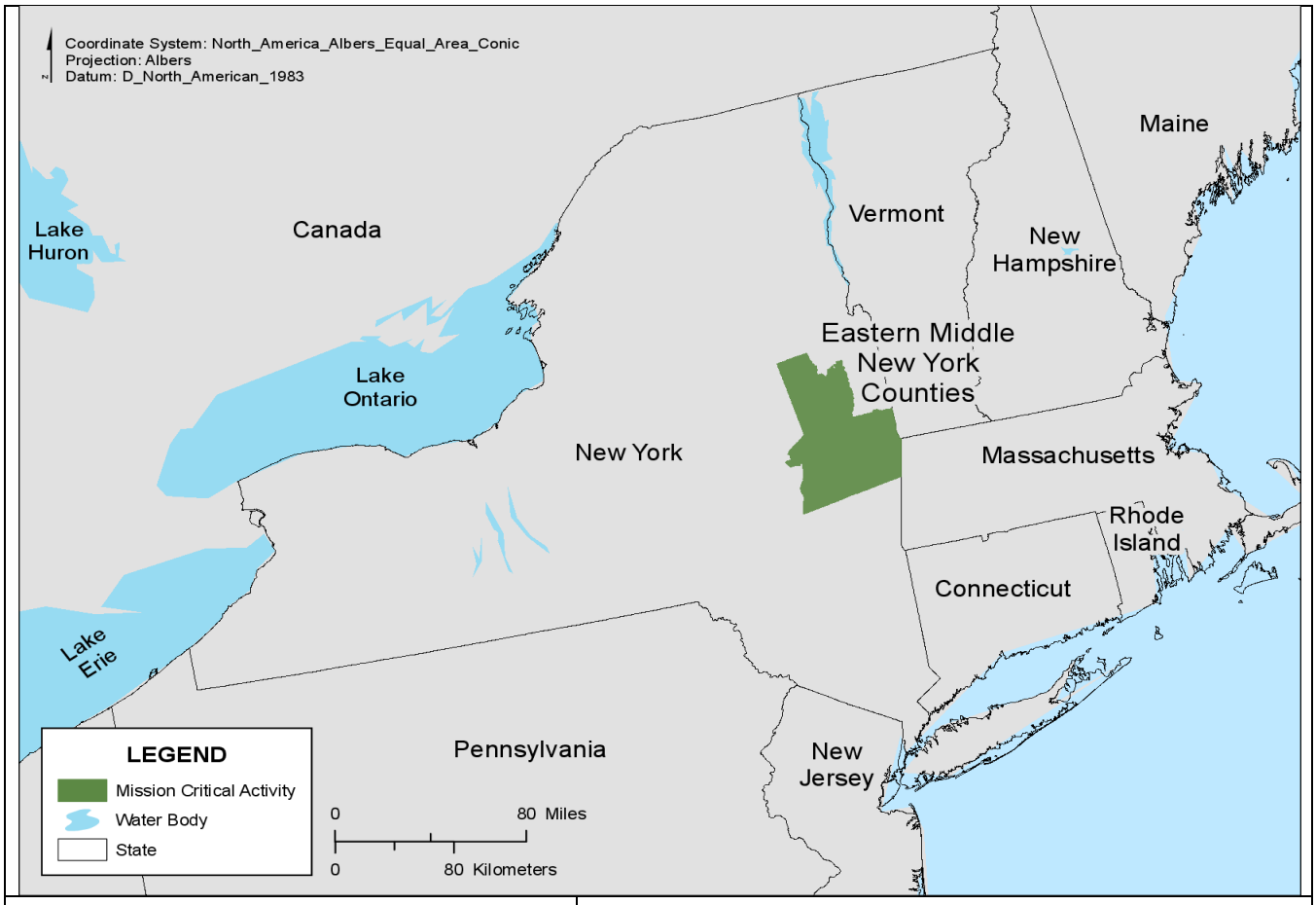
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	State Drought Management Task Force improved decision making.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Navigable waters/riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):	NYC DEP Reservoir Levels – Highly Desirable, Perform Geospatial Analysis; Local/municipal withdrawal points for firefighting – Highly Desirable, Associate Selected Data Type	NYC DEP Reservoir Levels – Highly Desirable, Perform Geospatial Analysis; Local/municipal withdrawal points for firefighting – Highly Desirable, Associate Selected Data Type

Hydrographic Mapping and Analysis



Mission Critical Activity Title:	Hydrographic Mapping and Analysis
Mission Critical Activity Description:	General base mapping including the following hydrography layers and features: rivers, streams, lakes. Base mapping and analysis for Federal environmental mitigation requirements including the following hydrography layers and features: rivers, streams, lakes, wetlands, watersheds, floodplains, aquifers.
MCA_ID:	3772371788_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Capital District Transportation Committee MPO
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Hydrography layers provided by NYS agencies.

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided
Future Benefits Description:	Better data availability equals better product and improved ability to meet requirements in a more timely and efficient manner.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

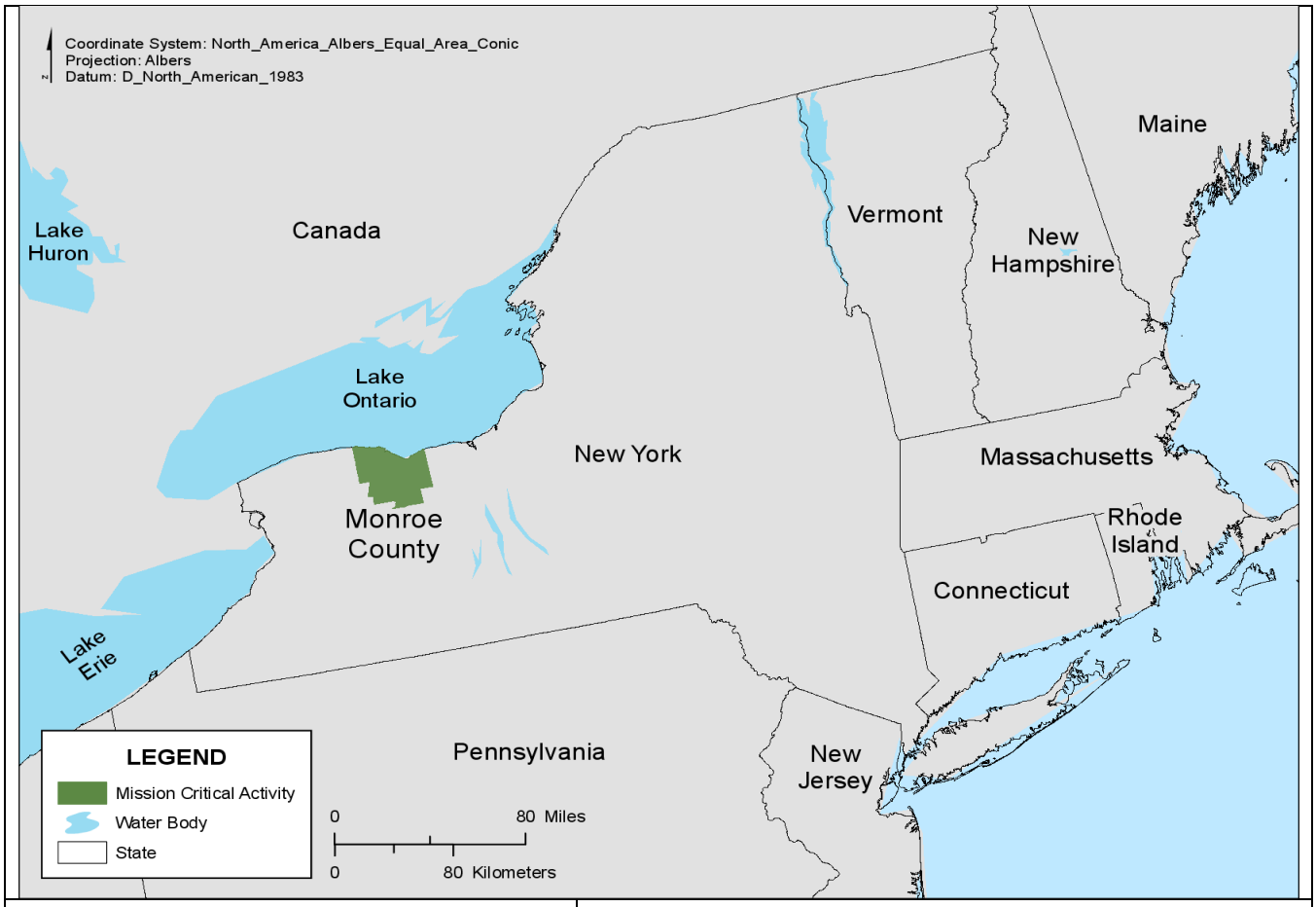
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Visual Inspection
Stream Flow	Not Required	None
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3772635519_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Town of Pittsford
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NYS-DEC hydro DLGs (old).

Current Benefits	
Total Annual Program Budget:	$106,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Many streams are shown out of alignment with the actual stream, some even going through buildings and houses. Improved accuracy would assist staff with planning, and alleviate confusion for our residents. It would also save time so I don't have to refine geography or attributes in spot areas.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor

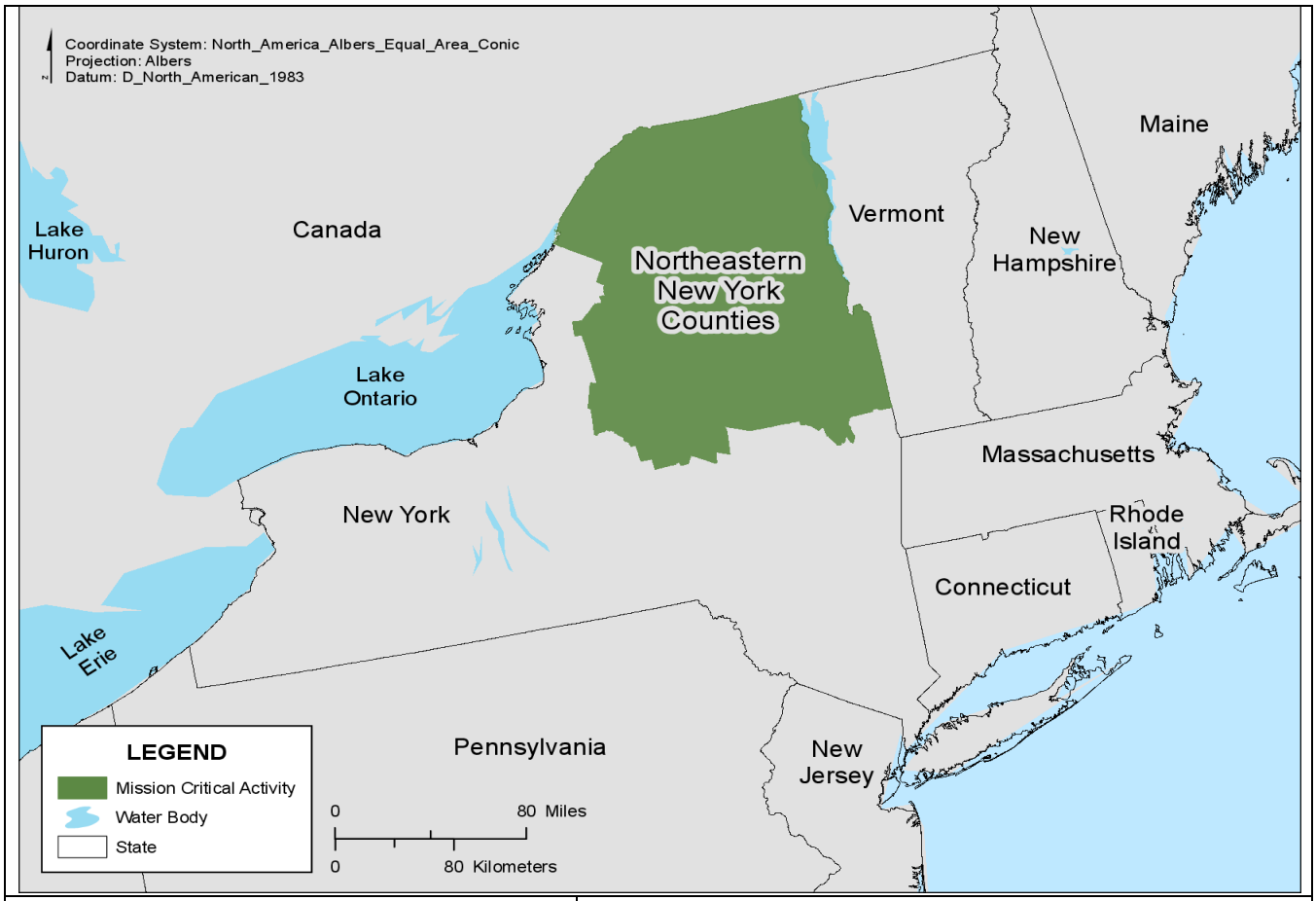
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	Local property database – Perform Geospatial Analysis; NWS rainfall, etc. – Perform Geospatial Analysis	Local property database – Perform Geospatial Analysis; NWS rainfall, etc. – Perform Geospatial Analysis

Land Use Planning



Mission Critical Activity Title:	Land Use Planning
Mission Critical Activity Description:	Land use permit review for shoreline, groundwater, and wetland protection.
MCA_ID:	3828510069_1
Organization Type:	State Government
Organization Name:	NYS Adirondack Park Agency
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	Improved surface water delineation would provide more accurate shoreline protection compliance. Ground water and wetland mapping would improve septic system permit review.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

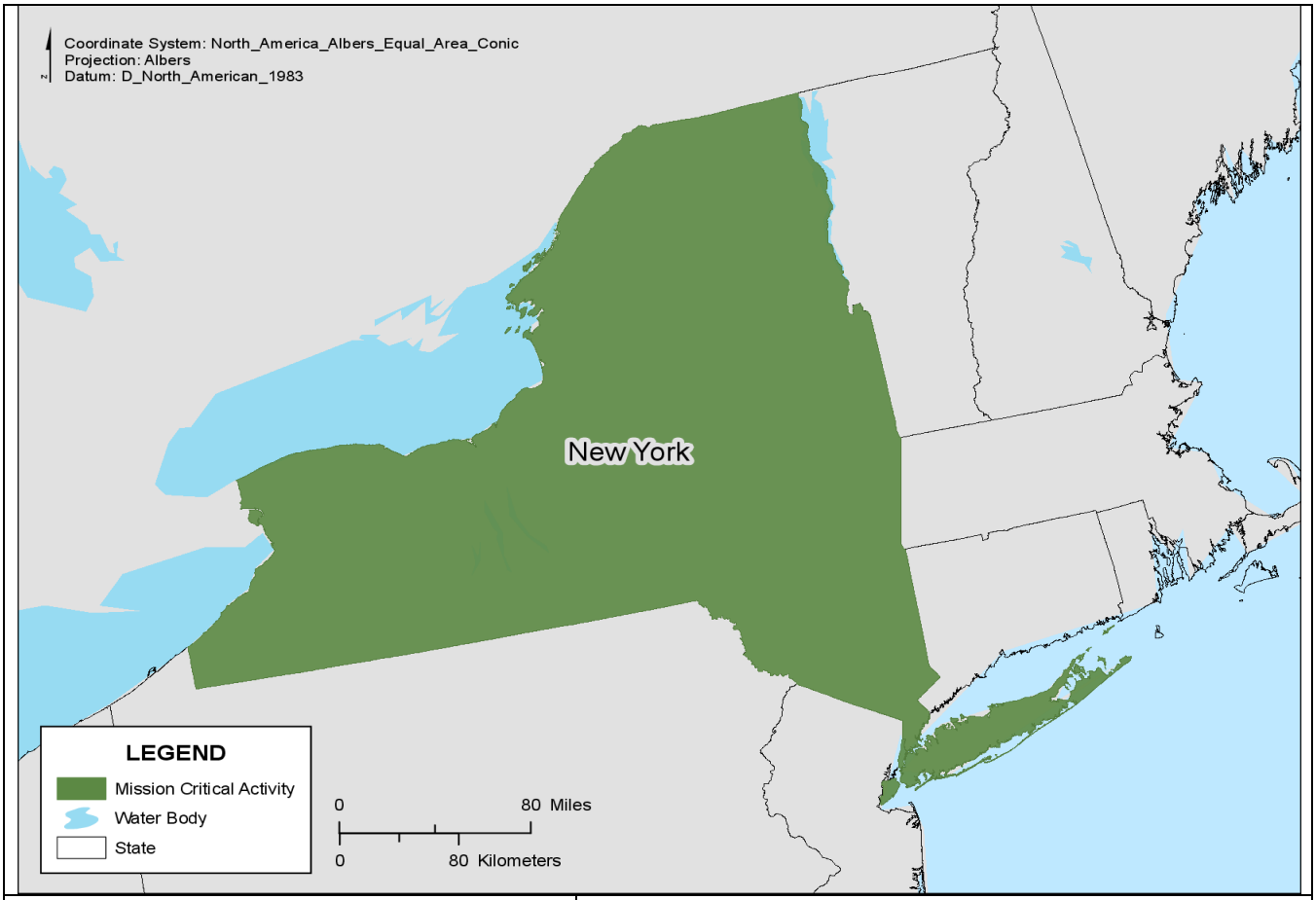
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Quality Assessment



Mission Critical Activity Title:	Water Quality Assessment
Mission Critical Activity Description:	Evaluate and assess the water quality of all waters in New York State. This evaluation relies on data and information generated by the agency monitoring program and outside sources.
MCA_ID:	3803658398_1
Organization Type:	State Government
Organization Name:	NYS Dept. of Environmental Conservation
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Internal groundwater, surface water, priority water bodies, stream segments.

Current Benefits	
Total Annual Program Budget:	$1.5 million
Current Annual Benefits ($):	$52,500
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$200,000
Future Benefits Description:	More accurate tools allow for better assessments and planning.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

Future Benefits	
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

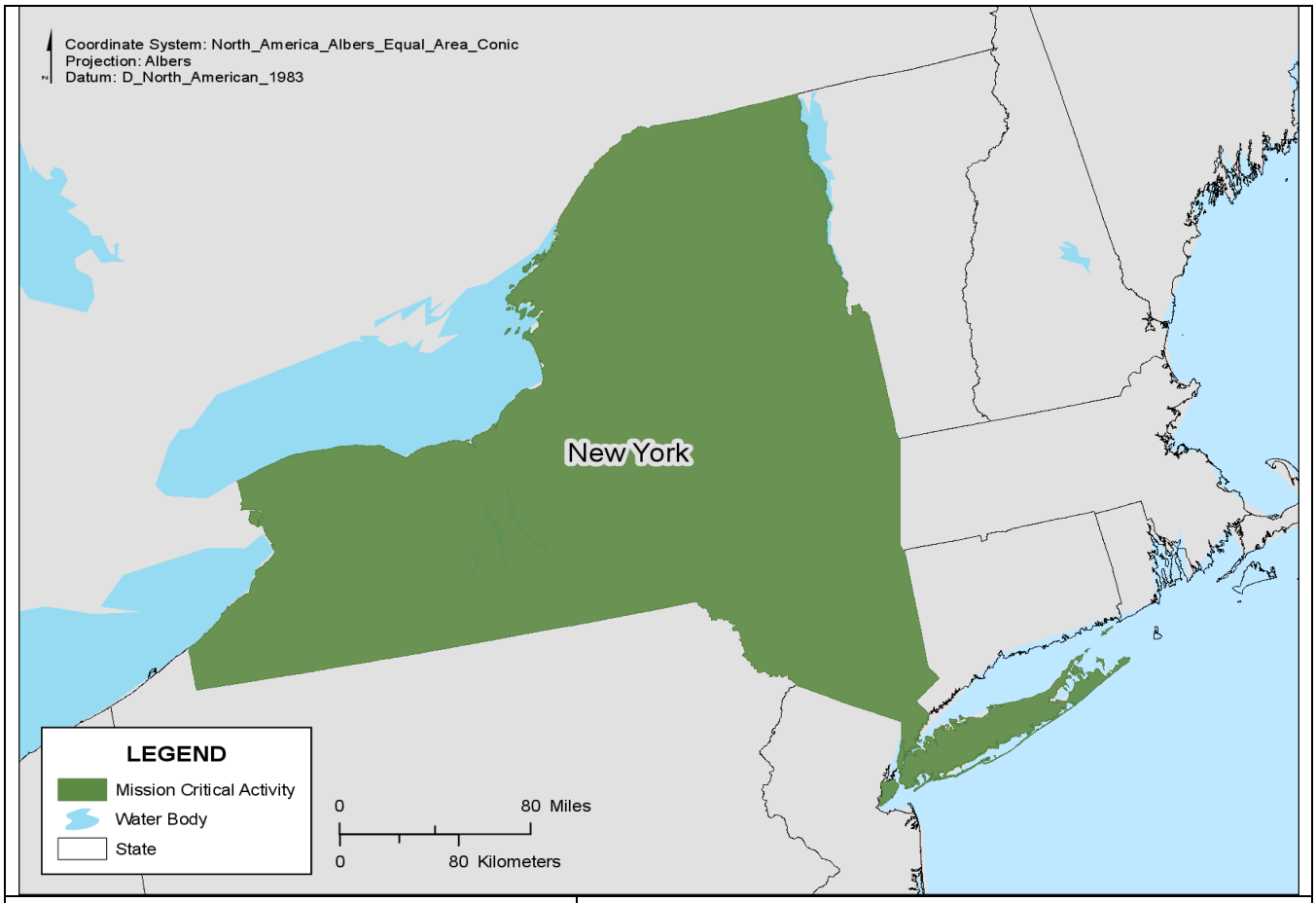
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Not Required	None
Surficial Geology	Nice To Have	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Not Required	None
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Not Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Protection



Mission Critical Activity Title:	Watershed Protection
Mission Critical Activity Description:	Protect the waters of NY State by targeting water quality and quantity, or specific pollutants and their sources.
MCA_ID:	3803658398_2
Organization Type:	State Government
Organization Name:	NYS Dept. of Environmental Conservation
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Internal groundwater, surface water, priority water bodies, stream segments.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	No major benefits identified.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

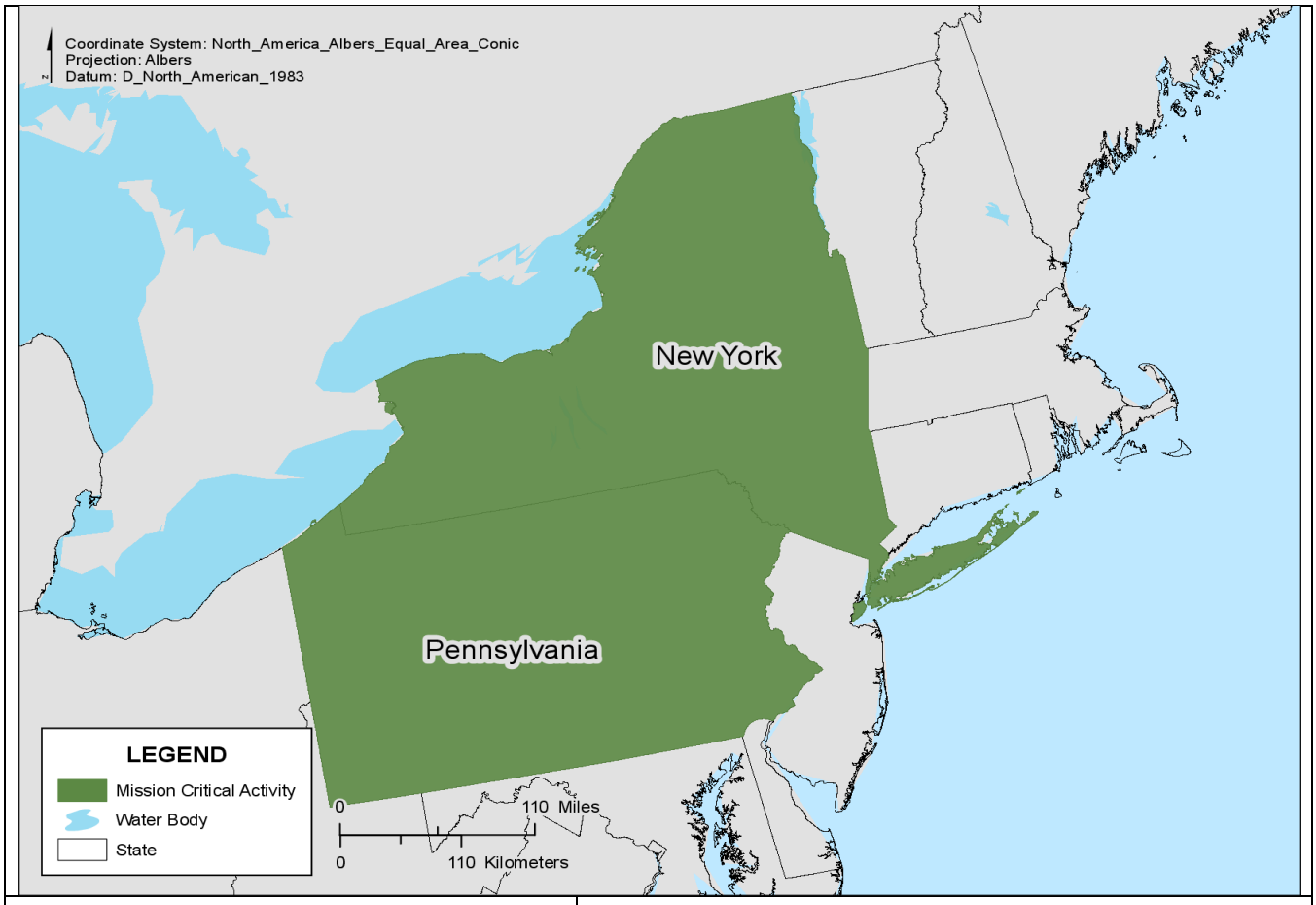
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Not Required	None
Climate	Nice To Have	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resource Planning and Development



Mission Critical Activity Title:	Water Resource Planning and Development
Mission Critical Activity Description:	Watershed management: water quality protection, mitigation. Infrastructure planning. Community resiliency planning, scoping.
MCA_ID:	3809232845_2
Organization Type:	Private or Commercial
Organization Name:	CasaAlba Consulting
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally develop in restricted urban areas.

Current Benefits	
Total Annual Program Budget:	$500,000 (projects in which I participate).
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000 (projects in which I participate).
Future Benefits Description:	Most derived from value-added services enabled by the data.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

North Carolina

The state and local agencies that represent North Carolina identified 12 Mission Critical Activities (MCAs) for which hydrography is imperative. The abbreviated titles of the MCAs for NC are below:

- Flood Risk Mitigation
- Risk Analysis and Decision Making for Complex Systems
- Floodplain Mapping, Flood Risk Mapping and Modeling, and Emergency Response
- Protect, Manage, and Promote Forest Resources
- Regulations for Construction and Stormwater Management
- Drainage Design for New and Upgraded Transportation Facilities
- Management of the Public Drainage System
- Support the North Carolina Stream Mapping Advisory Committee
- Protect the Water Quality of the Region
- Water Quality and Quantity Management
- Environmental Protection including Impact Avoidance and Stormwater Management
- Watershed Conservation and Delineation; Riparian Buffer Creation

There are 5 Business Uses (BUs) that were identified for the MCAs:

- Flood Hazard Modeling for Emergency Management Agencies
- Forest Resources Management
- Infrastructure and Construction Management
- River and Stream Flow Management
- Water Quality

The benefits of a high-quality hydrography dataset are difficult to quantify, particularly the intangible benefits such as “increase in public confidence” and “increase in government credibility.” Ignoring these benefits would be short-changing the value of an accurate representation of streams in the state.

Survey respondents responsible for regulatory enforcement felt that a more-timely update frequency was important (more frequently than annually). The ability to have the national dataset match what is being regulated in the state is important to decrease confusion for the public if the datasets do not match.

Update cycles are based on funding and data and are event-driven. Most often, state and local governments update small areas of the state based on construction site plans, restoration site plans, bridge alignments, daylighting of streams, or other projects that affect stream placement. The exception is when events such as catastrophic natural events create a funding opportunity to update large areas of the state. Since a large number of respondents use hydrography data for flooding and emergency response, it is highly desirable to have updates to the dataset following disaster events.

The positional accuracy and density of the dataset reflect the statewide local-resolution data: this includes the statewide 6-inch orthoimagery and lidar-derived elevation data. A horizontally- and vertically-integrated hydrography dataset with a 1-meter elevation surface is desired for hydrologic applications and to be compatible with the local-resolution base data. An opportunity to schedule updates for hydrography with the imagery and elevation data exists, but has not yet been pursued. In discussions it

was felt that feature-level accuracy metadata was more important than consistent accuracy. If a dataset is multi-scale, however, guidance on integration/implementation of multiple sources is important.

Features that are important in a dataset for NC are flow periodicity, left and right bank delineations, bridges and culverts, floodplain boundaries, and diversions. These features would not necessarily need to be part of the data model itself (with the exception of left/right banks). The local source of data for these features could be used and tied to the hydrography dataset, and maintained locally.

Primary needs for a hydrography dataset include the need to integrate outside datasets with the hydrography dataset. There are many ancillary datasets that can be linked to the hydrography data, and some sort of catalog or indexing method is important to NC. Of the datasets listed in the HRBS, elevation, land cover, stream flow, and soils are most important. Many existing statewide datasets can also be tied to the hydrography to enhance its usefulness. Local names, flow periodicity, dams, bridges and culverts, impaired streams, and sampling sites are a few of the local datasets that may be tied to the network.

Having accurate flow direction and connectivity are critical or highly impactful to the agencies that responded. Having a simplified, documented, transparent method of updating and maintaining the dataset is also desired.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

North Carolina managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Mitigation

Mission Critical Activity Title:	Flood Risk Mitigation
Mission Critical Activity Description:	The City of Asheville actively partners with community groups including USACE and the NC Division of Water Resources to evaluate flood risk mitigation opportunities. The mission is to protect life and property by enforcing ordinances limiting disturbance based on elevation and slope, and regulating development in special flood hazard areas.
MCA_ID:	3787857145_3
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Asheville
Business Use:	Flood Risk Management

Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FEMA Special Flood Hazard Areas.

Current Benefits	
Total Annual Program Budget:	$1.1 million
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Improved hydrographic information will help staff accurately document activities along stream calls, analyze the stormwater conveyance system, meet NPDES requirements, improve web maps provided to inform citizens about water quality and flood hazards, arm staff with accurate information to provide better service to the public and internal customers, help staff make the most informed decisions, and improve analysis for stream and wetland restoration and flood mitigation projects.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes

Required Characteristics	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Risk Analysis and Decision Making for Complex Systems

Mission Critical Activity Title:	Risk Analysis and Decision Making for Complex Systems
Mission Critical Activity Description:	Risk analysis and decision making for complex systems, many of which are directly impacted by climate stressors and hazards. One of the primary hazards we have dealt with is inland and coastal flooding.
MCA_ID:	3801483749_1
Organization Type:	State Government
Organization Name:	UNC Asheville's National Environmental Modeling and Analysis Center (NEMAC)
Business Use:	Flood Risk Management
Area of Interest:	Nationwide

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Better data lead to less uncertainty and better data distribution that can be linked to socioeconomic datasets to calculate cost-benefit ratios and determine a more accurate Expected Value.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

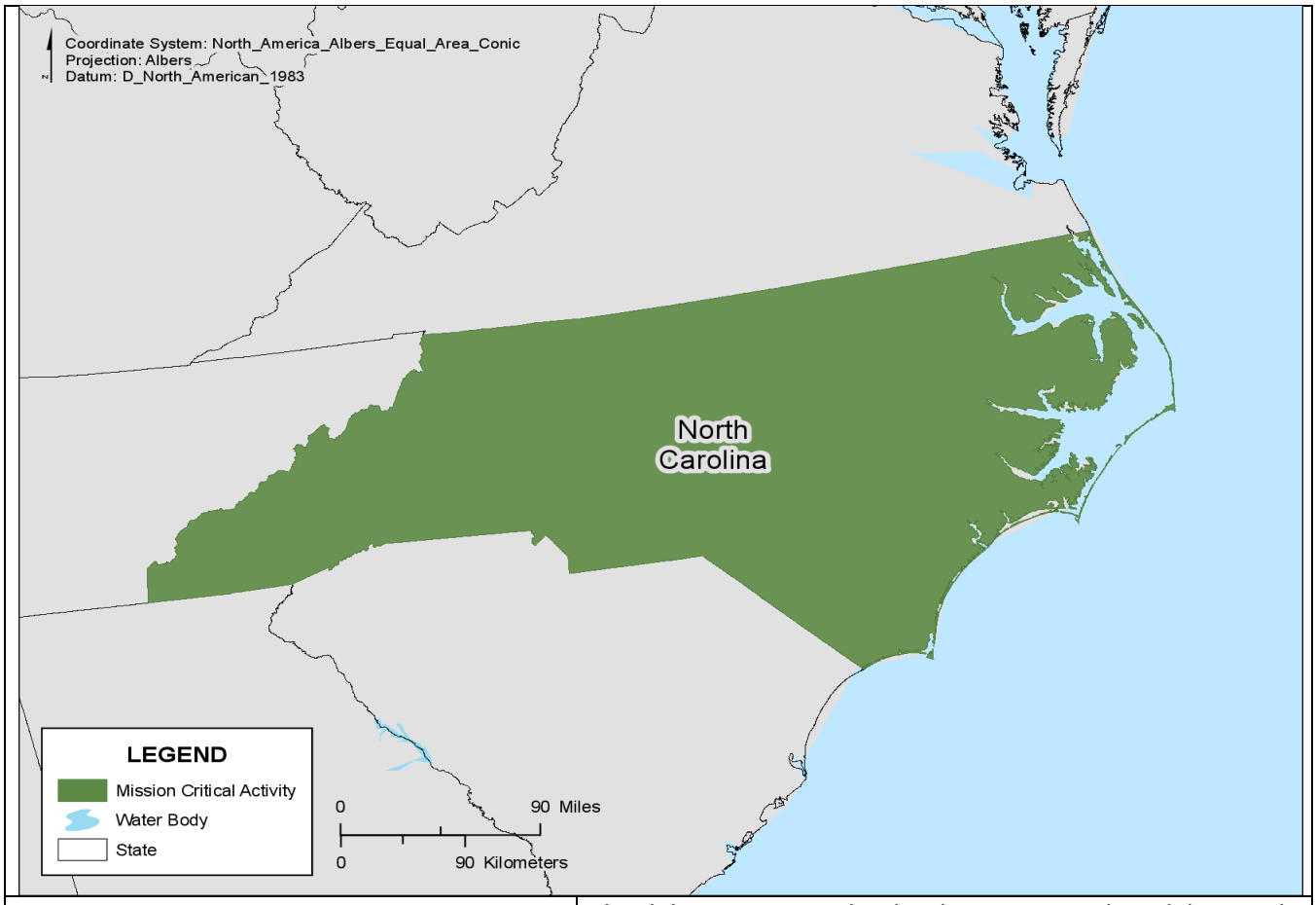
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Floodplain Mapping, Flood Risk Mapping and Modeling, and Emergency Response



Mission Critical Activity Title:	Floodplain Mapping, Flood Risk Mapping and Modeling, and Emergency Response
Mission Critical Activity Description:	Floodplain mapping, flood risk mapping, hydrologic and hydraulic modeling, and emergency response.
MCA_ID:	3820897953_1
Organization Type:	State Government
Organization Name:	North Carolina
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Internal sources for the state, FEMA National Flood Hazard Layer.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	All benefits are using the in-house products.

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	NC floodplain mapping produces the detailed information that should be fed into the NHD. I am not sure that a Federal set of information could be more beneficial or provide more detail than is being produced in-house. If well-maintained and kept up-to-date with plans and standardized rules, it would be a more comprehensive yet less detailed set of information.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

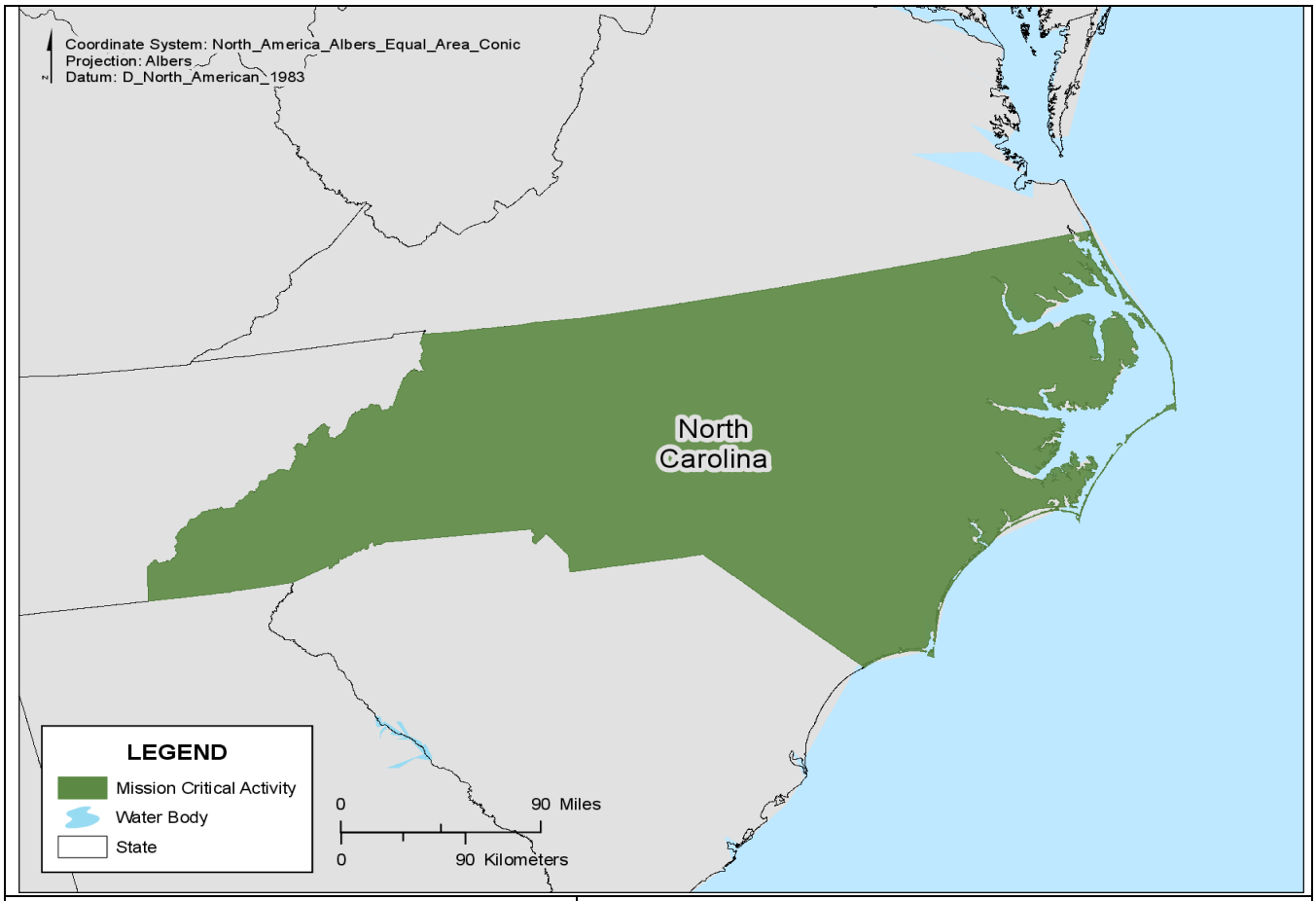
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Protect, Manage, and Promote Forest Resources



Mission Critical Activity Title:	Protect, Manage, and Promote Forest Resources

Mission Critical Activity Description:	The NC Forest Service (NCFS) has a mission to protect, manage, and promote forest resources for the citizens of North Carolina. The NCFS recognizes the strong relationship between sustainably-managed forests and water quality and quantity. During the development of the NC Forest Action Plan, the NCFS and partners identified a need to target program delivery to accomplish our overall water goal to manage, conserve, restore, and enhance forestlands important to current and future supplies of clean water for economic, social, and ecological uses. Hydrography information is critically important for our agency to achieve our mission and goals. Some examples of how the NCFS uses hydrography information are: (1) Identifying surface waters for evaluating voluntary and mandatory compliance with Federal/state laws associated with conducting forestry activities on the landscape. (2) Watershed water quality analyses to identify areas in need of forest management, conservation, enhancement, and restoration to improve water quality conditions. (3) Protection of surface waters during wildfire suppression. (4) Research to evaluate the effectiveness of forestry Best Management Practices (BMPs) to protect water quality. (5) Information to support emergency response (wildfires, hurricanes, etc.). NCFS is the primary emergency response state agency behind NC Emergency Management. (6) Information and education about the role of forests and forestry in the conservation of water resources.
MCA_ID:	3828469603_1
Organization Type:	State Government
Organization Name:	N.C. Forest Service
Business Use:	Forest Resources Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NC StreamStats, flow networks derived from state lidar data.

Current Benefits	
Total Annual Program Budget:	$63 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$3 million
Future Benefits Description:	Improved hydrography data will greatly reduce time spent by NCFS personnel identifying the location of surface waters and wetlands that require protection in association with silvicultural activities. This will in turn improve our agency's ability to support our mission and provide timely services to citizens of North Carolina. Improved hydrography data will also support our efforts to educate the public about the importance of forests and forestry for the protection of water resources and during emergency response events. Overall, improved data will benefit society as a whole.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

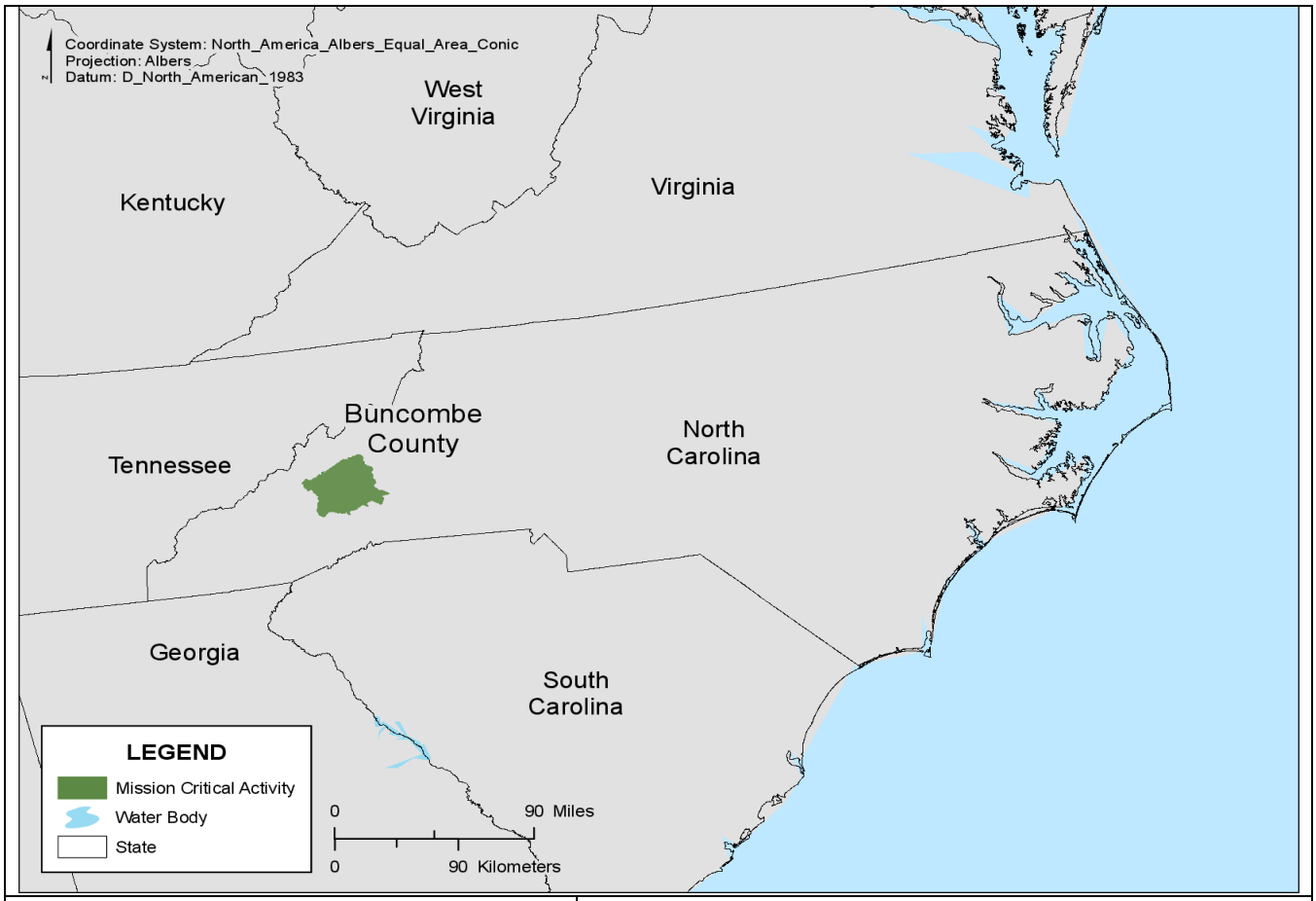
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	None
Bathymetry	Not Required	None
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Regulations for Construction and Stormwater Management



Mission Critical Activity Title:	Regulations for Construction and Stormwater Management
Mission Critical Activity Description:	The City of Asheville maintains standards and regulations for construction and stormwater management; our goal is to provide citizens with a safe place to work, play, and visit through regulating stormwater controls, post construction discharge, and an undisturbed buffer for construction projects.
MCA_ID:	3787857145_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Asheville
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FEMA Special Flood Hazard Areas.

Current Benefits	
Total Annual Program Budget:	$2.9 million
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Improved hydrographic information will help staff accurately document activities along stream calls, analyze the stormwater conveyance system, meet NPDES requirements, improve web maps provided to inform citizens about water quality and flood hazards, arm staff with accurate information to provide better service to the public and internal customers, help staff make the most informed decisions, and improve analysis for stream and wetland restoration and flood mitigation projects.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

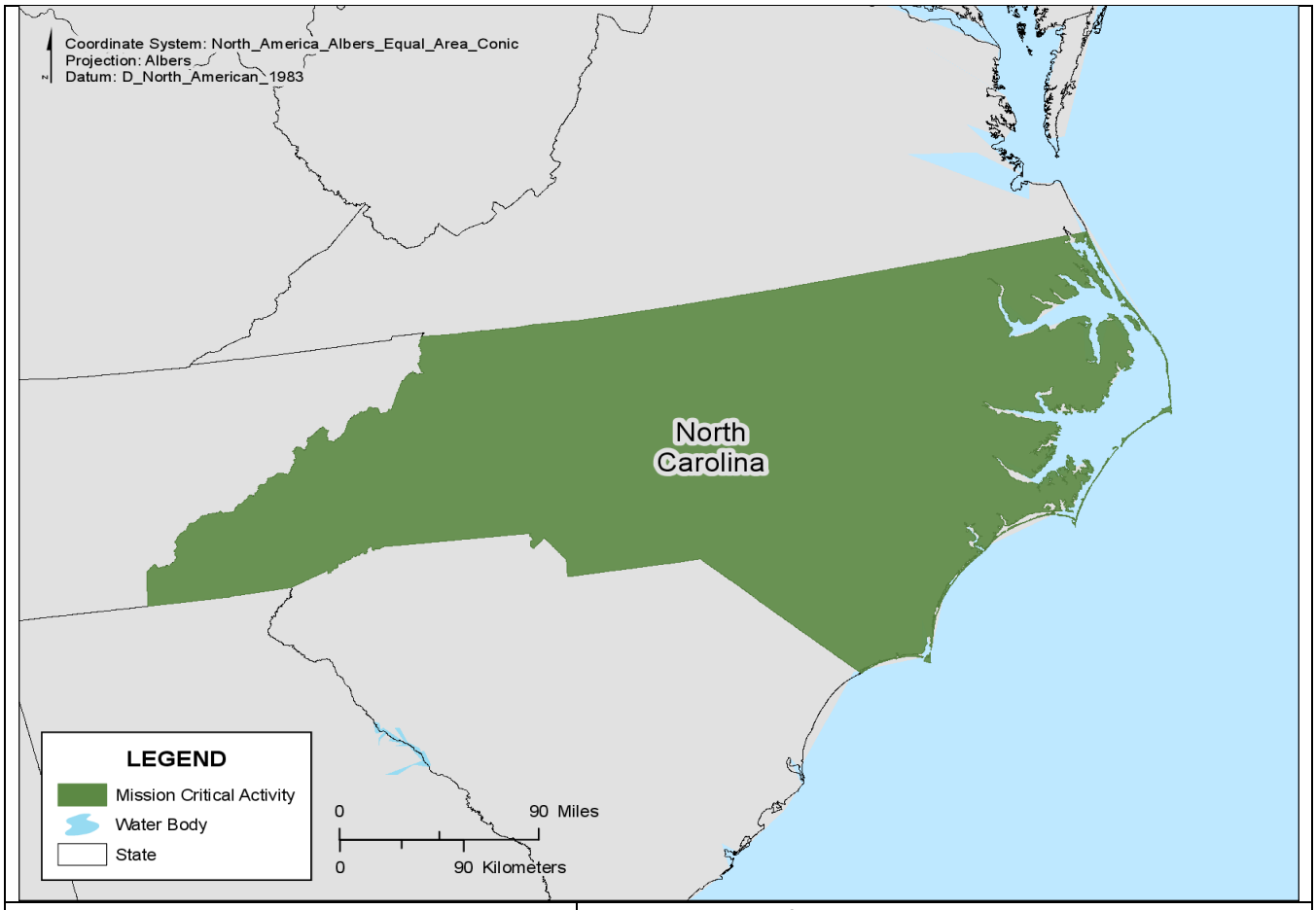
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Drainage Design for New and Upgraded Transportation Facilities



Mission Critical Activity Title:	Drainage Design for New and Upgraded Transportation Facilities
Mission Critical Activity Description:	Drainage design for new and upgraded transportation facilities.
MCA_ID:	3806709180_1
Organization Type:	State Government
Organization Name:	North Carolina Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	$1 million
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

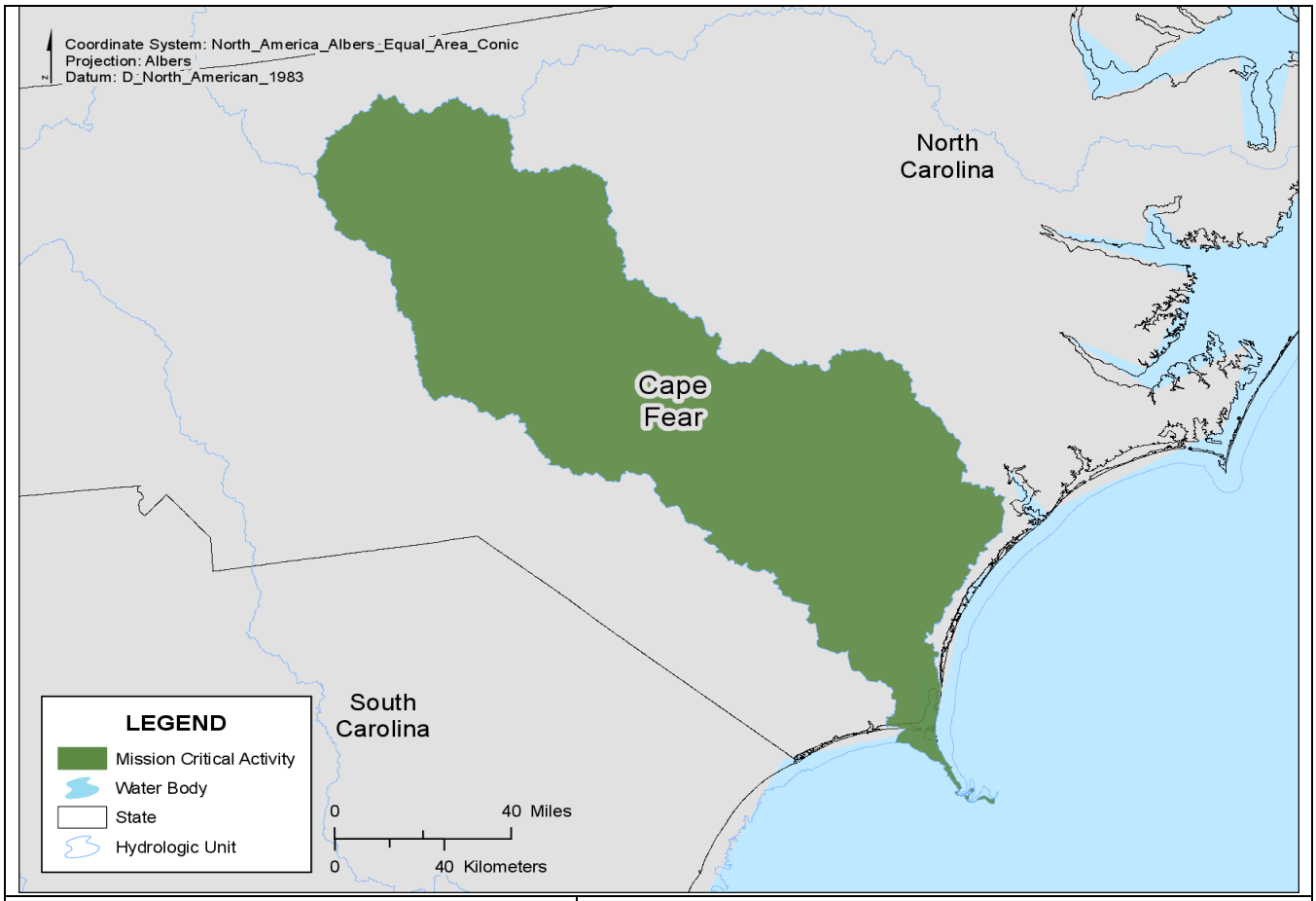
Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	I am not sure any of the benefits would qualify as 'major' given that drainage design for infrastructure often requires survey-grade accuracy; however, moderate benefits could be expected from improvements in the ability to conduct preliminary design phases more accurately.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Required	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Management of the Public Drainage System



Mission Critical Activity Title:	Management of the Public Drainage System
Mission Critical Activity Description:	We manage the public drainage system for the protection of our community and the environment.
MCA_ID:	3826963262_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Wilmington
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$8.5 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

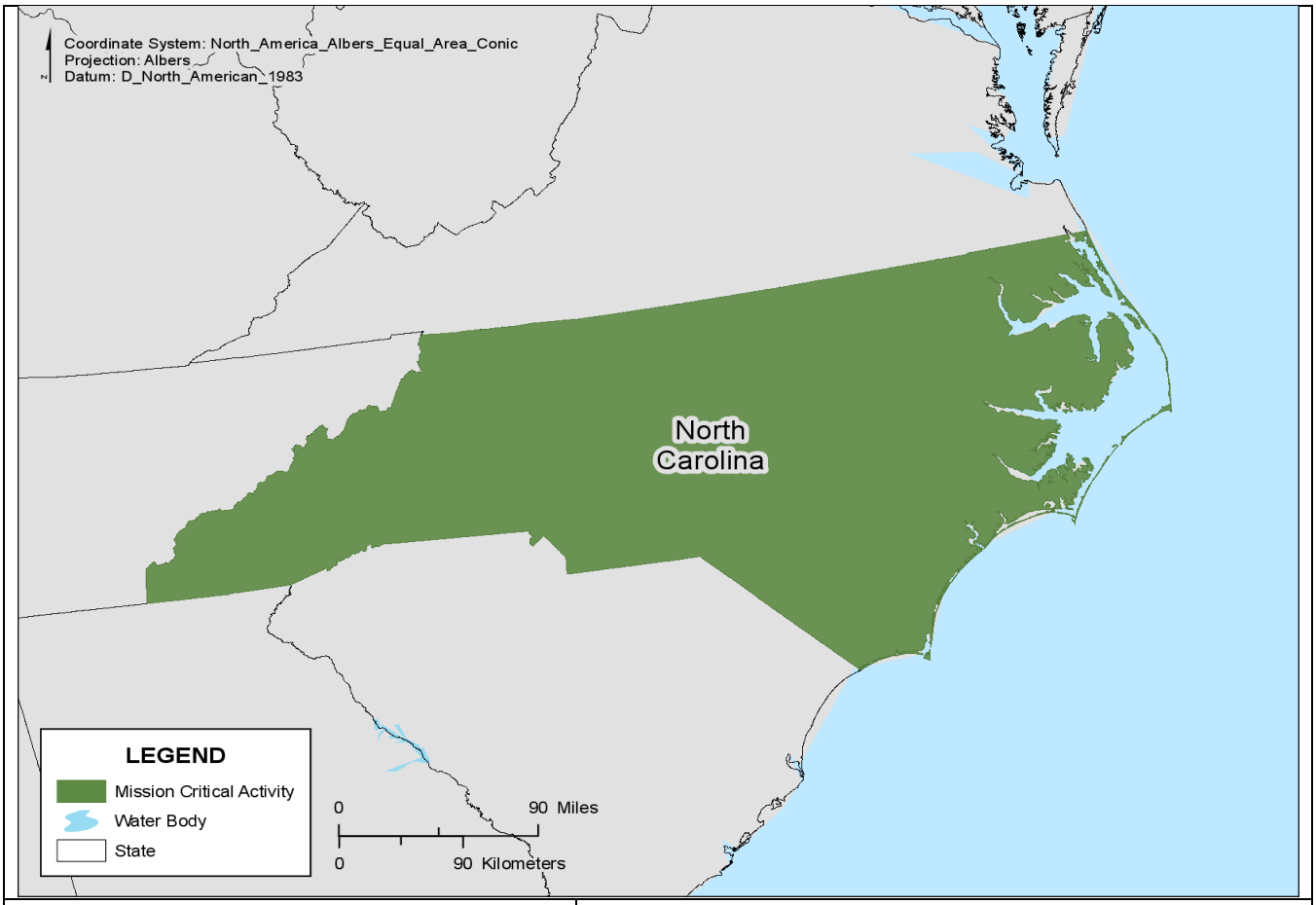
Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	Only minor benefits in engineering analysis for capital projects, which is a minor annual cost for our program.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Nice To Have	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Support the North Carolina Stream Mapping Advisory Committee



Mission Critical Activity Title:	Support the North Carolina Stream Mapping Advisory Committee
Mission Critical Activity Description:	Support the North Carolina Stream Mapping Advisory Committee (NC StreamMAC). NC StreamMAC is a subcommittee of the NC Statewide Mapping Advisory Committee. StreamMAC endeavors to generate improved surface water mapping data to address the diversity of business applications across hydro users in North Carolina.
MCA_ID:	3803829022_1
Organization Type:	State Government
Organization Name:	NC Center for Geographic Information and Analysis
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Local-resolution data (both included in the NHD and other local-resolution pending additions to the NHD database) and locally-sourced hydro data.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Engaging in NHD stewardship that would meet the needs of NC stakeholders (including the diversity of planning, science-based, and regulatory business processes) has significant value for the community of users. In lieu of a stewardship process that does not support (primarily) regulatory requirements, there is significant discussion of developing a parallel hydrographic dataset that meets the regulatory requirements of state and local government agencies. The outcome will be that the resources that are most appropriate for supporting NHD stewardship will be diverted to meeting a state and local need.

Future Benefits	
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

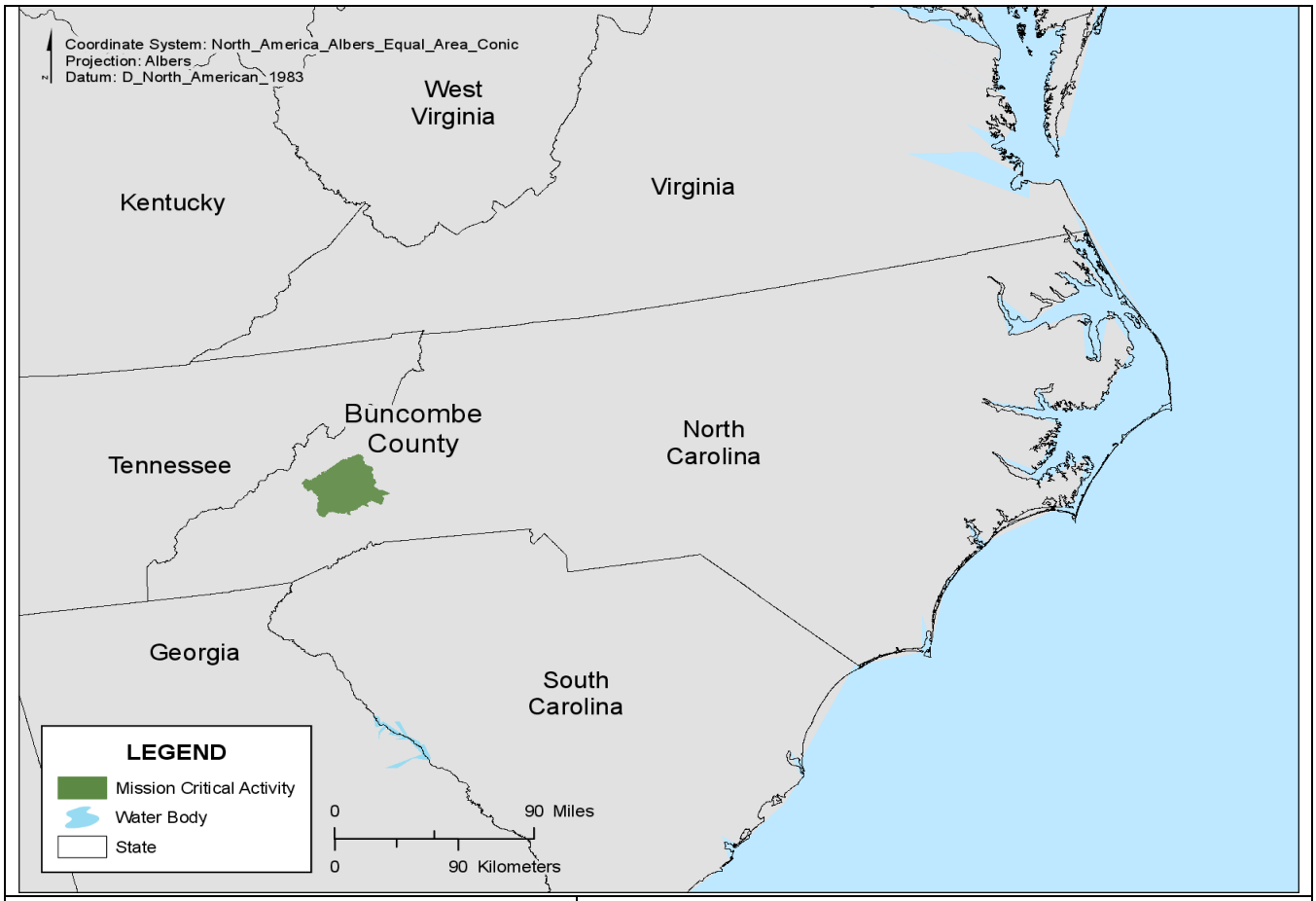
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Dams.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes

Required Analytical Functions	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Protect the Water Quality of the Region



Mission Critical Activity Title:	Protect the Water Quality of the Region
Mission Critical Activity Description:	The City of Asheville is an NPDES Phase II permitted municipality; our mission is to protect the water quality of the region through public education, outreach and involvement as well as illicit discharge detection and elimination, pollution prevention, and good housekeeping programs.
MCA_ID:	3787857145_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Asheville
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	FEMA Special Flood Hazard Areas.

Current Benefits	
Total Annual Program Budget:	$1.4 million
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000
Future Benefits Description:	Improved hydrographic information will help staff accurately document activities along stream calls, analyze the stormwater conveyance system, meet NPDES requirements, improve web maps provided to inform citizens about water quality and flood hazards, arm staff with accurate information to provide better service to the public and internal customers, help staff make the most informed decisions, and improve analysis for stream and wetland restoration and flood mitigation projects.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

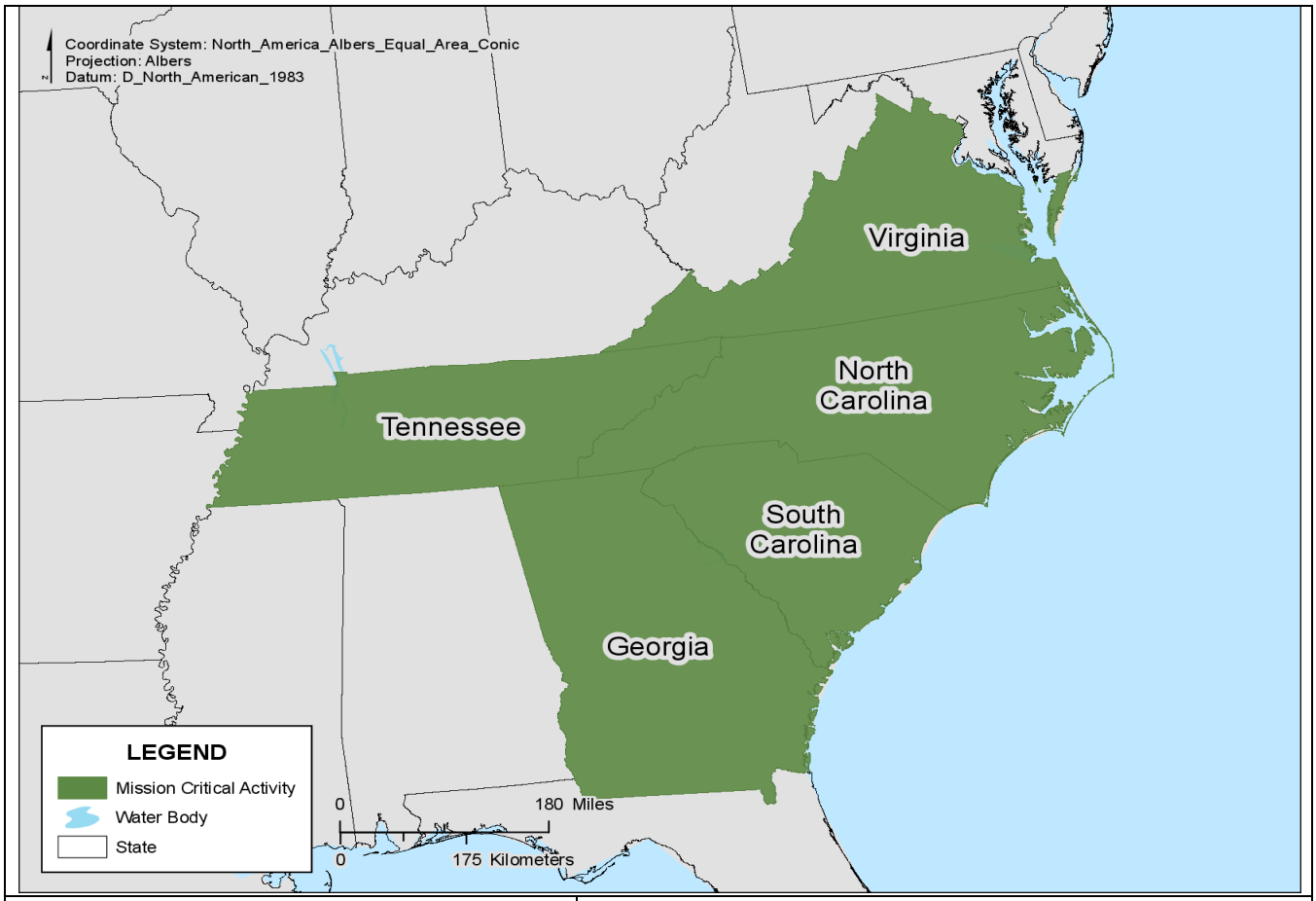
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality and Quantity Management



Mission Critical Activity Title:	Water Quality and Quantity Management
Mission Critical Activity Description:	Water quality and quantity management.
MCA_ID:	3787901988_1
Organization Type:	State Government
Organization Name:	NC DENR Division of Water Resources
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Versions of NRCS and USGS paper map products.

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

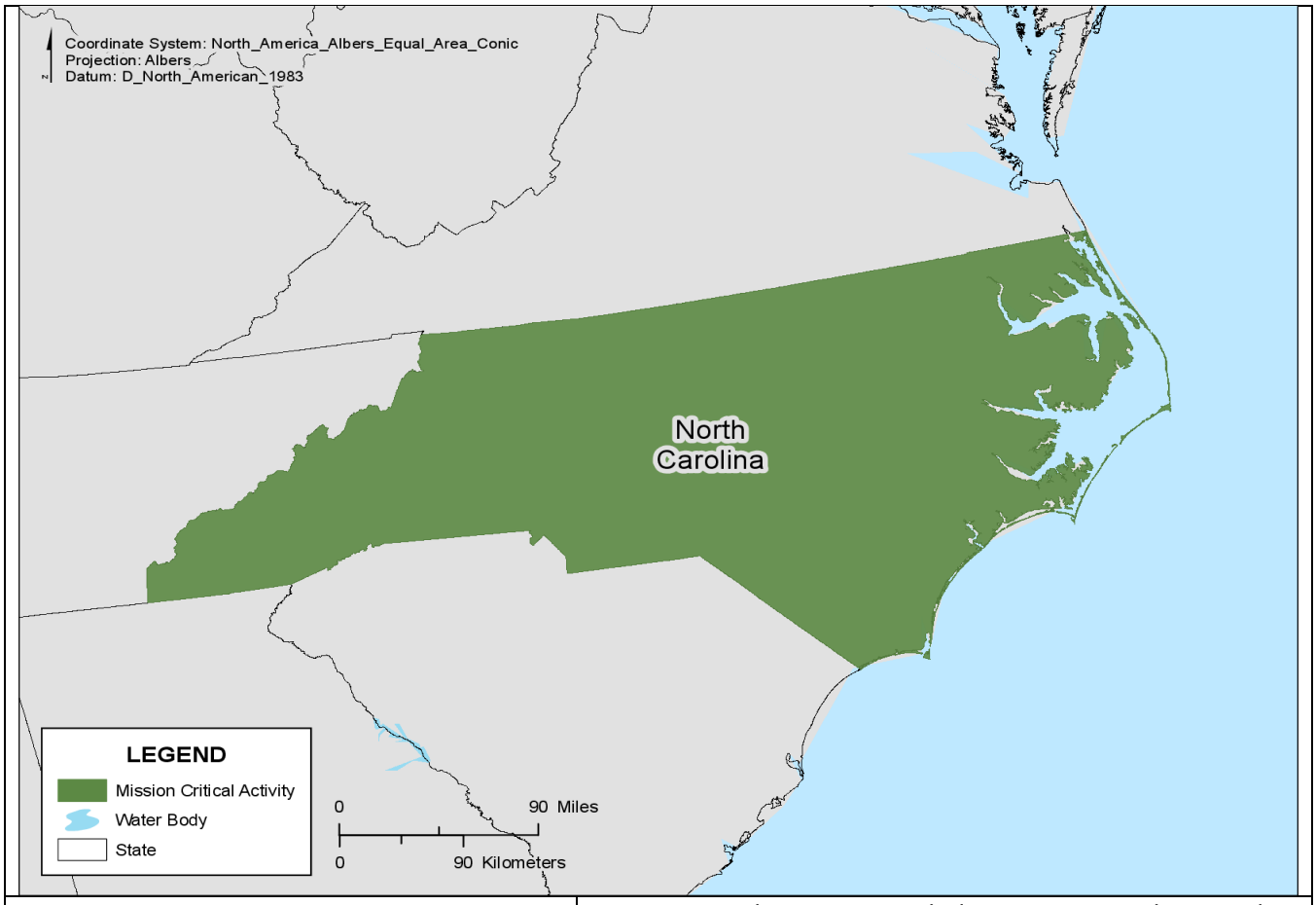
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	More accurate and updated hydrography data would greatly decrease need for future field work during project planning and better account for implementation and effectiveness of several water quality and quantity programs.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Environmental Protection including Impact Avoidance and Stormwater Management



Mission Critical Activity Title:	Environmental Protection including Impact Avoidance and Stormwater Management
Mission Critical Activity Description:	Environmental protection including impact avoidance and stormwater management.
MCA_ID:	3806709180_2
Organization Type:	State Government
Organization Name:	North Carolina Department of Transportation
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$3 million
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

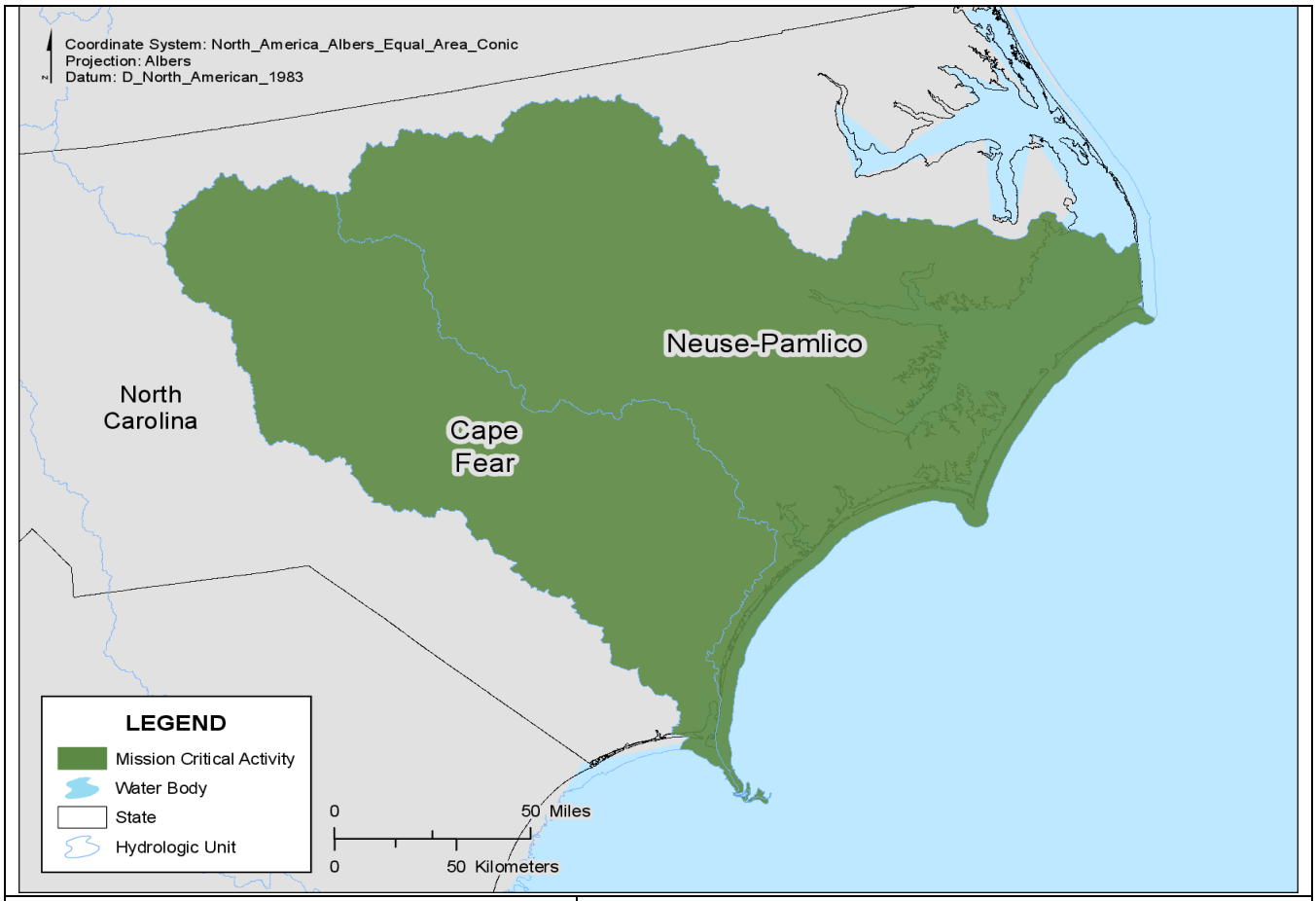
Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	Time savings could be significant with respect to reducing the need for field recon associated with impact analyses.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Conservation and Delineation & Riparian Buffer Creation



Mission Critical Activity Title:	Watershed Conservation and Delineation & Riparian Buffer Creation
Mission Critical Activity Description:	Watershed conservation and delineation, drainage area to a particular location on stream, riparian buffers of various widths for perennial and intermittent streams based on watershed classification, delineation of streams at local resolution for regulatory purposes, flood hazard modeling for emergency management agencies.
MCA_ID:	3820680729_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Wake County
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally acquired stream data layer, soil survey stream information.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Improved hydrographic information would allow for riparian buffer delineation, regulatory enforcement, potential contaminant analysis, watershed/catchment delineation, and emergency response to be implemented in a more timely and efficient manner. This will reduce staff time costs and improve customer service.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

North Dakota

HRBS survey results for North Dakota identified two Mission Critical Activities (MCAs) from two state agencies. They noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Water quality planning and protection
- Water resources planning and development
- Water development permitting
- Emergency response for flooding

The State Water Commission has four primary missions, all of which involve hydrologic study, planning, modeling, and resource management:

- Appropriations - focused on the appropriation of the state's surface and sub-surface water resources
- Development - focused on rural water systems and dams/reservoirs
- Regulatory - dealing primarily with the permitting and regulation of dams and drains
- Emergency Response - involving response to potential dam breaks and flooding

The North Dakota Department of Health - Environmental Health Section has multiple regulatory programs where hydrography information is mission critical, including activities in the following divisions:

- Division of Water Quality has regulatory responsibility for surface water quality/management, water quality special projects, wastewater facility/permits, groundwater protection program.
- Division of Municipal facilities has regulatory responsibilities for the Clean Water state revolving loan fund, drinking water program including operator certification, training, and facility inspections, and drinking water state revolving loan fund.
- Division of Waste Management has regulatory responsibility for the hazardous waste program, PCBs (polychlorinated biphenyls), brownfields, the underground storage tank program, antifreeze registration, petroleum product testing, the solid waste program, pollution prevention, and abandoned automobiles.

In order to satisfy their requirements, these agencies ideally need statewide spatial hydrography data that are of medium positional accuracy (1:24,000); are reviewed and updated on an annual basis; include small impoundments (less than 1 acre), diversions, discharges, intakes, and other hydrographic features and structures that may not be discernable on aerial imagery; and provide stream order, whole stream identifiers, names (including GNIS and alias names), streamflow statistics, and accurate flow periodicity (perennial, intermittent, ephemeral).

The large numbers of pothole lakes in the eastern part of the state vary greatly in size over time due to short- and medium-term climatic variations. These differences give rise to political issues when lake levels are officially updated in databases. The state needs to be involved in the decision process on such updates to mitigate unwanted consequences. Therefore, the North Dakota local stewards of the NHD and Watershed Boundaries Dataset (WBD) need to have the resources and ability to ensure that their data are the best available, and have an easy way to incorporate it into the national structure. It is critical that data

flow from the bottom up - and not from the top down. Elevation models are not always correct, and local knowledge is important for verification. The state does not have the staff and funding to fully implement stewardship responsibilities, but that doesn't mean that we wish to hand it over to the Federal Government. It would be ideal to have grants or funding to implement stewardship and maintenance of these datasets at the state level. It is important to identify funding mechanisms so states can fully implement stewardship and maintenance at the local level.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓		✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

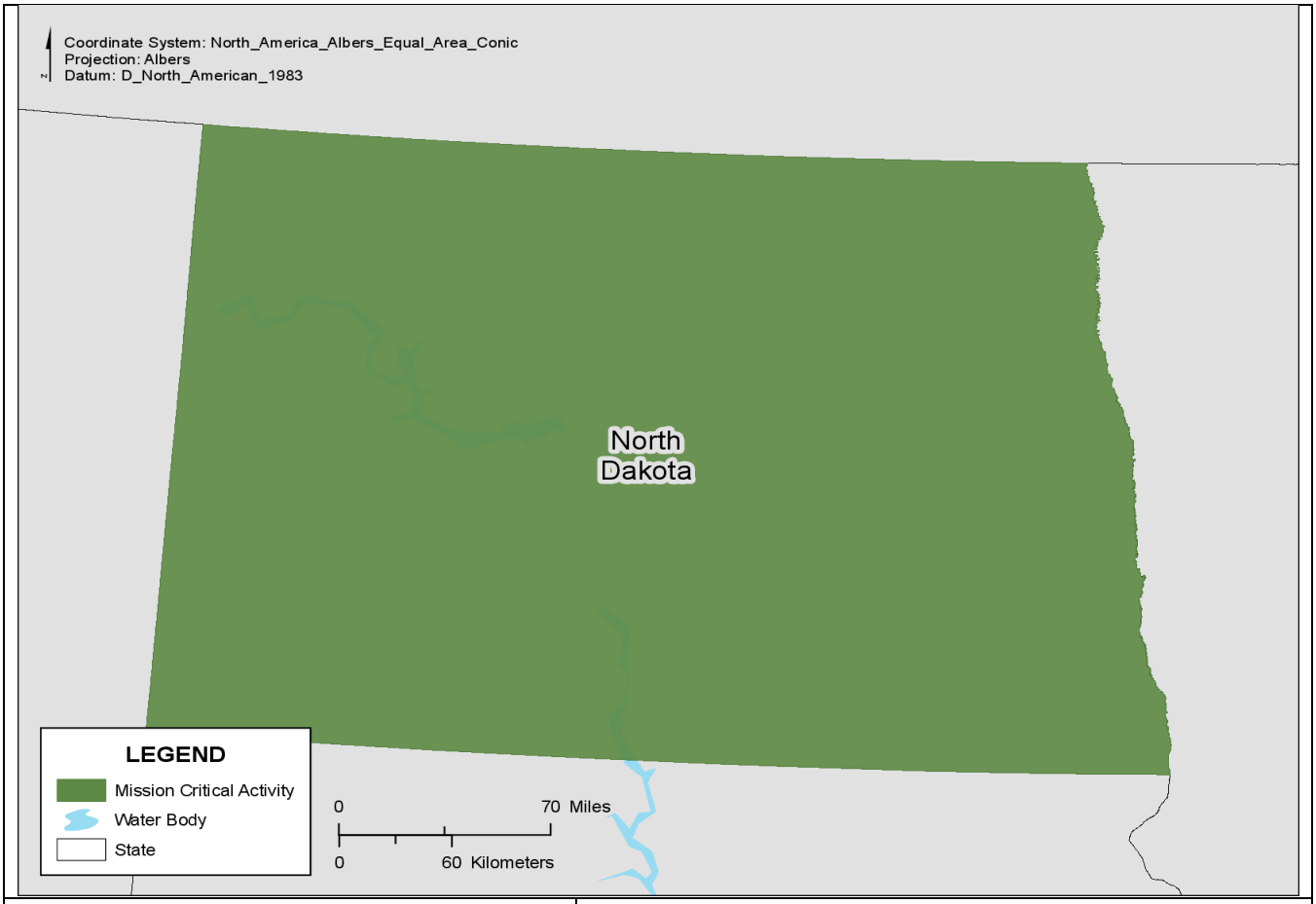
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 10% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don’t know
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

North Dakota managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	The North Dakota Department of Health-Environmental Health Section has multiple regulatory programs to which hydrography information is mission-critical, including activities in the following Divisions: Division of Water Quality has regulatory responsibility for surface water quality/management, water quality special projects, wastewater facility/permits, groundwater protection program. Division of Municipal facilities has regulatory responsibility for the Clean Water state revolving loan fund, drinking water program including operator certification, training, and facility inspections, and drinking water state revolving loan fund. Division of Waste Management has regulatory responsibilities for the hazardous waste program, PCBs (polychlorinated biphenyls), brownfields, the underground storage tank program, antifreeze registration, petroleum product testing, the solid waste program, pollution prevention, and abandoned automobiles.
MCA_ID:	3787877374_2

Organization Type:	State Government
Organization Name:	North Dakota Department of Health-Division of Water Quality
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$9 million
Current Annual Benefits ($):	$9 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	Our entire mission in the water quality program is regulatory responsibility for surface and groundwater quality of the state.

Future Benefits	
Future Annual Benefits ($):	$5 million per year.
Future Benefits Description:	Improved data would mean more time to implement, administer, and run the programs that we are responsible for. Better data helps us make better decisions.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

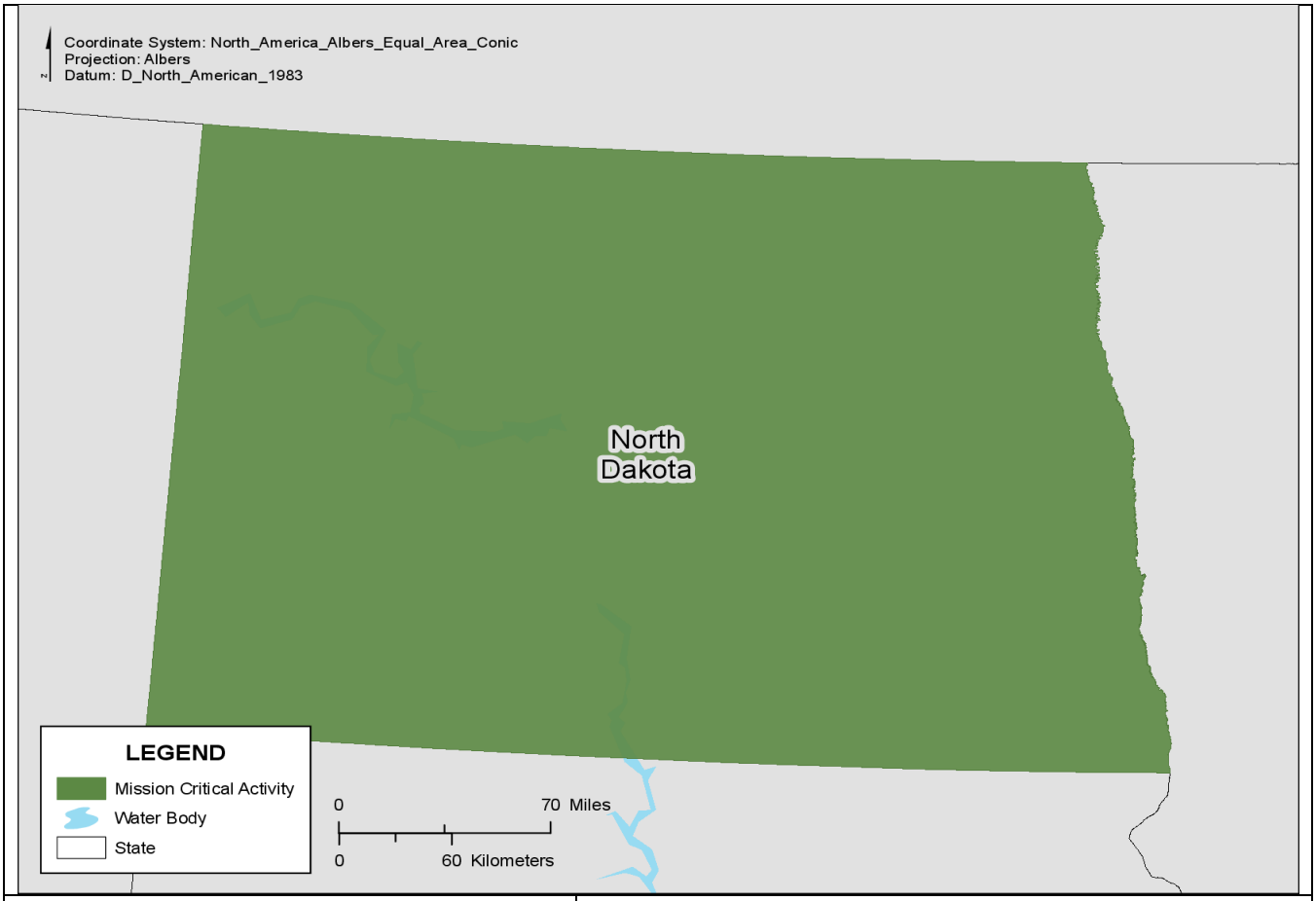
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Diversion channels (may already be included in built, above).

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Resources Management



Mission Critical Activity Title:	Water Resources Management
Mission Critical Activity Description:	We have four primary missions: appropriations - focused on the appropriation of state surface and sub-surface water resources; development - focused on rural water systems and dams/reservoirs; regulatory - dealing primarily with the permitting and regulation of dams, drains, etc.; and emergency response - involving the response to potential dam breaks, flooding, etc. All involve hydrologic study, planning, modeling, and resource management.
MCA_ID:	3816393317_1
Organization Type:	State Government
Organization Name:	North Dakota State Water Commission
Business Use:	Water Resource Planning and Management

Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500 million
Current Annual Benefits ($):	$50 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	Regulatory and use management of surface and subsurface appropriations, emergency response, and water distribution.

Future Benefits	
Future Annual Benefits ($):	$10 million
Future Benefits Description:	Better data helps us make better decisions and hopefully faster decisions (as in flood emergency response). We get a certain budget to maintain the state's water resources. Quantifying the benefits of having good data are almost impossible as every year is different.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Ohio

Many agencies and groups within the state of Ohio have requirements for more complete and current hydrography data that are shared and maintained across local, regional, state, and national groups.

Ohio has been progressive as an early investor in statewide lidar-based elevation data, which can be of great value as a reference for an improved hydrography geo-data framework. Many counties in Ohio also maintain their own local version of required hydrography data that is not yet part of the state framework.

The Ohio example of local maintenance for the statewide Location-Based Response System of framework roads and streets may be a good model for possible data stewardship for Ohio's version of the National Hydrography Dataset (NHD). One county in Ohio is working with the state and with USGS to develop a local stewardship process for NHD which is expected to lead to a wider implementation in the future.

The initial HRBS survey results for Ohio noted critical requirements for improved and coordinated hydrography data supporting the following Mission Critical Activities (MCAs):

- Flood Risk Management
- Stormwater Management
- Watershed Protection
- Conservation
- Recreation
- Emergency Management
- Permitting
- Coastal Management
- Resource Management
- Infrastructure Management
- Watershed Management
- Water Quality
- Urban and Regional Planning
- Drinking Water Protection

Subsequent Ohio meetings with key hydrography stakeholders have identified additional critical activities with many similar requirements for improved hydrography framework data. These include:

- Transportation Planning
- Nutrient Management
- Mosquito Abatement
- Public Safety
- Infrastructure Asset Protection
- Property Loss Reduction

Access to more accurate spatial data for rivers, streams, drains, lakes, ponds, wetlands, watershed boundaries, and related features that are maintained at the local or county level and supported as shared

authoritative data among state and federal agencies and by the public will allow managers to make better decisions based on better data and will support improved service to the public.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful

Quality Issue	Impact
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

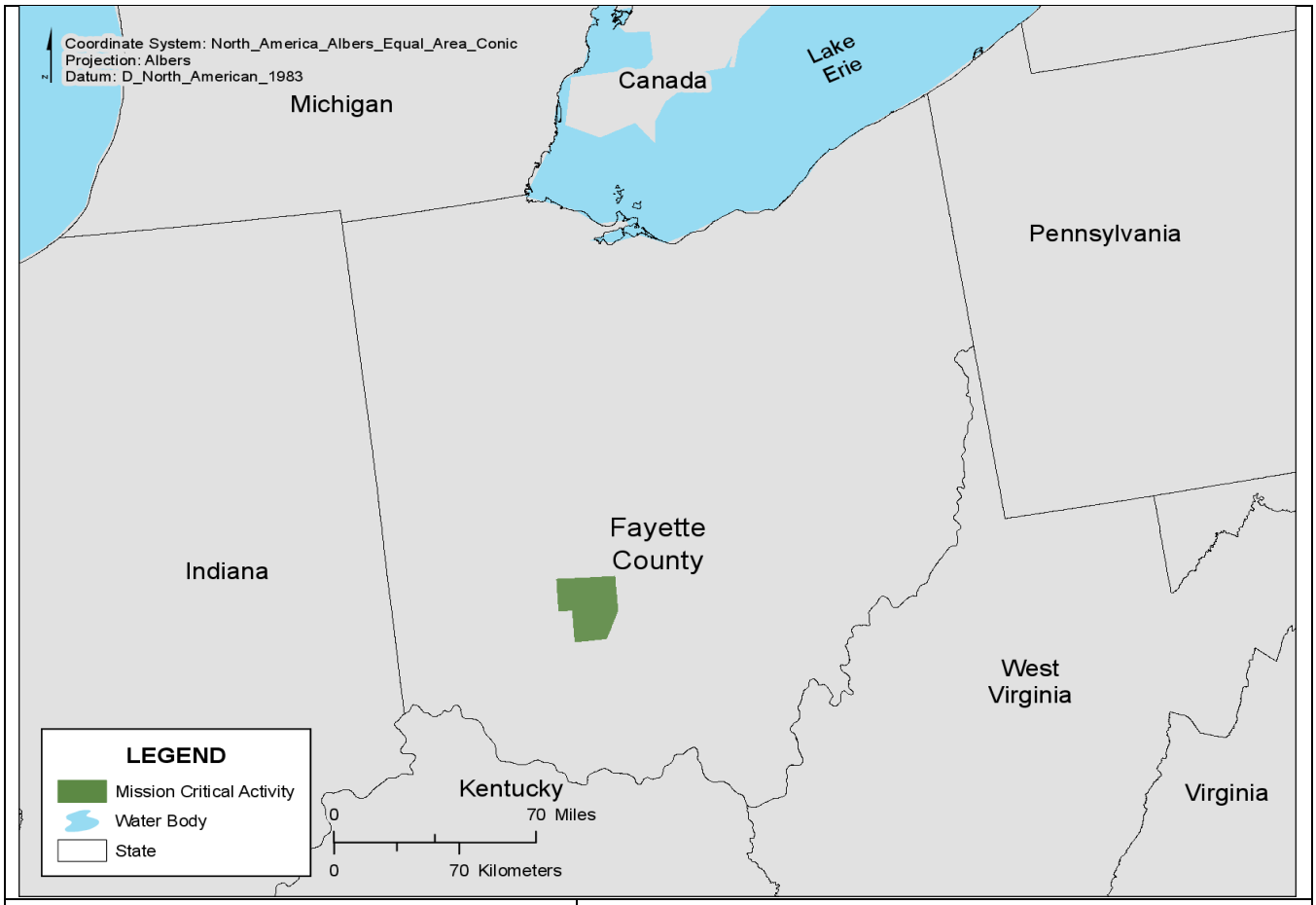
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Ohio managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages. While many of the MCAs listed have similar requirements, the activities may be performed by different agencies or divisions or paid for through separate funding sources. For that reason these MCAs were not aggregated based on requirements, rather they were itemized to ensure the importance of the activities was captured. Every effort was made to ensure that costs and benefits for each activity were listed separately.

Watershed Protection



Mission Critical Activity Title:	Watershed Protection
Mission Critical Activity Description:	Watershed protection.
MCA_ID:	3836990520_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Fayette County
Business Use:	Agriculture and Precision Farming
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-created streams and watersheds.

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	Indeterminate.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Indeterminate.
Future Benefits Description:	Improved ability to more accurately model farm runoff and monitor application practices.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Flood Risk Management

Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Flooding mitigation and response.
MCA_ID:	3796967038_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Lake County, Ohio GIS Department
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-created photogrammetric hydrography datasets, when available.

Current Benefits	
Total Annual Program Budget:	$35,000
Current Annual Benefits ($):	Indeterminate.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$3 million
Future Benefits Description:	Improved hydrographic information will provide for improved planning for mitigation and more accurate assessments post-event.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Major

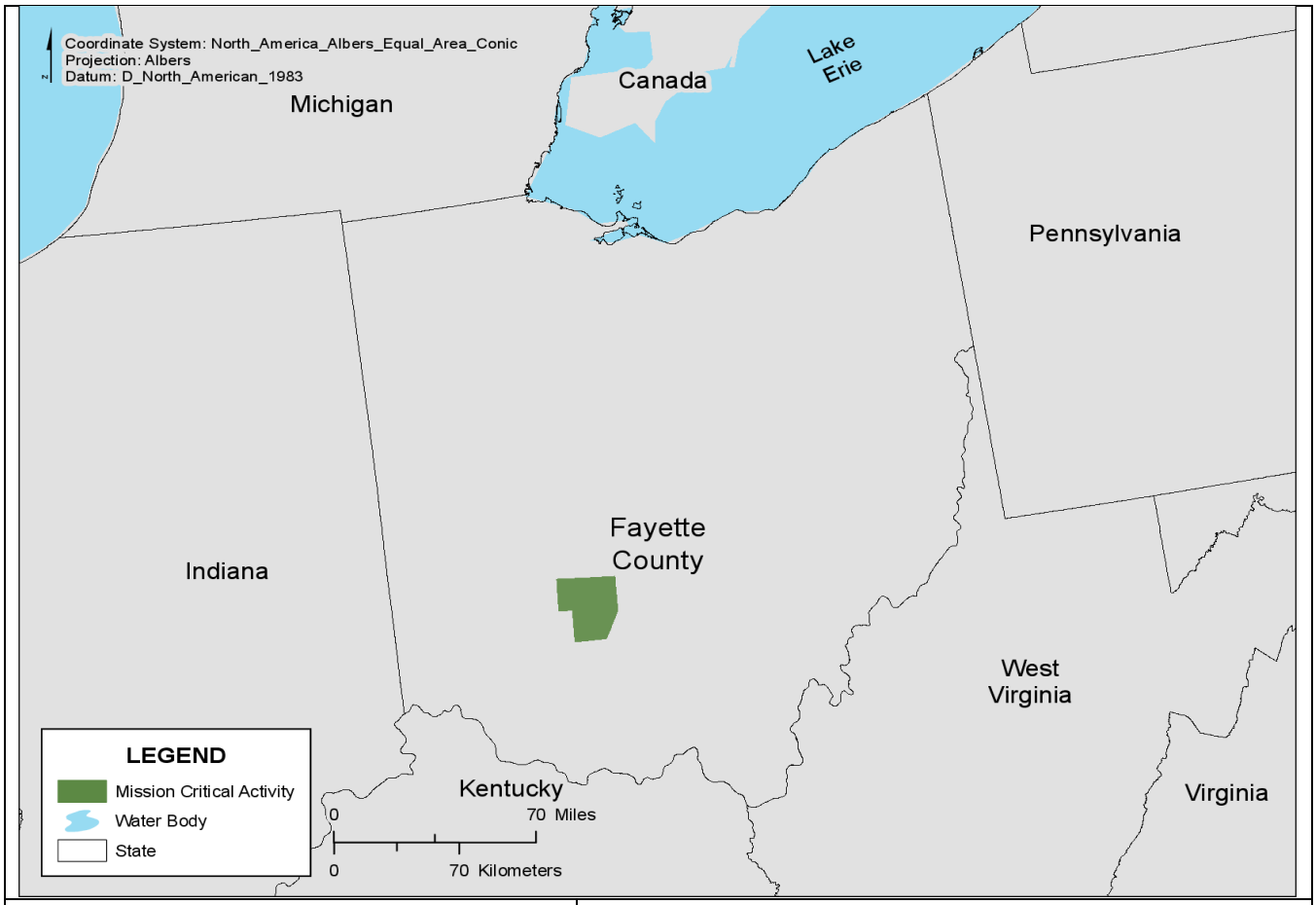
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Flood risk modeling.
MCA_ID:	3783633408_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Fayette County
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-created streams and watersheds.

Current Benefits	
Total Annual Program Budget:	Do not know.
Current Annual Benefits ($):	Do not know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Undetermined.
Future Benefits Description:	Improved ability to more accurately model the real world.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Flood Risk Management

Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Flood risk reduction.
MCA_ID:	3820356398_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Muskingum Watershed Conservancy District
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.3 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$17,000
Future Benefits Description:	Better data to perform hydro calculations.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Emergency Management

Mission Critical Activity Title:	Emergency Management
Mission Critical Activity Description:	Emergency/disaster planning, mitigation, response, and recovery
MCA_ID:	3796967038_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Lake County, Ohio GIS Department
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-derived photogrammetric rivers/streams datasets, when available.

Current Benefits	
Total Annual Program Budget:	$753,000
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

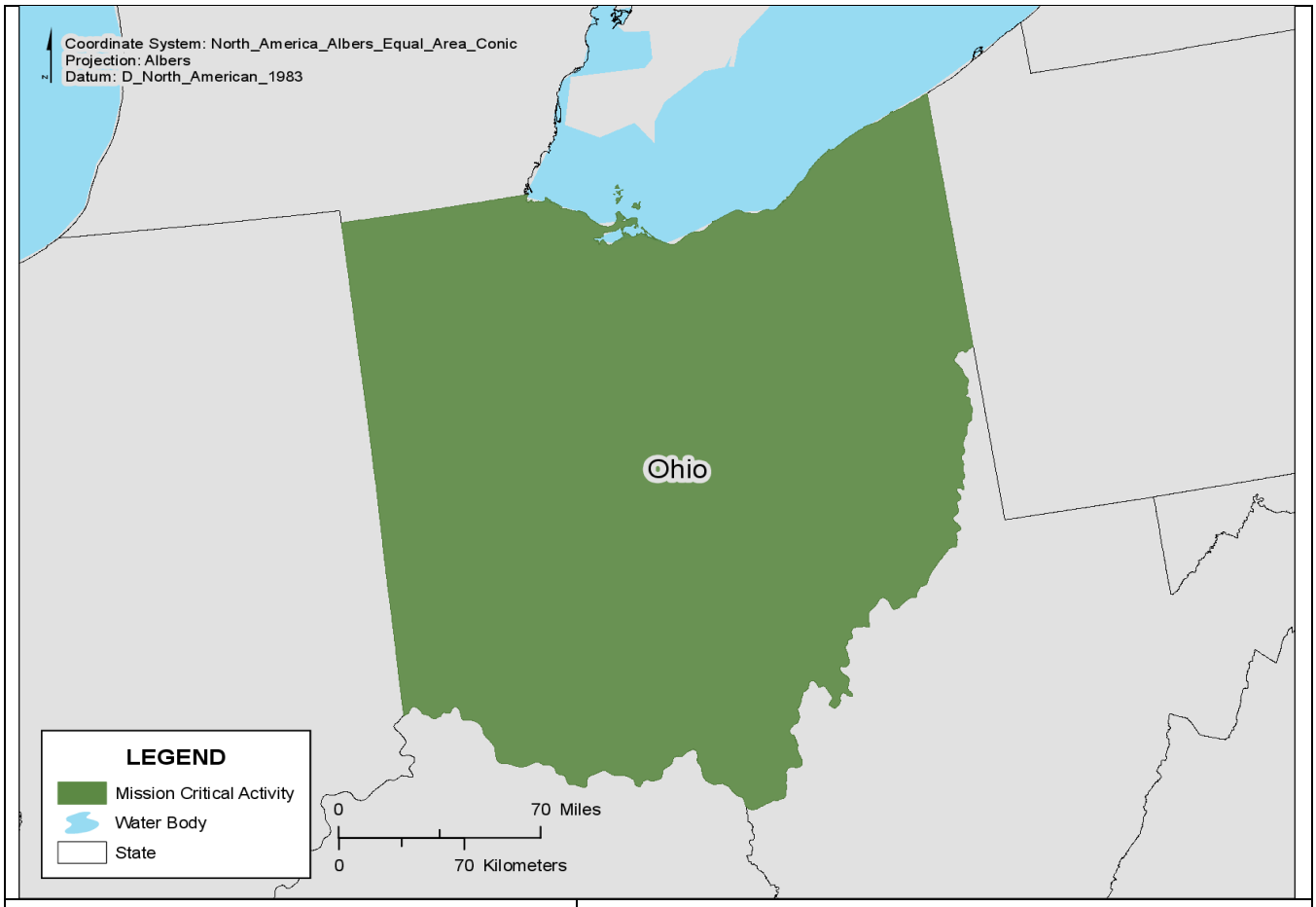
Future Benefits	
Future Annual Benefits ($):	$5 million
Future Benefits Description:	Improved hydrographic information would provide for more accurate planning for mitigation efforts and more accurate assessments post-event.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Drinking Water Protection



Mission Critical Activity Title:	Drinking Water Protection
Mission Critical Activity Description:	Spill tracking and response includes emergency response measures, such as identifying where to locate containment measures, identifying the downstream path of a spill, and estimating its time of arrival at crucial critical or sensitive resources. Emergency response and drinking water protection programs use the NHD for these purposes.
MCA_ID:	3836990530_1
Organization Type:	State Government
Organization Name:	Ohio Environmental Protection Agency
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

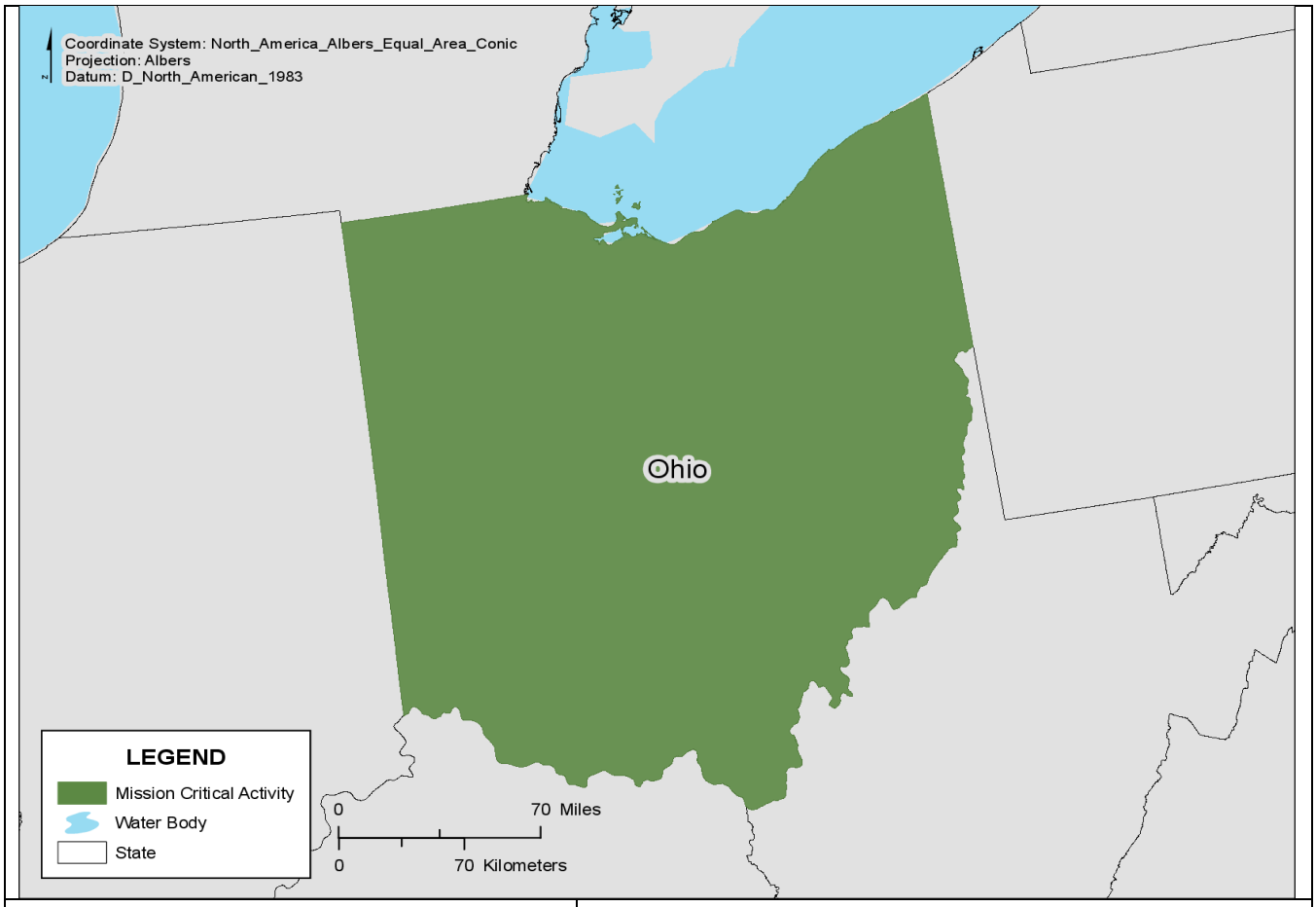
Future Benefits	
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Emergency Management



Mission Critical Activity Title:	Emergency Management
Mission Critical Activity Description:	Spill tracking and response includes emergency response measures, such as identifying where to locate containment measures, identifying the downstream path of a spill, and estimating its time of arrival at crucial critical or sensitive resources. Emergency response and drinking water protection programs use the NHD for these purposes.
MCA_ID:	3813266704_2
Organization Type:	State Government
Organization Name:	Ohio Environmental Protection Agency
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

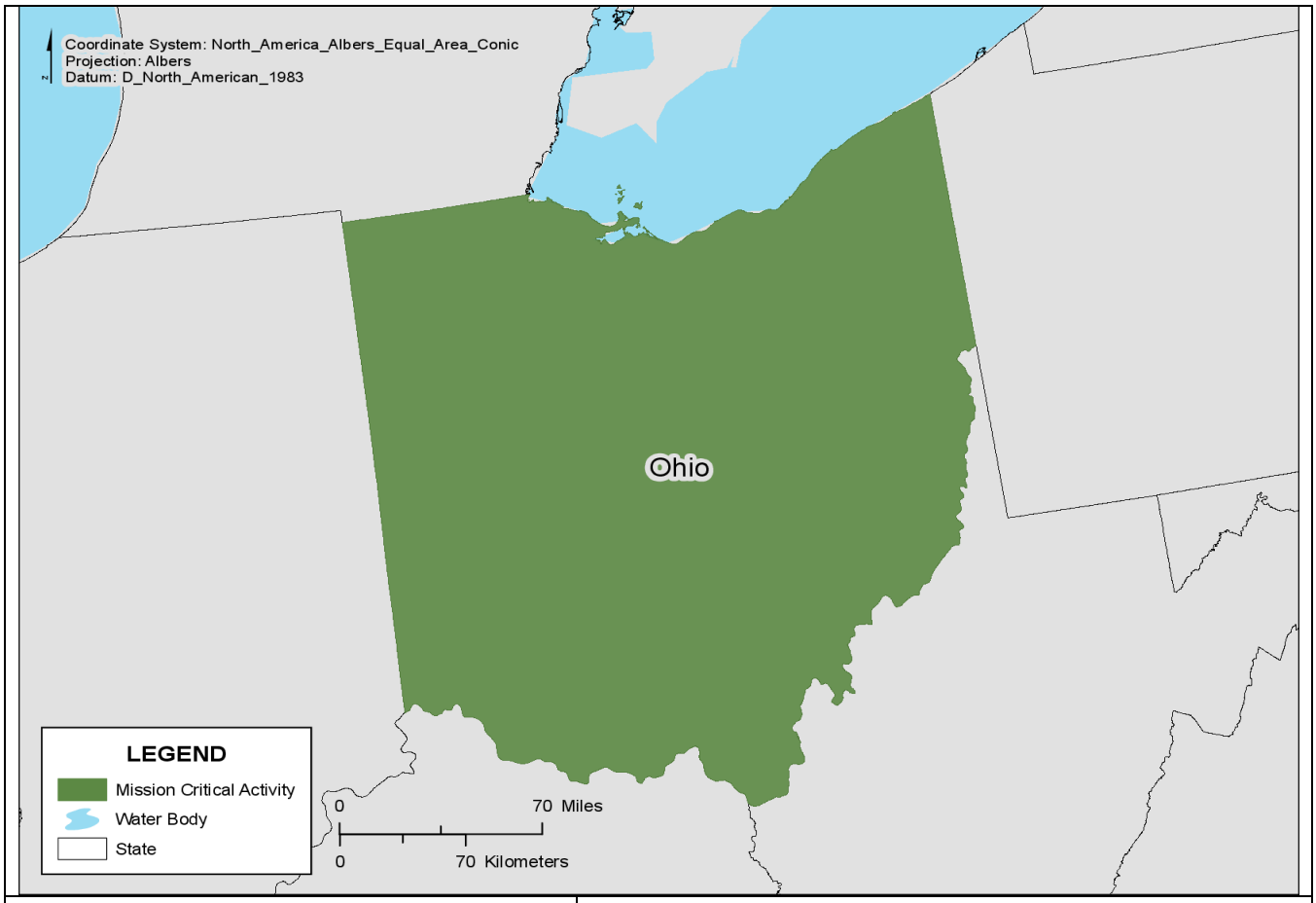
Future Benefits	
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Infrastructure Management



Mission Critical Activity Title:	Infrastructure Management
Mission Critical Activity Description:	Coastal shore structure permitting, dam safety monitoring, coal mining permitting.
MCA_ID:	3836990525_1
Organization Type:	State Government
Organization Name:	Ohio Department of Natural Resources
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	
Current Other Benefits:	

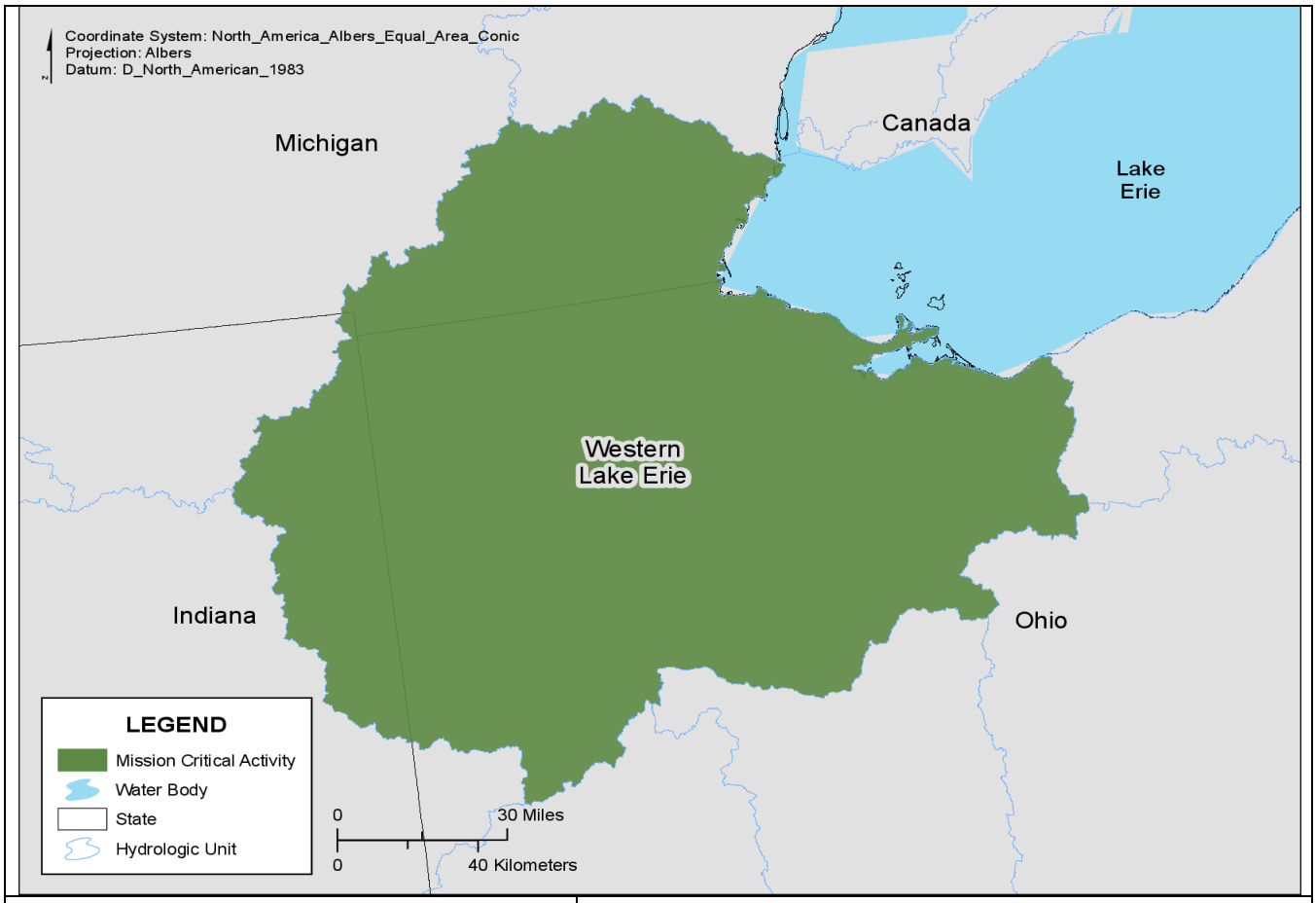
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)		
EPA - STOrage and RETrieval Data Warehouse (STORET)		
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)		
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)		
USGS National Water-Quality Assessment Program (NAWQA)		
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	We provide stormwater management and development. We develop watershed-scale protection and restoration plans. We maintain and develop the 208 plan for our area.
MCA_ID:	3836990529_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Toledo Metropolitan Area Council of Governments
Business Use:	Infrastructure and construction management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-generated dataset containing streams, verified by county engineers and auditors' offices.

Current Benefits	
Total Annual Program Budget:	$140,250
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Improved and accurate hydrographic information will aid in better focusing resources and efforts to improve water quality. Projects for environmental protection and restoration can be better focused and benefits more readily quantified. Updates and accurate data can help in applying for grant funding to carry out projects to help remediate or protect water resources.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Nice To Have	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Stormwater Management

Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Assisting local municipalities, townships, and county agencies in meeting NPDES (stormwater discharge) permit requirements.
MCA_ID:	3780421598_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Franklin Soil and Water Conservation District (FSWCD)
Business Use:	Natural Resources Conservation
Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Our compiled dataset, Franklin County Stream Resource Geodatabase. It contains surface and subsurface (storm pipe) flows throughout a majority of Franklin County. Currently consists of 340,000 records and 8,400 miles of surface and subsurface drainage.

Current Benefits	
Total Annual Program Budget:	$1.8 million
Current Annual Benefits ($):	$150,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$90,000
Future Benefits Description:	We are a public service agency providing both technical assistance and education to residents and government entities of Franklin County, Ohio. Any and all improvements are always beneficial to the services we provide. We currently use a FSWCD-created hydrography dataset that was created on a 1:1,200 scale and includes surface drainage information, stormwater information, roadside drainage information and other hydrographic information. Over 1,600 miles were verified in the field using GPS and digital cameras to collect over 41,000 initial data points. NHD information is used for watershed boundaries for locations extending out of our county. We have created over 1,000 small watersheds and catchments reflecting urban drainage (stormwater modifications) for a majority of the county.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes

Required Characteristics	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Stormwater information including jurisdictional ownership, stormwater outflow connectivity to other surface drainage, roadside drainage, node connectivity and directionality, basins, ponds, and reservoirs. Artificial paths with hydrographic designations instead of the designation of 'artificial path' for all hydrographic features, i.e. artificial path - perennial.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Conservation

Mission Critical Activity Title:	Conservation
Mission Critical Activity Description:	Conservation.
MCA_ID:	3836990521_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Muskingum Watershed Conservancy District
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.4 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

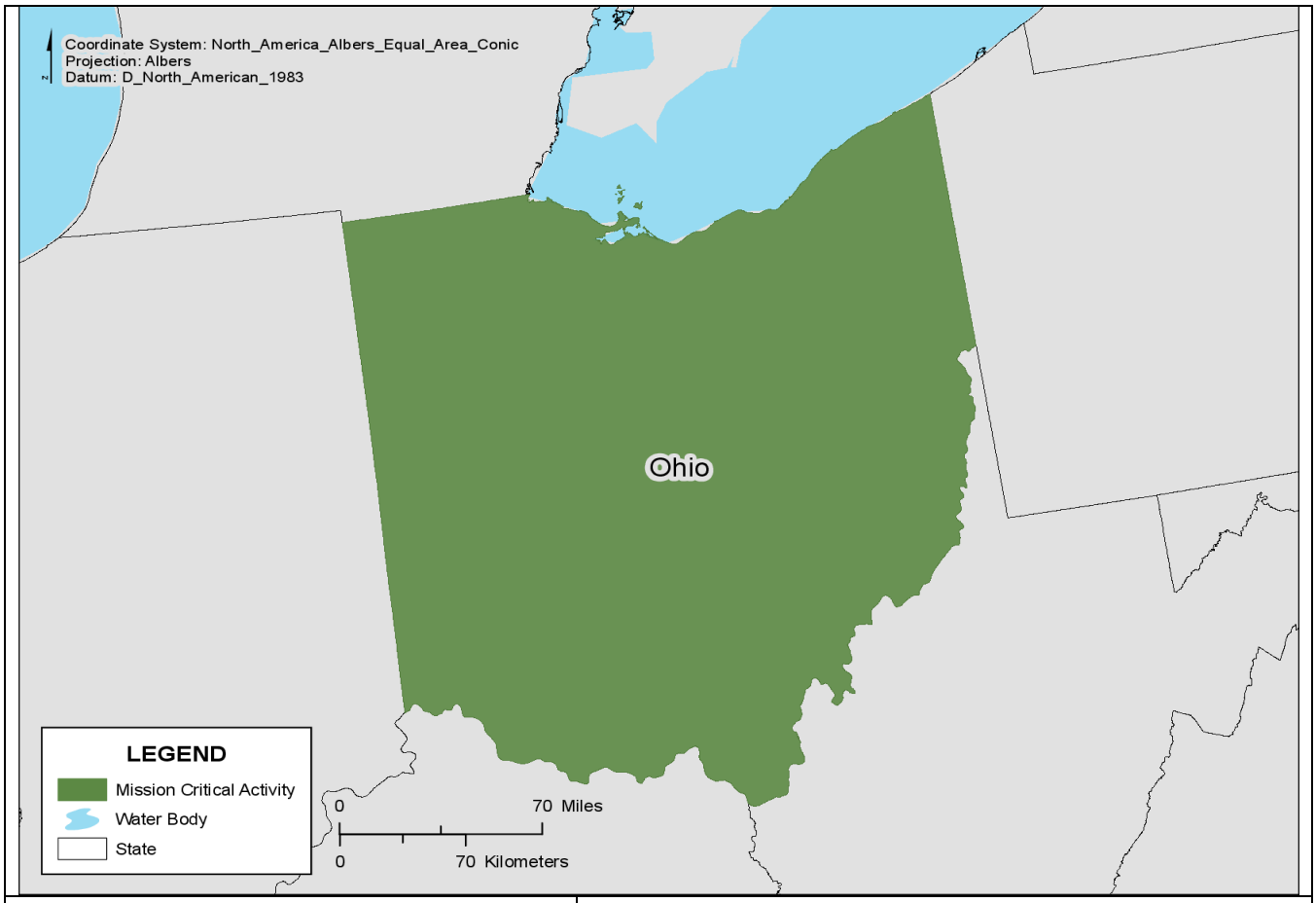
Future Benefits	
Future Annual Benefits ($):	$17,000
Future Benefits Description:	Better data to perform hydro calculations.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	We provide stormwater management and development. We maintain and develop the 208 plan for our area.
MCA_ID:	3833036330_1
Organization Type:	State Government
Organization Name:	Ohio Department of Natural Resources
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	2 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Not available.
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	
Current Other Benefits:	Improves ability to manage stormwater by providing consistent data

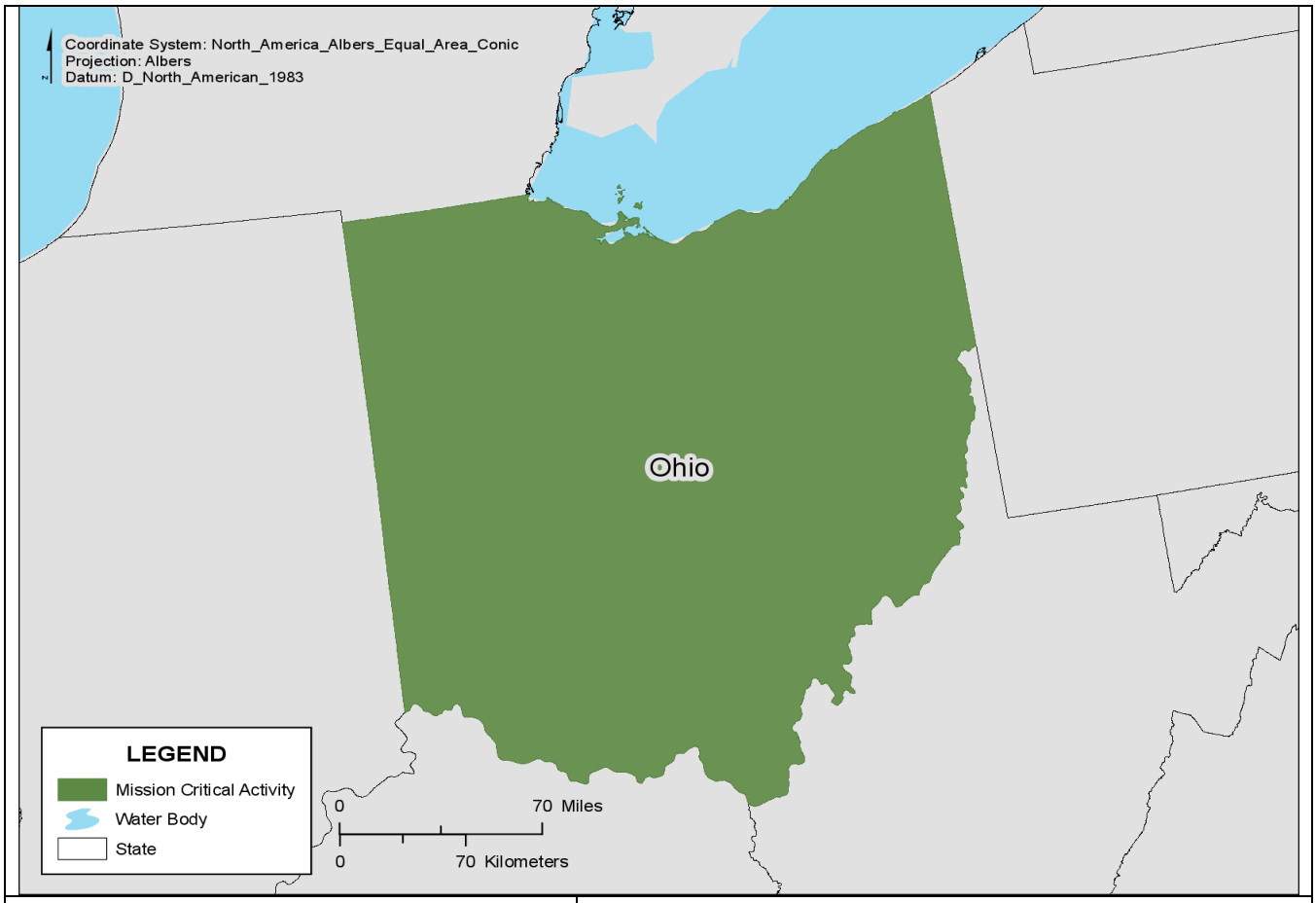
Future Benefits	
Future Annual Benefits ($):	Indeterminate.
Future Benefits Description:	Better assessment of plans for stormwater runoff and mitigation strategies as development proceeds to protect the waterways, streams, and creeks.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate		
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Resource Management



Mission Critical Activity Title:	Resource Management
Mission Critical Activity Description:	Oil and gas well permitting, water well permitting, water withdrawal permitting, coal mining permitting, coastal shore structure permitting, dam safety monitoring.
MCA_ID:	3836990524_1
Organization Type:	State Government
Organization Name:	Ohio Department of Natural Resources
Business Use:	Oil and Gas Resources
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	
Smallest Contributing Area:	2 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally maintained when available.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Indeterminate.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover		
Soils		
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry		
Climate		
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)		
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Recreation

Mission Critical Activity Title:	Recreation
Mission Critical Activity Description:	Recreation.
MCA_ID:	3836990522_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Muskingum Watershed Conservancy District
Business Use:	Recreation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.3 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$16,000
Future Benefits Description:	Better data to perform hydro calculations.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	

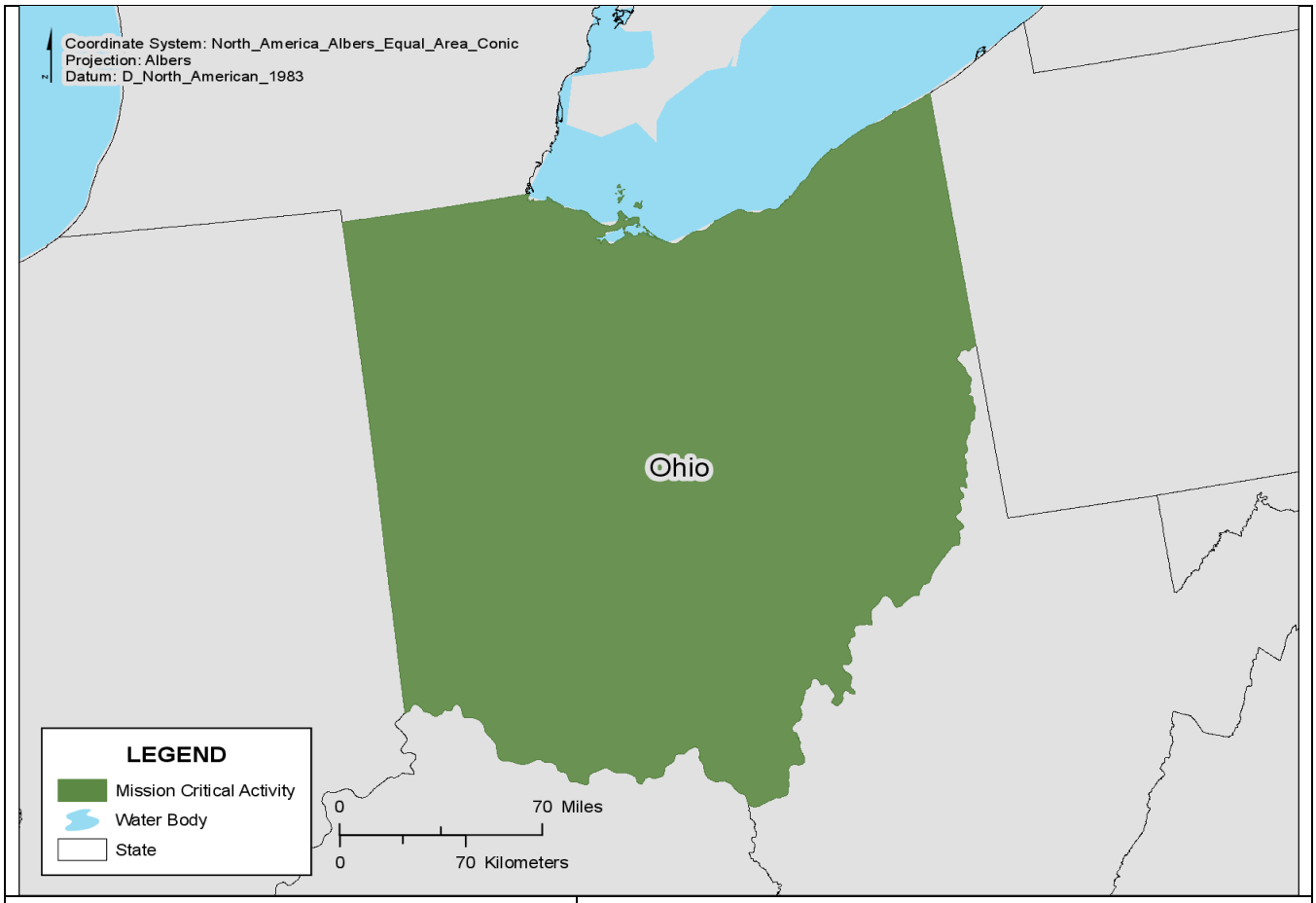
Required Characteristics	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	Watershed assessment and protection. The NHD, along with elevation data and the WBD, is integral to planning, assessment and reporting. Assessment of biological, chemical, and habitat characteristics of rivers, lakes, and streams all use the NHD, WBD, and elevation data.
MCA_ID:	3813266704_1
Organization Type:	State Government
Organization Name:	Ohio Environmental Protection Agency
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Not available.
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Indeterminate.
Future Benefits Description:	Planning and development: comprehensive reviews of land use to protect surface water, surface water filtering buffer areas, groundwater recharge areas, and well sites. Impervious surface modeling to protect drinking water supplies.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

Future Benefits	
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Management

Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3771871218_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Clermont County
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Stream layer created by consultants (Woolpert, I think).

Current Benefits	
Total Annual Program Budget:	$115,000
Current Annual Benefits ($):	Undetermined.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

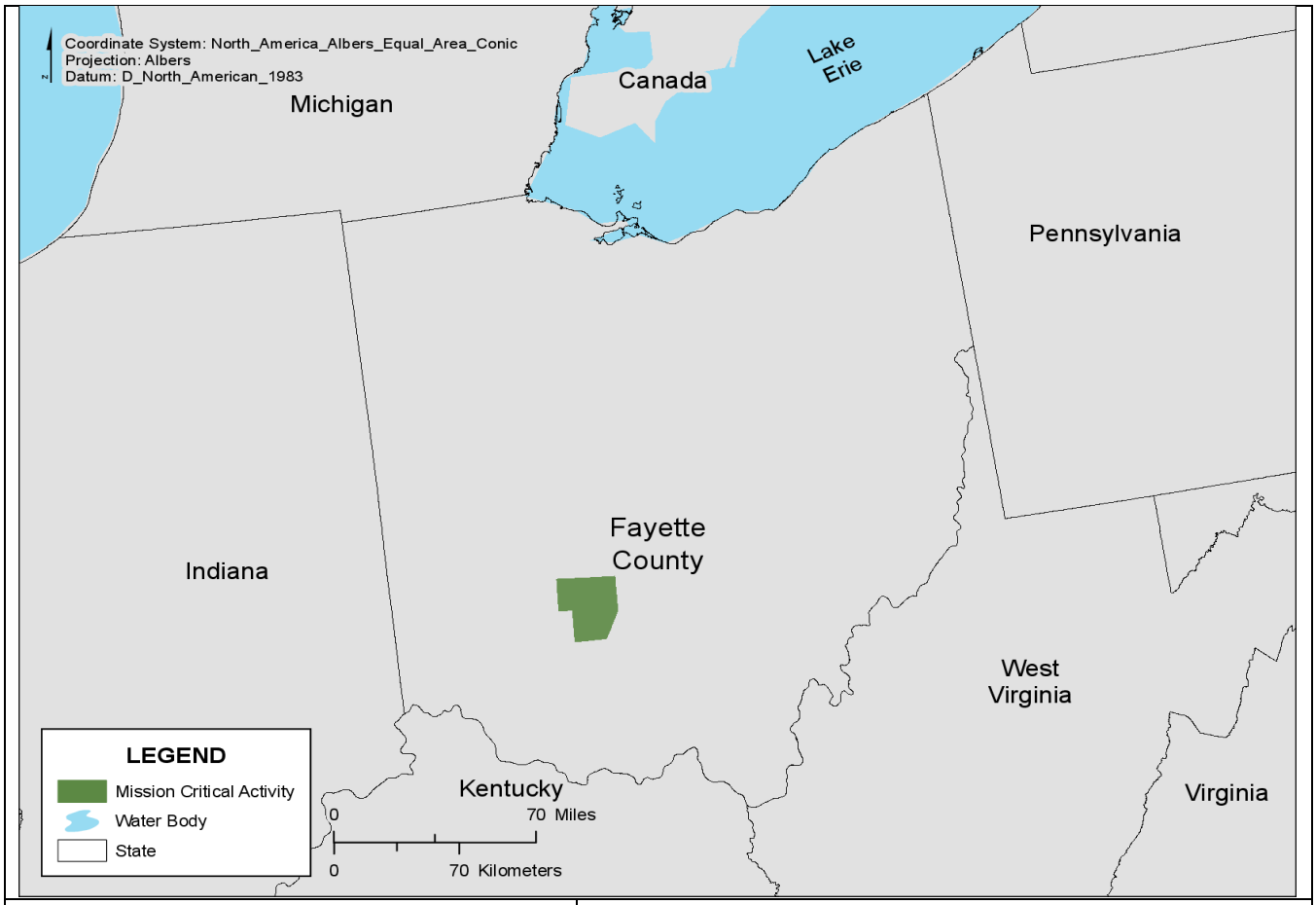
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Modeling stormwater runoff will improve efficiency and reduce the need for field surveys.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	For now, just the network.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3836990519_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Fayette County
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-created streams and watersheds.

Current Benefits	
Total Annual Program Budget:	Do not know.
Current Annual Benefits ($):	Do not know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

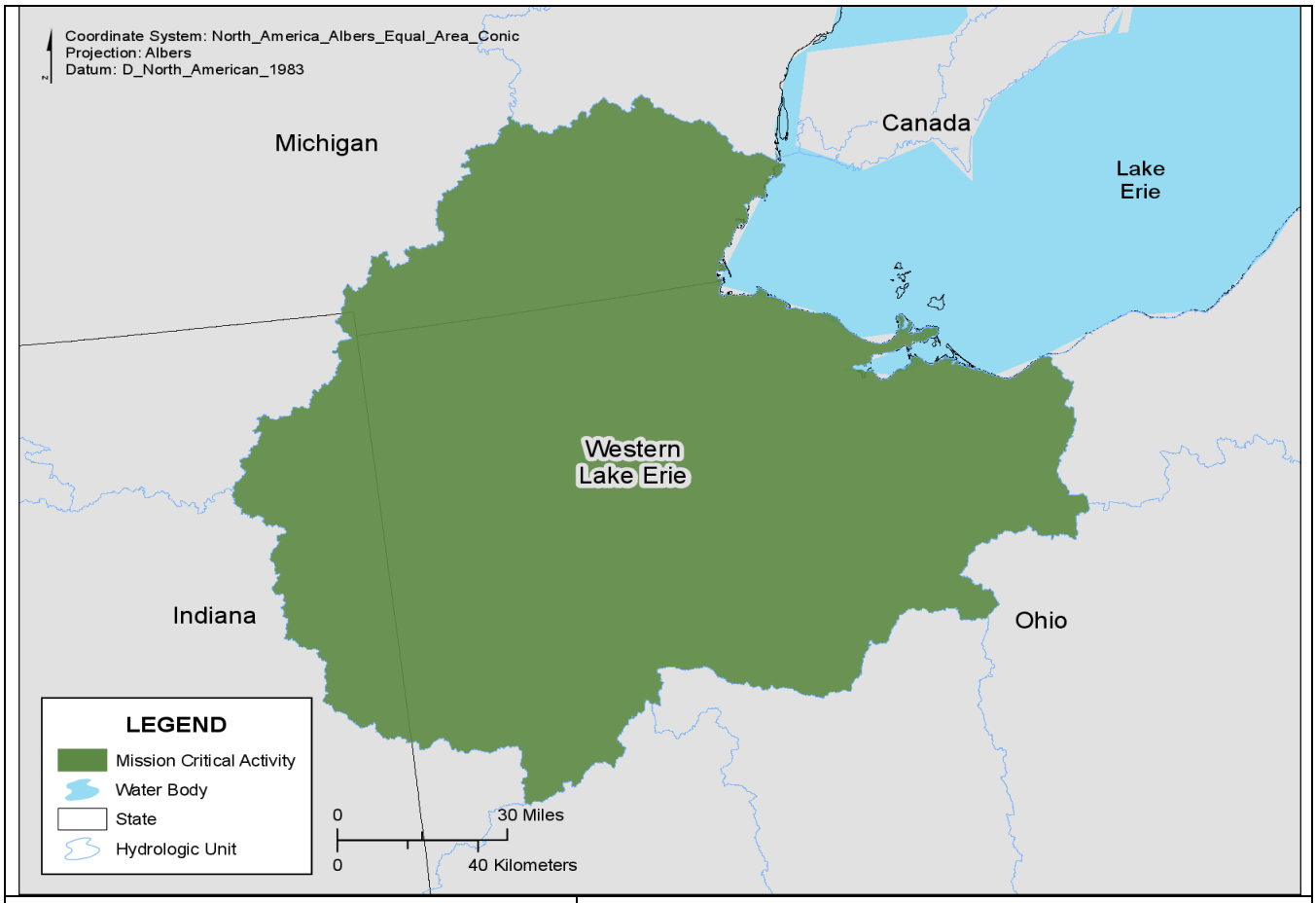
Future Benefits	
Future Annual Benefits ($):	Undetermined.
Future Benefits Description:	Improved ability to more accurately model the real world.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	We provide stormwater management and development. We develop watershed-scale protection and restoration plans. We maintain and develop the 208 plan for our area.
MCA_ID:	3772451768_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Toledo Metropolitan Area Council of Governments
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-generated dataset containing streams, verified by county engineers and auditors' offices.

Current Benefits	
Total Annual Program Budget:	$140,250
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Improved and accurate hydrographic information will aid in better focusing resources and efforts to improve water quality. Projects for environmental protection and restoration can be better focused and benefits more readily quantified. Updates and accurate data can help in applying for grant funding to carry out projects to help remediate or protect water resources.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

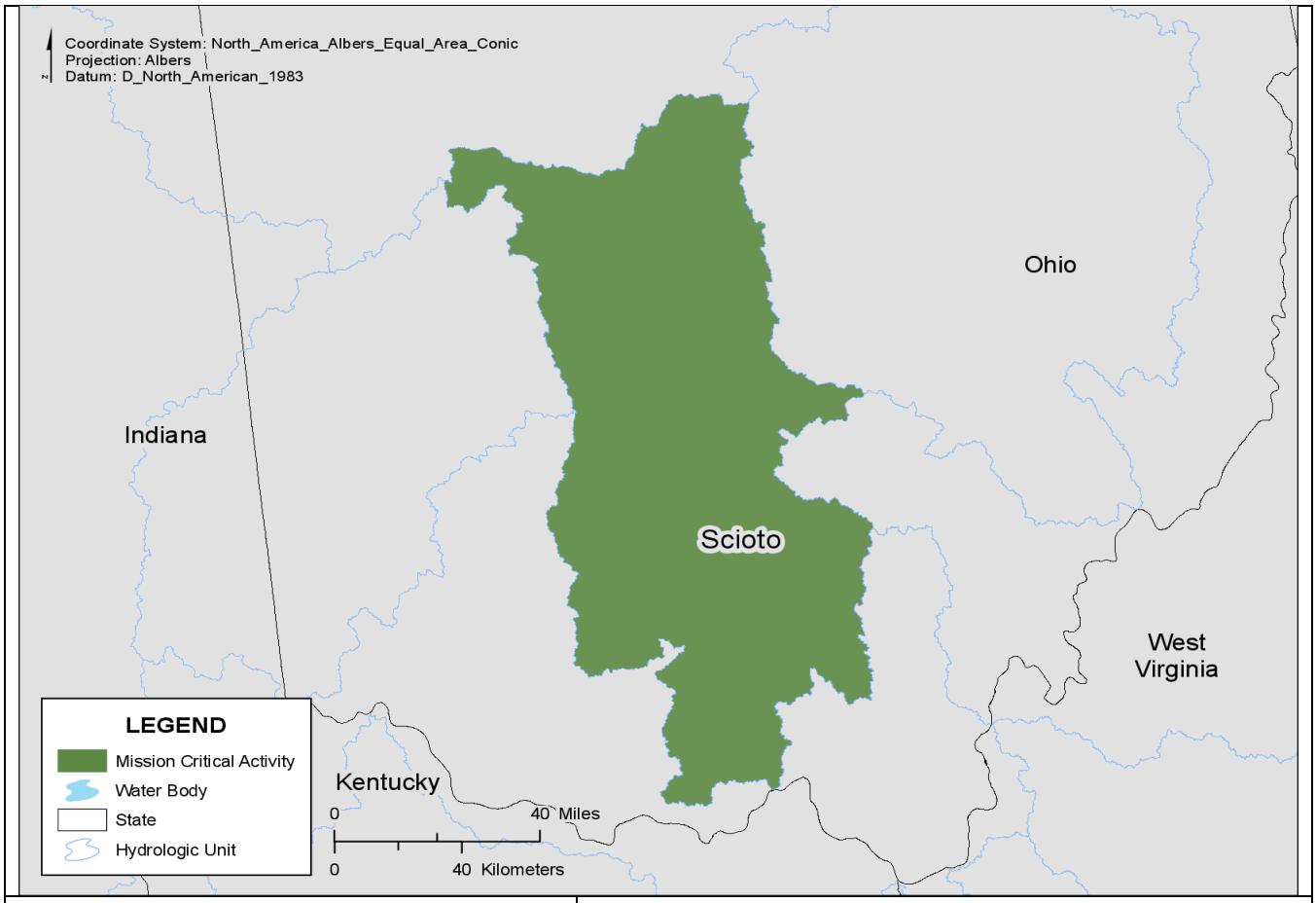
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Nice To Have	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Urban and Regional Planning



Mission Critical Activity Title:	Urban and Regional Planning
Mission Critical Activity Description:	We develop, maintain, and acquire data for all county agencies to use in the scope of their duties.
MCA_ID:	3829269213_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Fairfield County Auditor
Business Use:	Urban and Regional Planning
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Not budgeted.
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	Because we don't have a program budget at this time, benefits are limited.

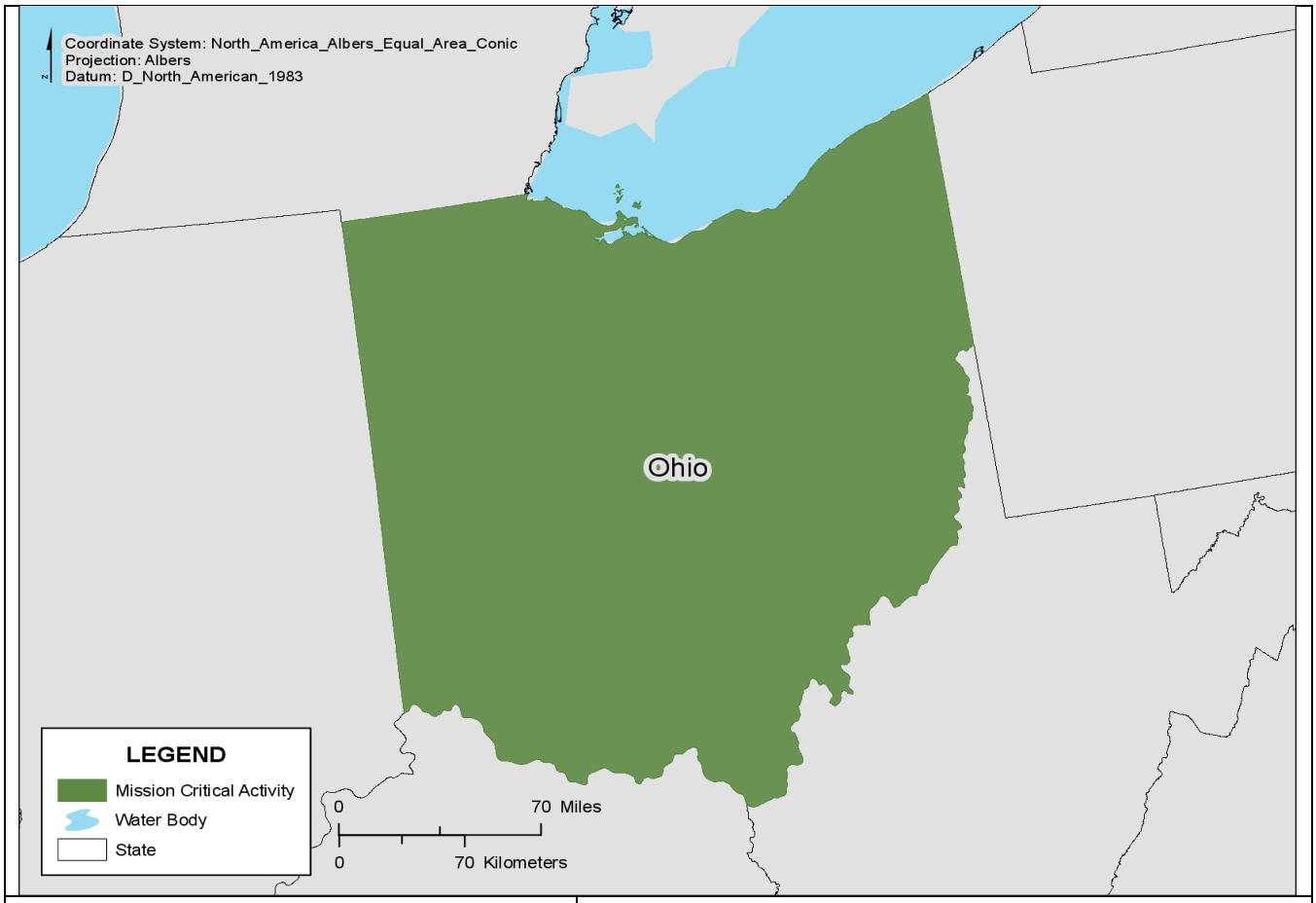
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	We are uncertain at this time of what the benefits would be.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Visual Inspection
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Pollutant loading analysis and reduction. Identification and display of water quality standards and other stream and lake designations. The NHD is used to locate beneficial use designations from water quality standards in addition to other stream or lake designations and events (linear referencing and event themes).
MCA_ID:	3813266704_4
Organization Type:	State Government
Organization Name:	Ohio Environmental Protection Agency
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate

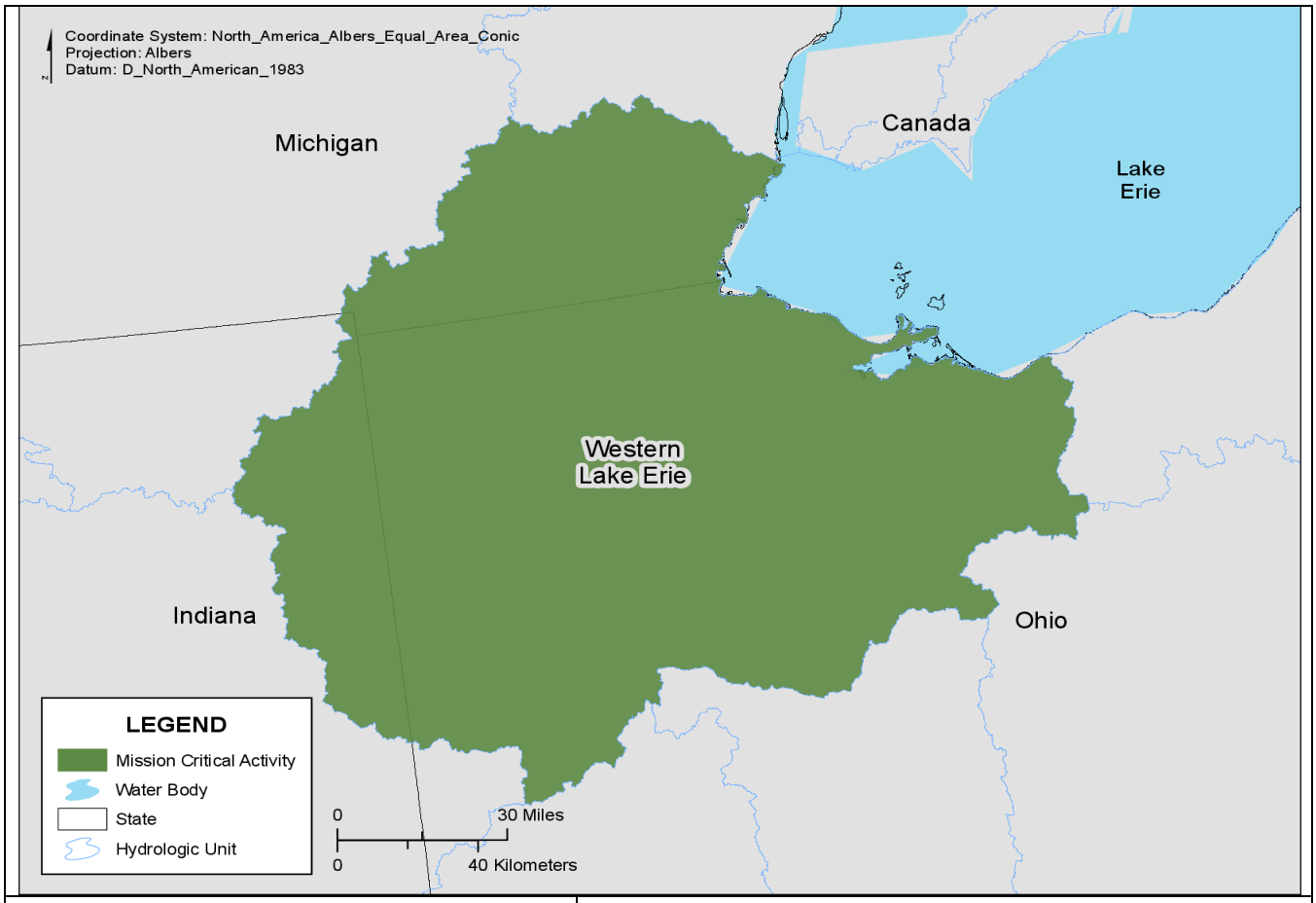
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	Visual Inspection
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	We develop watershed-scale protection and restoration plans. We maintain and develop the 208 plan for our area. Accurate stream mapping helps us to develop and evaluate programs and practices to improve and protect our waterways and ultimately the drinking water supply for the region and Lake Erie.
MCA_ID:	3836990527_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Toledo Metropolitan Area Council of Governments
Business Use:	Water Quality
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-generated dataset containing streams, verified by county engineers and auditors' offices.

Current Benefits	
Total Annual Program Budget:	$140,250
Current Annual Benefits ($):	Indeterminate.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Improved and accurate hydrographic information will aid in better focusing resources and efforts to improve water quality. Projects for environmental protection and restoration can be better focused and benefits more readily quantified. Updates and accurate data can help in applying for grant funding to carry out projects to help remediate or protect water resources.
Future Operational Benefits	
Future Time/Cost Savings:	Minor

Future Benefits	
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

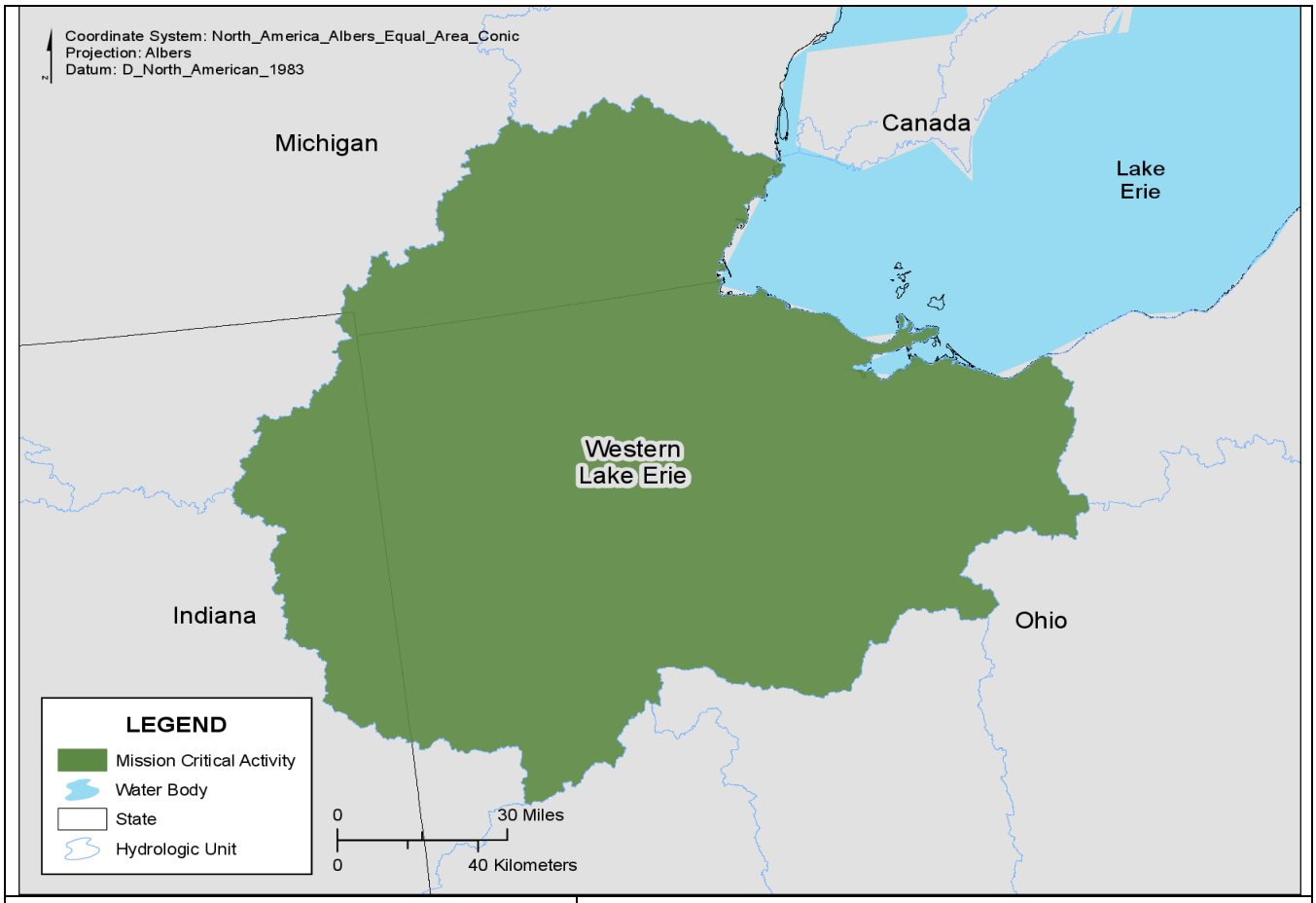
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	

Required Analytical Functions	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Nice To Have	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Drinking Water Protection



Mission Critical Activity Title:	Drinking Water Protection
Mission Critical Activity Description:	We develop watershed-scale protection and restoration plans. We maintain and develop the 208 plan for our area. Accurate stream mapping helps us to develop and evaluate programs and practices to improve and protect our waterways and ultimately the drinking water supply for the region and Lake Erie.
MCA_ID:	3836990528_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Toledo Metropolitan Area Council of Governments
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-generated dataset containing streams, verified by county engineers and auditors' offices.

Current Benefits	
Total Annual Program Budget:	$140,250
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$75,000
Future Benefits Description:	Improved and accurate hydrographic information will aid in better focusing resources and efforts to improve water quality. Projects for environmental protection and restoration can better focused and benefits more readily quantified. Updates and accurate data can help in applying for grant funding to carry out projects to help remediate or protect water resources.
Future Operational Benefits	
Future Time/Cost Savings:	Minor

Future Benefits	
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	

Required Analytical Functions	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Associate Selected Data Type
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Nice To Have	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Oklahoma

Oklahoma respondents reported 11 Mission Critical Activities (MCAs) that are grouped into six Business Uses (BUs). Of these, the predominant two BUs are Water Quality and Water Resource Planning and Management, which are indicated by six MCAs. Water Quality Monitoring as an MCA is indicated by three State agencies: Oklahoma Water Resources Board (OWRB), Oklahoma Conservation Commission (OCC), and Oklahoma Department of Environmental Quality (ODEQ). The Water Resource Planning and Management BU is indicated by OWRB for the activities of Water Rights and Aquifer Characterization, and also by the Oklahoma Geological Survey for various groundwater resource assessment studies.

The BU of Infrastructure and Construction Management is represented by MCAs at OWRB and Oklahoma Department of Transportation, for their respective activities regarding the Clean Water State Revolving Fund (CWSRF) and Stormwater Management. Additional MCAs include Hydrologic Modeling for Flood Risk Management, Interstate River Compact Reporting related to River and Stream Flow Management, and Improved Water Resource Education and Outreach for Professionals and the Public.

Current annual benefits of hydrography data are estimated to total approximately $1.1 million, while estimated new benefits from improved hydrography data would total almost $3.3 million. Projected benefits of improved hydrography data include:

- Improved decision-making regarding water resource quality and availability
- More accurate base map data for modeling and mapping purposes
- Increased efficiencies in staff productivity
- Improved interactions with the public for activities such as permitting, education, and safety

In spring 2015, a five-year drought in Oklahoma ended abruptly when the state experienced historic levels of rainfall. Together, the drought and the significant flooding that followed illustrate two of the state's major uses for water-related data: management of the state's water supply to protect against future droughts, and to better predict areas of potential flooding. In addition, Oklahoma needs to ensure adequate water quality as well as quantity for its growing population.

Up-to-date NHD layers are crucial for water use management, flood modeling, visualization, and data collection. An improved USGS NHD website would be of great benefit to Oklahoma, particularly if it were regularly updated with information about NHD development, stewardship, and opportunities for partnership and training.

Because of its use in flood studies and modeling as well as the development of more accurate NHD flowlines, lidar coverage is linked with the need for better hydrologic data. Approximately 50 percent of the state has lidar coverage, but less than 10 percent is considered effective for flood studies and modeling; moreover, in 2016, 40 percent of the effective flood models in FEMA's Coordinated Needs Management Strategy (CNMS) will be considered obsolete, requiring either revised or new topographic data. The recent flooding in Oklahoma has altered the channels for the four large stem rivers in Oklahoma, potentially rendering the current 30- to 40-year-old flood models obsolete and underscoring the urgent need for up-to-date, high-resolution elevation and hydrologic data.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required

Data Type	Elevation Data Integration	Requirement
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

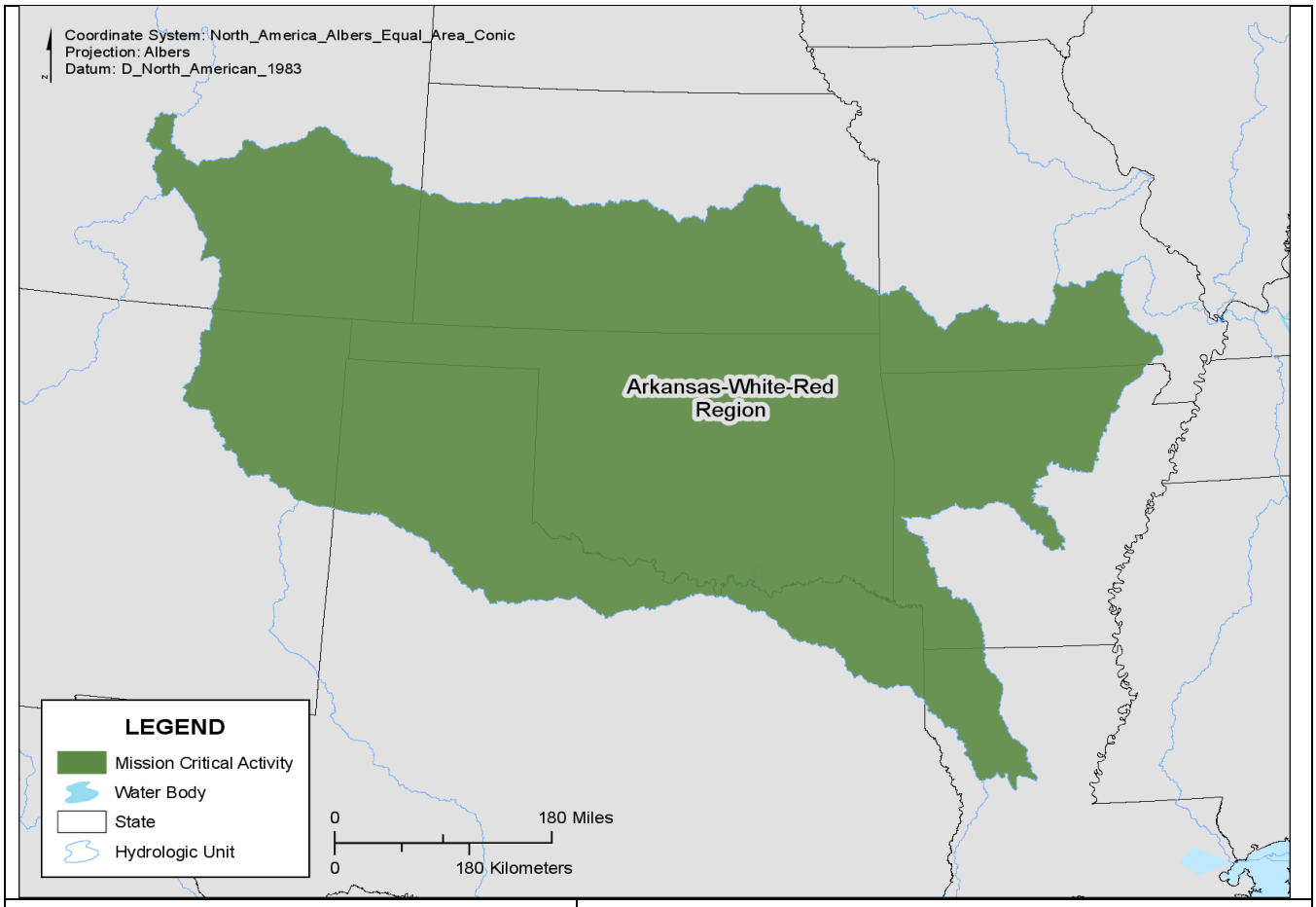
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data cannot be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Oklahoma managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Resource Education and Outreach



Mission Critical Activity Title:	Water Resource Education and Outreach
Mission Critical Activity Description:	Support research on all topics related to understanding and managing Oklahoma water resources, and provide education and training opportunities for water specialists, professionals, and students.
MCA_ID:	3787170295_1
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Center
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$192,335
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know
Future Benefits Description:	A major benefit would be use within the educational, research and outreach missions of Oklahoma State University and the Oklahoma Water Resources Center.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

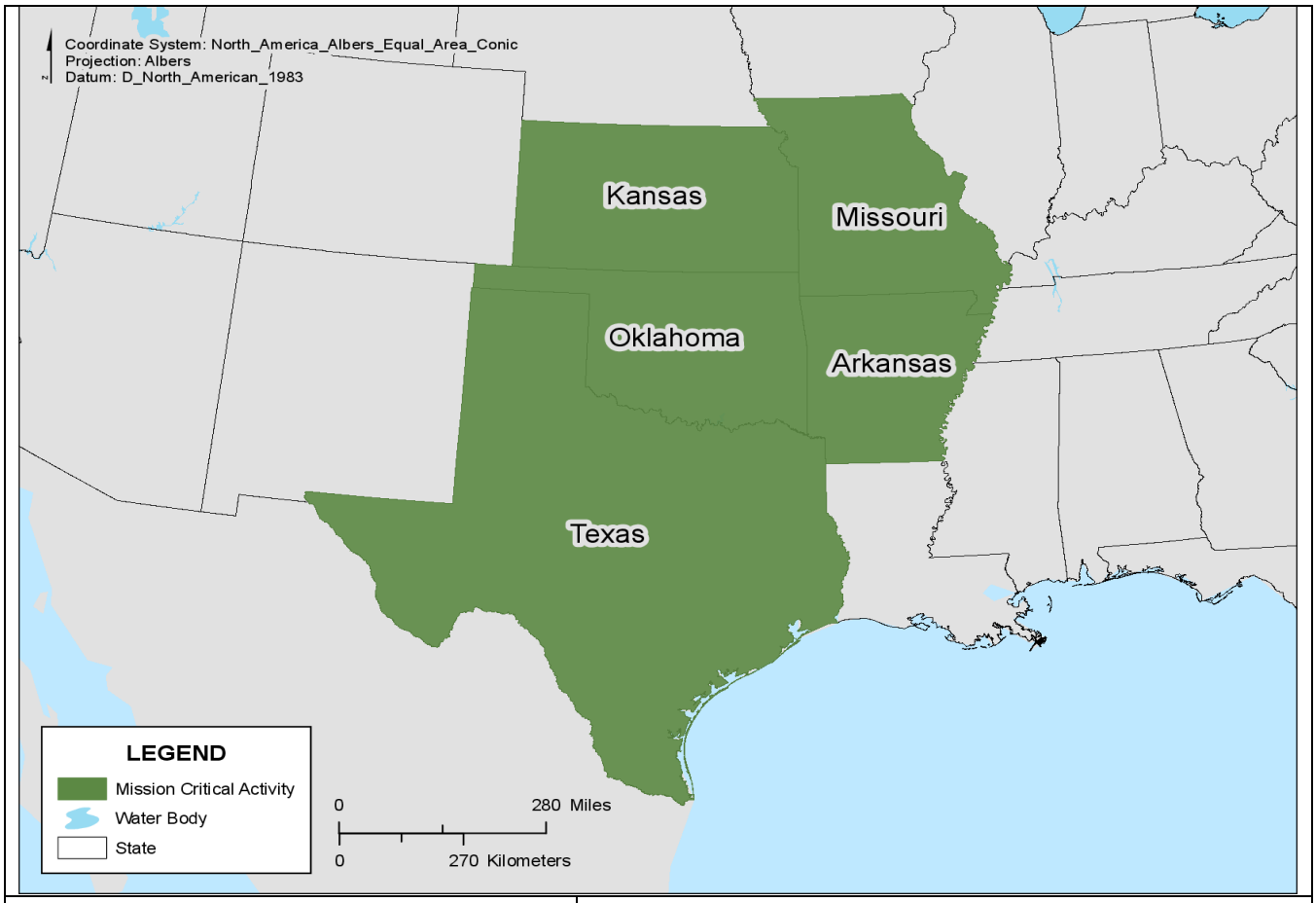
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Hydrologic Modeling



Mission Critical Activity Title:	Hydrologic Modeling
Mission Critical Activity Description:	Developing hydrology and hydraulic models for flood risk mapping and for master drainage planning.
MCA_ID:	3823317530_1
Organization Type:	Private or Commercial
Organization Name:	Meshek & Associates, PLC
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Lidar data from the Geospatial Data Center in Denton, TX.

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	We have several clients that make important decisions using the 10-meter DEM dataset. Recent lidar coverage has improved our ability to perform detailed analysis in many areas; however, we still have many locations where reasonable topography detail is not available.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Not Applicable
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

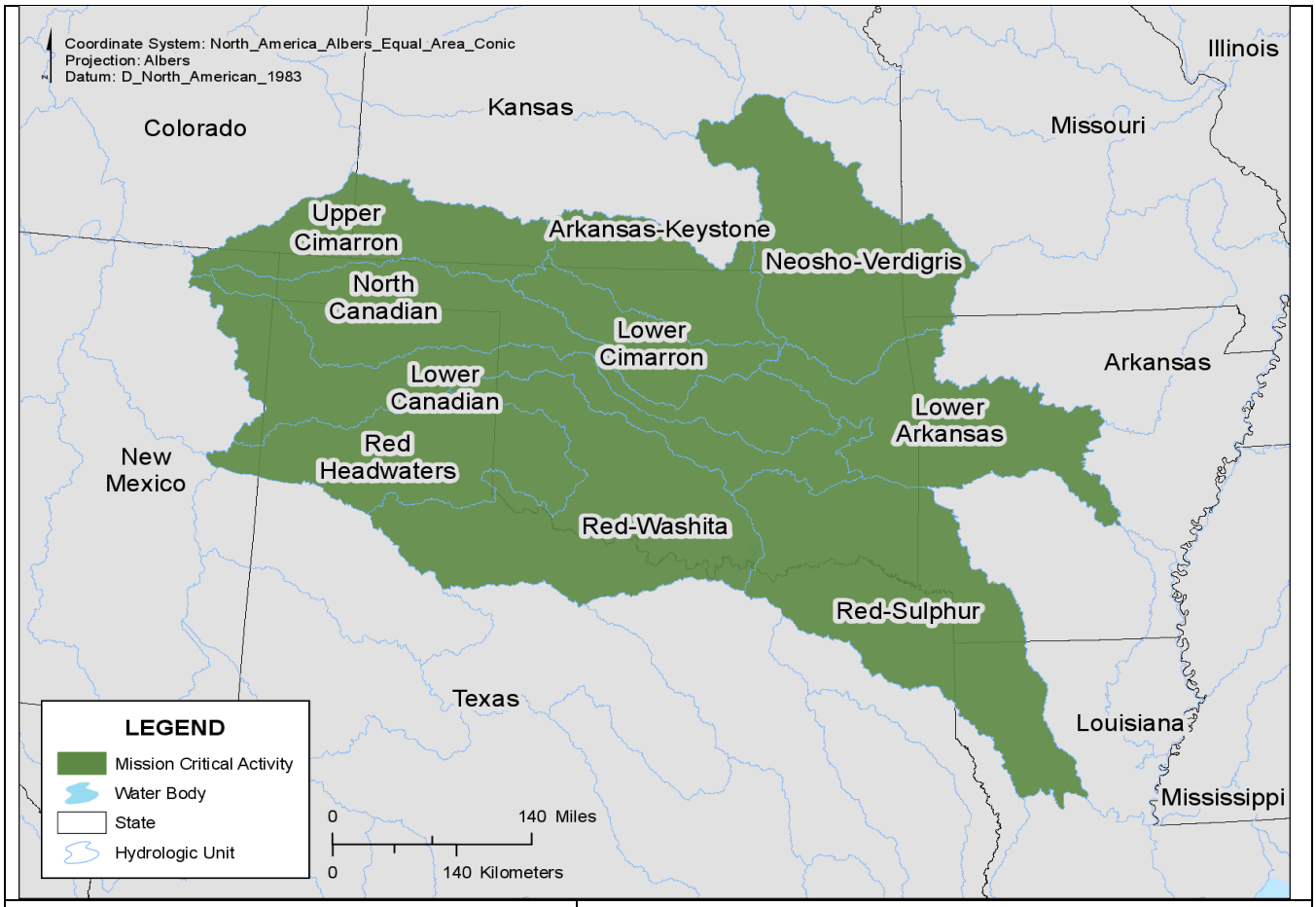
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Not Required	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	The Oklahoma Department of Transportation (ODOT) uses best management practices (BMPs) to control and manage stormwater. These include structural devices, maintenance procedures, and management practices that prevent or reduce the harmful effects of storm water runoff; such as pollution, erosion and flooding.
MCA_ID:	3771887166_1
Organization Type:	State Government
Organization Name:	Oklahoma Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	Major time and cost savings would result, because design plans would be more accurate, leading to fewer field engineering changes, which are very costly and time consuming.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate

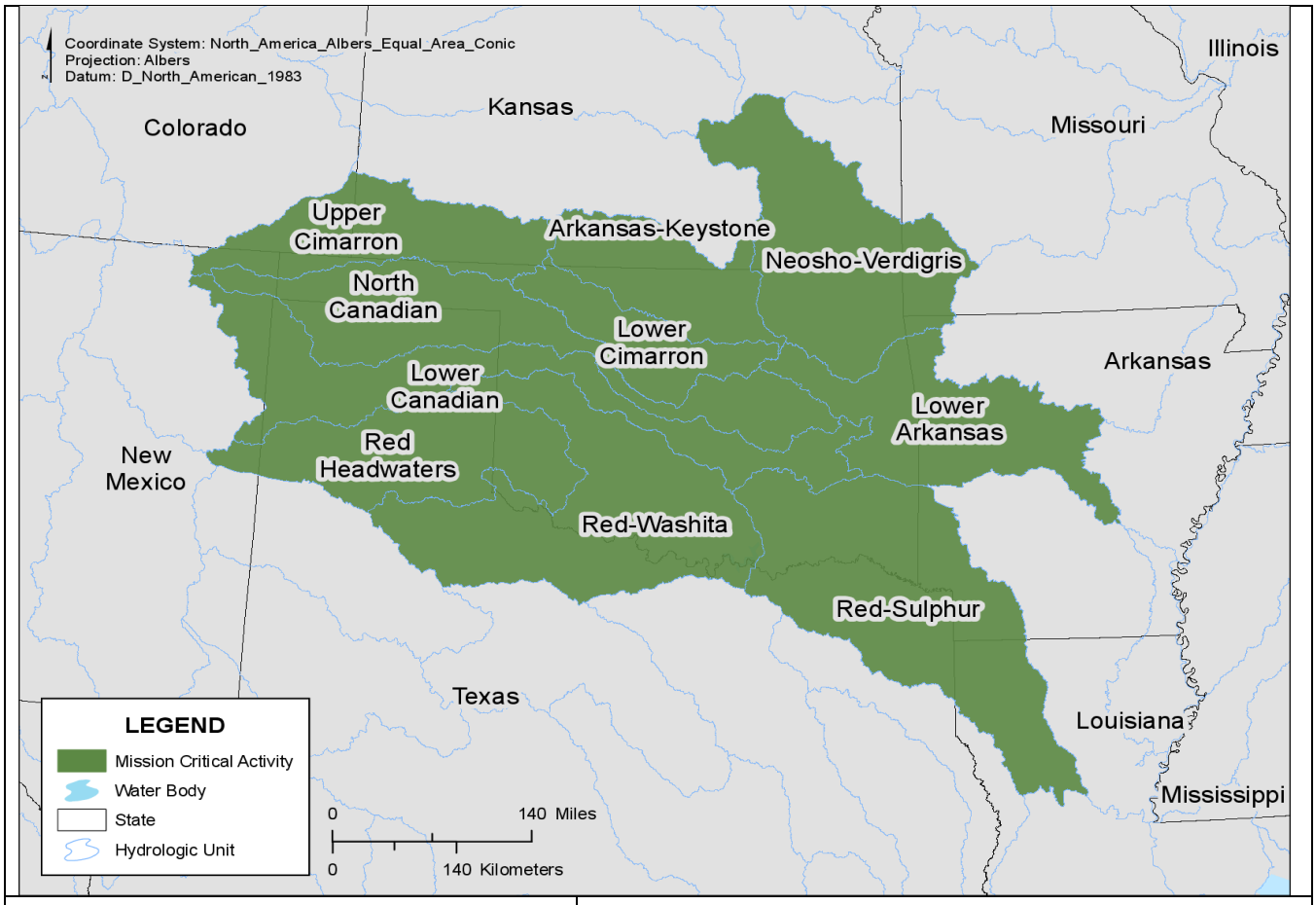
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	None
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	None
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Required	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

CWSRF Project Ranking



Mission Critical Activity Title:	CWSRF Project Ranking
Mission Critical Activity Description:	Rank and evaluate proposed Clean Water State Revolving Fund (CWSRF) projects based on relative impact of the proposed project in achieving water quality objects and report the environmental benefits for each project implemented in EPA's Clean Benefits Reporting Benefits Database.
MCA_ID:	3795513122_4
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Board
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Improved timelines for reporting environmental benefits from proposed and implemented CWSRF (loan) projects.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

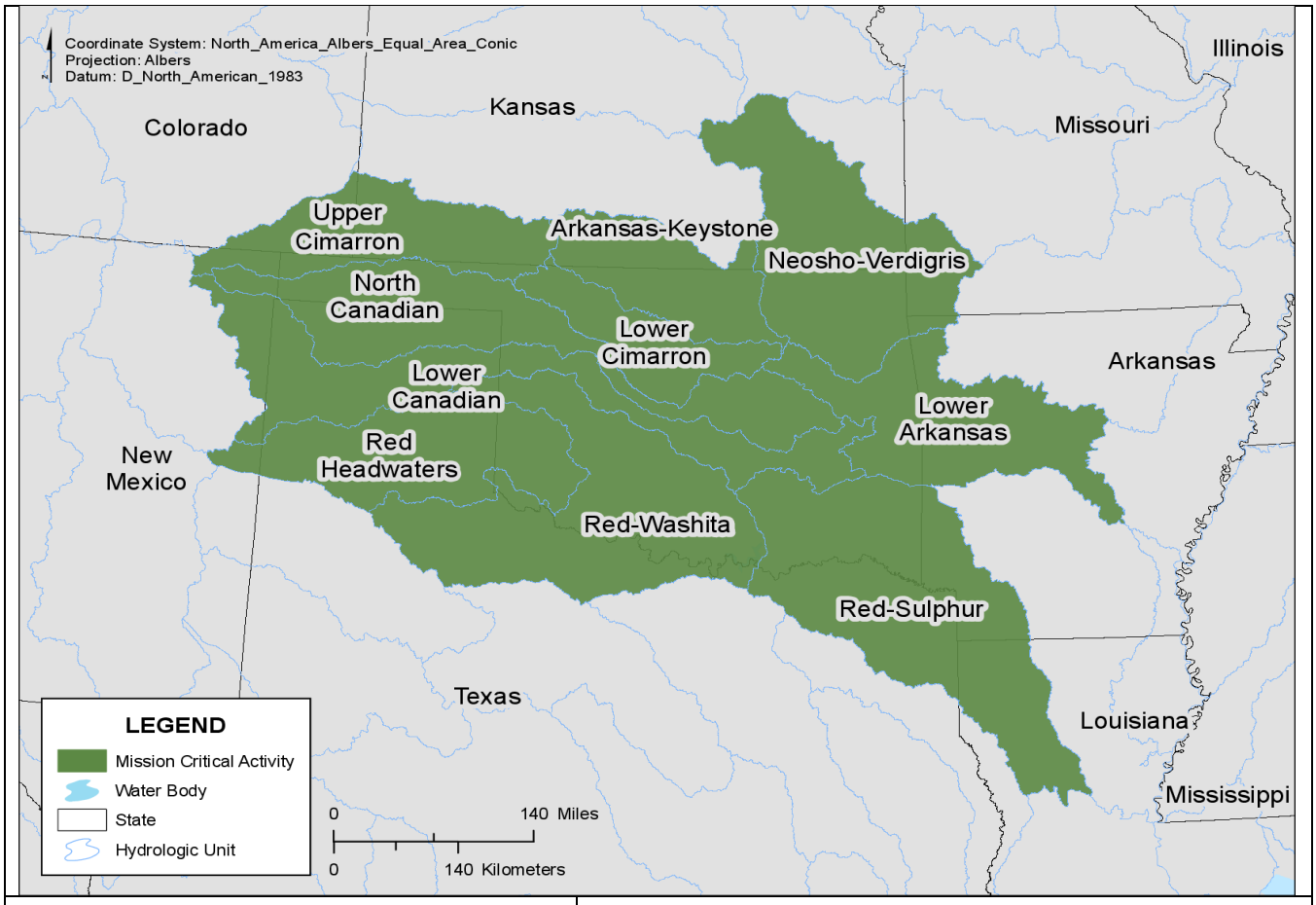
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Highly Desirable	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Not Required	None
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Nice To Have	Visual Inspection
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Interstate River Compact Reporting



Mission Critical Activity Title:	Interstate River Compact Reporting
Mission Critical Activity Description:	Complete an annual report on water flow across and out of the state for each of four interstate river compacts.
MCA_ID:	3795513122_5
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Board
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Savings from increased efficiency in performing tasks.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes

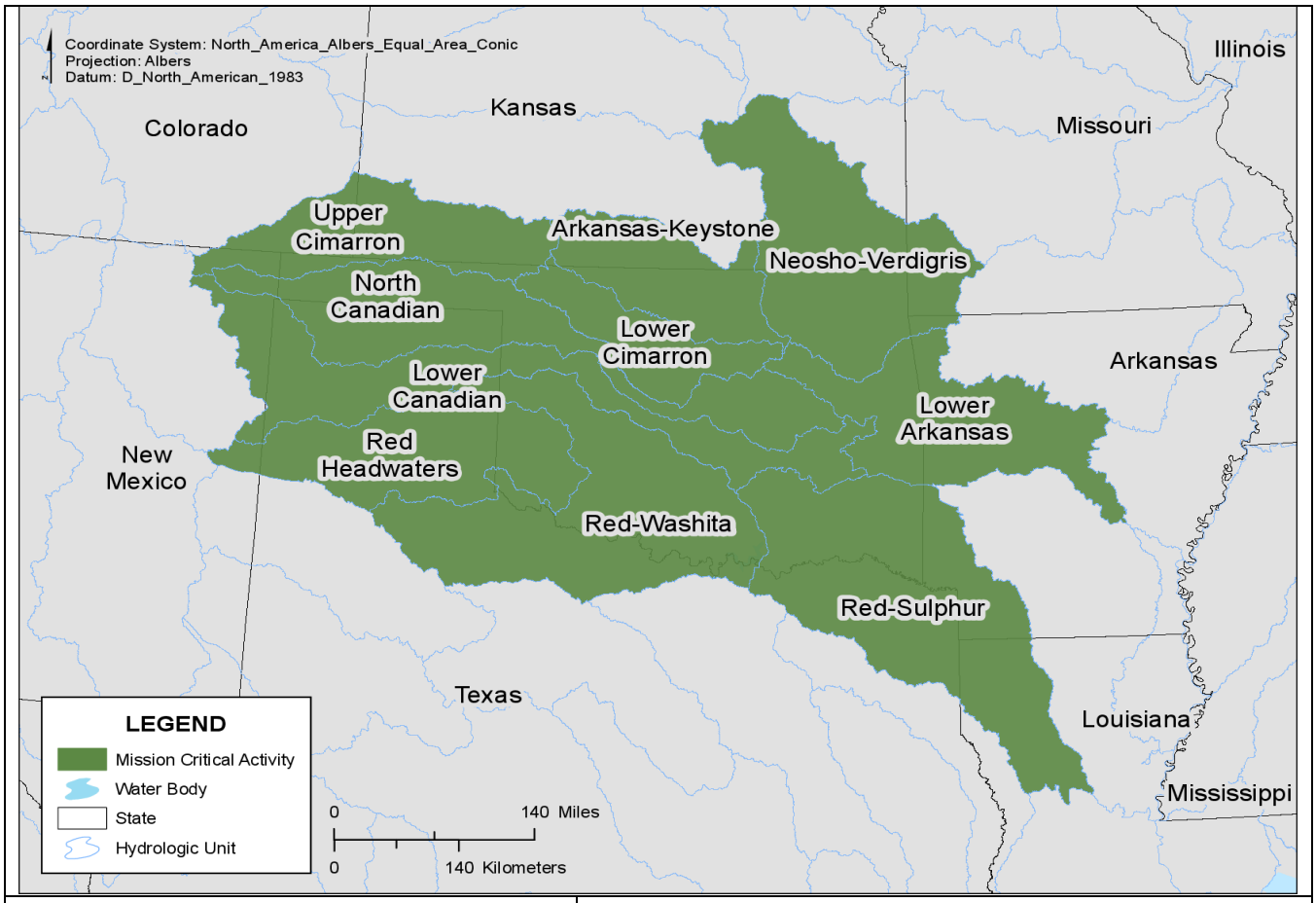
Required Characteristics	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Wetlands	Not Required	None
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring



Mission Critical Activity Title:	Water Quality Monitoring
Mission Critical Activity Description:	Monitor stream, lake, and groundwater sites for annual Beneficial Use Monitoring Program (BUMP) report. The OWRB conducts statistical survey monitoring throughout the state at sites selected randomly by computer. A physical habitat assessment is conducted, chemistry is analyzed, and samples of algae and bacteria are collected at each waterbody. Fish and macroinvertebrate collections are also made at each selected stream site.
MCA_ID:	3795513122_3
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Board
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$3.2 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$120,000
Future Benefits Description:	Improved confidence in the accuracy of sampling results.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

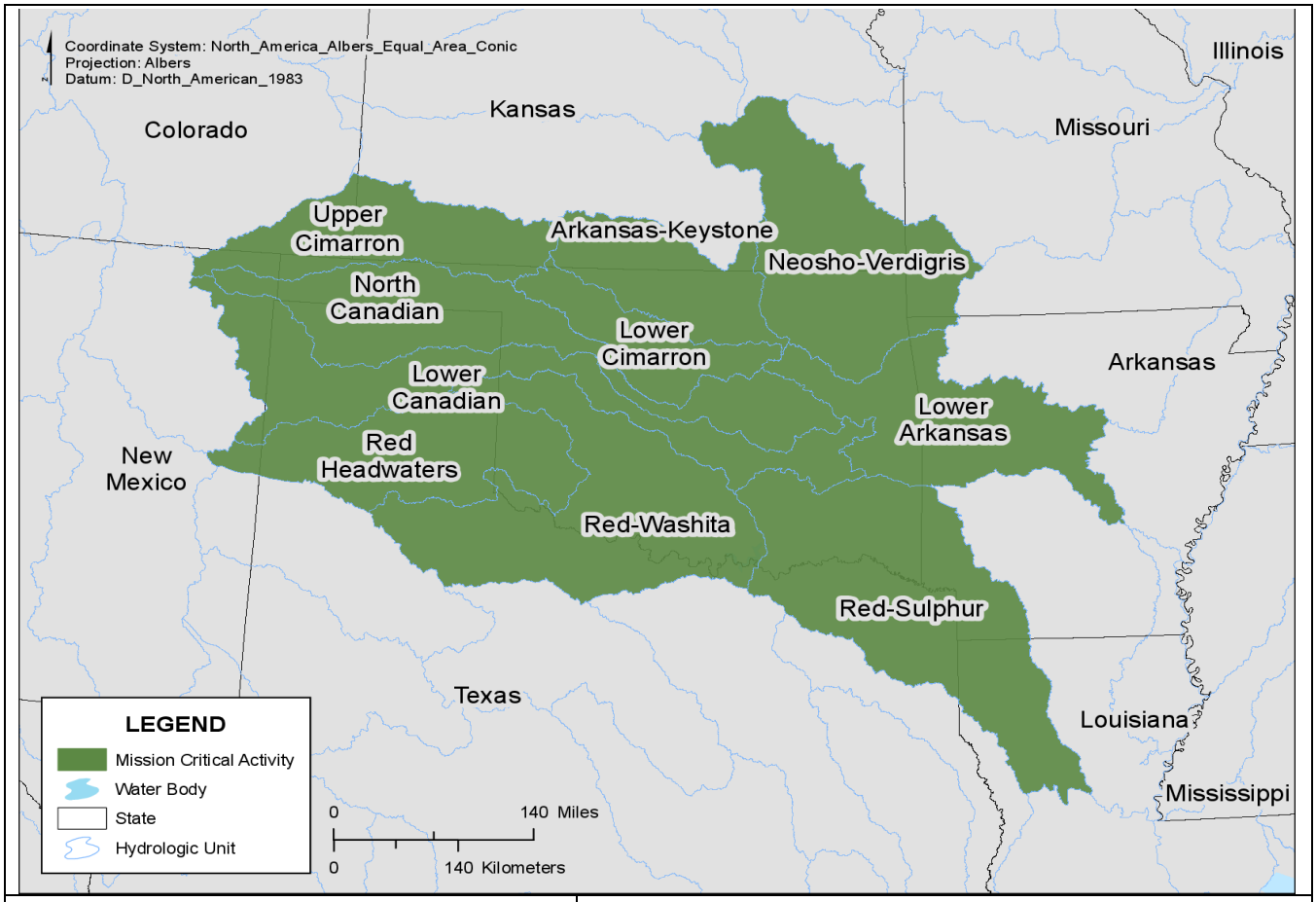
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Not Required	Visual Inspection
Surficial Geology	Required	Visual Inspection

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Protection, Stream Protection, Water Quality Monitoring, Environmental Mapping



Mission Critical Activity Title:	Watershed Protection, Stream Protection, Water Quality Monitoring, Environmental Mapping
Mission Critical Activity Description:	The mission of the OK Conservation Commission (OCC) is to conserve, protect, and restore Oklahoma's natural resources, working in collaboration with the conservation districts and other partners, on behalf of the citizens of Oklahoma. The OCC's Water Quality Division is responsible for identifying waters impaired by nonpoint source pollution, which is pollution that comes from multiple sources, such as pesticides, fertilizers, sediment, and animal waste. Once problems are identified, we work to prioritize and implement projects to reduce the pollutants and improve water quality.
MCA_ID:	3796678167_1
Organization Type:	State Government
Organization Name:	Oklahoma Conservation Commission
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$3 million
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$350,000
Future Benefits Description:	It would give us a better understanding of the stream network allowing us to create better maps.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	

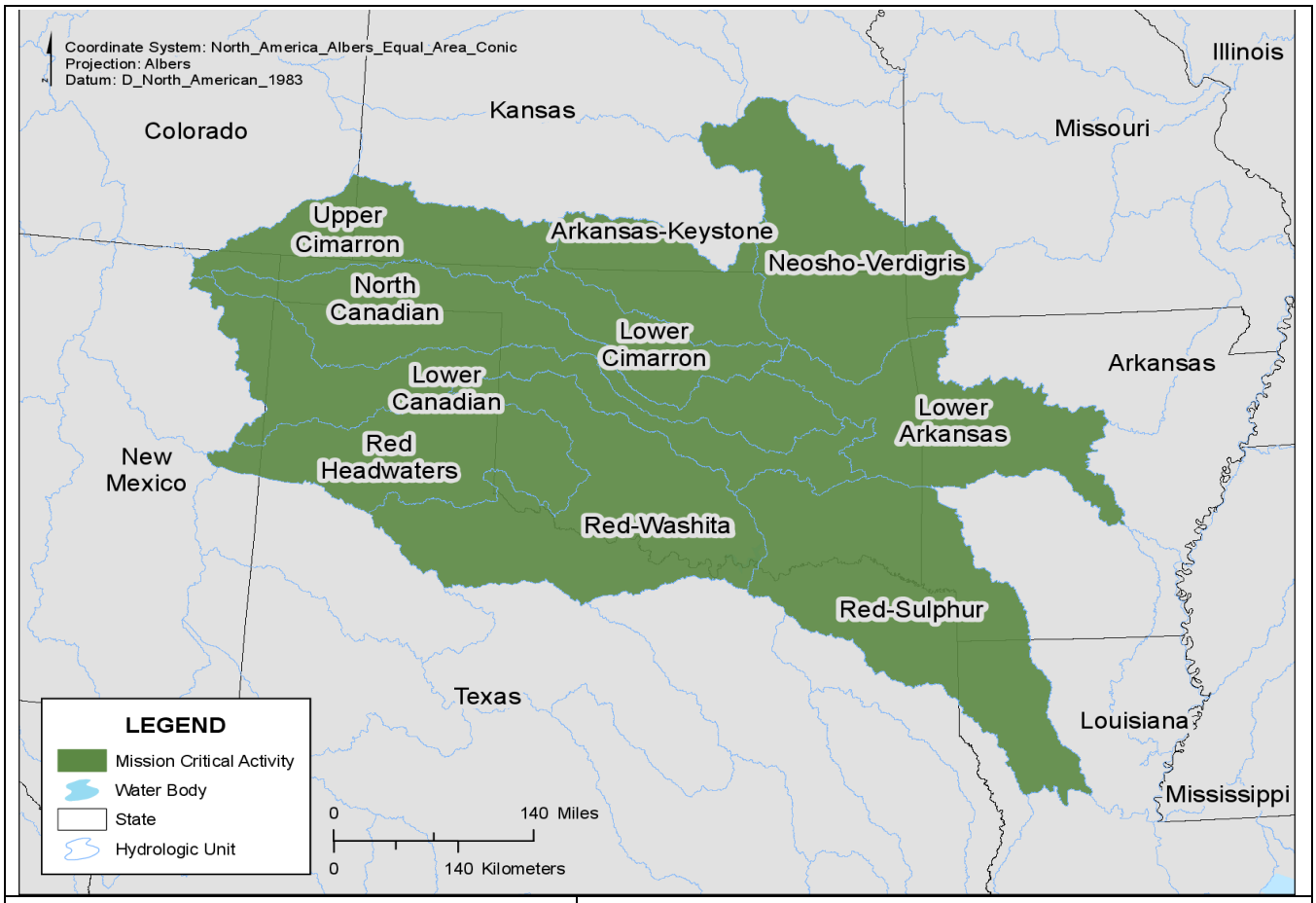
Future Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Surface Water Quality Monitoring



Mission Critical Activity Title:	Surface Water Quality Monitoring
Mission Critical Activity Description:	Surface water quality monitoring and assessment to meet reporting requirements of Sections 303(d) and 305(b) of the Clean Water Act.
MCA_ID:	3826043531_1
Organization Type:	State Government
Organization Name:	Oklahoma Department of Environmental Quality
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	$250,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$125,000
Future Benefits Description:	More accurate modeling based on the improved data.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	

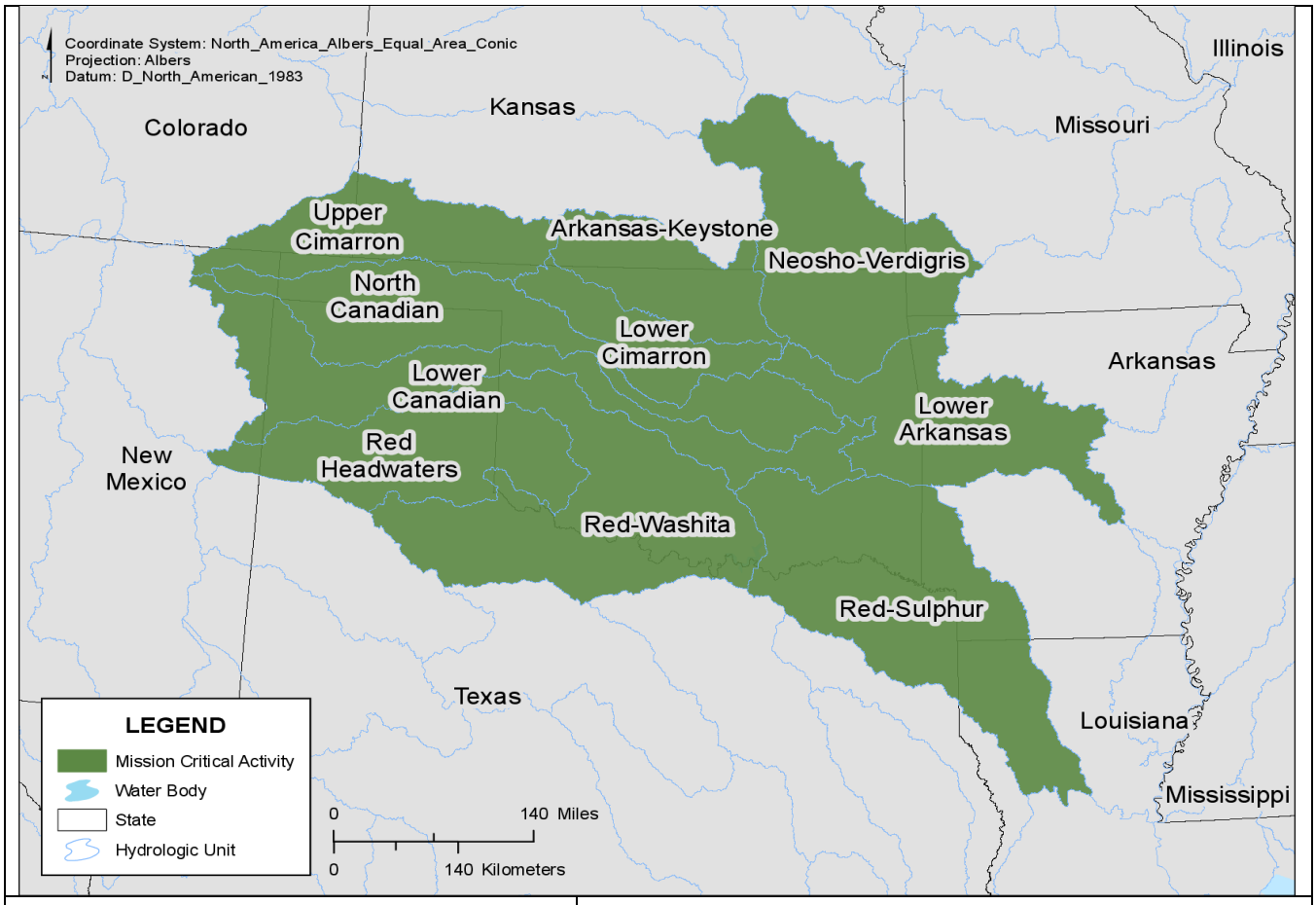
Required Characteristics	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Aquifer Characterization



Mission Critical Activity Title:	Aquifer Characterization
Mission Critical Activity Description:	Aquifer characterization and determining maximum annual yield for water rights permitting, management, and planning.
MCA_ID	3795513122_1
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Board
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.5 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved timeliness of water-level data and improved accuracy of geologic data for groundwater studies. For surface water, improved stream-flow data and drainage network delineation.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

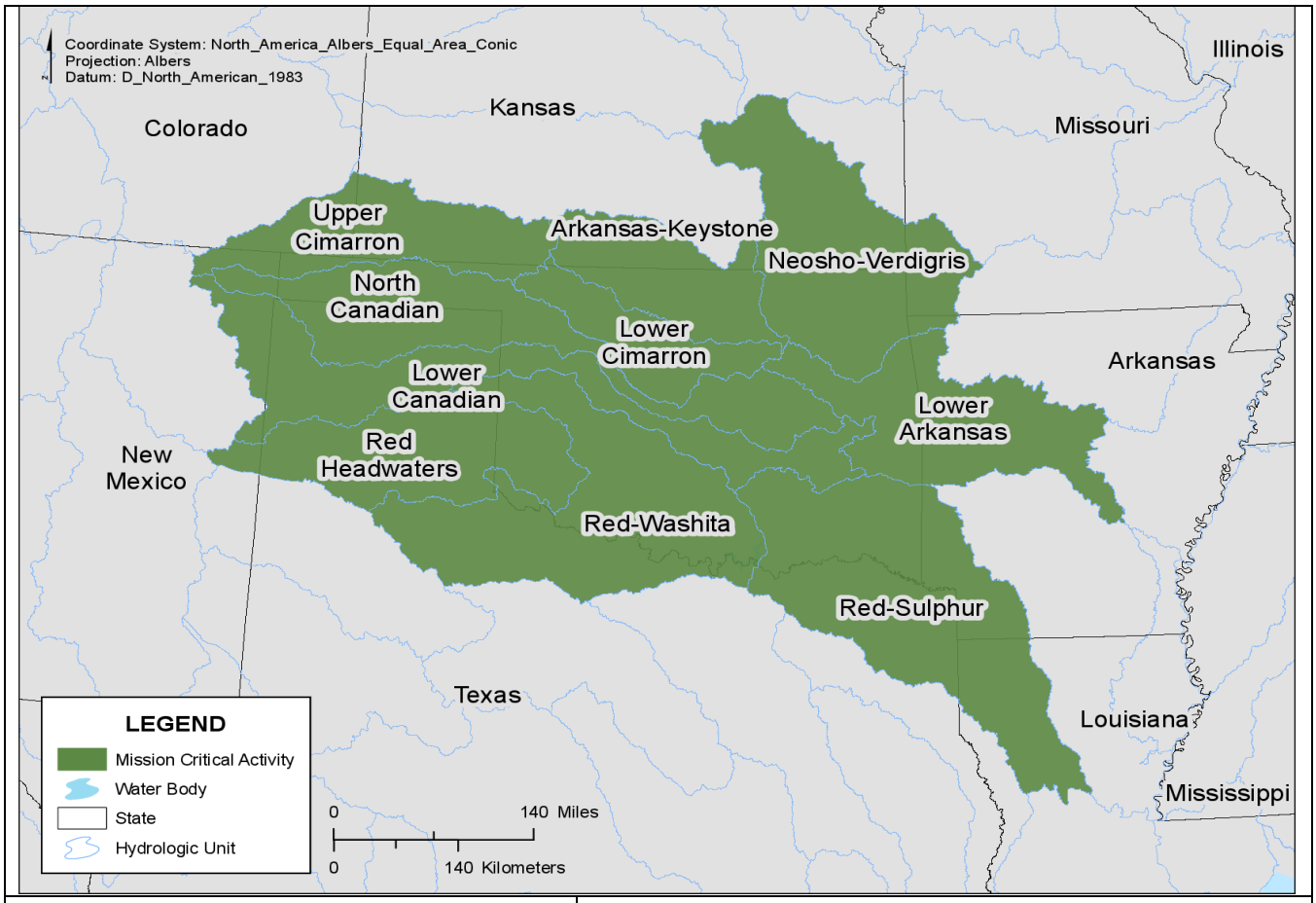
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Associate Selected Data Type
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	Visual Inspection
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Not Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Rights



Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	To protect watersheds, calculation of the amount of surface water available for permitted uses; water rights administration.
MCA_ID:	3795513122_2
Organization Type:	State Government
Organization Name:	Oklahoma Water Resources Board
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.18 million
Current Annual Benefits ($):	$118,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$236,000
Future Benefits Description:	Improved staff productivity and better management of taxpayers' money for the issuance of surface water permits.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

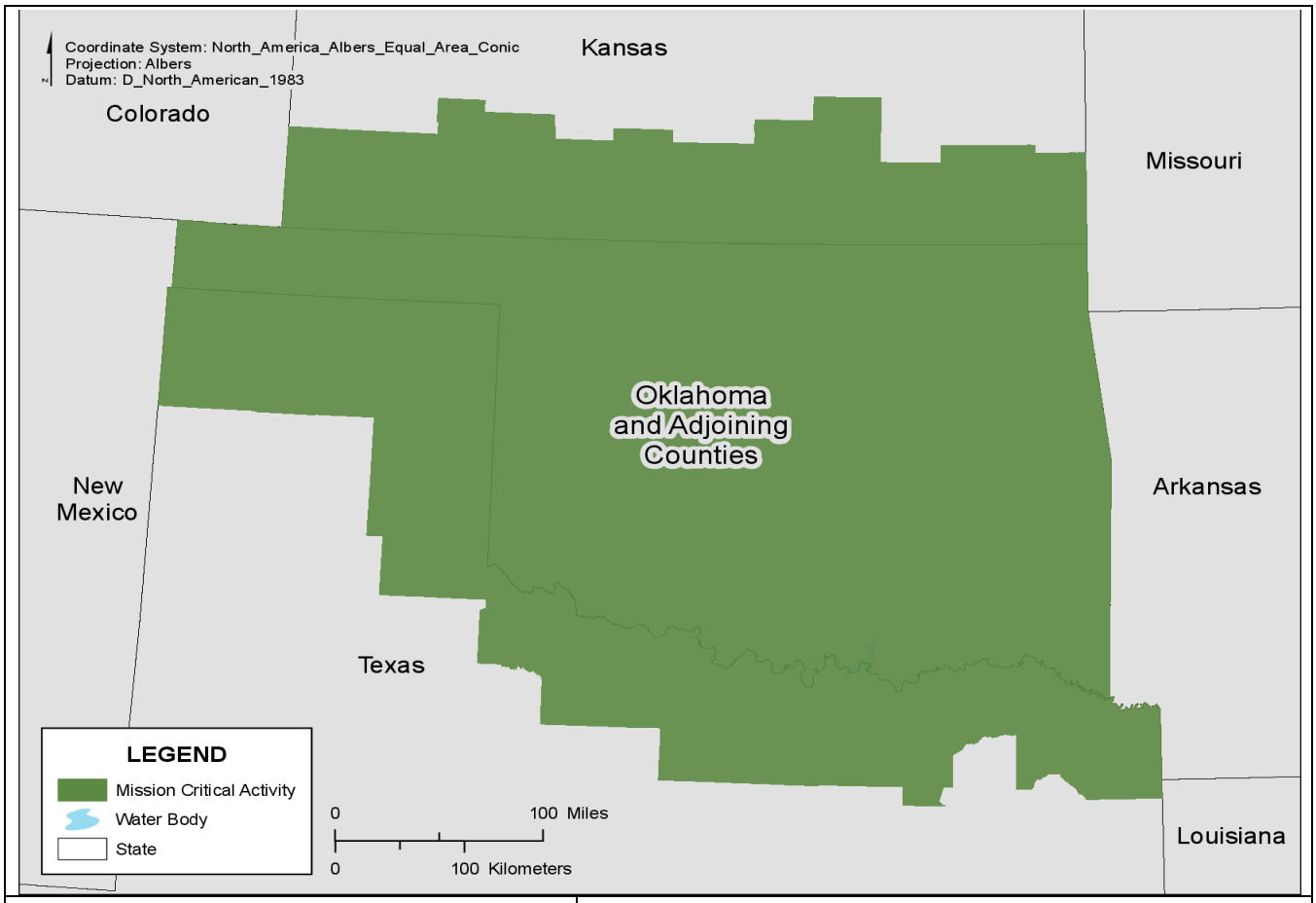
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Not Required	None
Surficial Geology	Nice To Have	Associate Selected Data Type
Bathymetry	Not Required	None

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Groundwater Resources Assessment



Mission Critical Activity Title:	Groundwater Resources Assessment
Mission Critical Activity Description:	Studies include groundwater resources assessment, energy industry saltwater production and management, data compilation and analysis, aquifer storage and recovery feasibility.
MCA_ID:	3797068328_1
Organization Type:	State Government
Organization Name:	Oklahoma Geological Survey
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved ability to conduct water resources investigations.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	

Required Characteristics	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Oregon

In 2012, the Oregon Geographic Information Council (OGIC) adopted the National Hydrography Dataset (NHD) as the state standard for the digital representation of surface water features. The state's natural resource agencies have been moving their hydro-related data to this theme as a result. These currently include the following Mission Critical Activities (MCAs):

- Flood Risk Mapping (Oregon Department of Geology and Mineral Industries)
- Fish Habitat Distribution Mapping (Oregon Department of Fish and Wildlife)
- Maintaining an Inventory of Fish Passage Barriers (Oregon Department of Fish and Wildlife)
- Water Quality Modeling, Analysis, and Reporting (Oregon Department of Environmental Quality)
- Administration of Water Rights (Oregon Water Resources Department)
- Irrigation Water Rights Delivery (Santiam Water Control District)

Each agency has also found it necessary to edit the NHD frequently to add missing lakes and streams, or to correct the geometry of existing features. While this improves the NHD, the complexity of the editing process creates additional costs for the participating agency that they find difficult to take on.

As use of the NHD becomes more prevalent through the National Map Viewer and other web sites, there will be increasing demand to add missing streams and align existing streams with current imagery and elevation layers produced from lidar. There are also issues with feature typing (e.g. stream or canal) and stream periodicity (perennial, intermittent, or ephemeral). Some public agencies base regulations on these data, which can affect the activities of businesses and the public.

The state of Oregon actively coordinates with the state of Washington and Federal agencies located in the region through the Pacific Northwest Hydrography Framework (PNWHF) group to prioritize and leverage resources to address this work while conforming to best practices and existing stewardship agreements. Assistance from USGS in the form of grants and tool development, to name a few examples, would greatly assist our efforts to update the NHD.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓		✓			✓			

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Nice To Have
Services to support online analysis of hydrography information (such as StreamStats)	Nice To Have

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Nice To Have
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

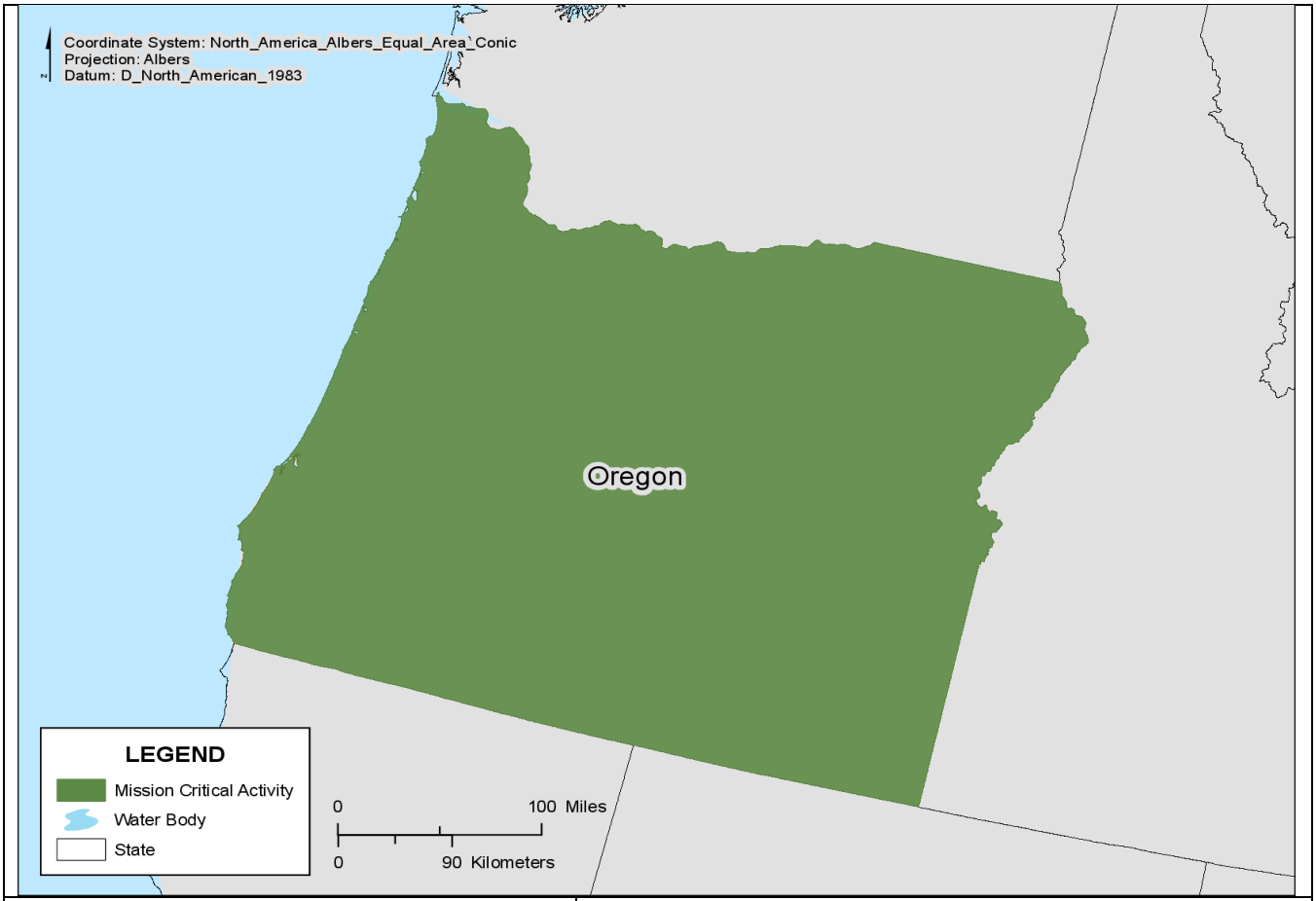
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Oregon managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Hydrology and hydraulic modeling of riverine flood scenarios for the purpose of National Flood Insurance Program administration, mitigation planning, response, and recovery.
MCA_ID:	3773857510_1
Organization Type:	State Government
Organization Name:	Oregon Department of Geology and Mineral Industries
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable

Requirements	
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Hydrography delineated in-house from lidar.

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$2,500
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Less time spent deriving hydrography from lidar. More time for analysis and providing service to customers. Allows more time to focus on modeling impacts of floods.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	Note also that lidar-based hydrography is an important component of producing accurate flood zone mapping that the National Academy of Sciences (2009, "Mapping the Zone") has determined to have a 2.24 benefit-cost ratio for taxpayer dollars spent.

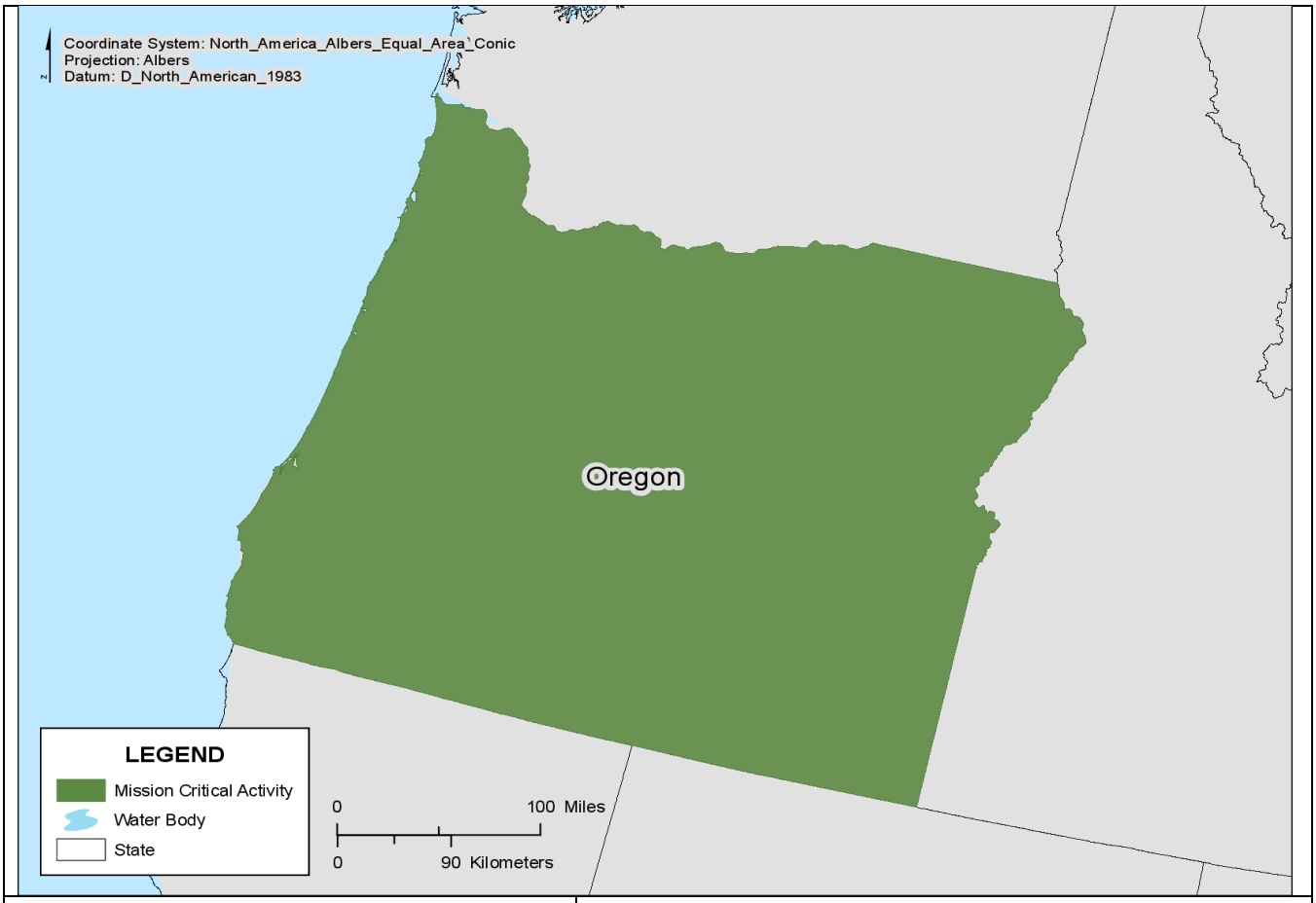
Required Characteristics	
Linkages to streamgage observations	Yes
Linkages to cross section geometry	Yes
Left right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	

Required Analytical Functions	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Fish Habitat Distribution



Mission Critical Activity Title:	Fish Habitat Distribution
Mission Critical Activity Description:	Fish habitat distribution mapping. Provide support for mapping habitat for a variety of fish species across the state. Especially important for restoration and monitoring of salmon habitats.
MCA_ID:	3813102403_1
Organization Type:	State Government
Organization Name:	Oregon Department of Fish and Wildlife
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$20,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Having accurate, comprehensive flowline data available would mean that we would never or rarely have to edit the NHD (e.g. add new flowlines, improve horizontal accuracy of existing lines) to support our business needs of managing fish habitat distribution.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

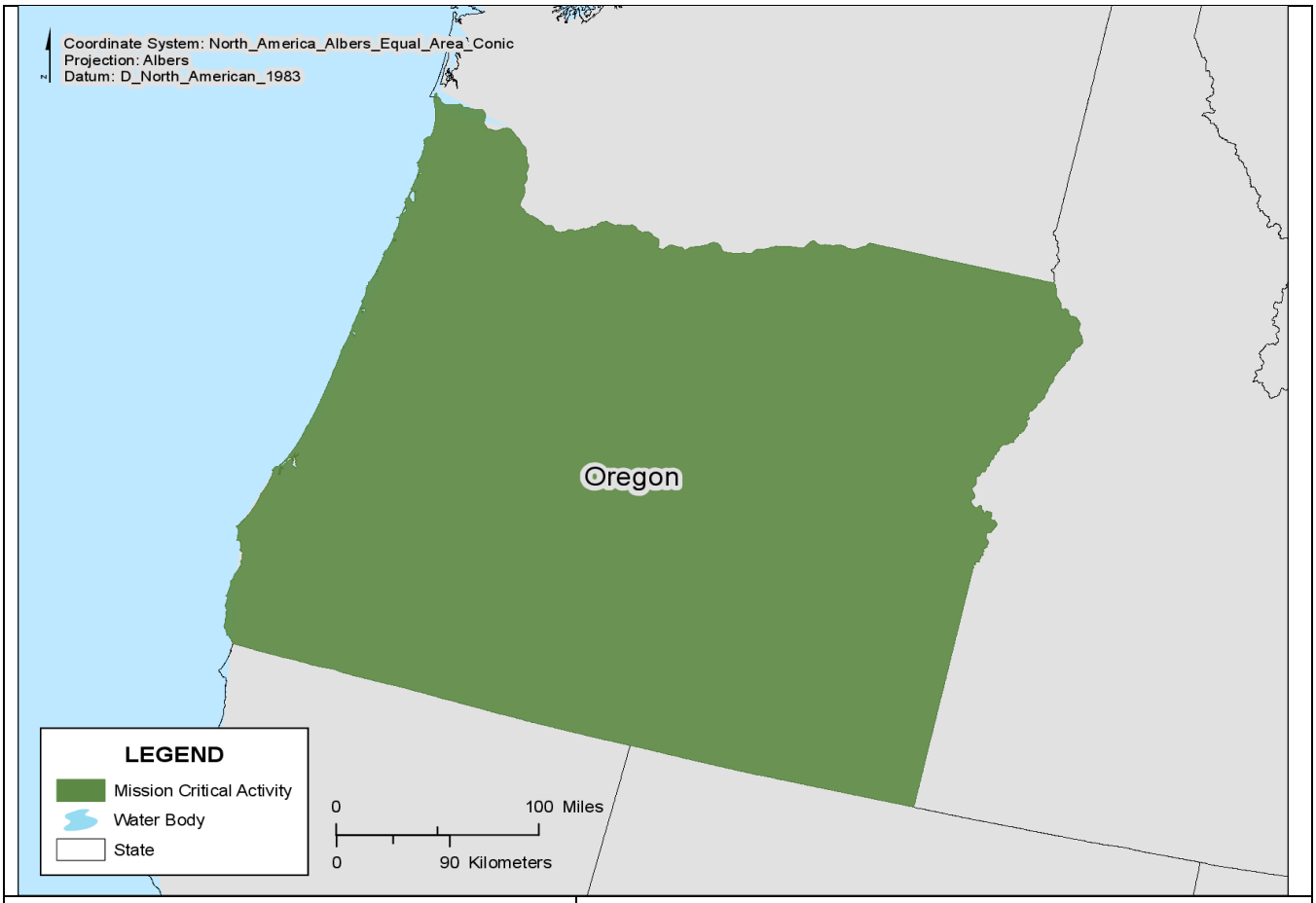
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Accurate stream centerlines.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Nice to Have	Associate Selected Data Type
Climate	Nice to Have	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Develop and Maintain an Inventory of Fish Passage Barriers



Mission Critical Activity Title:	Develop and Maintain an Inventory of Fish Passage Barriers
Mission Critical Activity Description:	Develop and maintain an inventory of fish passage barriers. Mapping fish passage barriers to the NHD would allow better monitoring and integration with other agencies.
MCA_ID:	3813102403_2
Organization Type:	State Government
Organization Name:	Oregon Department of Fish and Wildlife
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$40,000
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	With accurate and comprehensive flowlines, we would not have to be concerned with NHD editing and could focus on developing and maintaining our operational data, as well as enhancing those data with value added attribute information (e.g. miles of fish habitat accessible upstream of a blocking fish passage barrier).
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

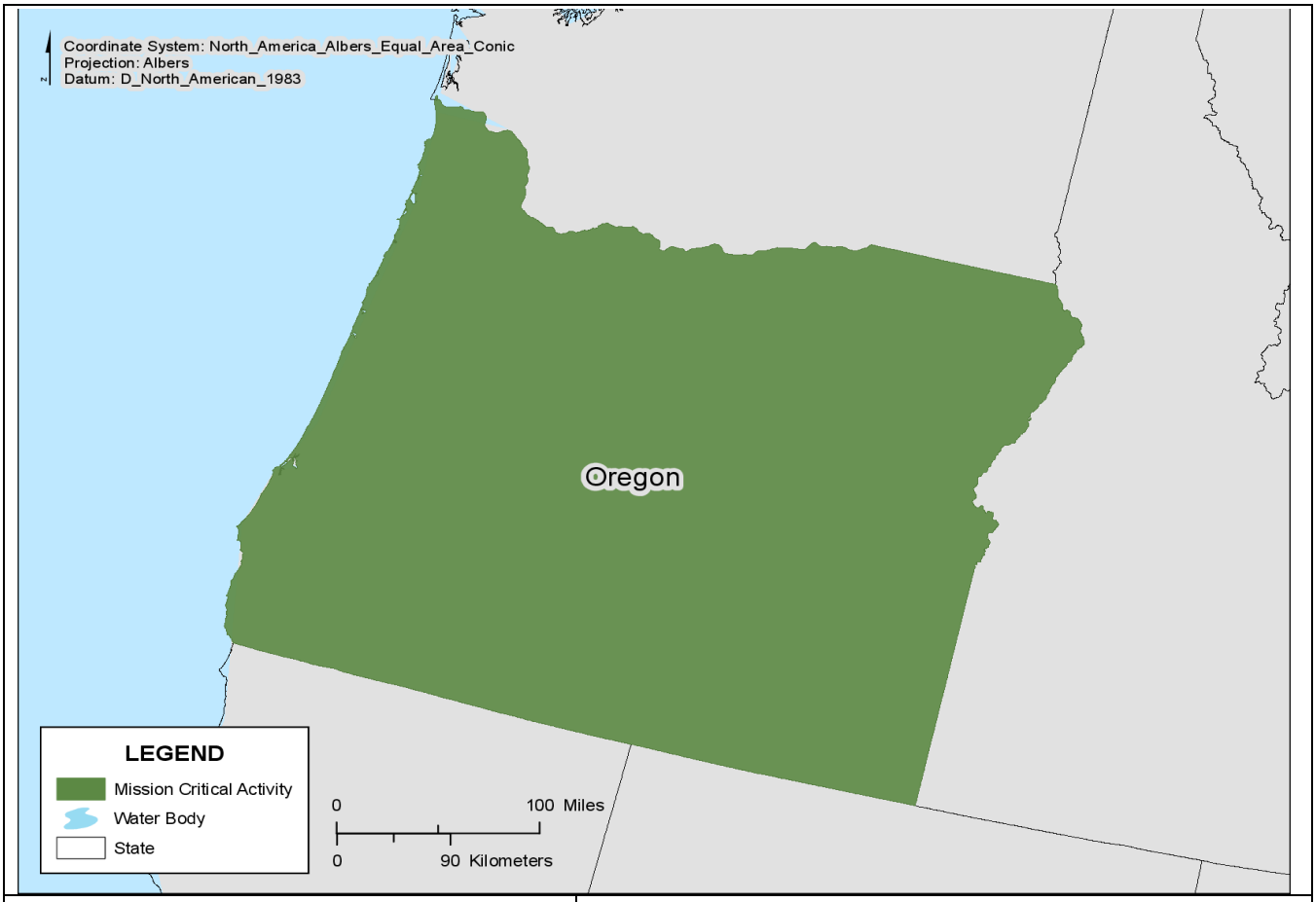
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice to Have	Perform Geospatial Analysis
Stream Flow	Nice to Have	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

TMDL and Drinking Water



Mission Critical Activity Title:	TMDL and Drinking Water
Mission Critical Activity Description:	NHD data are used for Total Maximum Daily Load (TMDL) modeling and analysis. Snapping existing points from another stream layer to the NHD for consistency in data exchange within and outside state.
MCA_ID:	3829993713_1
Organization Type:	State Government
Organization Name:	OR Dept. of Environmental Quality
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	State-agency-produced stream layer or StreamNet.

Current Benefits	
Total Annual Program Budget:	$40,000
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know
Future Benefits Description:	Improve TMDL modeling and analysis. Provides more consistency in monitoring. Provides better base for science.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

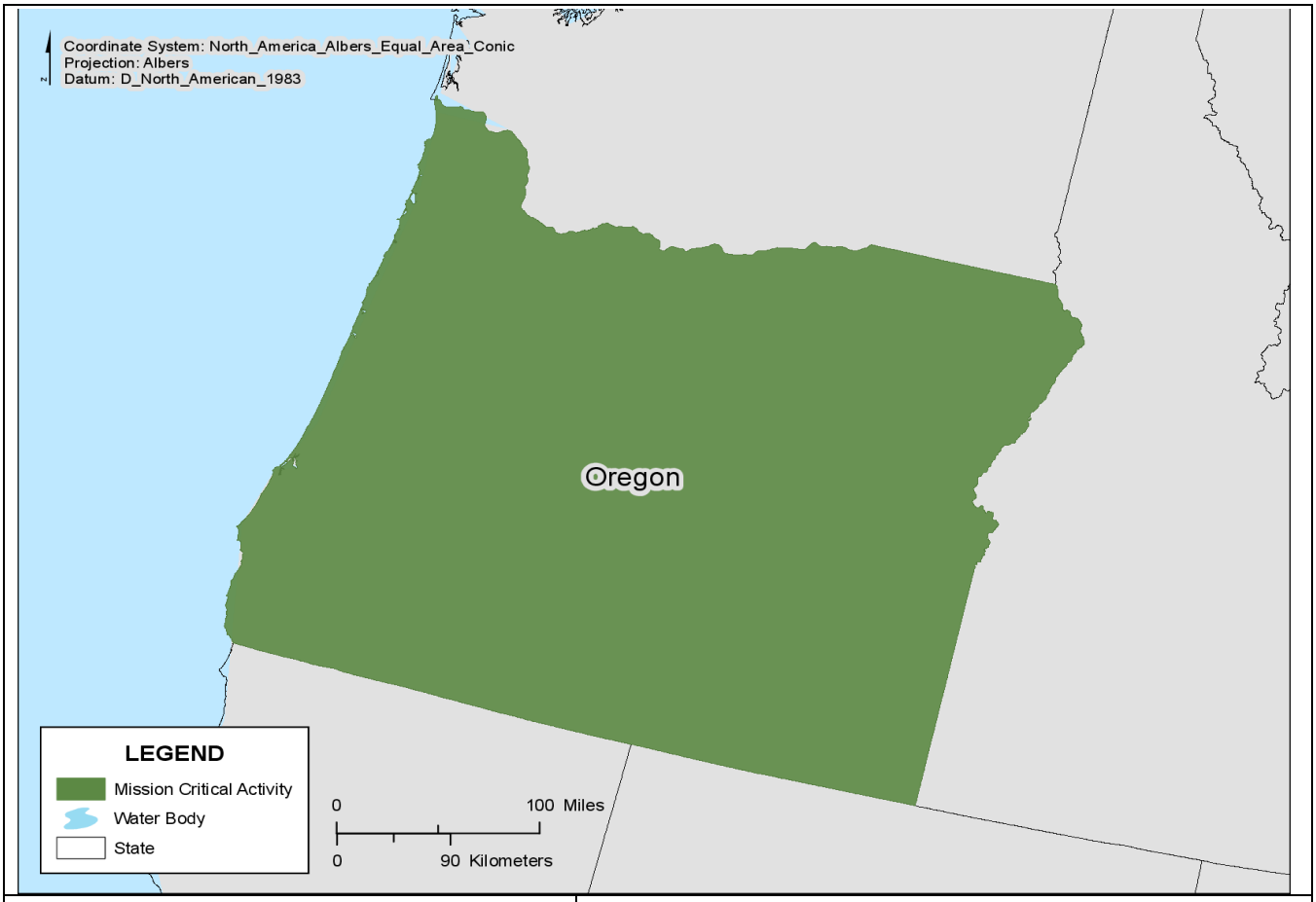
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Rights



Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	Administration of water rights from ground and surface sources. Important for state-level monitoring of water rights and providing information to others regarding water rights in the state.
MCA_ID:	3777927753_1
Organization Type:	State Government
Organization Name:	Oregon Water Resources Dept.
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$22 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	If the NHD supported a whole stream route it would save us a lot of additional processing to produce and maintain our own. Consumers of our data need a stream mile reference system that applies to the whole stream. Likewise, it would be helpful to see stream miles on the US Topo, similar to what there used to be on the quad maps.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

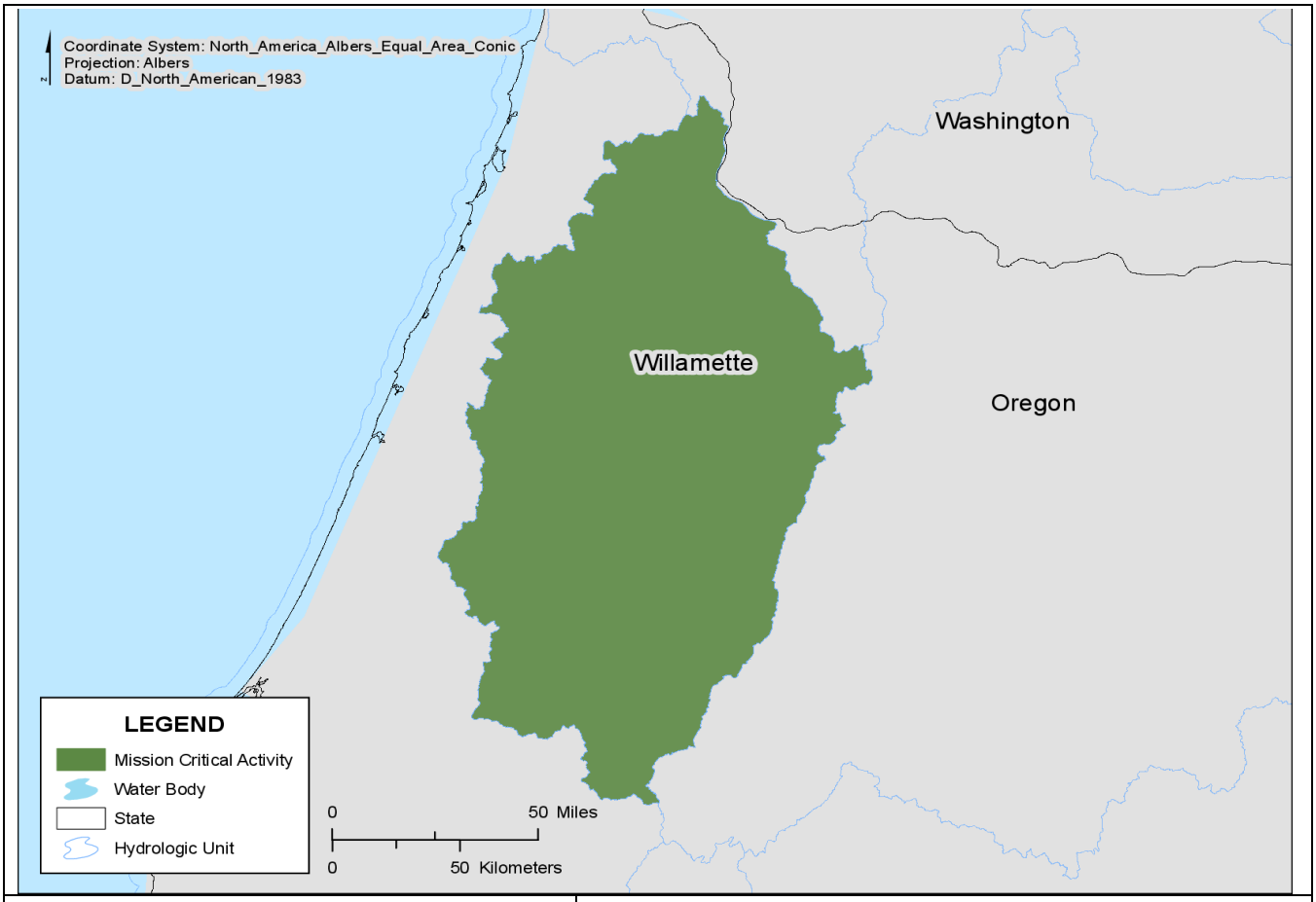
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Whole stream identifier with measures (routed).

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	Visual Inspection
Soils	Not Required	None
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice to Have	Associate Selected Data Type
Stream Flow	Nice to Have	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Irrigation Water Rights



Mission Critical Activity Title:	Irrigation Water Rights
Mission Critical Activity Description:	Irrigation water rights delivery and irrigation supply prediction. Agency has a need to accurately predict water supply for irrigation purposes. With significant issues in water rights, accurate water supply prediction is important to the state.
MCA_ID:	3801692286_1
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Santiam Water Control District
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$75,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$150,000
Future Benefits Description:	Increased understanding of water delivery system and environmental concerns.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	

Required Analytical Functions	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice to Have	Visual Inspection
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Not Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Required	Visual Inspection
Other (please specify the importance and highest analysis level):		

Pennsylvania

Nine state, regional, and local entities responded to the USGS Hydrography Requirements and Benefits Study (HRBS) survey and identified a total of 13 Mission Critical Areas (MCAs) for Pennsylvania.

The HRBS survey results for Pennsylvania noted requirements for improved and coordinated hydrography data covering a range of MCAs in support of:

- Water resource management with regard to monitoring and assessing both surface and ground water quality for environmental regulation
- Transportation and infrastructure planning and construction
- Stormwater management and regional water resource planning
- Watershed management and protection
- Flood mapping and flood risk management

The primary reported Business Uses (BUs) of Urban and Regional Planning, Watershed or Stream Management, and Water Quality Monitoring are reflected in the MCAs. One of the more unique applications in Pennsylvania was for mapping and modeling of abandoned mine pools. Most of the reporting entities had a working familiarity of the NHD and the Watershed Boundary Dataset (WBD); however, most do not use the NHDPlus on a regular basis or at all. USGS stream gage data, floodplain boundaries, and wetlands were seen as required data characteristics. Delineating catchments and calculating drainage areas were key analytical functions. In terms of integrating with other datasets, land cover, elevation, soils, and streamflow were rated as required by a majority of respondents. Most respondents favored the use of 12-digit HUCs as a management unit, and Esri geodatabases, shapefiles, and raster grids were the preferred file formats. To varying degrees, ancillary national datasets, such as the National Wetlands Inventory (NWI), STORET, National Agricultural Statistics Service (NASS), National Pollutant Discharge Elimination System (NPDES), and National Water Information System (NWIS), as well as specialized state hydrography-related datasets are used to augment programmatic needs to meet business requirements. Respondents in Pennsylvania defined business requirements for more current and complete hydrographic data to augment analysis integrating other framework layers that include improved alignment of NHD data with high-resolution elevation data (DEMs) as lidar elevation data become the increasingly available standard.

For Pennsylvania respondents, program budget information ranged from a high of $164 million to a low of $75,000, but most respondents were unsure of the exact amounts. Water programs are generally embedded in larger departments, and may operate on a mix of appropriated funds, non-appropriated special revenue, or grant funding. Quantitative fiscal benefits, both current and future, were similarly difficult to ascertain, and formal budgetary cost-benefit analysis or return-on-investment scenarios have not been performed regarding hydrographic data specifically.

Most respondents agree that improving NHD data and stewardship provide qualitative benefits to their work, such as providing better products and more value-added services to agency employees and the public, time savings for field work, data management and revision, and improved data accuracy and spatial delineation for analysis and modeling purposes.

Pennsylvania currently has no effective method for coordinating with state, Federal, and local agencies to collect and leverage resources to prioritize NHD updates. NHD stewardship was formalized by an MOU in 2006, and is currently maintained by one person in the Pennsylvania Department of Environmental Protection (DEP). The NHD is currently available at 1:24,000 scale, but funds and staffing resources are not available for comprehensive updates or improvements to the data. Over the past several years, unofficial efforts to promote and fund a more systematic and stable state NHD stewardship program have generated much interest, but not much action. A newly-created state GIS coordinating council may improve the data collection and update situation for the NHD.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Nice To Have
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Somewhat Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

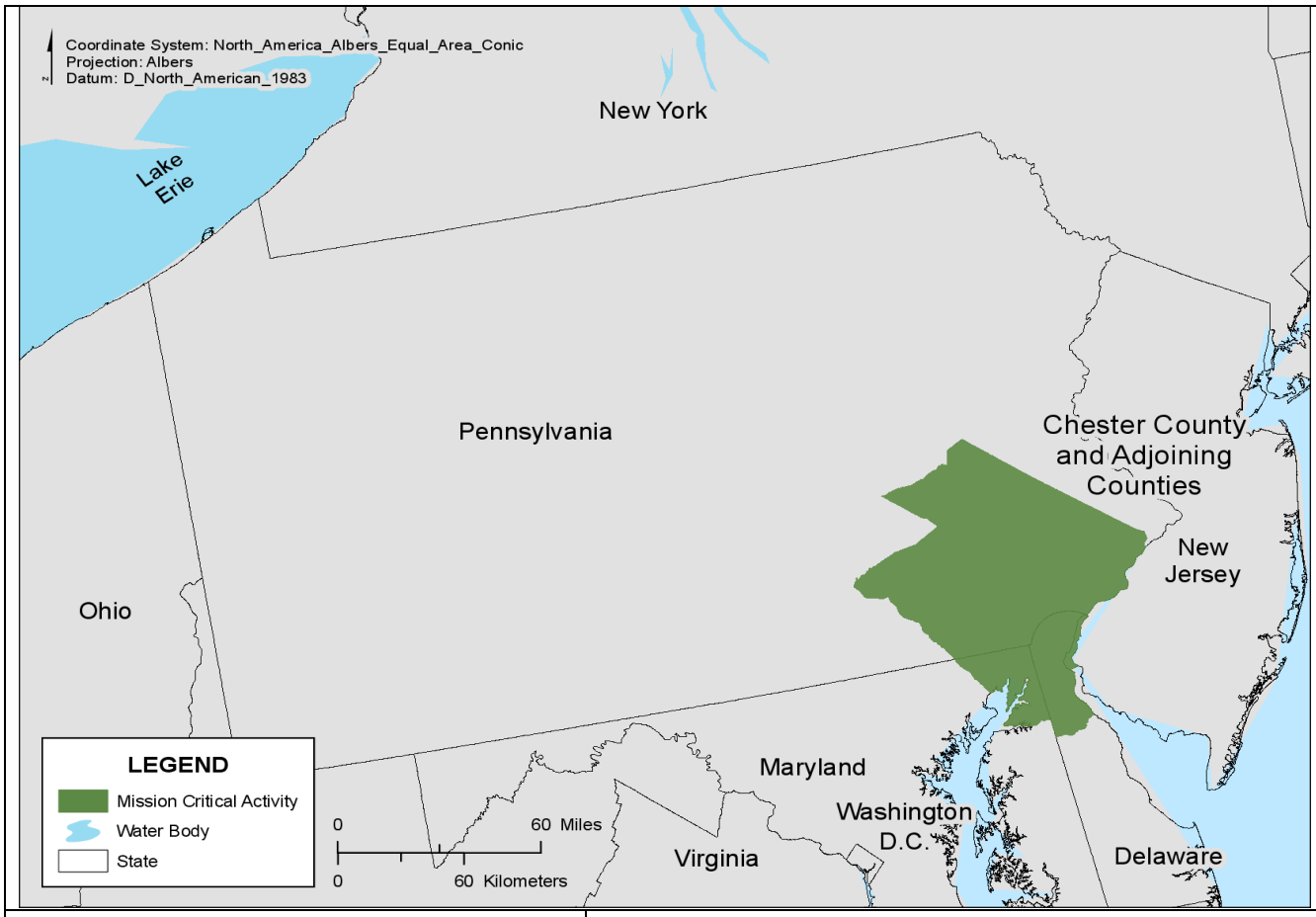
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Pennsylvania managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Education and Public Outreach



Mission Critical Activity Title:	Water Education and Public Outreach
Mission Critical Activity Description:	Public outreach and education.
MCA_ID:	3816450494_3
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Chester County Water Resources Authority
Business Use:	Education K-12 and Beyond
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	PADEP Integrated Non-Attaining; PADEP Integrated Attaining; PADEP Designated Uses; PADEP Existing Uses; FEMA Floodplains; and USGS Watershed Boundaries for Named Streams in PA.

Current Benefits	
Total Annual Program Budget:	$75,000
Current Annual Benefits ($):	$15,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	With better Hydrography, we could build better online maps and applications to conduct outreach and serve multiple interests.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable

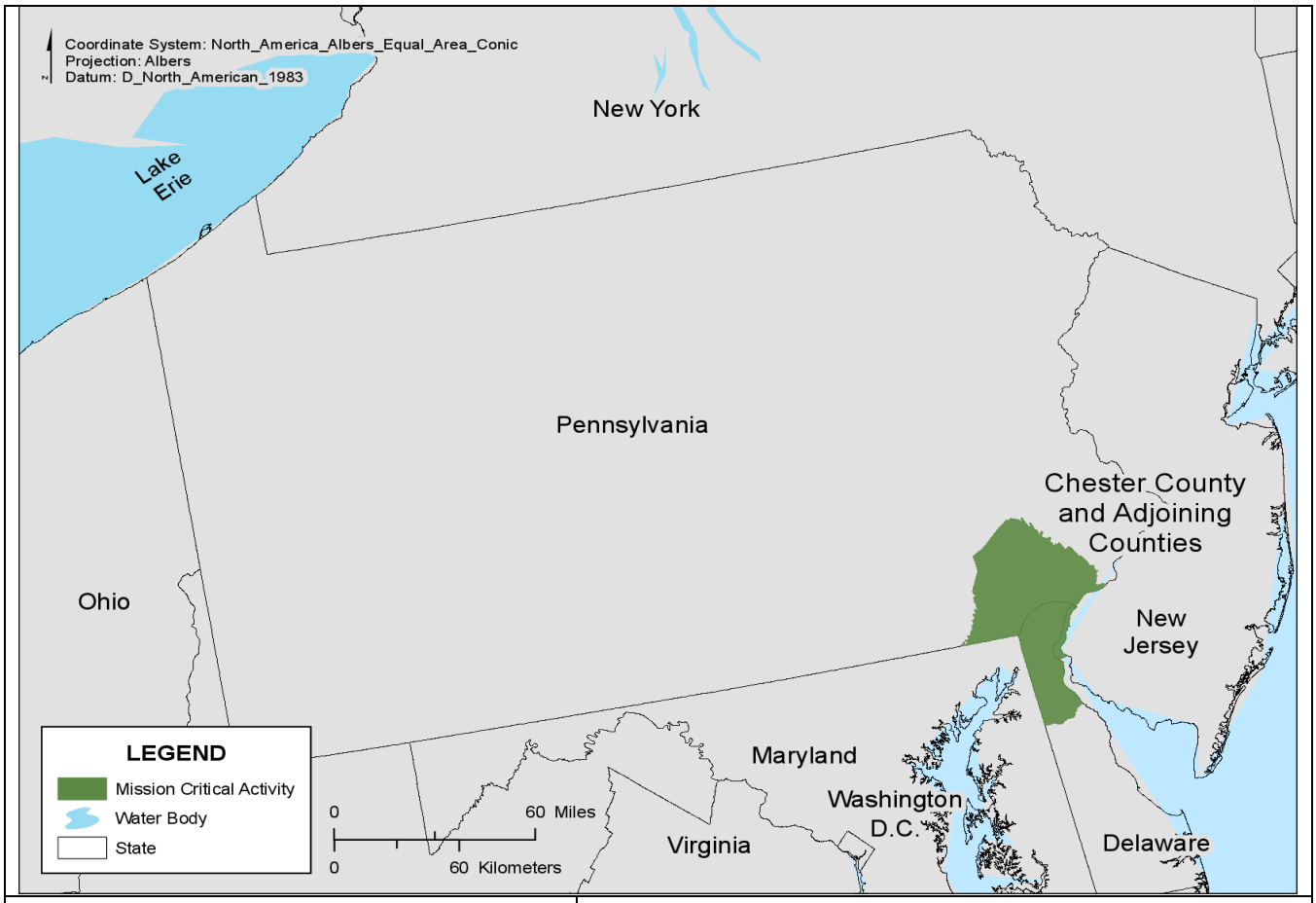
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	USDA SURGO; FEMA FIRMs.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Visual Inspection
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):	NWS flood forecast – Highly Desirable, Visual Inspection	NWS flood forecast – Highly Desirable, Visual Inspection

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Mapping and modeling of breach analyses (including probable inundation zones) of high hazard flood control dams.
MCA_ID:	3816450494_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Chester County Water Resources Authority
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Chester County has a local streams GIS layer based on aerial photographs that is more detailed than the NHD.

Current Benefits	
Total Annual Program Budget:	$400,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	New benefits from switching from local streams GIS to a consistent National GIS would be less costly to maintain data on us, better integration of our products with County Emergency Services, and easier outreach to public and first responders.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Minor

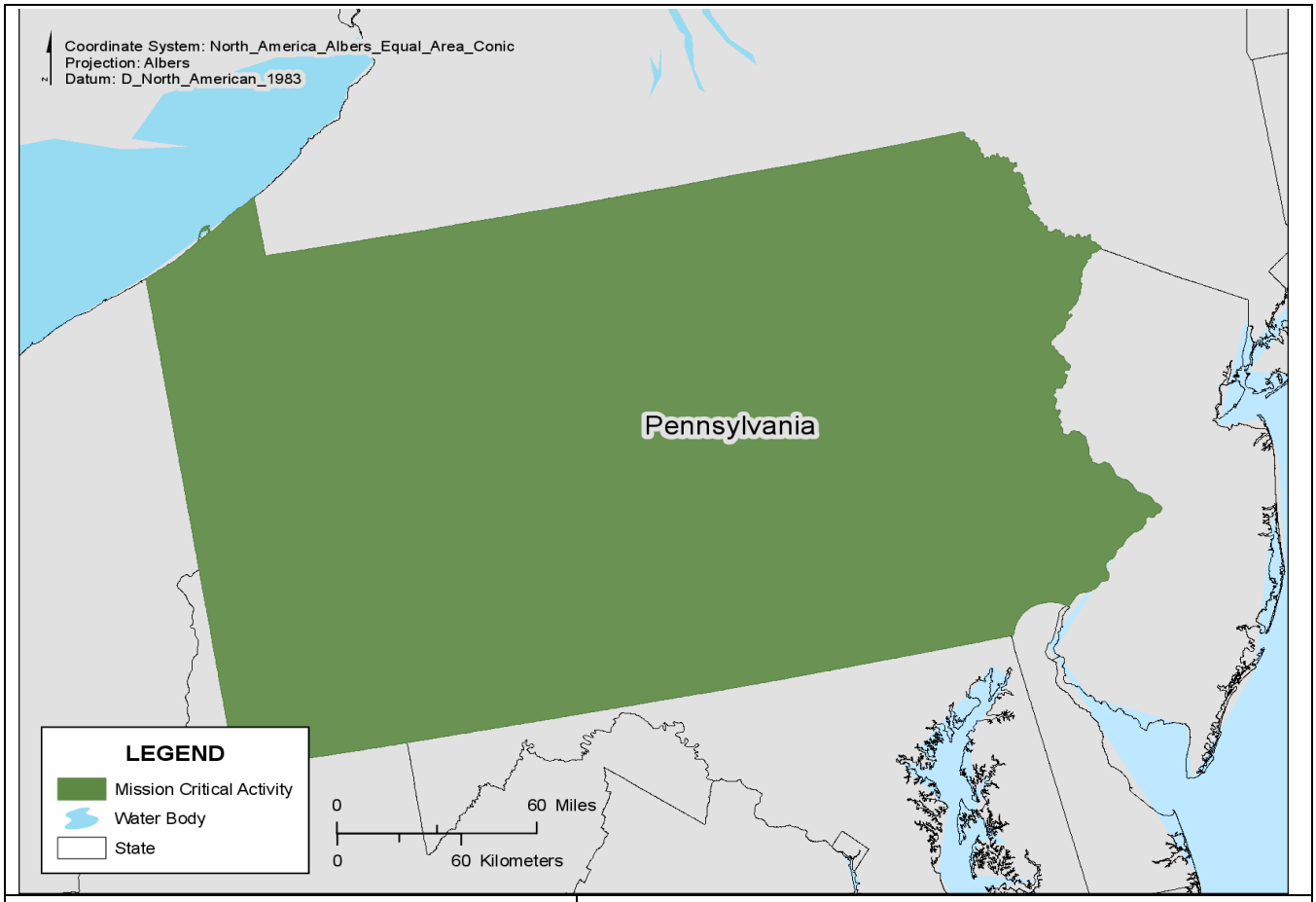
Future Benefits	
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Visual Inspection
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Forest Resources Management



Mission Critical Activity Title:	Forest Resources Management
Mission Critical Activity Description:	Forest and park management, conservation, and protection.
MCA_ID:	3829256384_1
Organization Type:	State Government
Organization Name:	Pennsylvania Department of Conservation and Natural Resources
Business Use:	Forest Resources Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Specialized stream delineation based on statewide lidar on a case-by-case basis.

Current Benefits	
Total Annual Program Budget:	$164 million
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

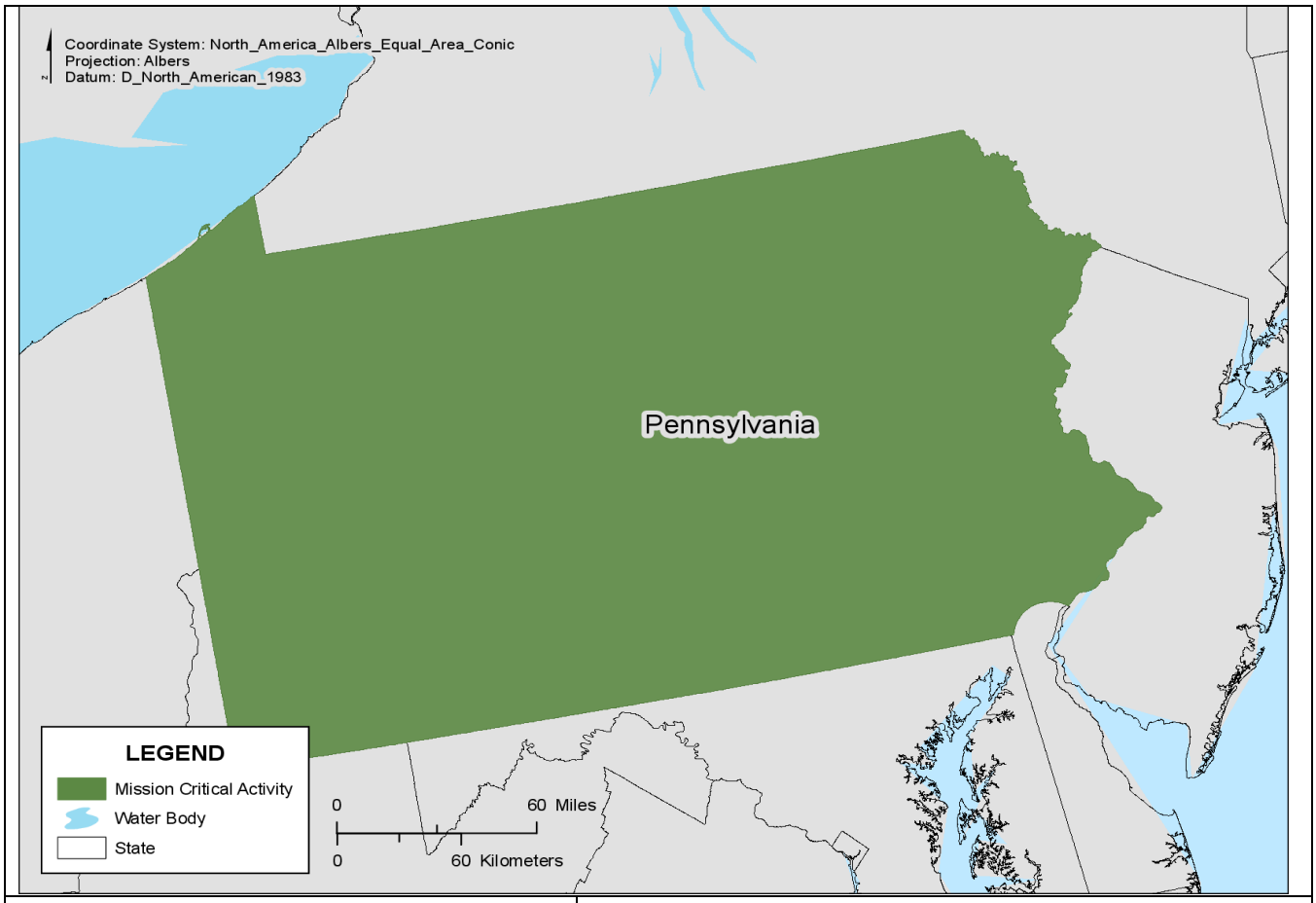
Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Improved ability and efficiency to meet our mission/initiatives minimizing field work needs.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):	NWS – Nice to Have, Visual Inspection	NWS – Nice to Have, Visual Inspection

Infrastructure and Construction Management



Mission Critical Activity Title:	Infrastructure and Construction Management
Mission Critical Activity Description:	Development of acceptable hydraulic bridge openings for replacement bridges (through H&H modeling).
MCA_ID:	3772224635_1
Organization Type:	State Government
Organization Name:	PennDOT
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Whatever StreamStats uses.

Current Benefits	
Total Annual Program Budget:	$1.3 million
Current Annual Benefits ($):	$13,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$65,000
Future Benefits Description:	It would save us time and money in that we could quickly use the data to supplement data we currently research and survey to obtain.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones/buffers.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Natural Resources Conservation

Mission Critical Activity Title:	Natural Resources Conservation
Mission Critical Activity Description:	Display on maps for land protection projects (fee-owned and conservation easements).
MCA_ID:	3796861319_1
Organization Type:	Not for Profit
Organization Name:	Natural Lands Trust
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Don't know.
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

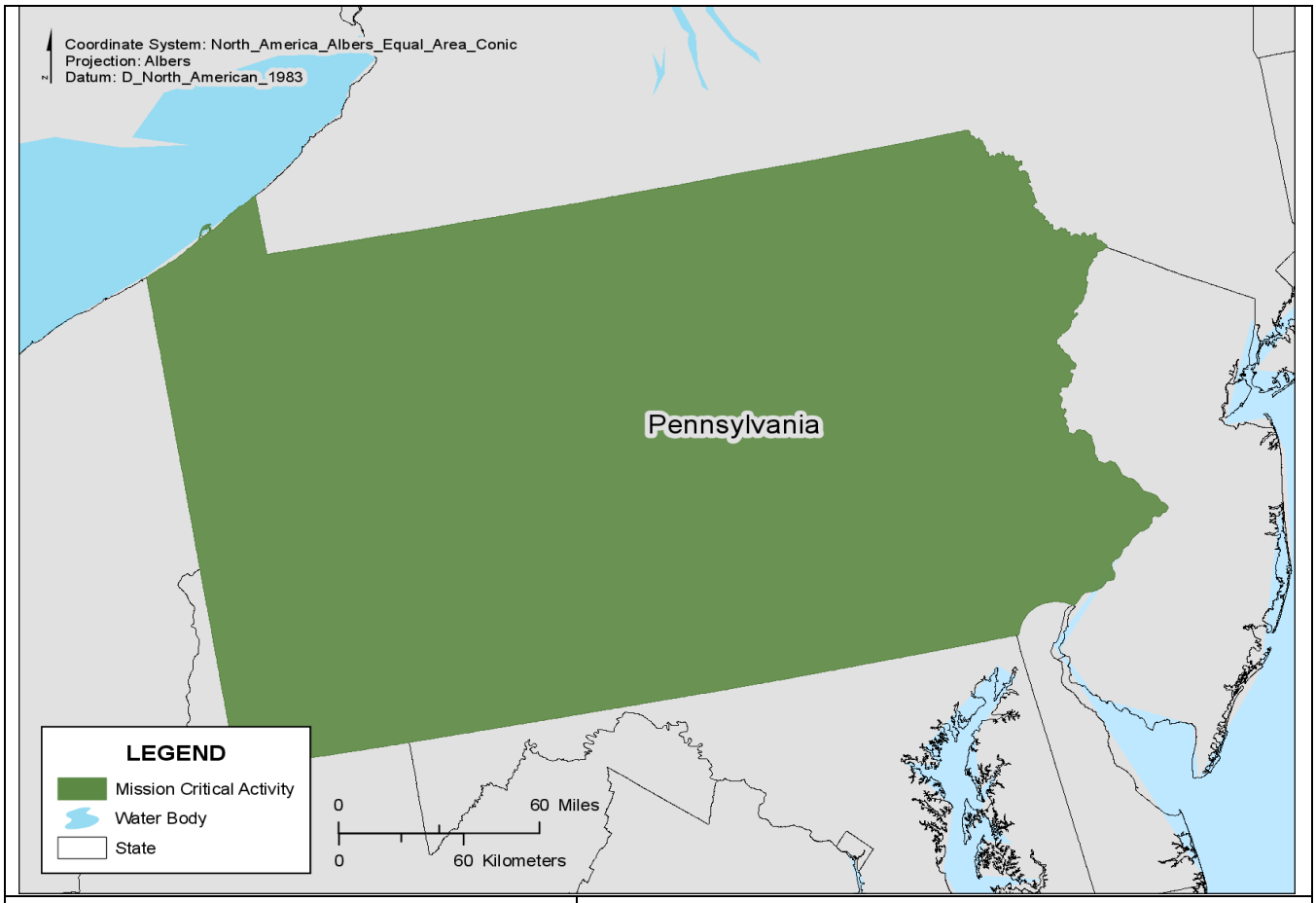
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	GNIS name of stream/river/lake.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Visual Inspection
Surficial Geology	Required	Visual Inspection
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	None
Elevation	Required	Visual Inspection
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Visual Inspection
Census (population statistics)	Nice To Have	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	None
USACE - National Inventory of Dams (NID)	Nice To Have	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Water Recreational Activities



Mission Critical Activity Title:	Water Recreational Activities
Mission Critical Activity Description:	Recreational opportunities relative to trails/water trails and greenways.
MCA_ID:	3829256384_2
Organization Type:	State Government
Organization Name:	Pennsylvania Department of Conservation and Natural Resources
Business Use:	Recreation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.4 million
Current Annual Benefits ($):	$1.4 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

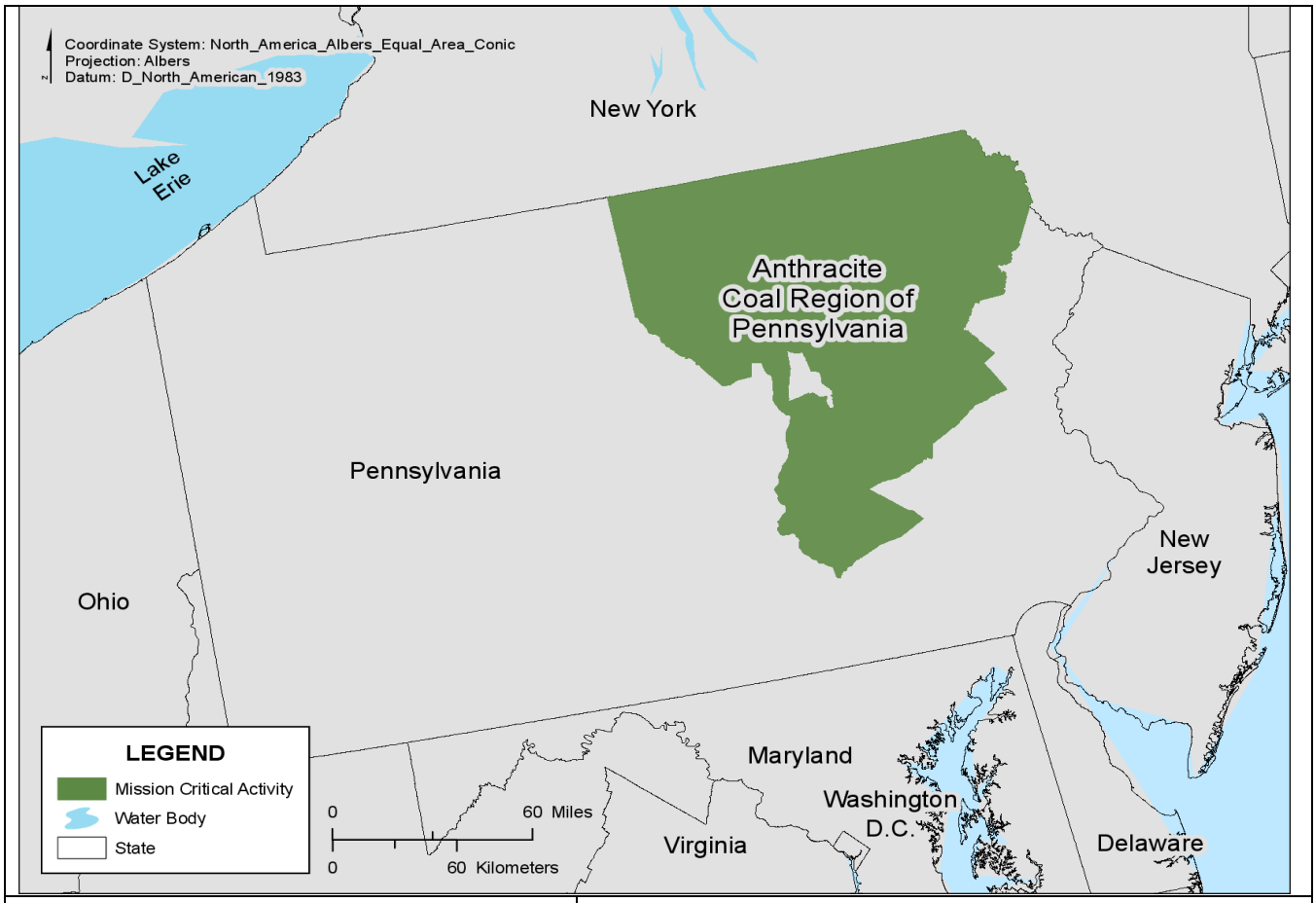
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Enhanced ability to provide for and manage recreational opportunities.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Map and Model Abandoned Mine Pools



Mission Critical Activity Title:	Map and Model Abandoned Mine Pools
Mission Critical Activity Description:	3D Mine Pool Modeling initiative on the cutting edge of computer technology to model pools of water that lie in underground abandoned coal mines. These mine pools can cause water table/stream water pollution and destabilize mine workings, causing subsidence of the ground above, damaging property and threatening human life.
MCA_ID:	3816741955_1
Organization Type:	Not for Profit
Organization Name:	Eastern PA Coalition for Abandoned Mine Reclamation
Business Use:	Resource Mining
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	DEP mine maps, watershed and subwatershed layers, impaired waters.

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Current NHD does not have elevation points associated with waterbodies or stream reaches. Just having the elevation would allow us to determine input (surface water loss) and output (discharge) baselines for mine pools, which in turn allows us to find the most vulnerable areas for water contamination and subsidence potential.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

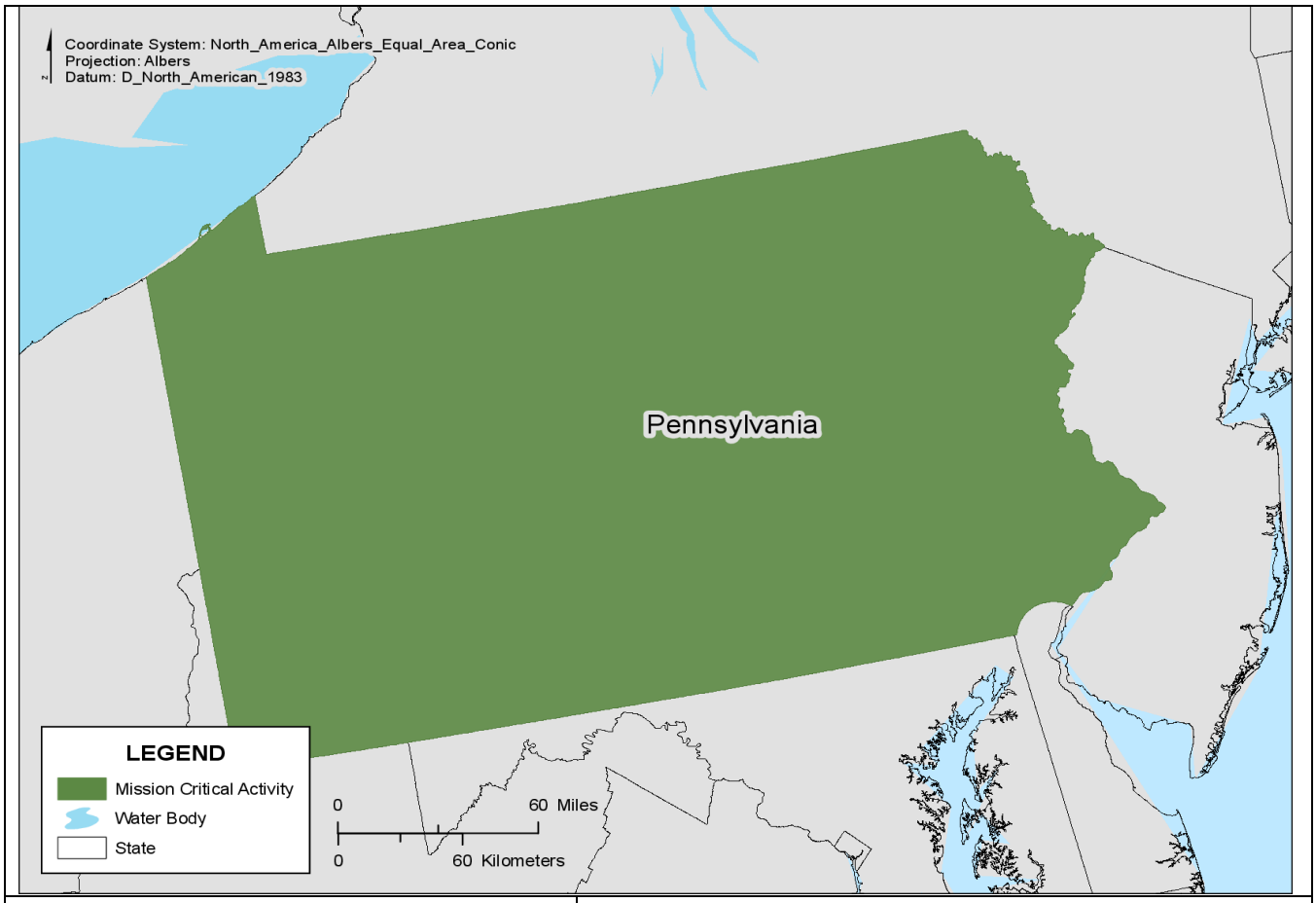
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Flow.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Visual Inspection
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	eAMLIS (OSMRE) – Required, Perform Geospatial Analysis	eAMLIS (OSMRE) – Required, Perform Geospatial Analysis

River and Stream Ecosystem Management



Mission Critical Activity Title:	River and Stream Ecosystem Management
Mission Critical Activity Description:	Fisheries management, boating, habitat.
MCA_ID:	3787570912_1
Organization Type:	State Government
Organization Name:	PA Fish and Boat Commission
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

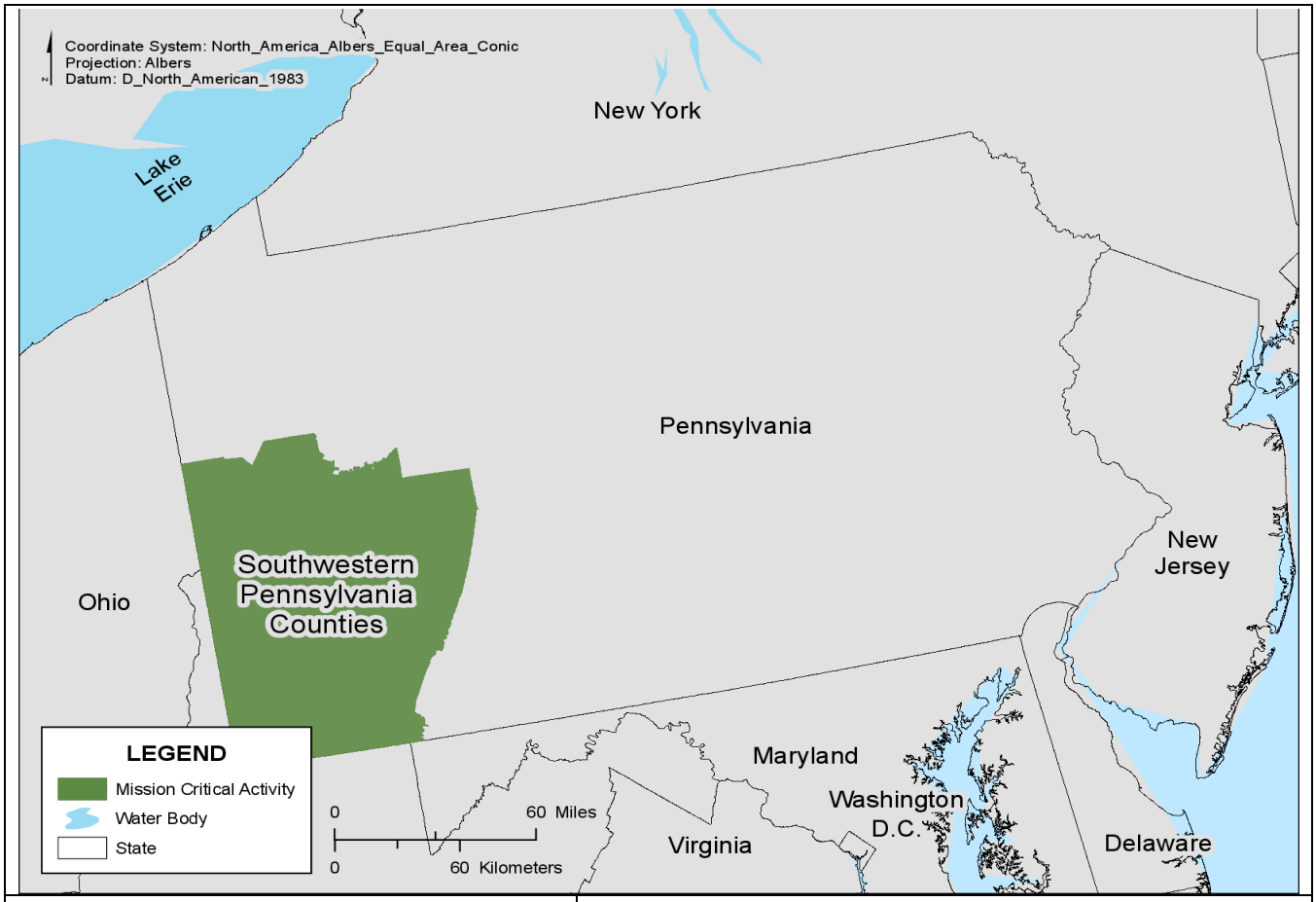
Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	Naming conventions and accuracy. Quality at lower resolutions is not mission-critical.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Summary of flowing stream miles.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Not Required	None
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Nice To Have	Visual Inspection
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Transportation Planning



Mission Critical Activity Title:	Transportation Planning
Mission Critical Activity Description:	Short- and long-range transportation planning.
MCA_ID:	3822808260_1
Organization Type:	Not for Profit
Organization Name:	Southwestern Pennsylvania Commission
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Locally-developed GIS data in vector and polygon format representing waterbodies. Initial dataset was derived by PennDOT and contained linework from USGS 7.5 minute quads, and has been enhanced with linework provided by counties and digitized from aerial imagery.

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	More confidence in the accuracy of the hydrologic data as a component of regional land cover and the intersection/proximity of hydrologic data to transportation and other built infrastructure.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

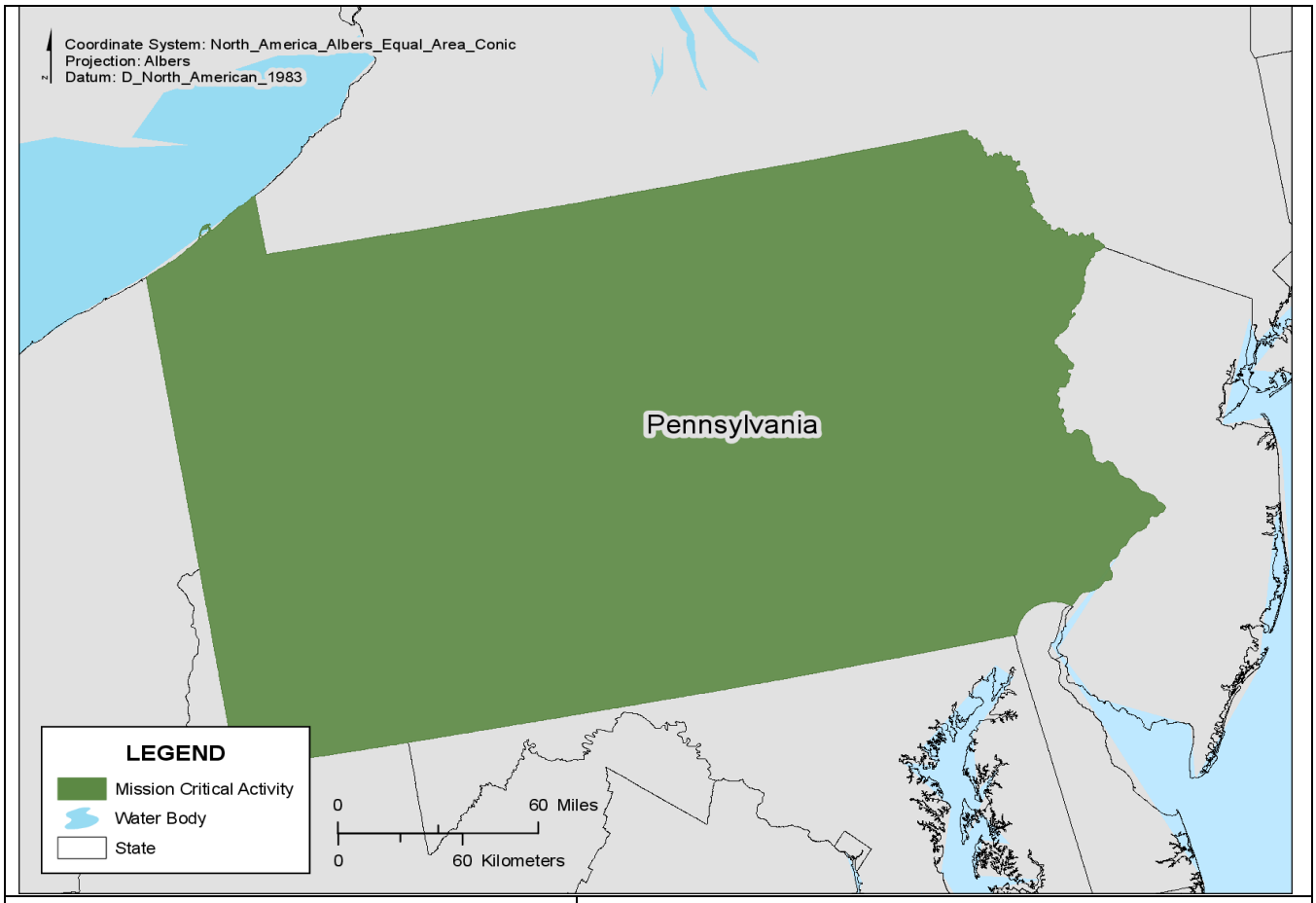
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Any intersection of hydrography with streets and roads.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Assessment



Mission Critical Activity Title:	Water Quality Assessment
Mission Critical Activity Description:	Surface water assessments across Pennsylvania for the CWA section 303(d).
MCA_ID:	3806666510_1
Organization Type:	State Government
Organization Name:	PA Dept. of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	Improved hydrographic information would allow us to more quickly and accurately assess and report the quality of PA's surface waters.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable

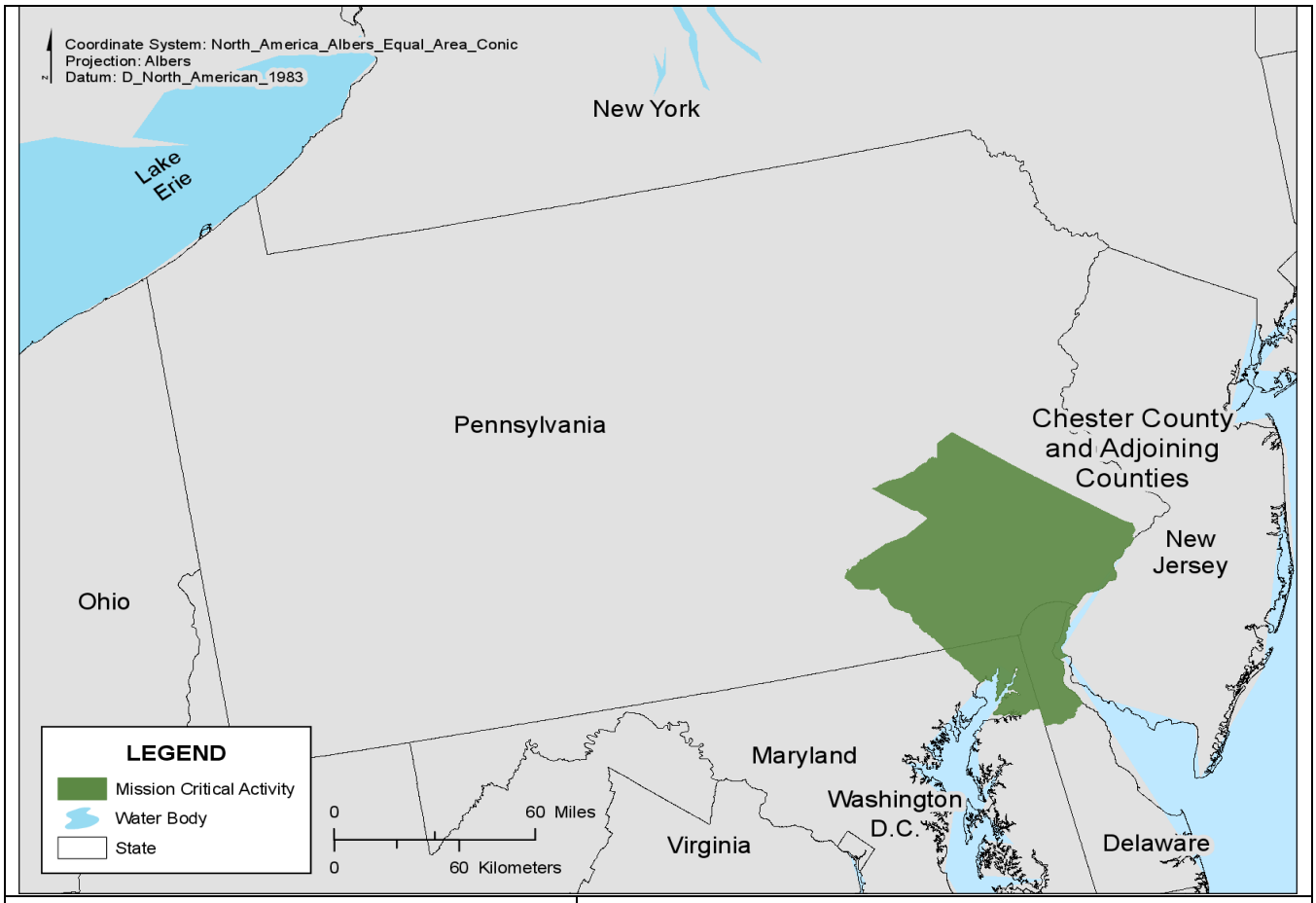
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Resource Quality Management



Mission Critical Activity Title:	Water Resource Quality Management
Mission Critical Activity Description:	Water quality modeling for TMDL compliance for county municipalities (MapShed model); Christina River Basin and potential for Chesapeake Bay.
MCA_ID:	3816450494_2
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Chester County Water Resources Authority
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$250,000
Current Annual Benefits ($):	$25,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	I suspect improved hydrologic information would allow more accurate modeling, with less staff effort. I think we would also have better products that would allow us to transfer the information to municipalities and respond to their questions better.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

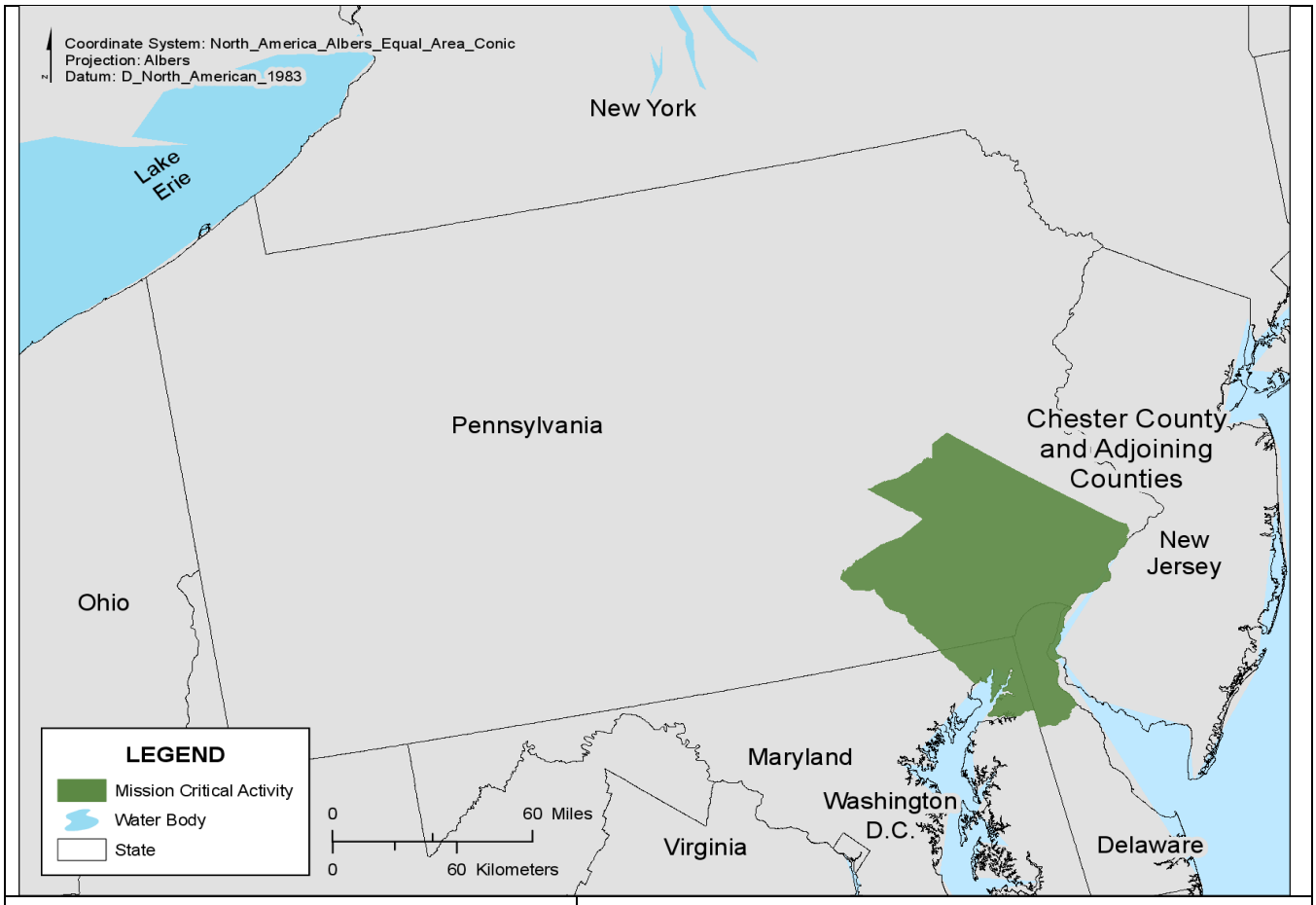
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Not Required	None
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Resource Planning and Development



Mission Critical Activity Title:	Water Resource Planning and Development
Mission Critical Activity Description:	Regional water resources planning.
MCA_ID:	3816450494_4
Organization Type:	Regional, County, City or Other Local Government
Organization Name:	Chester County Water Resources Authority
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Geologic units from USGS with data on base flow.

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

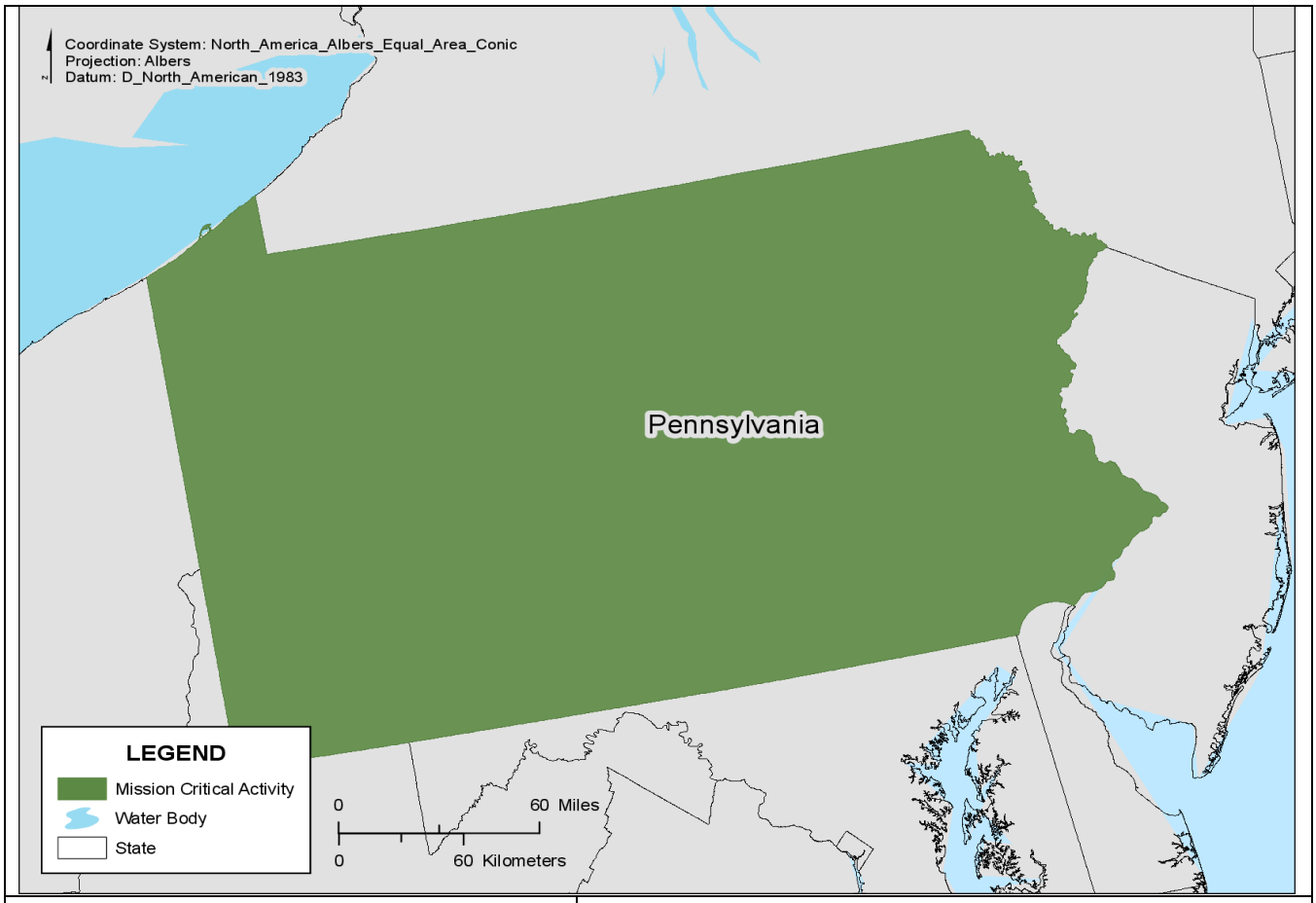
Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	We invested tremendous effort to collect water quality and quantity information from multiple states and regulatory agencies. The effort was so large that it precludes frequent updates. With an improved national dataset, more frequent and more detailed evaluations could occur.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Resource Planning and Development



Mission Critical Activity Title:	Water Resource Planning and Development
Mission Critical Activity Description:	Water allocation and instream flow protection.
MCA_ID:	3816749892_1
Organization Type:	State Government
Organization Name:	PA Dept. of Environmental Protection
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Rhode Island

Rhode Island has abundant fresh and marine surface waters with more than 250 lakes and ponds, approximately 400 miles of coastline, and 1,400 miles of rivers and streams. Worden's Pond is the state's largest natural freshwater pond, covering 1,051 acres. Rhode Island's Narragansett Bay dominates the landscape and is one of New England's most significant estuaries. The estuary is 25 miles long and 10 miles wide with about 256 miles of shoreline. The major uses of these surface water resources are recreation, habitat, public water supply, agriculture, and thermoelectric power generation.

Information gathered through the survey of state and local officials identified several Mission Critical Activities (MCAs) that require access to GIS-based hydrographic data for the management of surface waters. Rhode Island's MCAs are summarized below:

- Water Quality Monitoring and Assessment including activities to collect water quality data, map catchment areas for sampling stations, interpret data and characterize water resources, and generate information reported via the EPA Integrated Report process (305b/3030d)
- Watershed Protection and Restoration to facilitate actions to protect and restore water quality. Includes various programs to assess water pollution problems and design appropriate pollution control strategies (e.g. the Total Maximum Daily Load (TMDL) program, water quality modeling in river systems). Also involves aspects of water resource management such as lake management and regulation of water withdrawals
- Water Availability and Water Allocation including conducting and maintaining an inventory of the water resources of the state to ensure adequate quantities of water are available to support current and future users and uses, including the environment and the resources themselves. This also involves water supply management activities related to drought, water use and demand management, monthly water conditions monitoring, assessing precipitation patterns, public education, etc.
- Stormwater Management
- Teaching, research, and extension that addresses important surface water issues

Four additional activities were identified during a subsequent meeting of survey participants. The statistics from the survey do not reflect these activities:

- Flood Risk Mapping: characterization of flooding risks
- Climate Change Assessments: applying models to characterize changes in hydrology, sea level, and coastal storm surge attributable to changing climatic conditions; support planning for adaptation and mitigation to climate change
- Aquatic Habitat Management and Restoration: planning, designing, and installing fish passage to restore anadromous fisheries; various activities aimed at improving stream connectivity and protection and restoration of riparian buffers in order to support fish and wildlife management; tracking aquatic invasive species in freshwater lakes, ponds, rivers, and streams
- Culvert and bridge design

While specific responses to the survey vary, the median response from those taking the survey on update frequency indicates that a two-to-three-year update cycle for the data is required. The median response for required positional accuracy was +/- 33 feet and "less than an acre" for smallest mapped water body. The consensus of survey participants is that accurate and up-to-date hydrographic data yield moderate

benefits to their agencies, both currently and in the future. This is consistent across all three survey categories.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓				✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, streamgages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Required
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Critically Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2 to 30 days

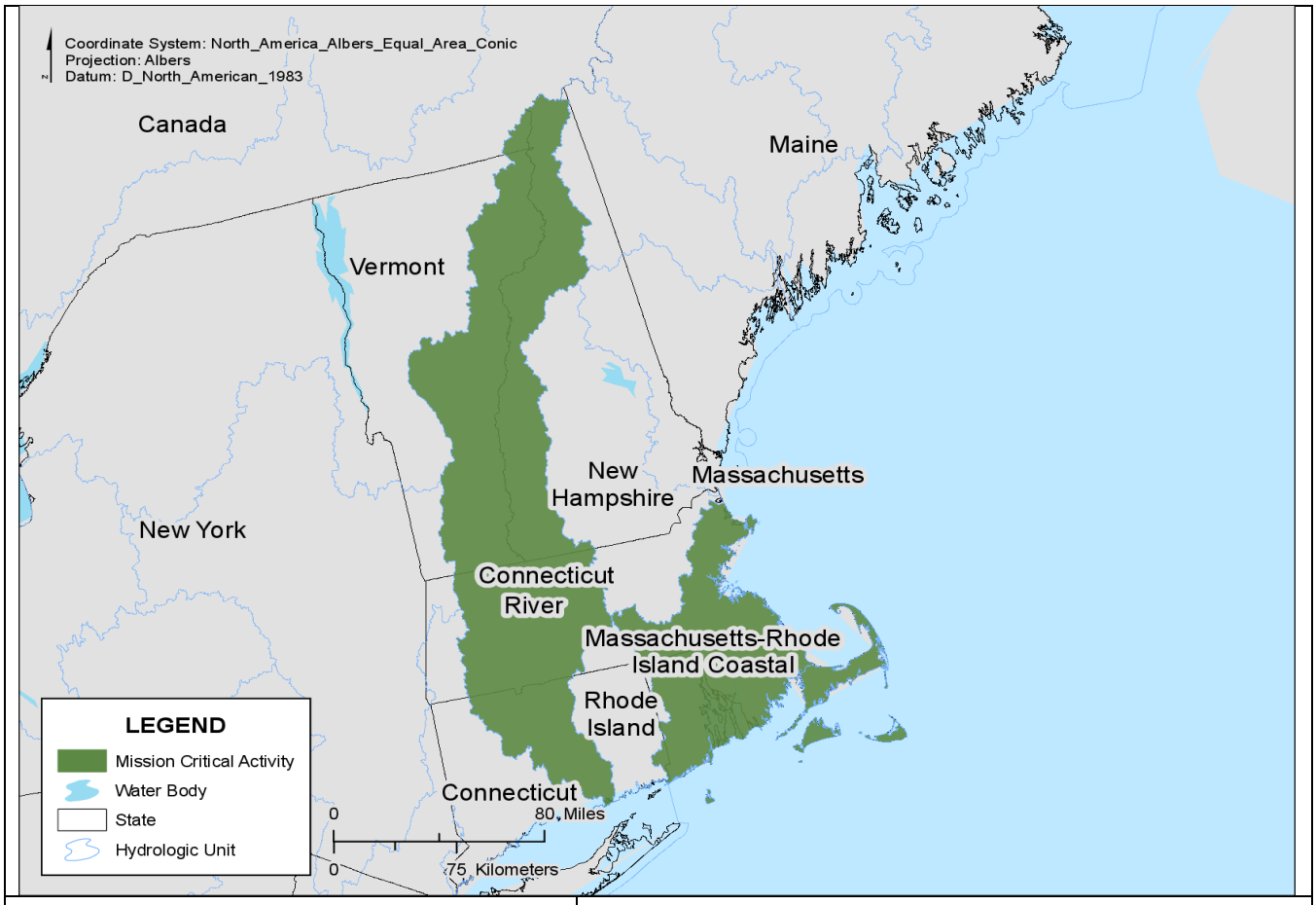
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Rhode Island managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Watershed Flux of Nutrients



Mission Critical Activity Title:	Watershed Flux of Nutrients
Mission Critical Activity Description:	Teaching, research, and extension related to watershed flux of nutrients. This can serve to inform TMDL and examine sources and sinks of pollutants.
MCA_ID:	3820286825_1
Organization Type:	State Government
Organization Name:	Rhode Island
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$300,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

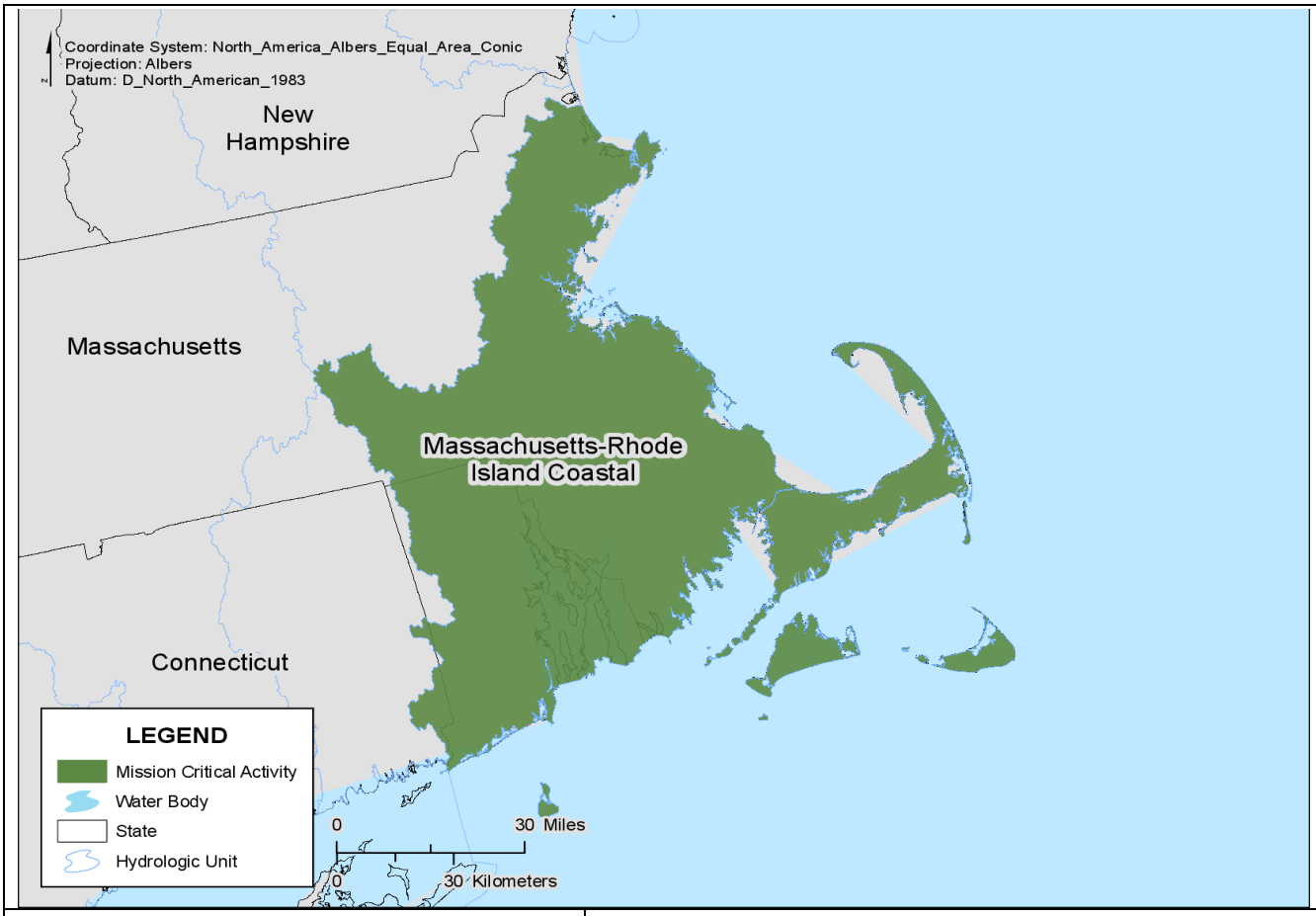
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management.
MCA_ID:	3787955159_2
Organization Type:	State Government
Organization Name:	RIDEM
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

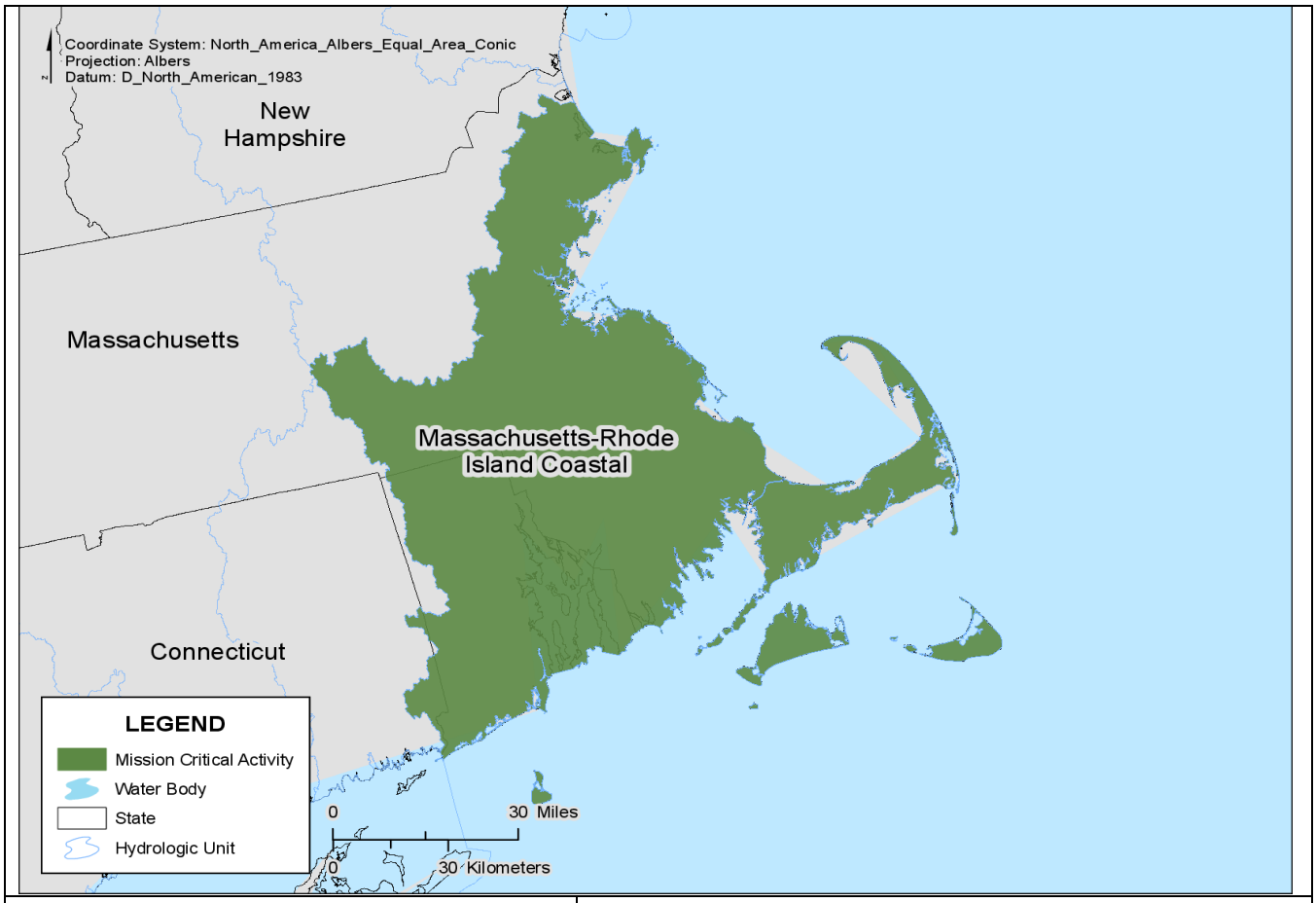
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	I do not know if NHD data could help with stormwater downstream analysis on large projects.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Nice To Have	Visual Inspection
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Water quality monitoring and assessment: involves activities to collect water quality data, map catchment areas for sampling stations, interpret data and characterize water resources, and generate information reported via the EPA Integrated Report process (305b/3030d).
MCA_ID:	3772111665_1
Organization Type:	State Government
Organization Name:	RI Department of Environmental Management
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown
Future Benefits Description:	Association of peripheral data (sources, diversions, dams) with hydrography will be a great help in water quality assessment and development of TMDLs on impaired waterbodies.
Future Operational Benefits	
Future Time/Cost Savings:	Not Applicable
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

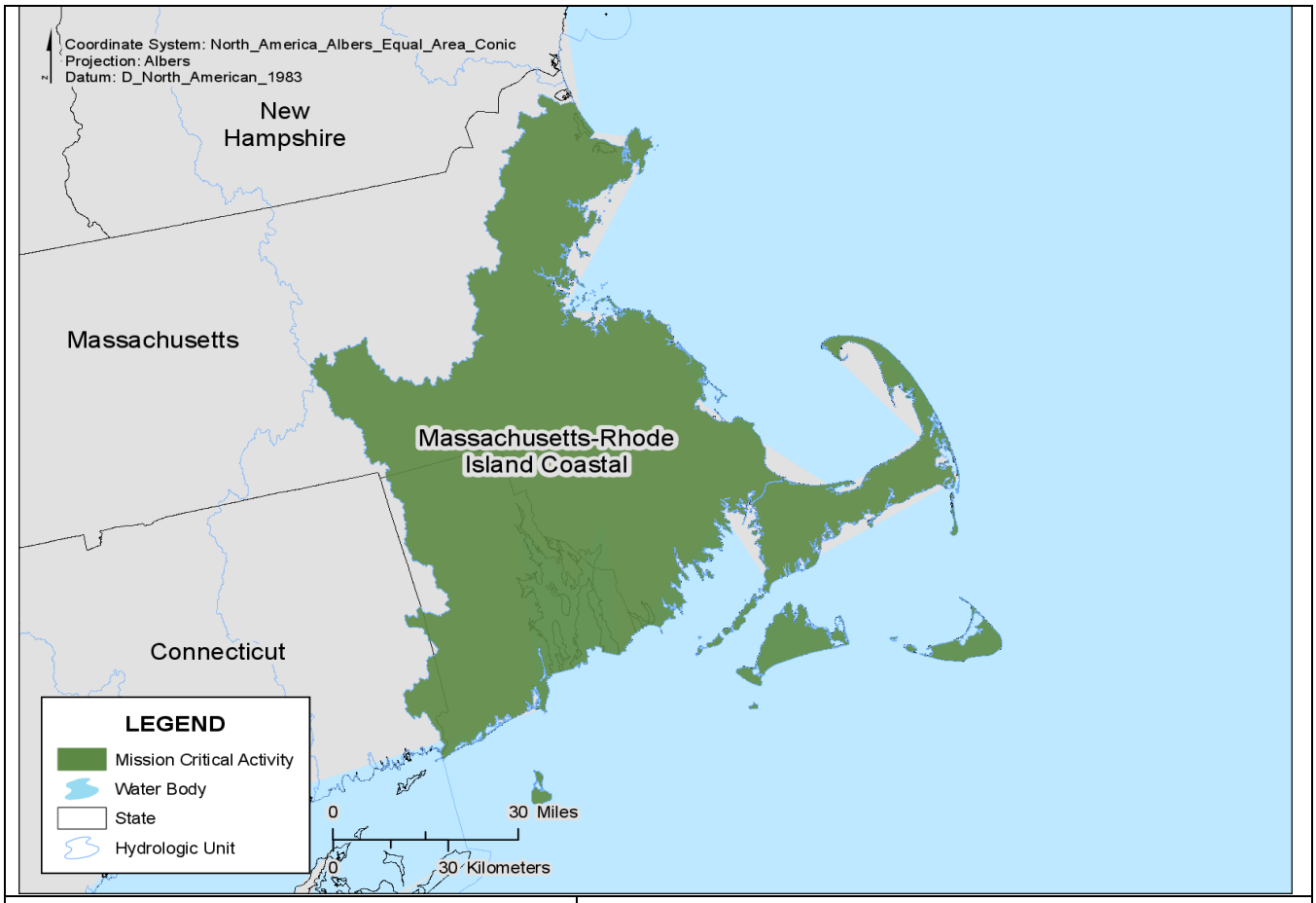
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Pollution Control



Mission Critical Activity Title:	Water Pollution Control
Mission Critical Activity Description:	Watershed protection and restoration: facilitate actions to protect and restore water quality. Includes various programs to assess water pollution problems and design appropriate pollution control strategies (e.g. TMDL program, water quality modeling in river systems). Also involves aspects of water resource management such as lake management and regulation of water withdrawals.
MCA_ID:	3787955159_1
Organization Type:	State Government
Organization Name:	RIDEM
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	EPA's Assessment Database and a water quality database called SWIMS (which is STORET and Water Quality Exchange [WQX] compatible).

Current Benefits	
Total Annual Program Budget:	$700,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	If NHD were improved and interactive with the public, if it was connected to STORET or another water quality or assessment database, then the public could easily find information about the waterbody of concern.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

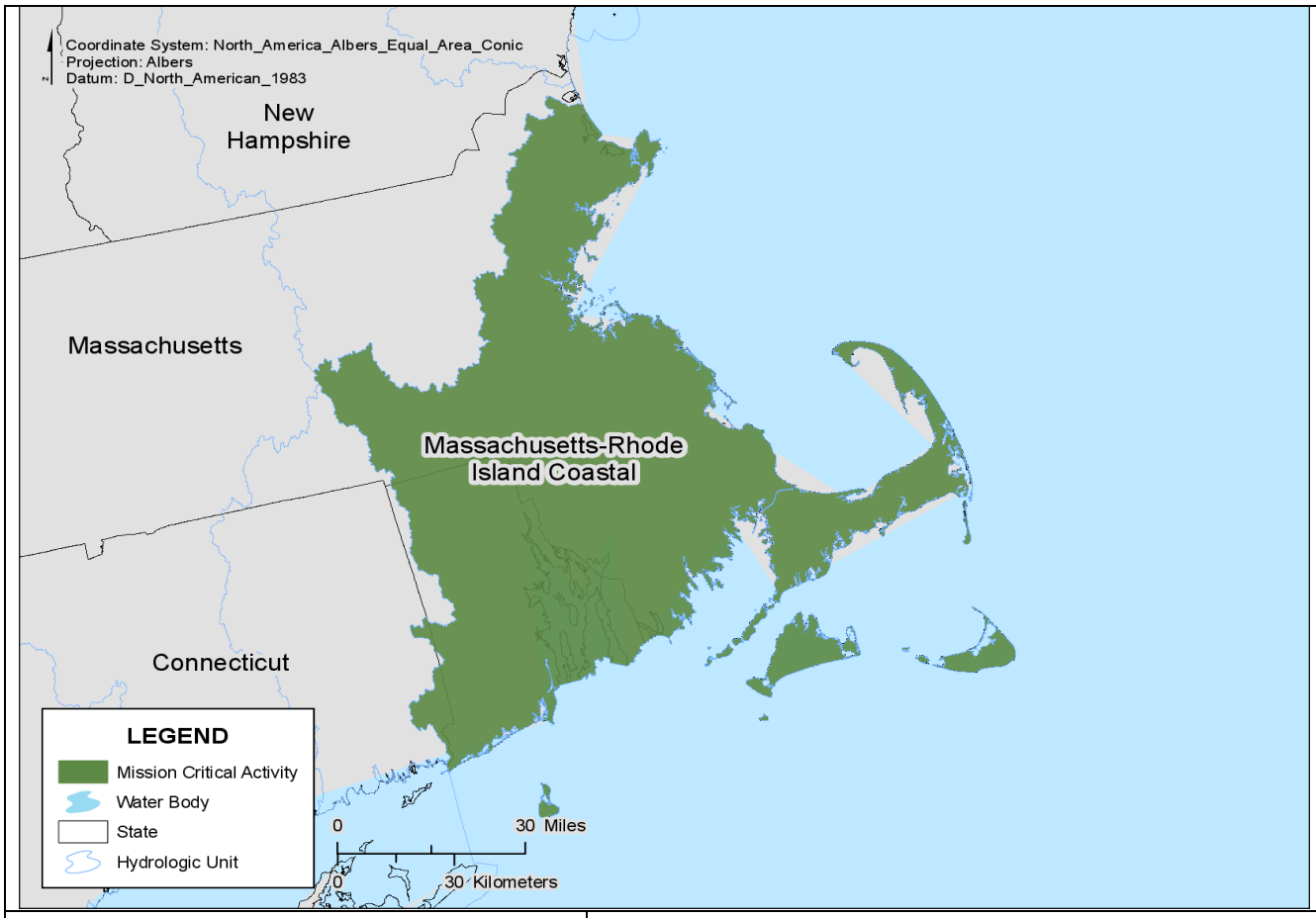
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Required	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Availability and Allocation



Mission Critical Activity Title:	Water Availability and Allocation
Mission Critical Activity Description:	Water availability and water allocation: this mission includes conducting and maintaining an inventory the water resources of the state to ensure adequate quantities of water are available to support current and future users and uses including the environment and the resources themselves. The mission includes fair and equitable allocations, if and when necessary.
MCA_ID:	3804520880_1
Organization Type:	State Government
Organization Name:	Rhode Island Water Resources Board
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Information from USGS water use and availability studies at the HUC-10 and -12 digit levels with modifications related to groundwater divides.

Current Benefits	
Total Annual Program Budget:	Currently unfunded.
Current Annual Benefits ($):	Not currently in use pending completion of RI StreamStats and water atlas.
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	Past and future budgets (pending for FY16) would realize societal, environmental, education, and human services benefits across multiple agencies. Human safety benefits related to drought planning, mitigation, and response.

Future Benefits	
Future Annual Benefits ($):	Unknown
Future Benefits Description:	More robust integration of water supply planning, hydrology, and water availability would result in additional efficiencies across agencies/suppliers in permitting new sources and ensuring reliable supplies statewide.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate

Future Benefits	
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Saturated thickness, withdrawal data, and groundwater reservoirs.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes

Required Analytical Functions	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Associate Selected Data Type
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Nice To Have	Visual Inspection
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

South Carolina

The state and local agencies that represent South Carolina identified five Mission Critical Areas (MCAs) for which hydrography is imperative. The abbreviated titles of the MCAs for South Carolina are:

- Flood Risk Mapping
- Geological Mapping
- Public and Environmental Health
- Stormwater Management
- Water Availability and Assessment

There are four Business Uses (BUs) that were identified for the MCAs:

- Flood Risk Mapping
- Geologic Resource Assessment and Hazard Mitigation
- Water Quality
- Water Resource Planning and Development

Two local governments and three areas of state government replied to the survey, so the geographic areas of interest covered range from one or two watersheds to the entire state. Many of the responses split out into two categories, one representative of local needs, and one representative of state needs.

It was felt that there was a critical need for Ecosystem Monitoring and Assessment for Habitat, Wetlands, and Natural Resources that wasn't reflected in the survey. The needs for this MCA would be comparable to the statewide data needs.

A statewide assessment of the streams network was determined to be needed every five to 10 years, to reflect new technology in lidar collection and imagery collection. Local jurisdictions need a more frequent review and update to reflect local construction, site plans, restoration, displacement, and other issues that would influence permitting and building restrictions. South Carolina is a coastal state that is affected by hurricanes, so both the state and local jurisdictions felt that post-event updates are nice to have or highly desirable.

Accuracy for a hydrography product was different for local and state users. The state bases many products on 1:24,000-scale maps (such as geology), so 1:24,000 is still a minimum scale requirement. The local government users have more detailed needs; urban areas in particular must be mapped at 1:1,200 scale.

All users stressed the desire to maintain the hydro lines (approximately 1:5,000 scale) that were collected with the lidar data for the state, and ideally conflate the linework into the NHD. Updates to the Watershed Boundary Dataset (WBD) are also mentioned as important in order to match and be well-integrated with the statewide lidar.

Other requirements for a hydrography dataset included integration with other datasets. Particularly important were floodplain boundaries, flood stage, and stream gage locations. The most important analytical functions were the requirement that a hydrography dataset allow users to calculate drainage area and determine downstream flood area. Diversions as lines and points and coastal bathymetry integration were also specifically mentioned in the follow-up meeting.

Of the datasets to integrate with hydrography listed on the HRBS survey, those required by more than one respondent were land cover, elevation, National Pollutant Discharge Elimination System (NPDES), diversions, point dischargers, and streamflow.

Survey respondents felt that web services are extremely important requirements for accessing the data. It was noted that allowing non-proprietary software to access the data and edit it would also be important. Web-based editing options were mentioned in the meeting as an ideal way to support multiple users. The issues of desktop software tools that need multiple versions of software was seen as a major obstacle to editing and updating the data currently.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓				✓							

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required

Data or Service Access Method	Requirement
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful

Quality Issue	Impact
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

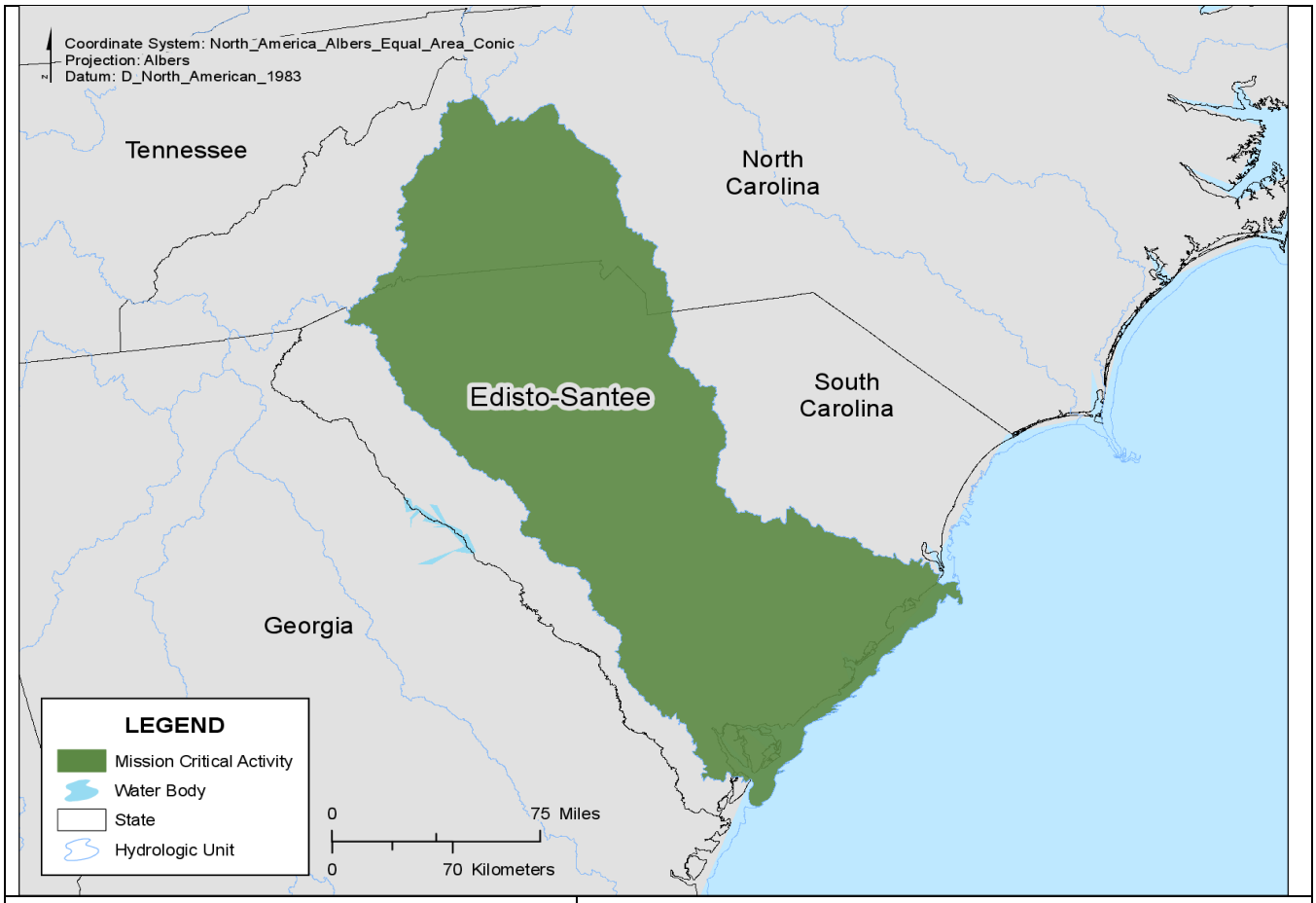
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Significant problem, but we have workarounds
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

South Carolina managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Mapping



Mission Critical Activity Title:	Flood Risk Mapping
Mission Critical Activity Description:	Flood risk mapping.
MCA_ID:	3826944639_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Lexington County, SC
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

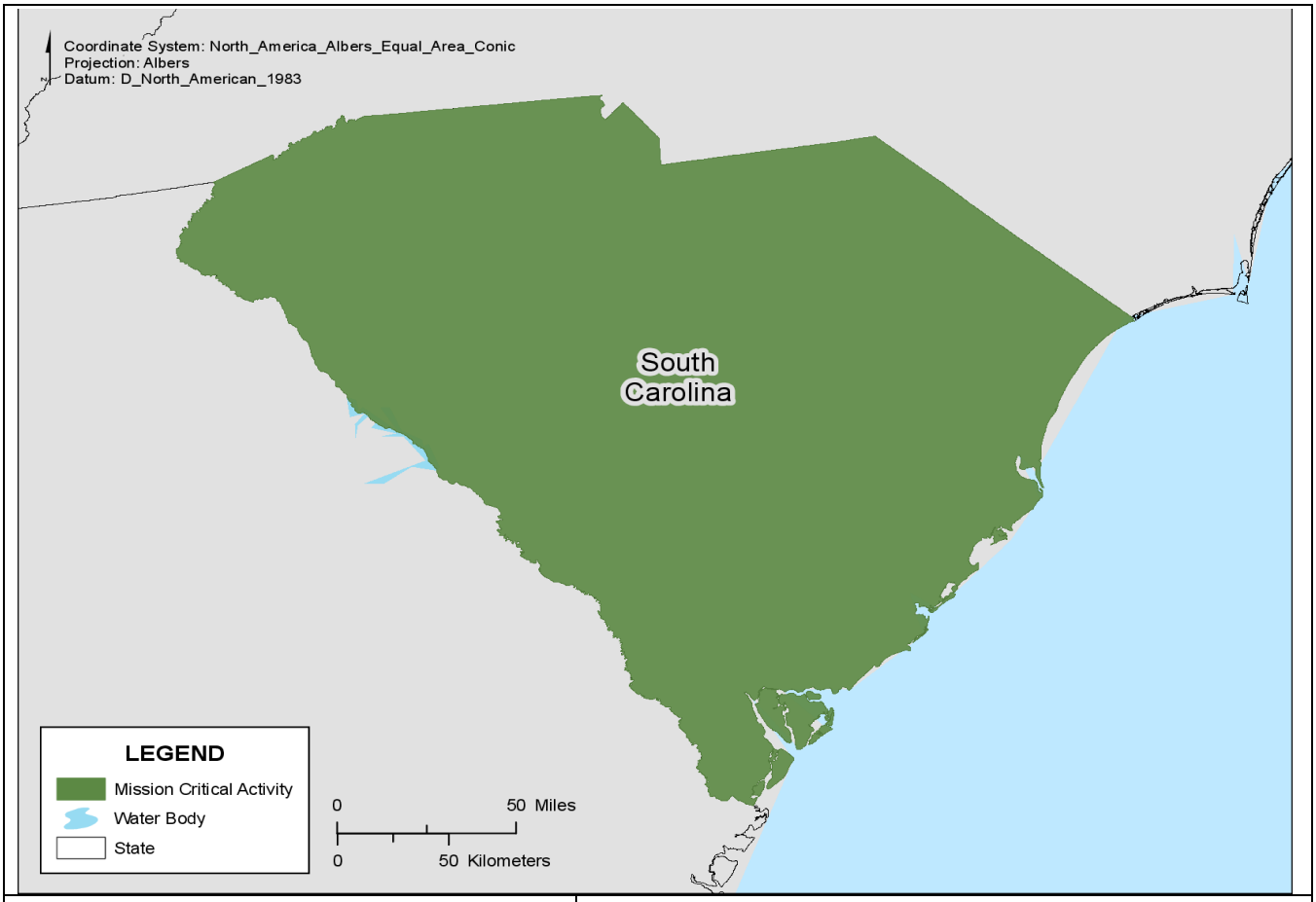
Future Benefits	
Future Annual Benefits ($):	$250,000 annually.
Future Benefits Description:	Immediate, more accurate, and more comprehensive flood mapping for permitting, public safety, and public education.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Geological Mapping



Mission Critical Activity Title:	Geological Mapping
Mission Critical Activity Description:	Geological mapping.
MCA_ID:	3829268445_1
Organization Type:	State Government
Organization Name:	SC Department of Natural Resources
Business Use:	Geologic Resource Assessment and Hazard Mitigation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Wetlands Inventory (NWI).

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	At this time it is not possible to give current or future benefits. Current benefits cannot be calculated because the NHD is not used programmatically at the Geological Survey.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	For future benefits, the programmatic use of NHD data is uncertain. Though some potential uses have been discussed, a benefit in dollars cannot be calculated.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	

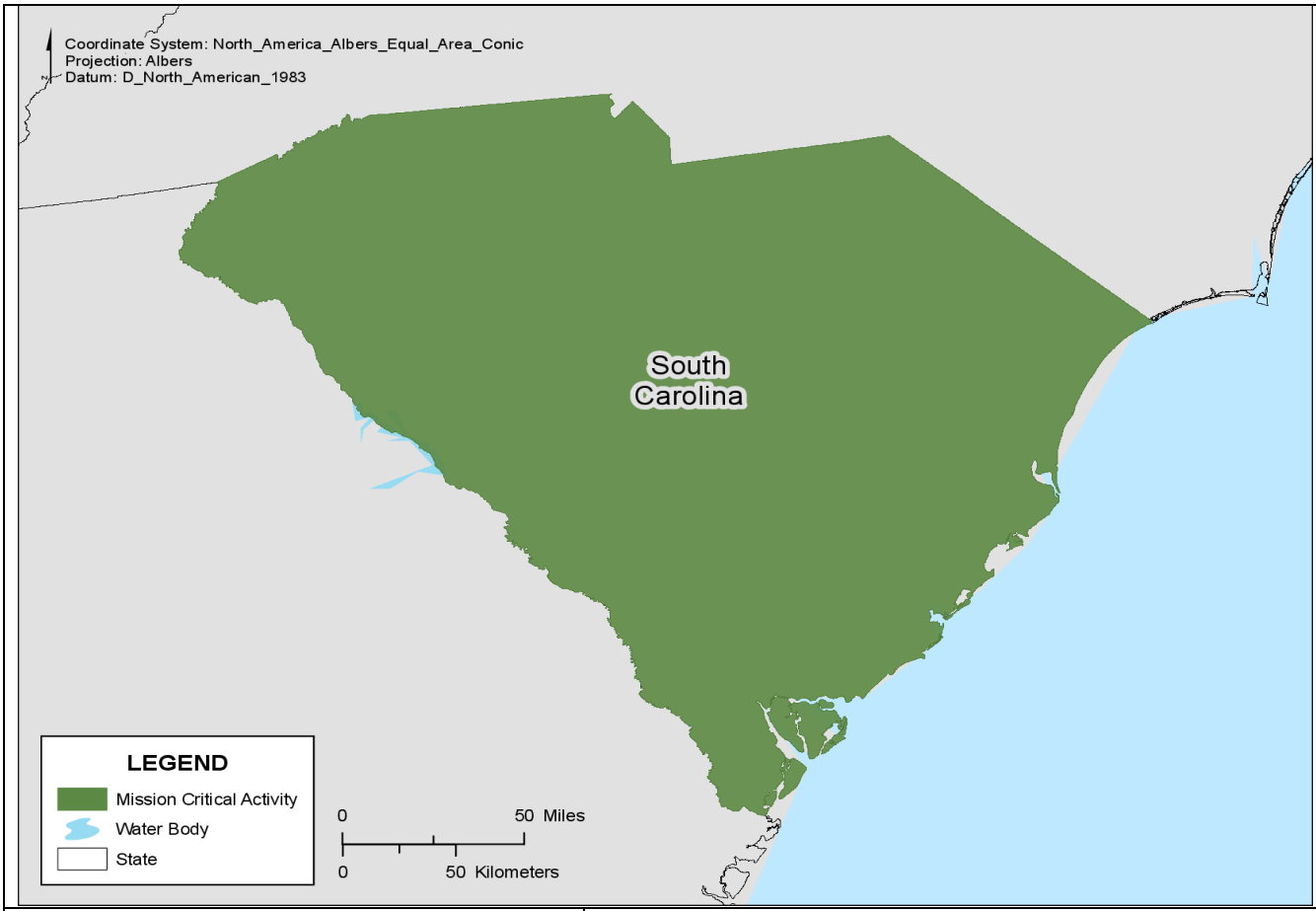
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Public and Environmental Health



Mission Critical Activity Title:	Public and Environmental Health
Mission Critical Activity Description:	SC DHEC promotes and protects the health of the public and the environment.
MCA_ID	3823315221_1
Organization Type:	State Government
Organization Name:	South Carolina Dept. of Health & Environmental Control (SC DHEC)
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Hydro breaklines – statewide lidar.

Current Benefits	
Total Annual Program Budget:	$600 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	1:24,000 hydrography meets most of our needs. The lidar has been great especially with elevation work in the coastal area, but the work was being adequately addressed with the 24K DEMS.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

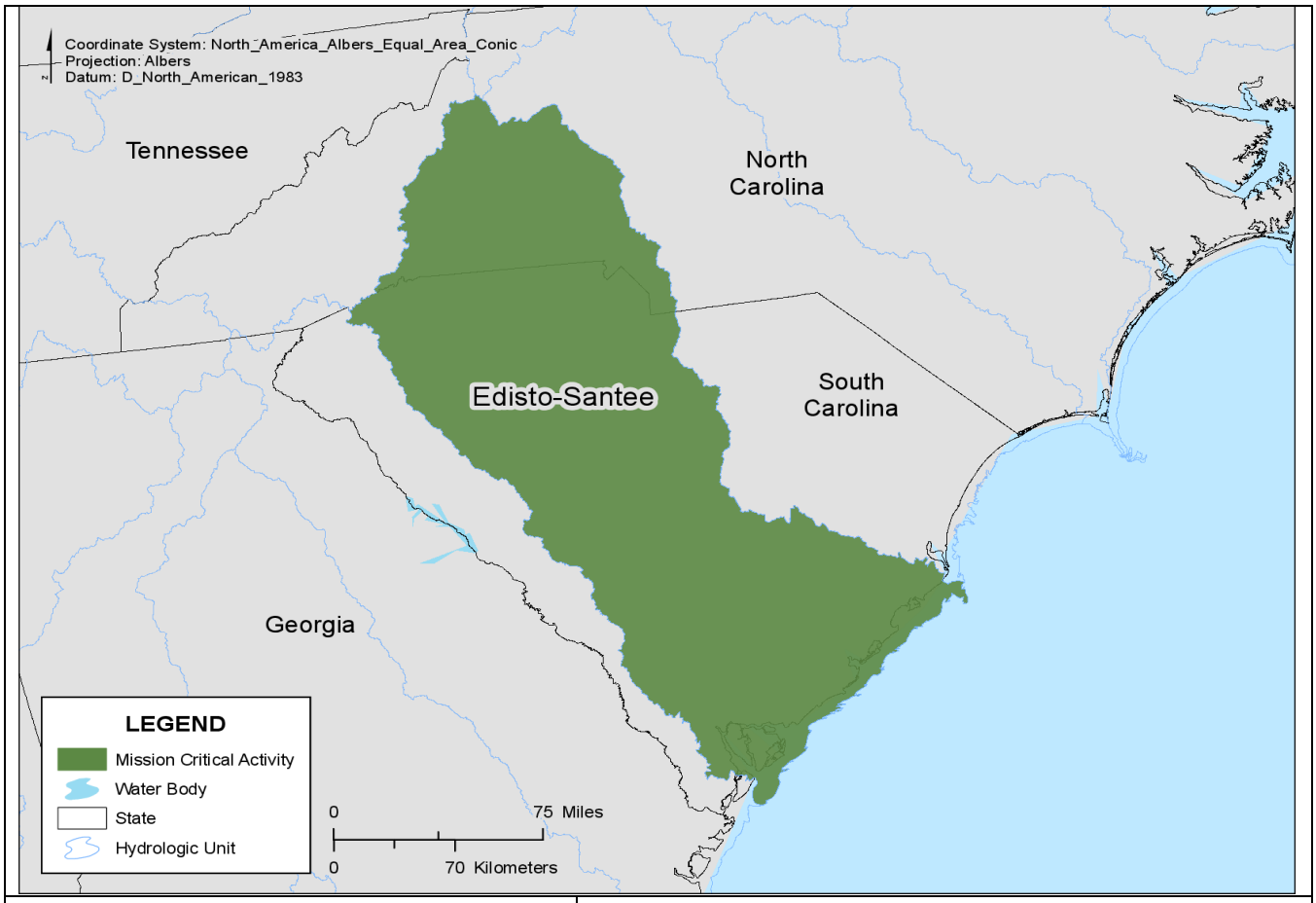
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Stormwater Management



Mission Critical Activity Title:	Stormwater Management
Mission Critical Activity Description:	Stormwater management, which includes management of the NPDES program, to include stream and waterbody buffering and flow modeling.
MCA_ID:	3826944639_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Lexington County, SC
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.3 million
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

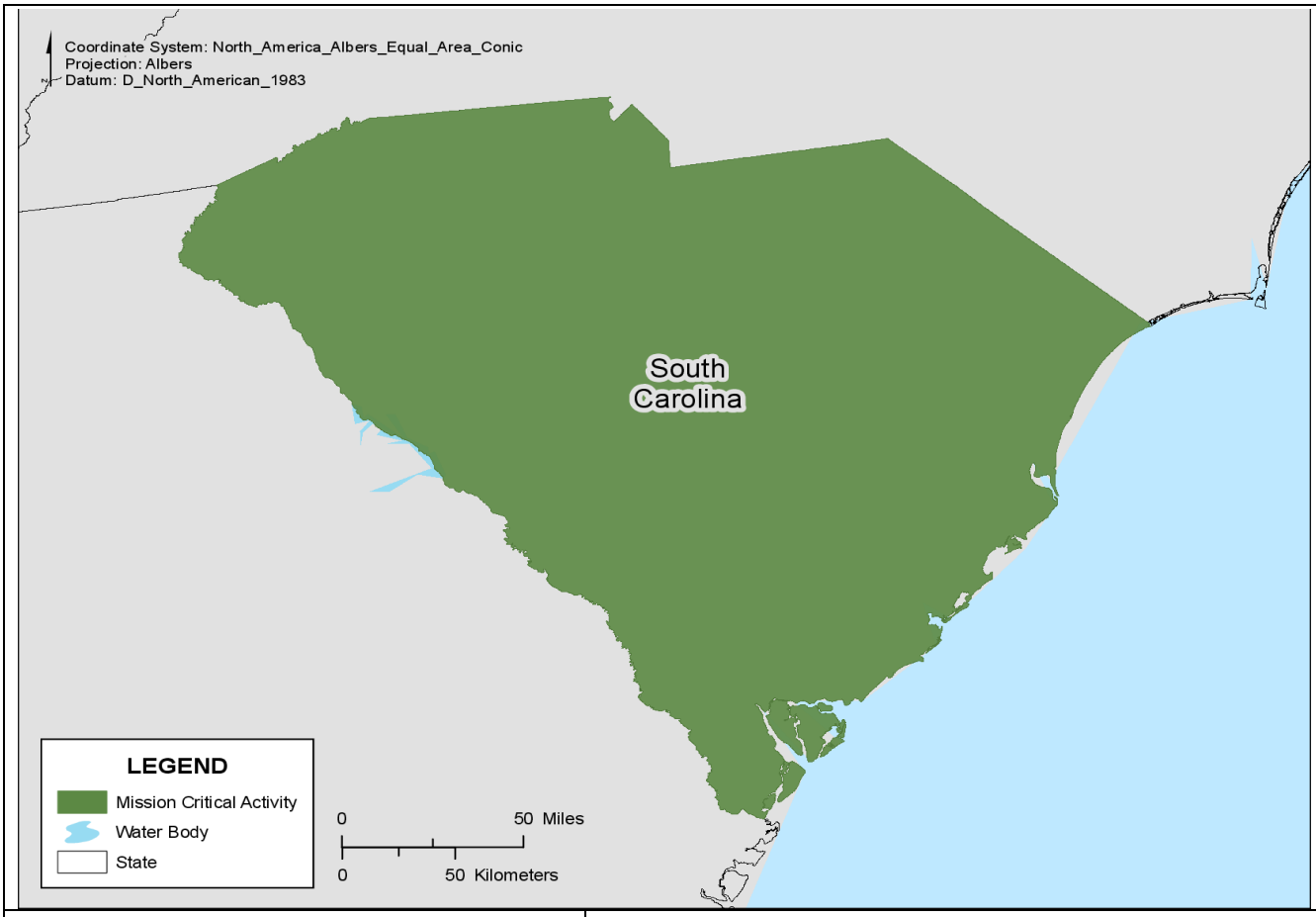
Future Benefits	
Future Annual Benefits ($):	$200,000 annually.
Future Benefits Description:	Higher level of detail at no cost.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Availability and Assessment



Mission Critical Activity Title:	Water Availability and Assessment
Mission Critical Activity Description:	Surface and groundwater monitoring, water availability and water assessment studies, drought management, FERC licensing, instream flow development, water planning.
MCA_ID:	3828760332_1
Organization Type:	State Government
Organization Name:	SC Dept. of Natural Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)

Requirements	
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Not sure of source, but may be an earlier version of the NHD dataset. Dataset I have been using is dated from at least five years ago. Only recently have tried to incorporate more recent NHD data.

Current Benefits	
Total Annual Program Budget:	$400,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrographic information should improve surface water modeling and planning efforts.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

South Dakota

The Hydrography Requirements and Benefits Study (HRBS) survey results for South Dakota identified 11 Mission Critical Activities (MCAs) from three state agencies, one city, one county, one tribal college, one state university, and one regional government organization. They noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Water Quality
- Water Management Planning
- Flood Risk Management
- Water Resources Education
- Water Rights

In order to satisfy their requirements, these agencies ideally need statewide spatial hydrography data that are of medium-to-high positional accuracy (1:24,000 to 1:1,200); are reviewed and updated on an annual or biennial basis; include small impoundments (1 acre), culverts, diversions, discharges, bathymetry, wetlands, and other hydrographic features and structures; and provide stream order, whole stream identifiers, names (including GNIS and alias names), streamflow statistics, and accurate flow periodicity (perennial, intermittent, ephemeral). The need for new lidar and surface water data in South Dakota was highlighted.

A number of respondents stated that improved hydrography data would provide major benefits to their programs. The state desires a centralized highly-detailed and functional data source enabling increased coordination among agencies, engineers, and developers for proactive risk assessment, planning, and management. Improved data would help improve research outcomes and save time reaching those improved outcomes.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓											

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
	✓	✓					

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Nice To Have
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Somewhat Impactful
In a series of tributary streams, several streams do not connect with the main river.	Somewhat Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

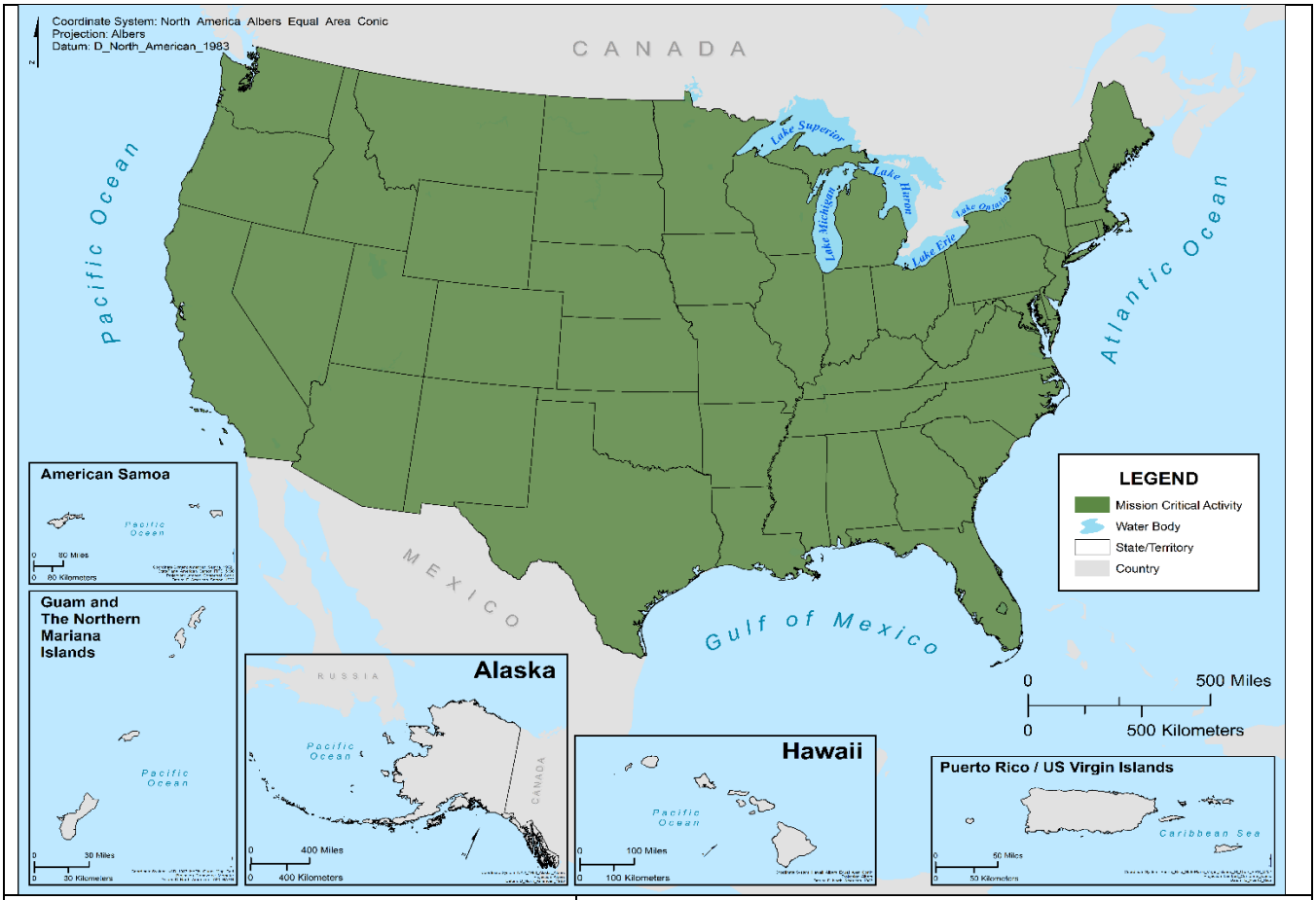
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Maybe

Mission Critical Activities

South Dakota managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	Agricultural water management research.
MCA_ID:	3790642319_1
Organization Type:	State Government
Organization Name:	South Dakota State University
Business Use:	Agriculture and Precision Farming
Area of Interest:	Nationwide

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$800,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Improved data could help improve our research outcomes and save time reaching those improved outcomes.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	

Future Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Resources Education

Mission Critical Activity Title:	Water Resources Education
Mission Critical Activity Description:	Natural resources engineering for higher education.
MCA_ID:	3790642319_2
Organization Type:	State Government
Organization Name:	South Dakota State University
Business Use:	Education K-12 and Beyond
Area of Interest:	Nationwide

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$180,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Better higher educational programs would result in better-trained graduates that would themselves be better users of hydrography datasets.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Flood Risk Management

Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Process datasets to identify flood risk mapping, create lakes and streams layer and other surface water datasets based on lidar information.
MCA_ID:	3772222727_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Planning and Development District III
Business Use:	Flood Risk Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Current lidar datasets.

Current Benefits	
Total Annual Program Budget:	$2,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

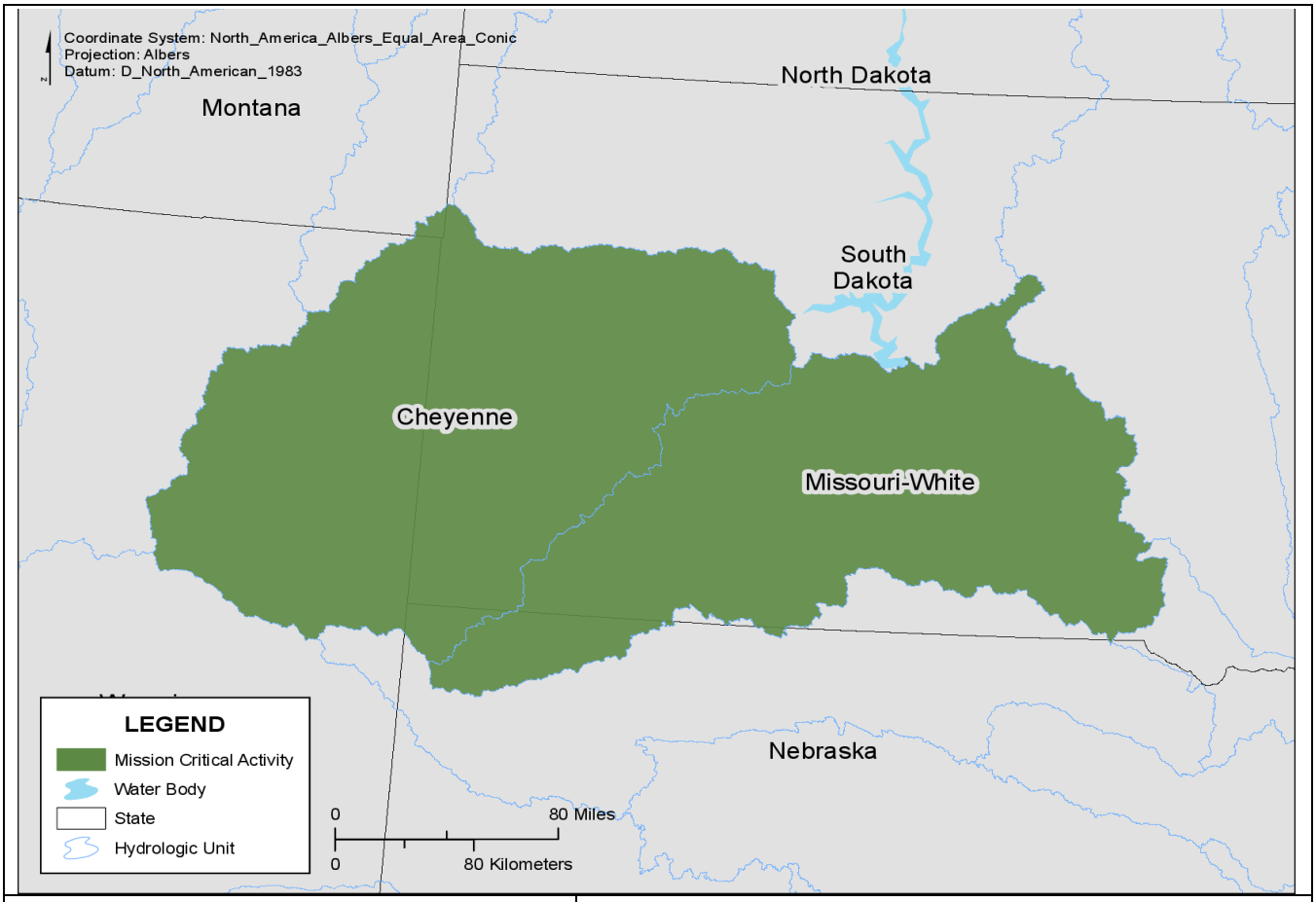
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Need new lidar/digital elevation and surface water data in South Dakota.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Lidar.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	Visual Inspection
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Nice To Have	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):	Current lidar processed for water lakes, stream network	Current lidar processed for water lakes, stream network

Flood Management Planning



Mission Critical Activity Title:	Flood Management Planning
Mission Critical Activity Description:	Flood monitoring by emergency management.
MCA_ID:	3773159967_2
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Rapid City
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Stream gages.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Major
Current Other Benefits:	

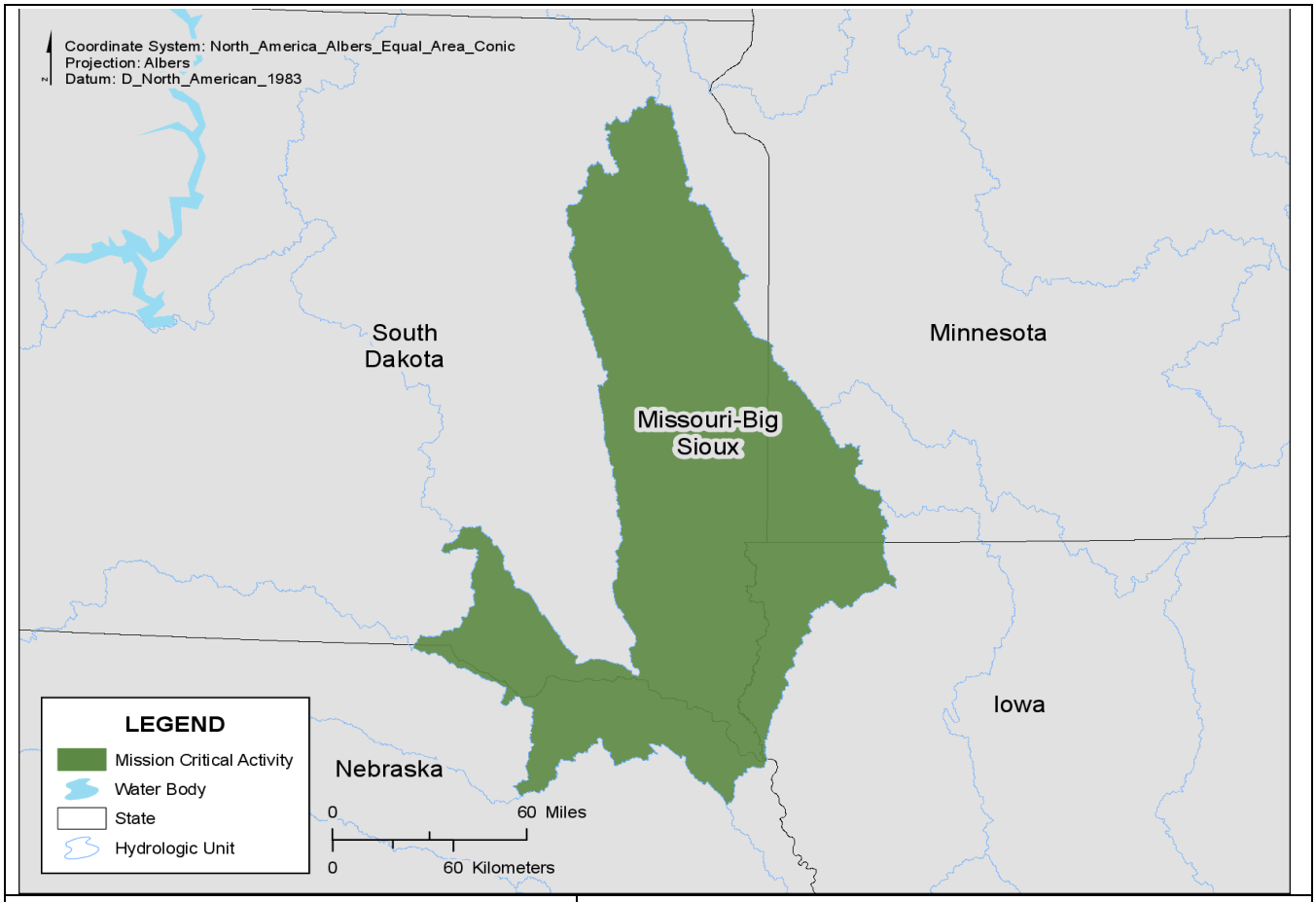
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Better or quicker access to stream gage information may result in more warning time for floods.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Flood risk mapping, analysis, and administrative support.
MCA_ID:	3777240579_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Lincoln County
Business Use:	Flood Risk Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Moderate
Current Other Benefits:	

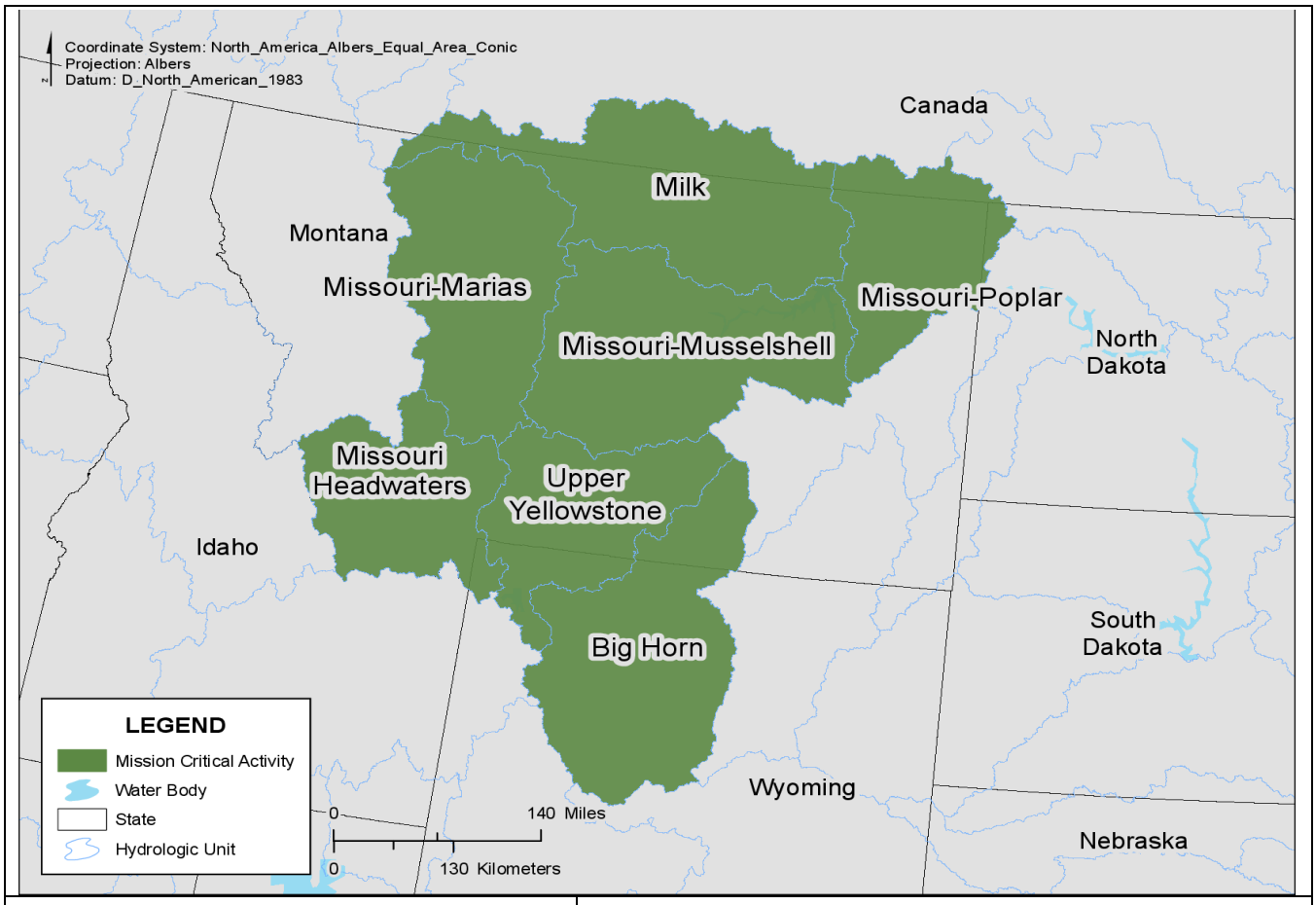
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Centralized, highly-detailed, and functional data source enabling increased coordination among agencies, engineers, and developers for proactive risk assessment, planning, and management.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	Hydrologic/hydraulic design of transportation drainage features.
MCA_ID:	3783316999_1
Organization Type:	State Government
Organization Name:	South Dakota Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

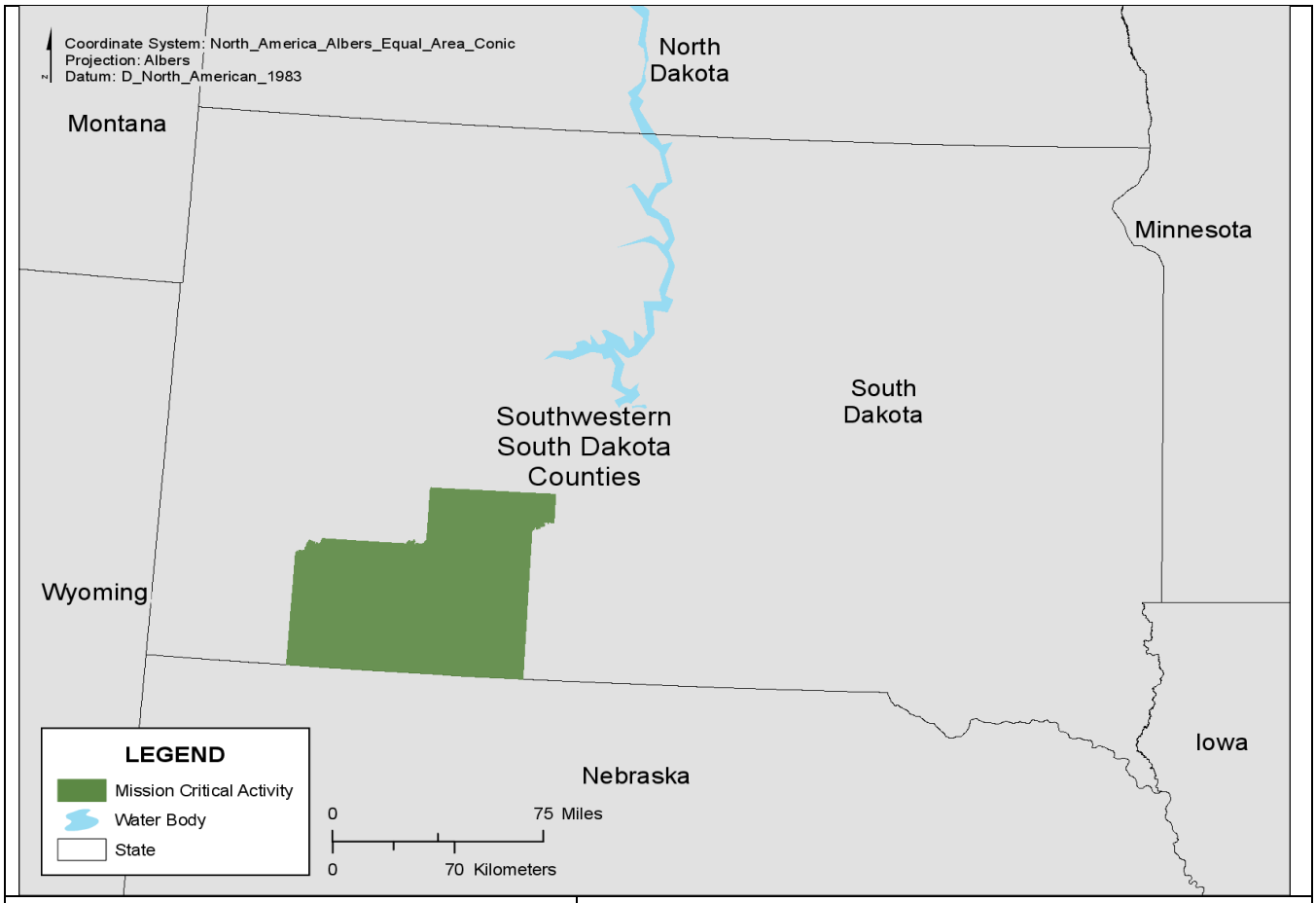
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved hydrographic information will moderately benefit our hydrologic/hydraulic recommendations for transportation drainage features.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Nice To Have	Associate Selected Data Type
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resources Education



Mission Critical Activity Title:	Water Resources Education
Mission Critical Activity Description:	Education.
MCA_ID:	3829472034_1
Organization Type:	Tribal Government
Organization Name:	Oglala Lakota College
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

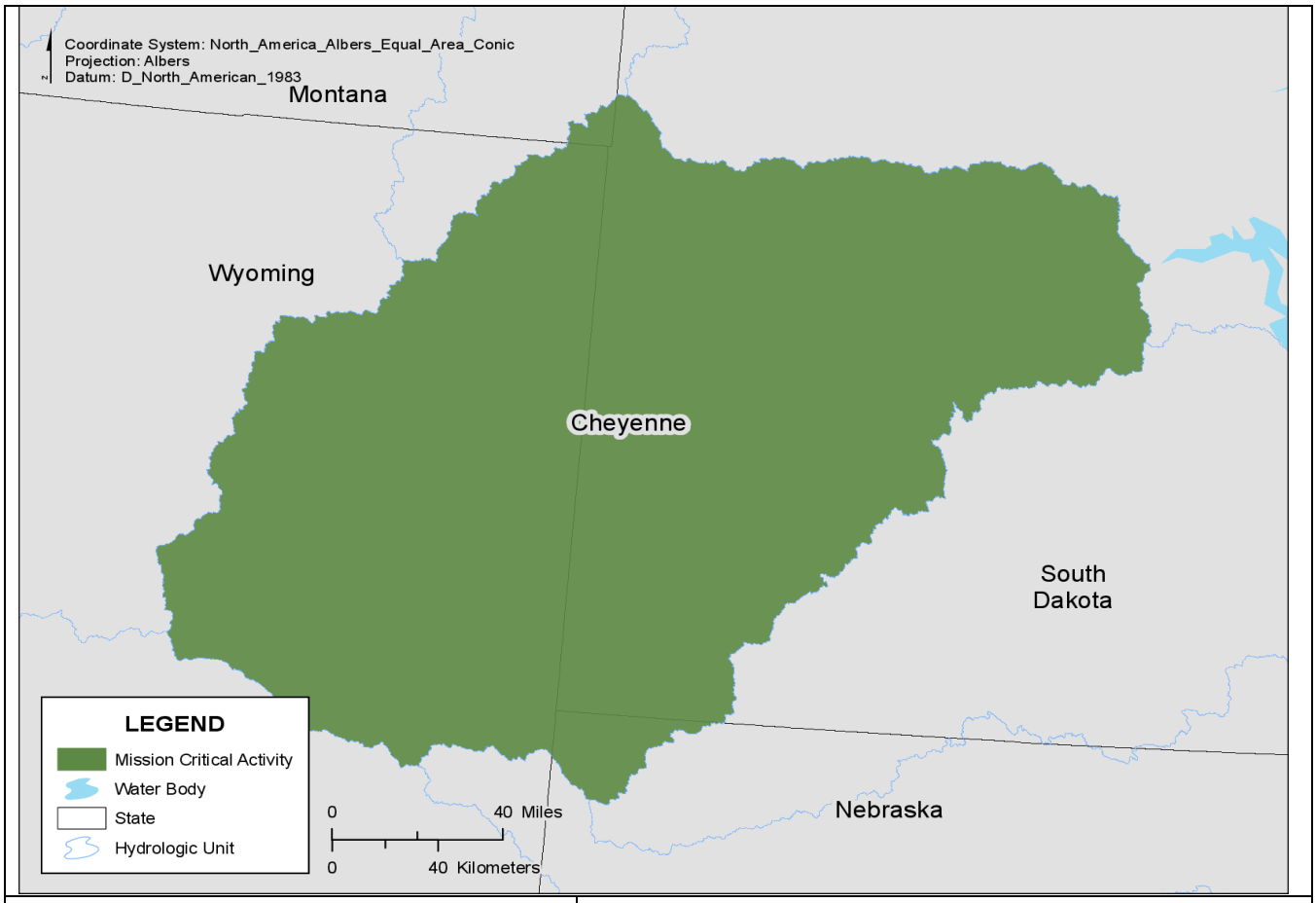
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover		
Soils		
Surficial Geology		
Bathymetry		
Climate		
Contaminant Sources		
Elevation		
Stream Flow		
Wetlands		
Census (population statistics)		
Aquifers		
Point Discharges		
Water Use: Diversions		
EPA - National Pollutant Discharge Elimination System (NPDES)		
EPA - STOrage and RETrieval Data Warehouse (STORET)		
USACE - National Inventory of Dams (NID)		
USDA - National Agriculture Statistics Service (NASS)		
USFWS - National Wetlands Inventory (NWI)		
USGS National Water Information Sites (NWIS)		
USGS National Water-Quality Assessment Program (NAWQA)		
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	Use stream gages to manage water for city use.
MCA_ID:	3773159967_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	City of Rapid City
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Stream gages.

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

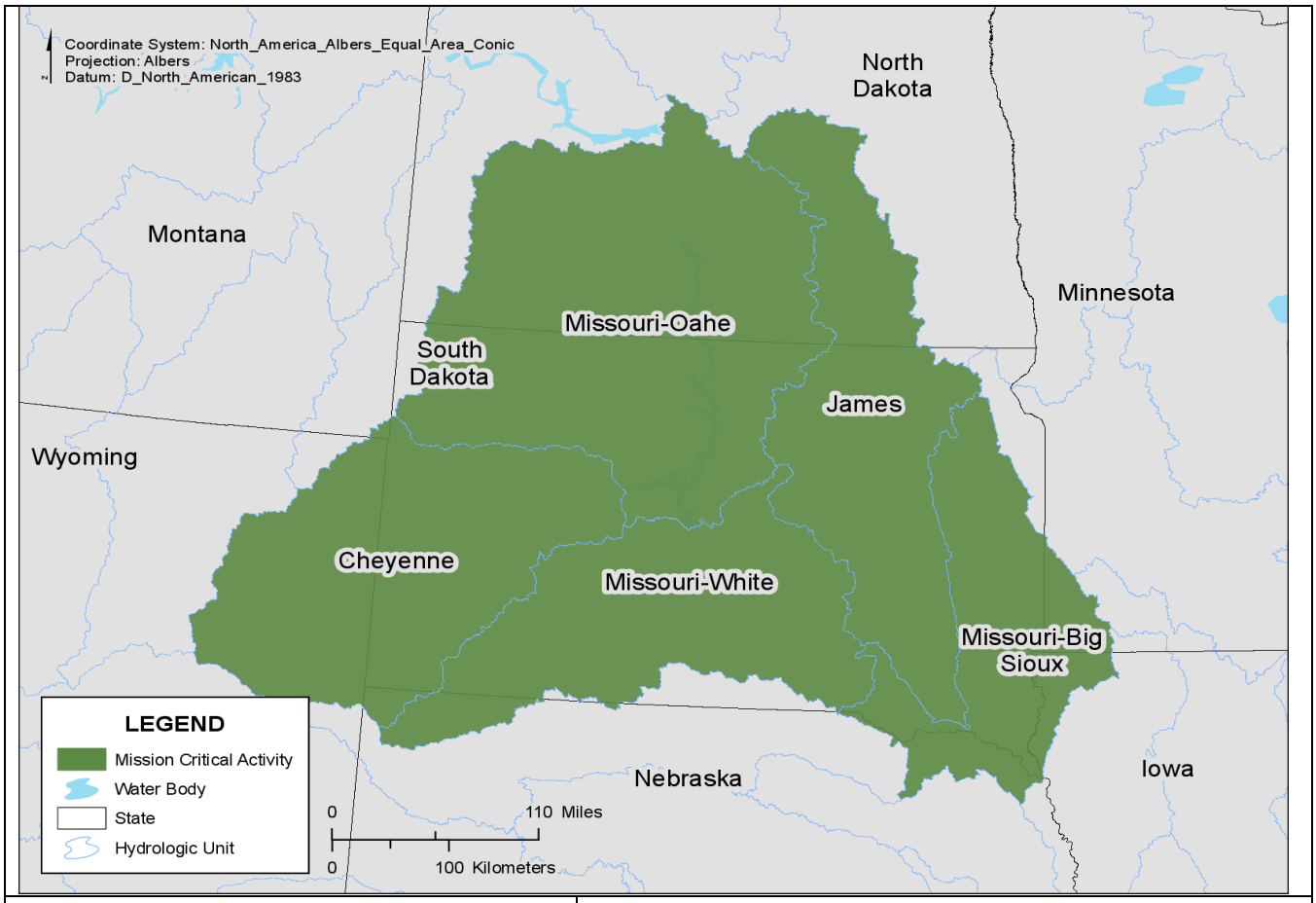
Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Required	Associate Selected Data Type
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	To conduct watershed modeling with regards to total maximum daily loads (TMDLs). This involves modeling various flow regimes to identify critical areas within the flow duration curve and to predict where most of the pollutant load occurs within that curve. In addition, the modeling serves in a predictive capacity to determine what best management practices may provide the highest reduction for the pollutant of concern.
MCA_ID:	3790306988_1
Organization Type:	State Government
Organization Name:	SD Department of Environment and Natural Resources
Business Use:	Water Quality
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Other (please specify)
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved accuracy in identifying locations in a watershed that may be significant contributors to waterbody impairments. Improved accuracy in predicting what will happen to the impaired waterbody when best management practices are installed to help curtail pollutants of concern.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

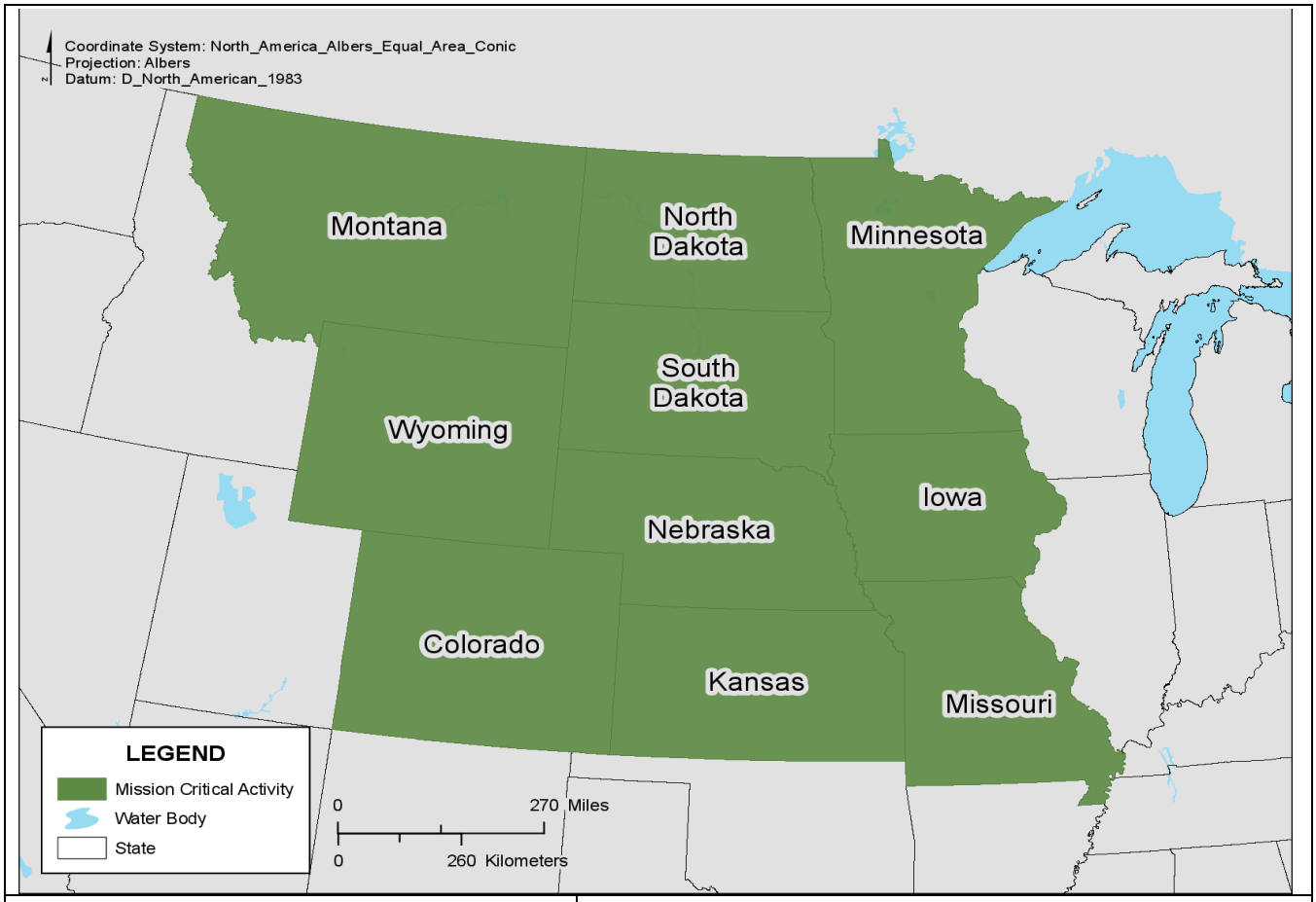
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Water Rights



Mission Critical Activity Title:	Water Rights
Mission Critical Activity Description:	The water rights program is responsible for protecting South Dakota's water resources on a quantity basis. We allocate this resource to users based on a first-in-time, first-in-right priority system, taking into account the source of water, the availability of water, the type of use, whether it is in the public interest and the ability to not impair existing uses.
MCA_ID:	3772148637_1
Organization Type:	State Government
Organization Name:	SD Dept. of Environment and Natural Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$1.9 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don’t know.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable

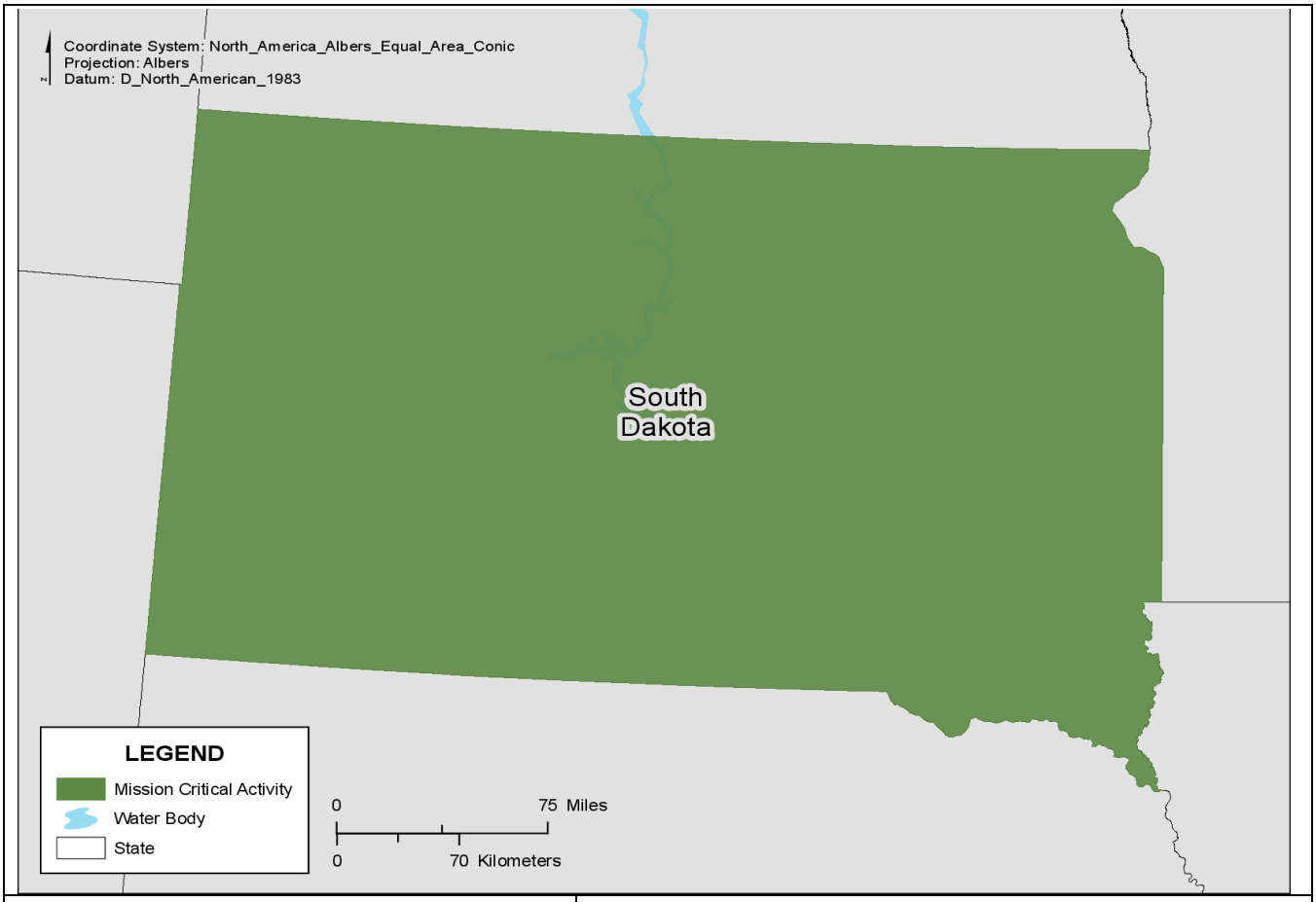
Future Benefits	
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Visual Inspection
Point Discharges	Nice To Have	Perform Geospatial Analysis
Water Use: Diversions	Required	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	The purpose of South Dakota Game, Fish, and Parks is to perpetuate, conserve, manage, protect, and enhance South Dakota's wildlife resources, parks, and outdoor recreational opportunities for the use, benefit, and enjoyment of the people of this state and its visitors, and to give the highest priority to the welfare of this state's wildlife and parks, and their environment, in planning and decisions. - See more at: http://gfp.sd.gov/agency/information/default.aspx#sthash.Pze4HG9i.dpuf
MCA_ID:	3771910341_1
Organization Type:	State Government
Organization Name:	South Dakota Game, Fish, and Parks
Business Use:	Wildlife and Habitat Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	Unknown.
Current Operational Benefits	
Current Time/Cost Savings:	Don't Know
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	If we had a better lakes layer, we could provide that information to our public and in a timely matter.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	None
Other (please specify the importance and highest analysis level):		

Tennessee

Detailed and accurate geospatial hydrography is essential for Tennessee. The high-resolution NHD data are not accurate enough to convey local waterways for use in city planning, storm water regulations, and water quality analysis. While various sources of hydrography geospatial data exist within the state, there is a need for standardization of a hydrography dataset that will satisfy the requirements for stormwater management, flood hazard mapping, fisheries management, and water quality protection. Long-term issues include flooding and loss prevention.

A statewide hydrography layer will need to be integrated with other framework layers, such as enhanced elevation and watershed boundaries; therefore, extracting hydrography and watersheds from the enhanced elevation will produce the alignment required.

Tennessee is beginning to acquire enhanced elevation data through lidar. Standards need to be developed and required for the extraction of a detailed hydrography framework layer from lidar. This data layer will need a separate layer suitable for hydrographic modeling rather than hydro breaklines used for lidar hydro flattening. Standards for data extraction would also help to address ongoing data maintenance.

Key hydrography stakeholders met in the summer of 2015. Responses to the HRBS were provided from the State of Tennessee, Metro Nashville/Davidson County, Rutherford County, and the City of Murfreesboro. The stakeholders emphasized the importance of one standardized hydrography layer that crosses jurisdictional boundaries and is required for the following Mission Critical Activities (MCAs):

- Drainage Across County Boundaries
- Stormwater Mapping
- Flood Hazard Mapping, Loss Prevention, and Education
- Water Quality Assessment and Management
- Watershed Protection
- Flow Analysis
- Fisheries Management
- Aquatic Habitat Management
- Recreation
- Conservation Planning
- Permitting
- Public Education
- Reporting Current Environmental Status
- State and Federal Protection and Regulation
- Authoritative Detailed Framework Hydrography Layer for Tennessee

Regulations are based on feature classification; therefore, stream delineation and key attributes should be uniform statewide to ensure consistency in government operations. Historical geospatial hydrography data should be preserved and accessible for change detection and modeling at each of the standard mapping scales.

A detailed geospatial hydrography framework layer will serve as the authoritative data for all levels of government to provide the critical foundation decision support systems for water resources in Tennessee.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓			✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Highly Desirable
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Nice To Have
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Not Required
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Nice To Have
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have

Data Type	Elevation Data Integration	Requirement
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Not Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Nice To Have
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Nice To Have
	Ensure that hydrography and elevation data represent a similar point in time.	Nice To Have
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Nice To Have
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Nice To Have
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Nice To Have
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Nice To Have

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Little or No Impact
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Little or No Impact
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Somewhat Impactful
A first order stream flow direction is reversed.	Somewhat Impactful
A second order stream flow direction is reversed.	Somewhat Impactful
A third order stream flow direction is reversed.	Somewhat Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**

Quality Issue	Impact
Acceptable error resolution time:	Within 1 year

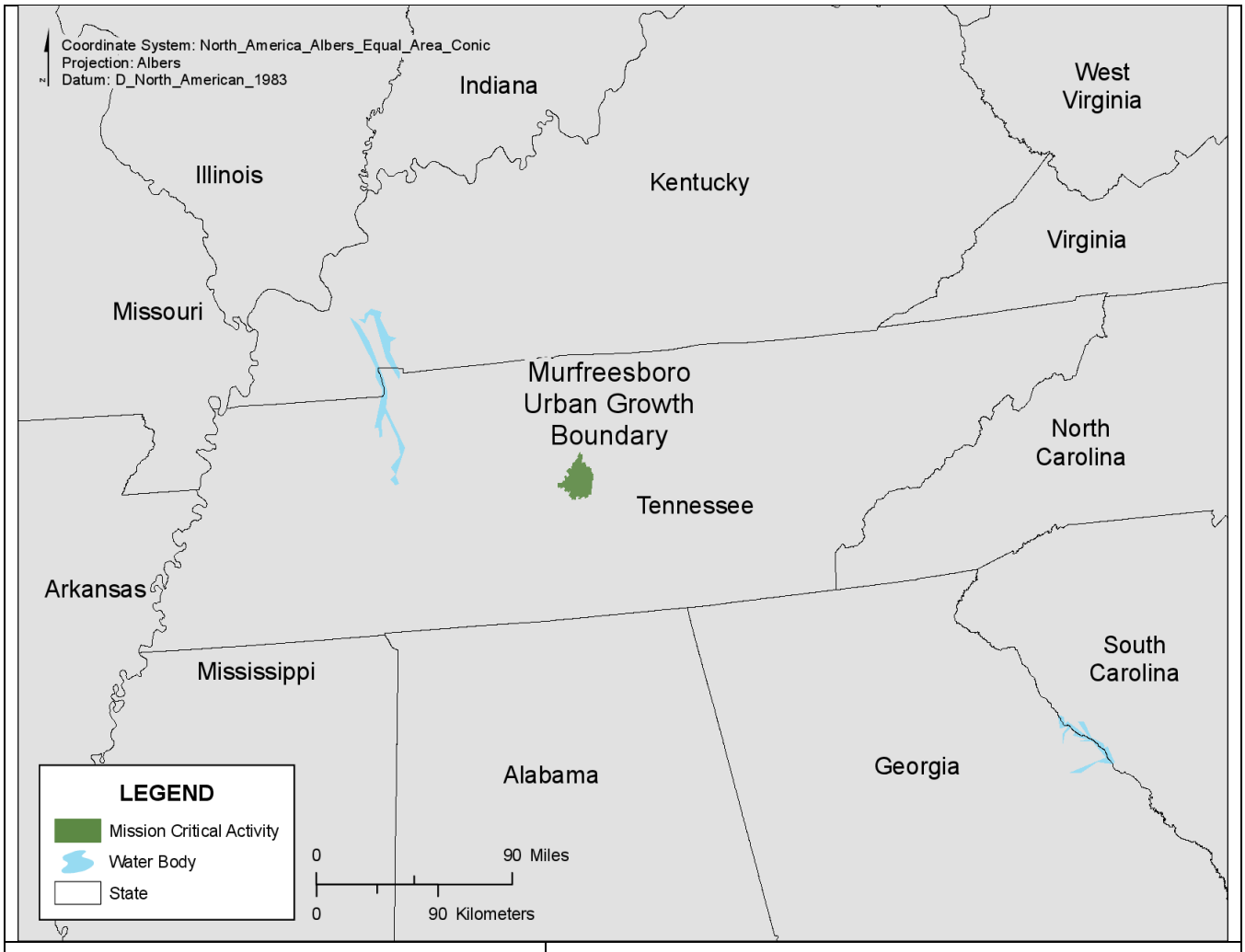
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Probably

Mission Critical Activities

Tennessee managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Education and Outreach



Mission Critical Activity Title:	Education and Outreach
Mission Critical Activity Description:	Education and outreach.

MCA_ID:	3836990516_1
Organization Type:	Municipal Government
Organization Name:	City of Murfreesboro
Business Use:	Education K-12 and Beyond
Area of Interest:	All area within the Murfreesboro Urban Growth Boundary

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$17,642
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography with more detail such as groundwater inputs would aid in watershed education.

Future Benefits	
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

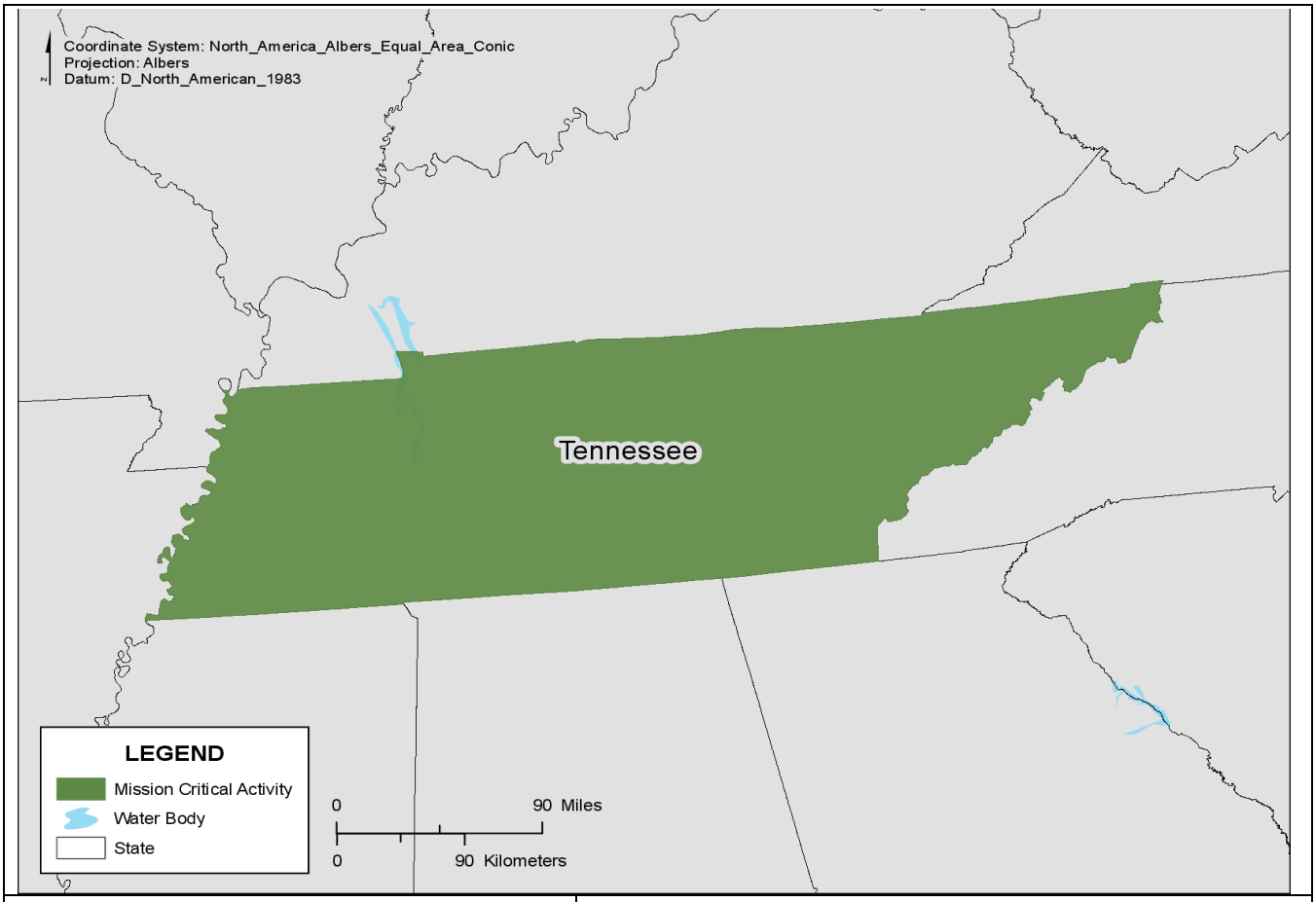
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes

Required Analytical Functions	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Habitat Management



Mission Critical Activity Title:	Habitat Management
Mission Critical Activity Description:	Our mission is to preserve, conserve, manage, protect, and enhance aquatic species and habitats for the use and benefits of the citizens of Tennessee and its visitors. We help to foster safe use of the state's waters through a program of law enforcement, public education, and access.
MCA_ID:	3836990509_1
Organization Type:	State Government
Organization Name:	Tennessee Wildlife Resources Agency
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)

Requirements	
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography would enable us to better protect the aquatic habitat and species in the state waters.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

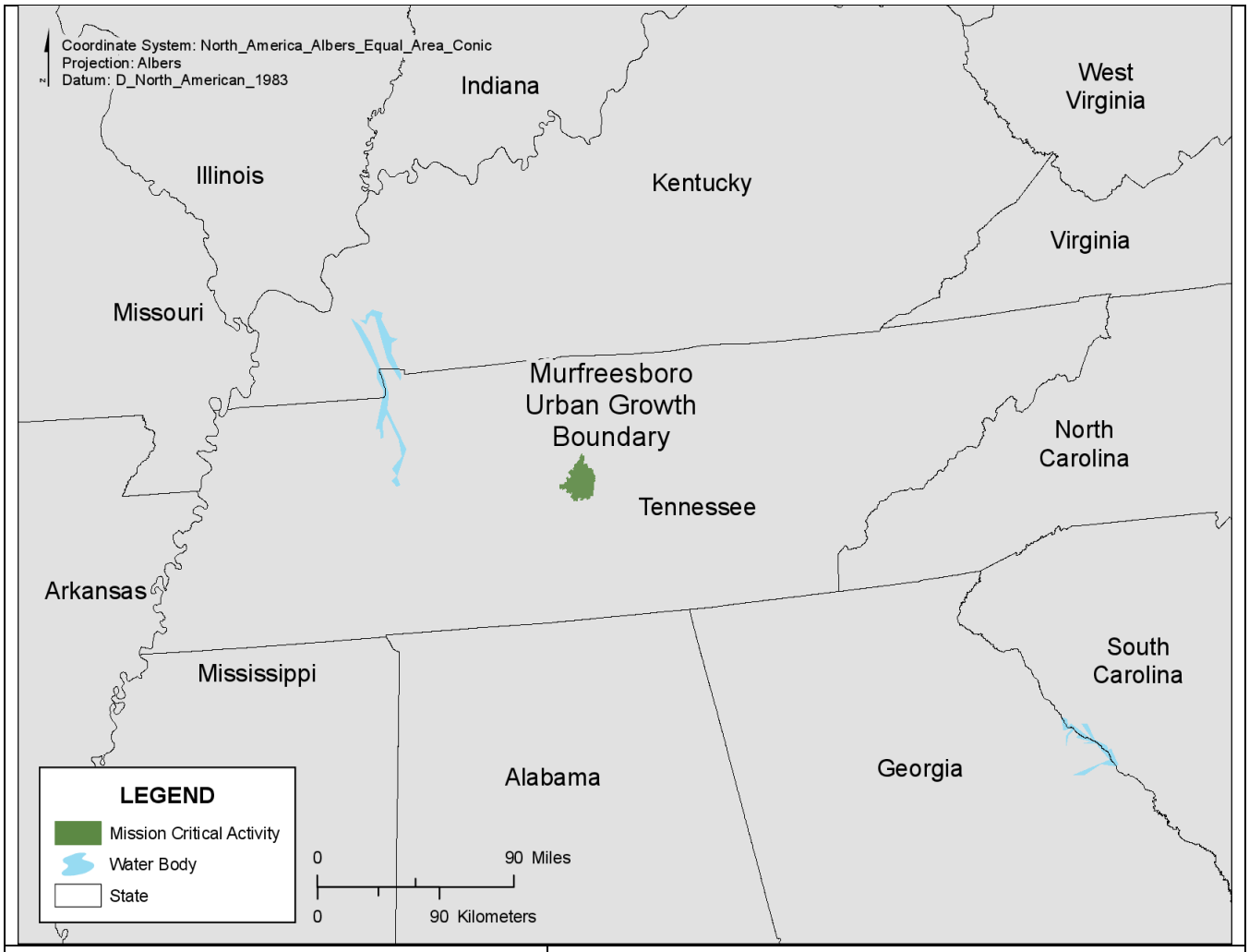
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Analytical Monitoring



Mission Critical Activity Title:	Analytical Monitoring
Mission Critical Activity Description:	Analytical/non-analytical monitoring (Visual Stream Assessments), NPDES permit section 5
MCA_ID	3836990514_1
Organization Type:	Municipal Government
Organization Name:	City of Murfreesboro
Business Use:	River and Stream Flow Management
Area of Interest:	All area within the Murfreesboro Urban Growth Boundary

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$17,643
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Local hydrography is used for field base data but layers would have to be turned on and off to switch sources on mobile device.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

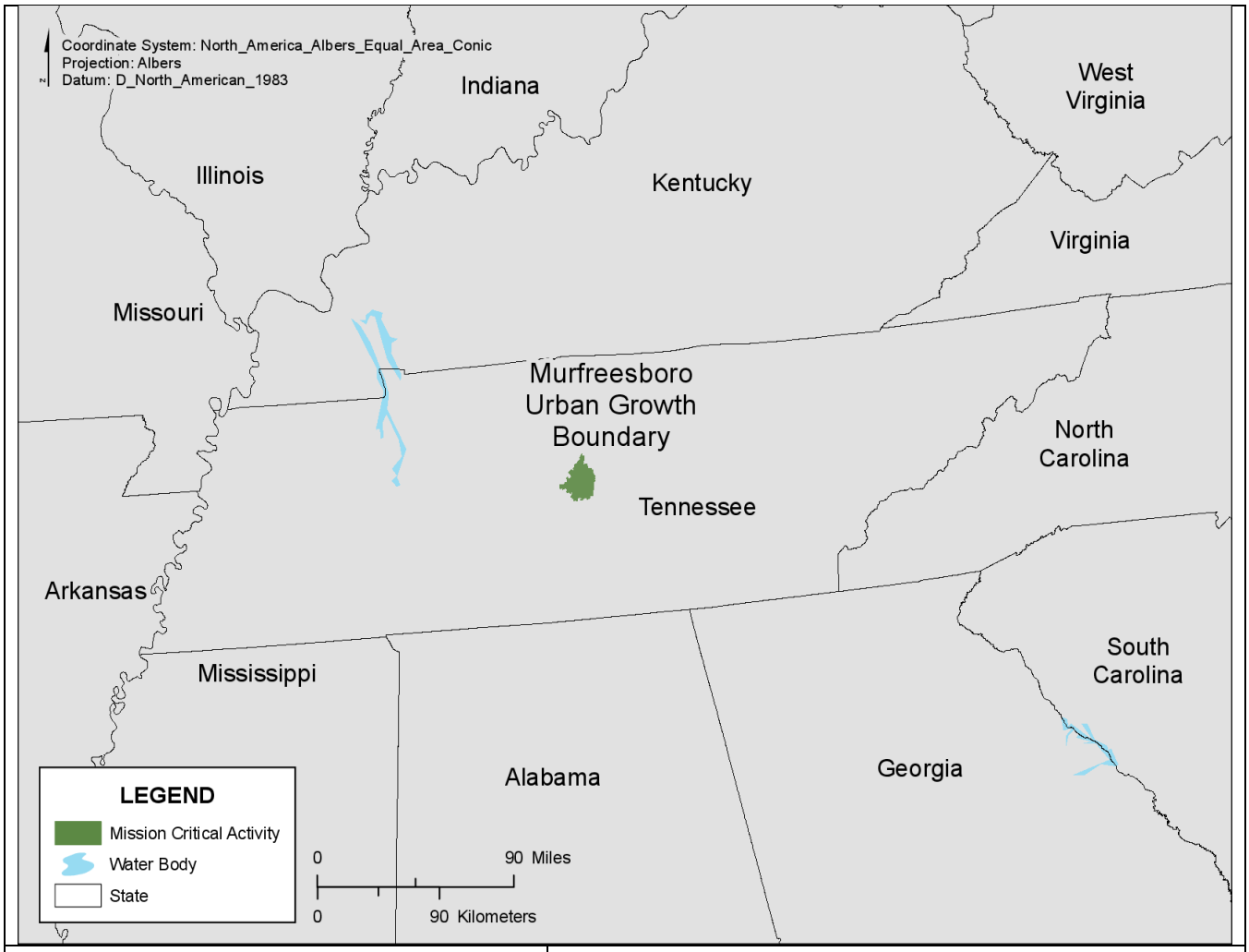
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Planning



Mission Critical Activity Title:	Planning
Mission Critical Activity Description:	Planning/permitting - accurate stream data is used to establish water quality protection areas (WQPAs), jurisdictional status, or when Aquatic Resource Alteration Permits (ARAP) are needed during development or municipal maintenance.
MCA_ID:	3836990515_1
Organization Type:	Municipal Government
Organization Name:	City of Murfreesboro
Business Use:	Urban and Regional Planning
Area of Interest:	All area within the Murfreesboro Urban Growth Boundary

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$17,643
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Stream data and key attributes should be uniform among overlapping entities statewide to ensure consistency in governmental operations.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Moderate
Future Other Benefits:	

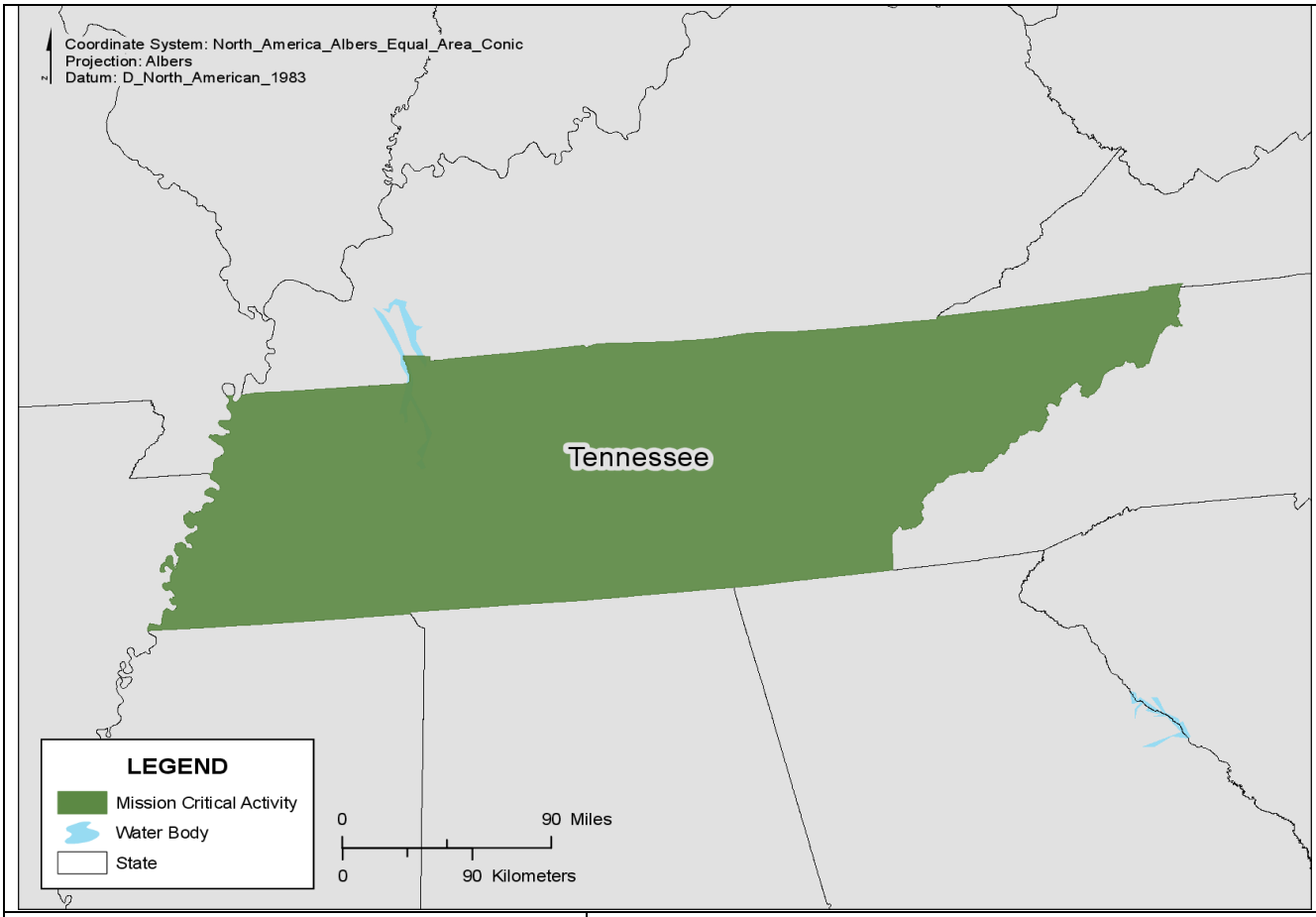
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality Monitoring



Mission Critical Activity Title:	Water Quality Monitoring
Mission Critical Activity Description:	My MCA is Water Quality Assessment and Watershed Protection. Water quality data from monitoring programs are reviewed and a decision on water quality based on state standards is made. This water quality assessment becomes the central information for almost all other aspects of our state's water program.
MCA_ID:	3776774870_1
Organization Type:	State Government
Organization Name:	State of Tennessee
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography would enable us to more accurately convey the status of water quality in TN. This would improve our ability to respond to permit requests, public questions/comments, and better report current environmental status.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

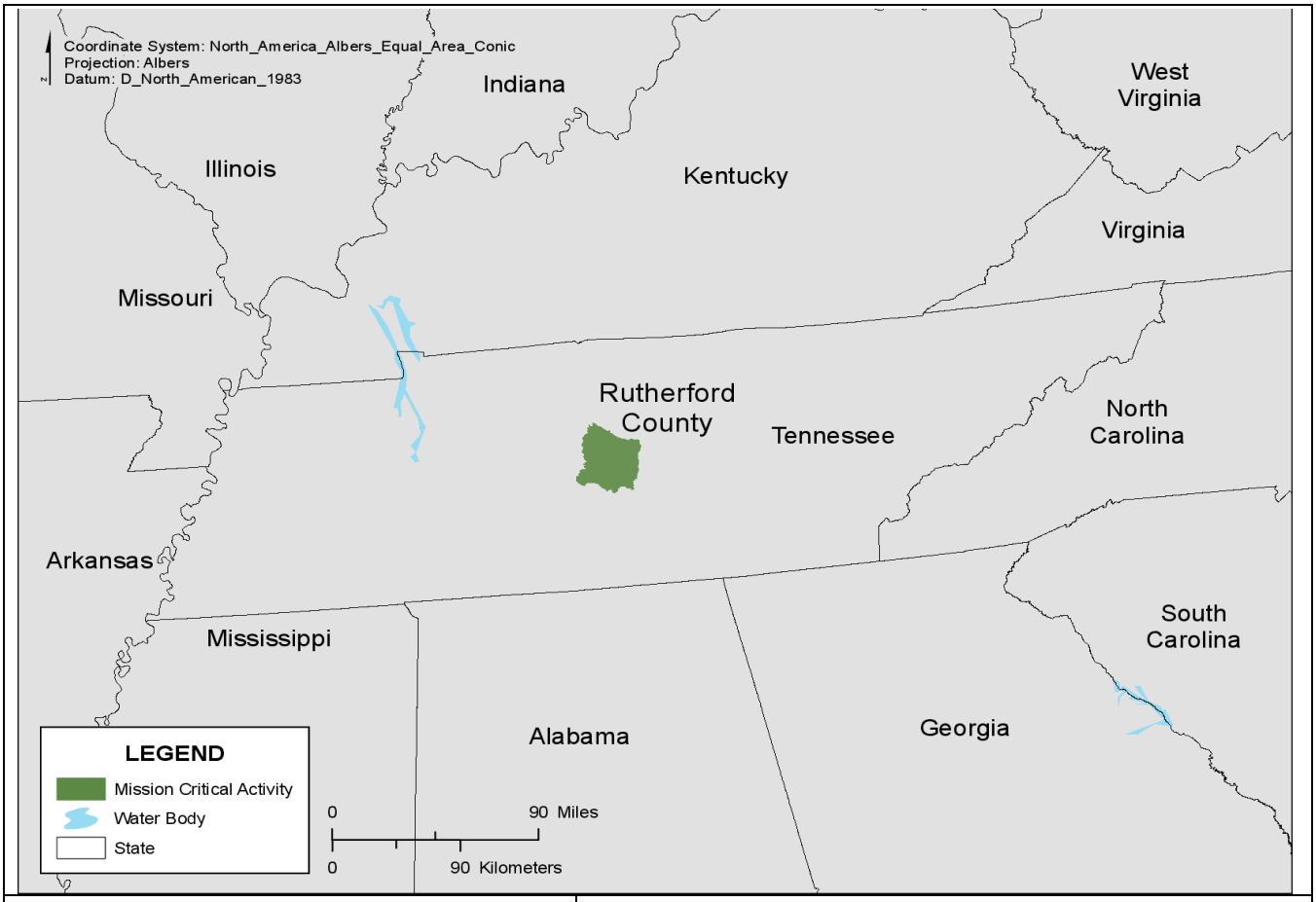
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Flooding



Mission Critical Activity Title:	Flooding
Mission Critical Activity Description:	MCAs are Water Quality Assessment and Watershed Protection, FEMA regulations, compliance with subdivision regulations, and local flooding concerns.
MCA_ID:	3836990510_1
Organization Type:	Local Government
Organization Name:	Rutherford County
Business Use:	Water Quality
Area of Interest:	Rutherford County

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	County-collected hydrography data.

Current Benefits	
Total Annual Program Budget:	$156,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography would enable us to more accurately convey the status of water quality in Rutherford County. This would improve our ability to respond to permit requests, public questions/comments, and better report current environmental status.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable

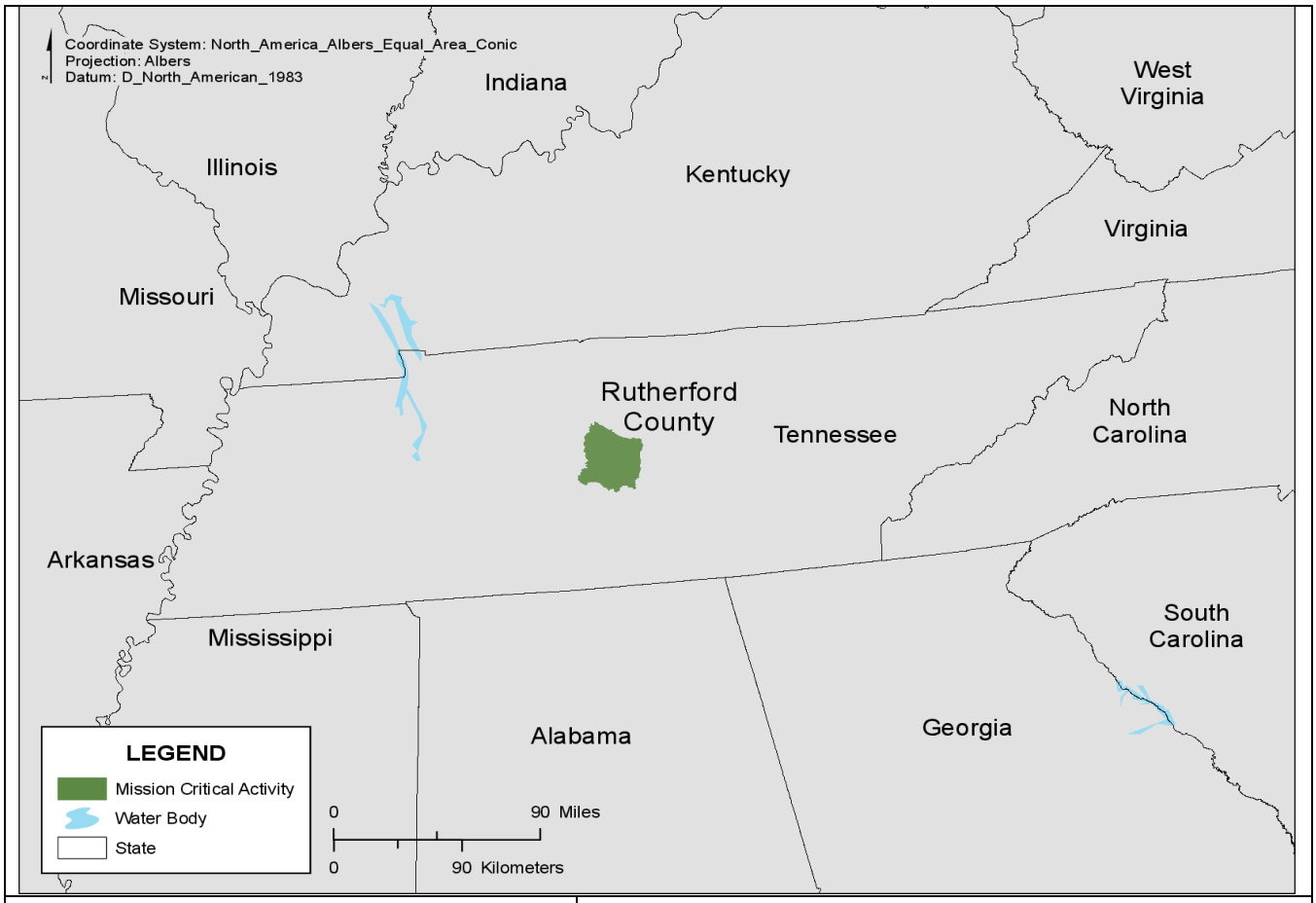
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality and Compliance



Mission Critical Activity Title:	Water Quality and Compliance
Mission Critical Activity Description:	MCAs are quality assessment and watershed protection, FEMA regulations, compliance with subdivision regulations, and local flooding concerns.
MCA_ID:	3836990511_1
Organization Type:	Local Government
Organization Name:	Rutherford County
Business Use:	Water Quality
Area of Interest:	Rutherford County

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	County-collected hydrography data.

Current Benefits	
Total Annual Program Budget:	$156,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Not Applicable
Current Mission Compliance Benefits:	Not Applicable
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved Hydrography will cut down on the phone calls from insurance and realtors making unnecessary questions cease. It would also make setting pad elevations on houses easier and more accurate.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate

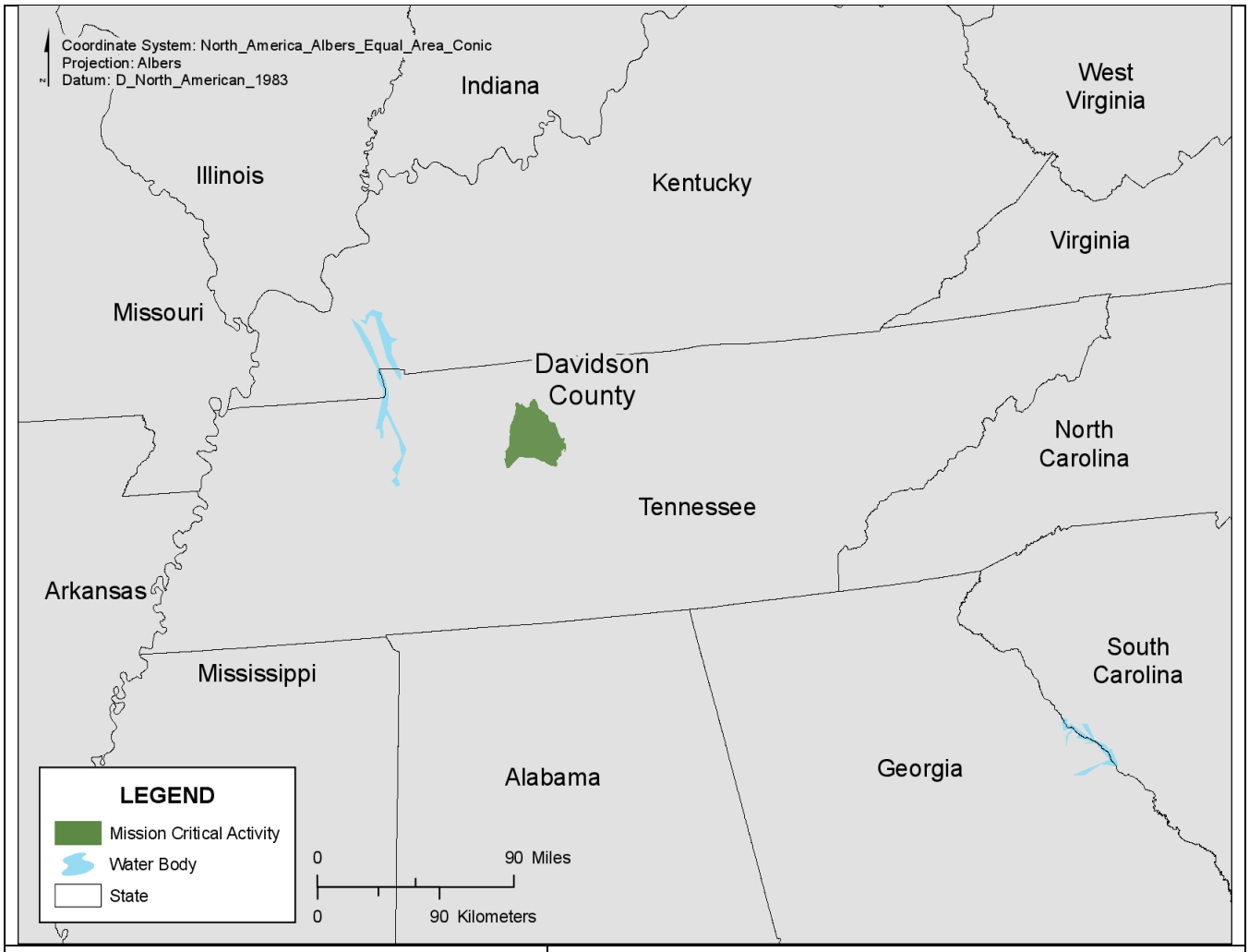
Future Benefits	
Future Human Lives Saved:	Moderate
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Not Required	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality Assessment



Mission Critical Activity Title:	Water Quality Assessment
Mission Critical Activity Description:	Metro's MCA is Water Quality Assessment and Watershed Protection. Water quality data are collected from streams and rivers throughout Davidson County (Tennessee) and sent to monitoring programs to be reviewed. Decisions on water quality are based on state standards. This water quality assessment becomes the central information for almost all other aspects of the county's water program.
MCA_ID:	3836990512_1
Organization Type:	County Government
Organization Name:	The Metropolitan Government of Nashville & Davidson County (Metro)
Business Use:	Water Quality
Area of Interest:	Davidson County, Tennessee

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes

Current Benefits	
Total Annual Program Budget:	$1 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography would enable MWS Stormwater to more accurately report the status of water quality in Davidson County.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

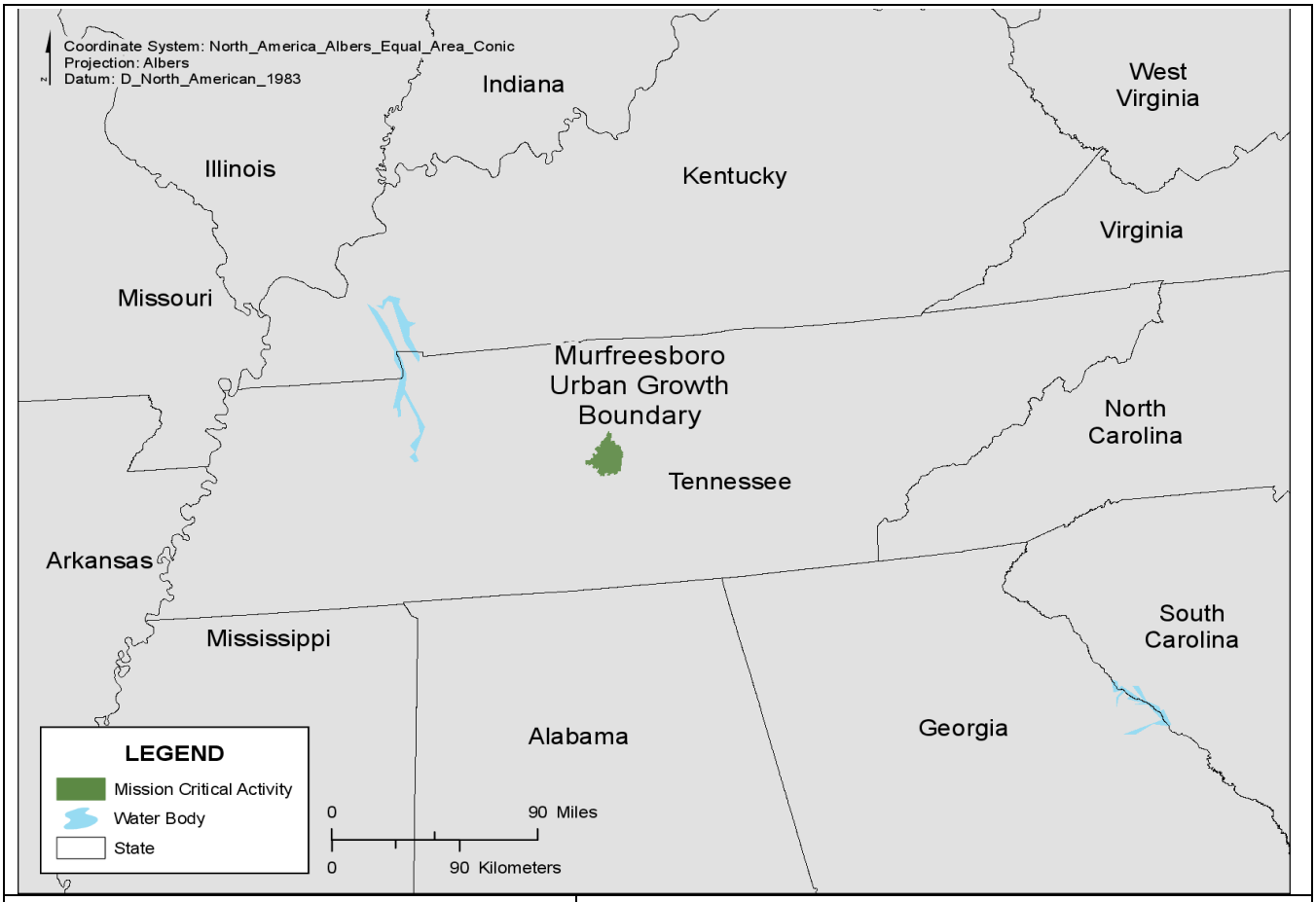
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice to Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Pollution Reduction



Mission Critical Activity Title:	Pollution Reduction
Mission Critical Activity Description:	Monitoring and sampling to comply with NPDES Permit Section 3 - Discharges to Water Quality Impaired Waters (modeling and pollution reduction activities including watershed management and groundwater characterization).
MCA_ID:	3836990513_1
Organization Type:	Municipal Government
Organization Name:	City of Murfreesboro
Business Use:	Water Quality
Area of Interest:	All area within the Murfreesboro Urban Growth Boundary

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$17,643
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Improved hydrography would help the analysis of water quality as opposed to obtaining attribute data from the NHD and using spatial data from local sources which are more accurate.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate

Future Benefits	
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Texas

Texas faces a wide range of challenges in managing its water resources, including severe drought, flooding, conservation, water quality, water rights, water supply, and environmental flows. The 2012 State Water Plan states that the population in Texas will nearly double between 2010 and 2060 to 46.3 million people. Texas must continue to maintain and improve the monitoring, mapping, and assessment of its water resources in order to meet the challenges of managing its natural resources while providing for the basic needs of the state's citizens. Maintaining and improving on the accuracy of hydrography data for the state's 261,000 square miles is a key component to meeting these challenges.

Texas respondents reported eight Mission Critical Activities (MCAs) associated with seven Business Uses (BUs). Two MCAs – Sustaining Healthy Water and Ecosystems by the Texas Parks and Wildlife Department (TPWD) and Water Rights Permitting and Administration by the Texas Commission on Environmental Quality (TCEQ) – were associated with the River and Stream Flow Management BU. TPWD reported two additional MCAs of Science-Based Decision Making and Natural Resource Identification and Conservation, with the respective BUs of River and Stream Ecosystem Management and Natural Resources Identification and Conservation. TCEQ reported a second MCA of Implementing Programs of the Clean Water Act (CWA), under the BU of Water Quality, in support of requirements of the CWA.

The General Land Office (GLO) reported the MCA of Coastal Resource Management and Protection under the BU of Coastal Zone Management. The Texas Water Development Board (TWDB) reported the MCA of Surface Water Data Collection and Analysis for the BU of Water Resource Planning and Management. Texas Natural Resources Information System (TNRIS), a division of TWDB, reported the MCA Authoritative Source Data Dissemination with a BU of Homeland Security, Law Enforcement, and Disaster Response.

Current annual benefits of hydrography data are estimated by respondents to be $7.8 million. If all requirements were to be met in the future, estimated new benefits are calculated to be $14.9 million annually. Although the current and future benefits differ among the responding organizations, existing and future qualitative benefits trended between moderate and major for all MCAs.

Future projected benefits of improved hydrography data include:

- Improved accuracy allowing for a wider spectrum of analysis, application, and modeling
- Better baseline data from which to manage resources and make decisions
- Major operational time and cost savings
- Improved communications with the public regarding safety and education
- Societal economic savings based on awareness of water conservation and availability

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓				✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful

Quality Issue	Impact
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

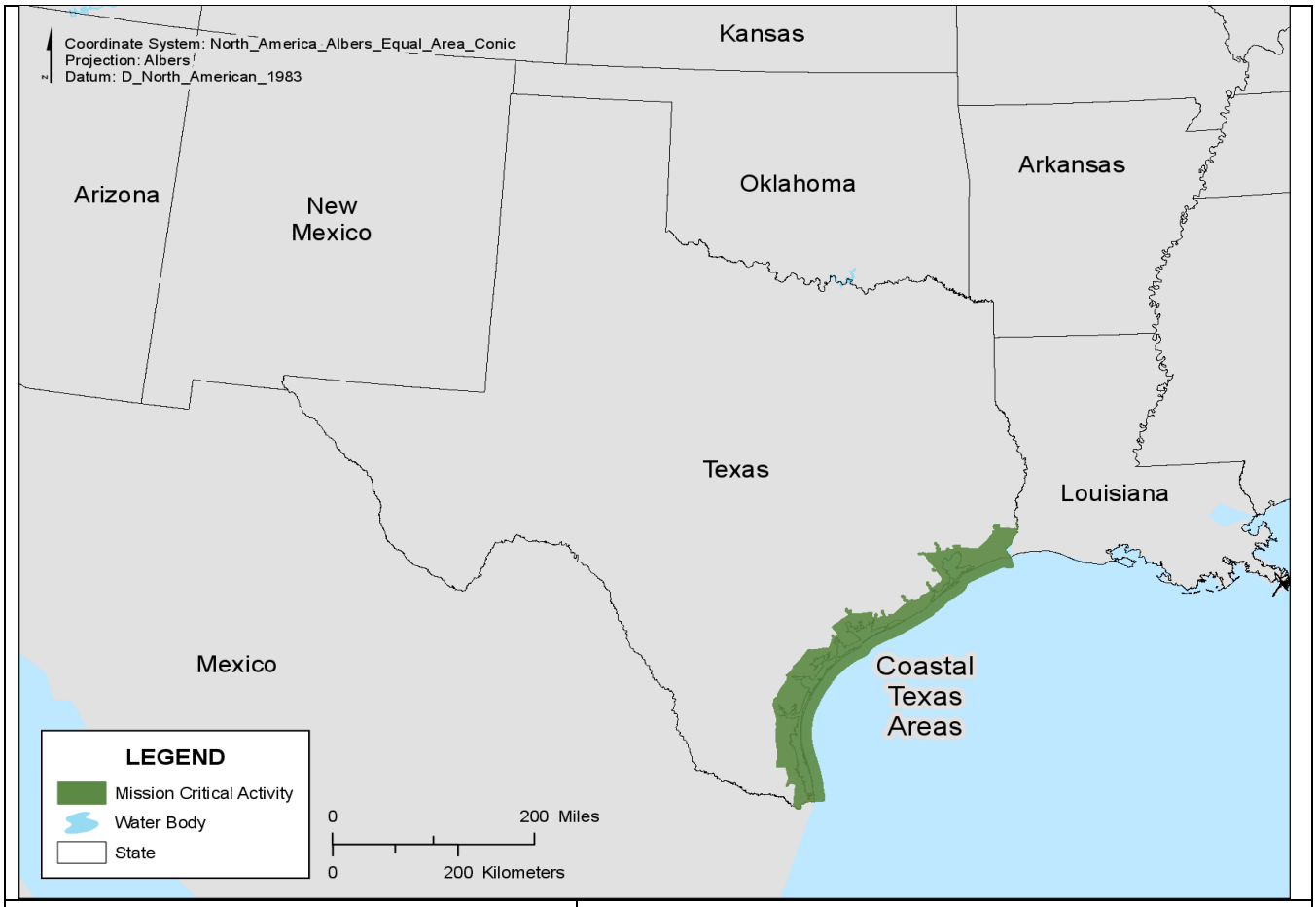
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Minor problem, requires some intervention
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Texas managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Coastal Resource Management and Protection



Mission Critical Activity Title:	Coastal Resource Management and Protection
Mission Critical Activity Description:	The Texas General Land Office (TGLO) is the state agency charged with stewardship of the Texas coast, with protecting the environment, conserving and developing its natural resources, promoting economic growth, and maintaining its health and resilience. Coastal GIS is responsible for providing GIS and related technical support to the Coastal Resources Program within TGLO. The Coastal Resources Program is involved in coastal construction, permitting assistance, beach access and dune maintenance, and administering Texas's Coastal Management Program (CMP), Coastal Erosion Planning and Response Act (CEPRA), and Coastal Impact Assistance Program (CIAP). It is also involved in response and mitigation activities for hurricanes and other coastal hazards/disasters in the Texas coastal zone.
MCA_ID:	3772936652_1
Organization Type:	State Government
Organization Name:	Texas General Land Office
Business Use:	Coastal Zone Management

Area of Interest:	Other geographic area; I will provide my own shapefile or geodatabase

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	$460,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$1 million
Future Benefits Description:	Major new benefits would include better baseline data from which to manage resources and make decisions.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

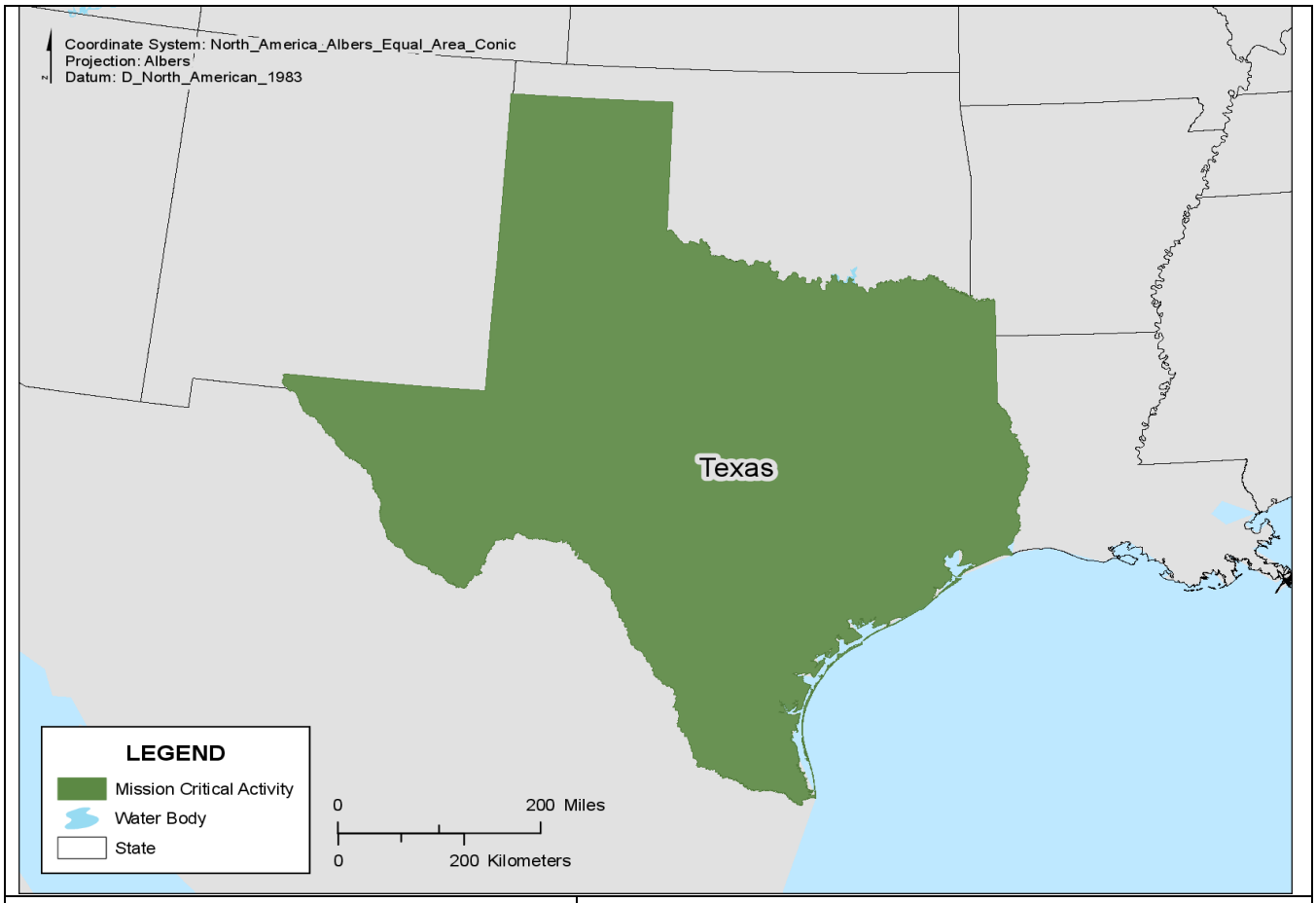
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Linkages to TX Coastal Ocean Observation Network (TCOON) tide gages.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes

Required Analytical Functions	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice To Have	Associate Selected Data Type
Bathymetry	Required	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):	NOAA Environmental Sensitivity Index (ESI) – Required, Perform Geospatial Analysis	NOAA Environmental Sensitivity Index (ESI) – Required, Perform Geospatial Analysis

Authoritative Source Data Dissemination



Mission Critical Activity Title:	Authoritative Source Data Dissemination
Mission Critical Activity Description:	To provide the public with a vital and accurate dataset representing water features in Texas to support mapping and modeling projects related to public safety and scientific research.
MCA_ID:	3783448783_1
Organization Type:	State Government
Organization Name:	Texas Natural Resources Information System (TNRIS)
Business Use:	Homeland Security, Law Enforcement, and Disaster Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	100 square miles (64,000 acres)

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$0
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

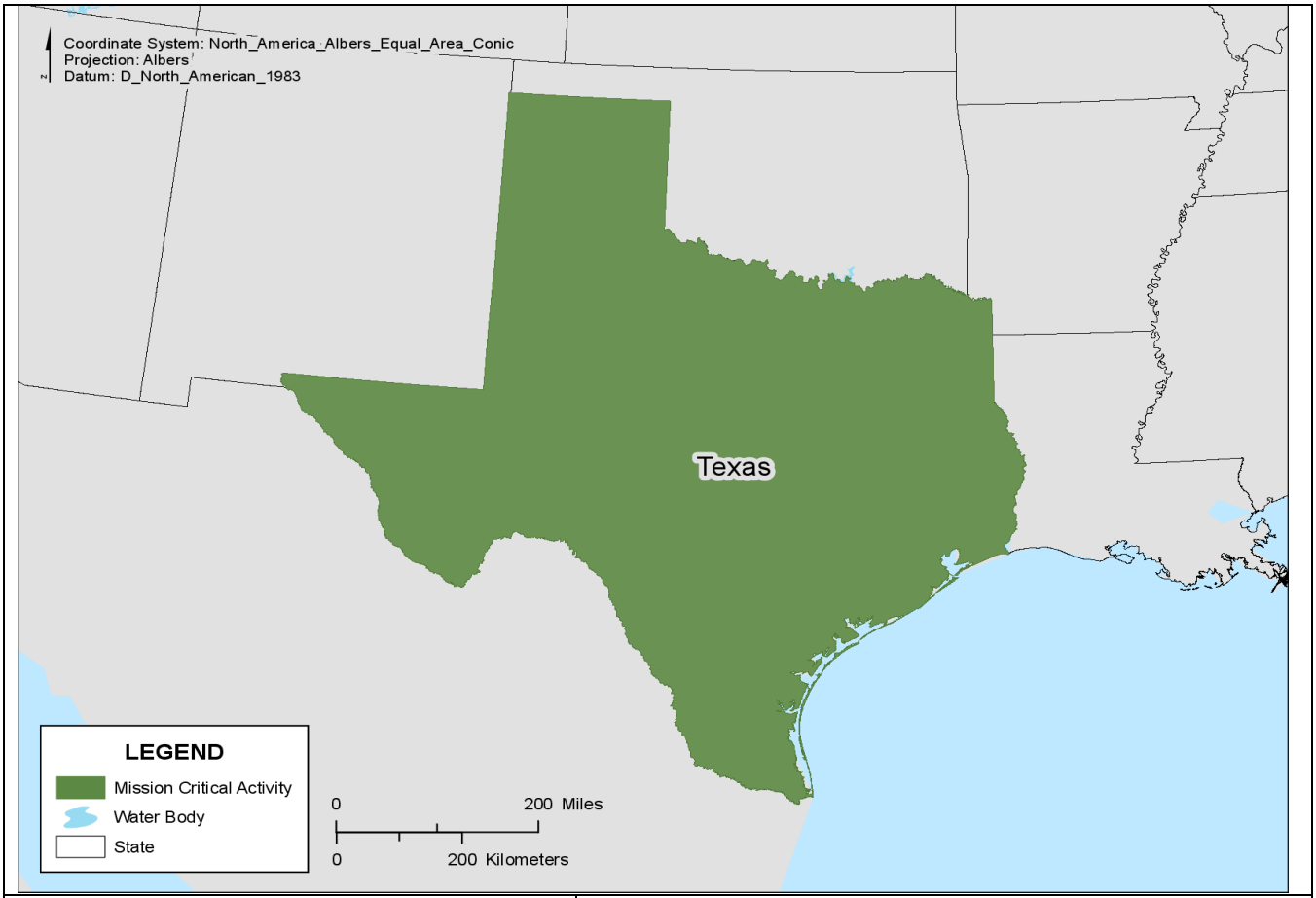
Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	Increase accuracy and performance of the data allowing for a wider spectrum of analysis and application for varying projects.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Associate Selected Data Type
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice To Have	Associate Selected Data Type
Bathymetry	Nice To Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Not Required	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Natural Resource Identification and Conservation



Mission Critical Activity Title:	Natural Resource Identification and Conservation
Mission Critical Activity Description:	TPWD's 2015 Land and Water Resources Conservation and Recreation Plan is the strategic visionary document that describes how the agency will accomplish its mission in the years ahead. Goals and strategies outlined in the Plan describe how the agency will provide exemplary stewardship of the public's land and water, and leadership for the promotion and protection of healthy aquatic ecosystems. The NHD hydrography program supports this mission through their mapping products and GIS-friendly platform.
MCA_ID:	3777021849_1
Organization Type:	State Government
Organization Name:	Texas Parks and Wildlife Department
Business Use:	Natural Resources Conservation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Lidar data for streambed delineation and change, and floodplain and watershed delineations.

Current Benefits	
Total Annual Program Budget:	$50 million
Current Annual Benefits ($):	$2.5 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5 million
Future Benefits Description:	Time or cost savings would be the closest thing to a major new benefit. With improved hydrographic information that meets all agency needs, staff would be free to conduct other business.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

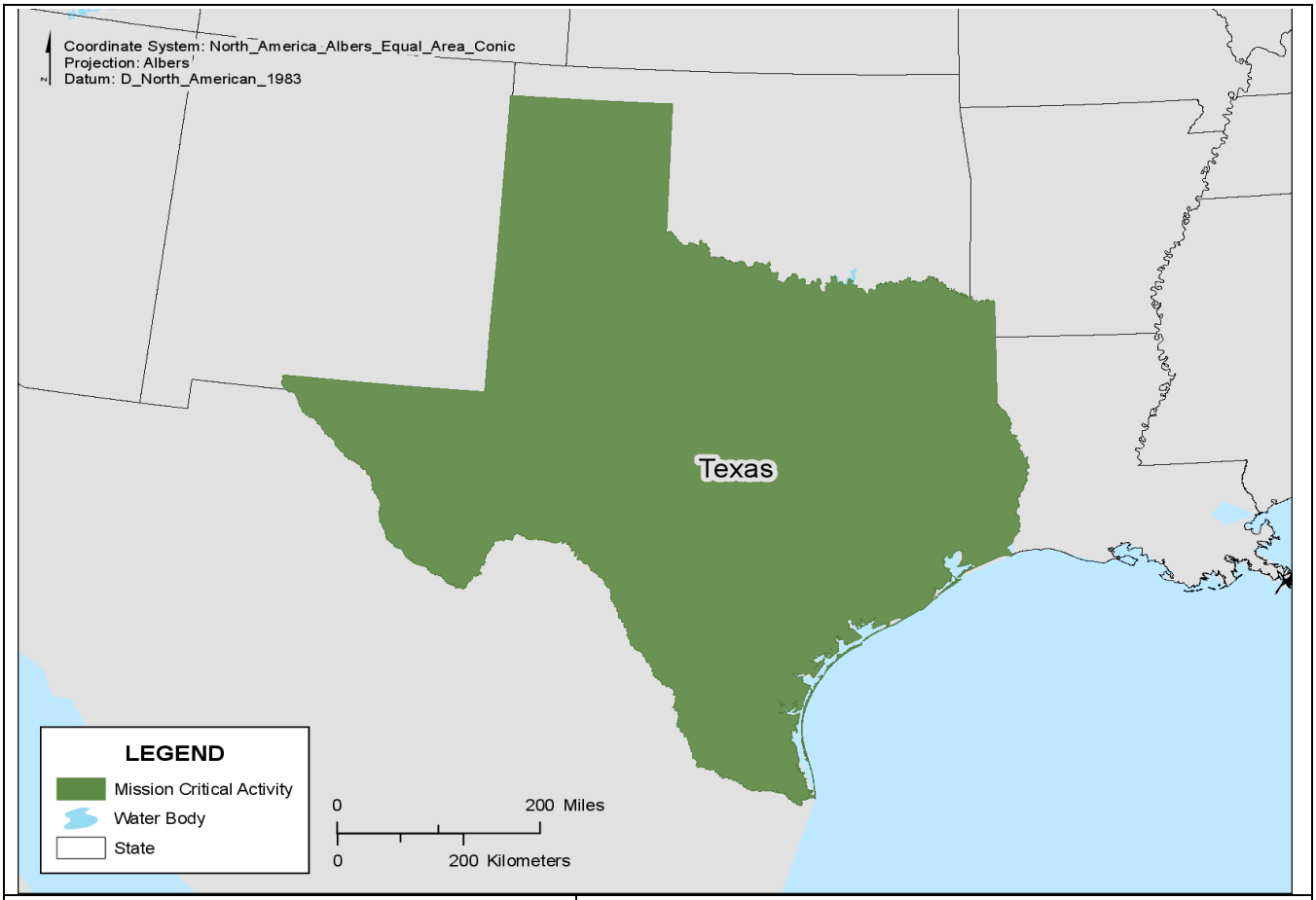
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice To Have	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Science-Based Decision Making



Mission Critical Activity Title:	Science-Based Decision Making
Mission Critical Activity Description:	Science and expertise foster understanding of natural systems and help TPWD anticipate changes and address emerging issues that impact plants, fish, and wildlife resources. The TPWD Commission, staff, partners, and constituents are informed by relevant science developed through strategic research on species, plants, and habitats. NHD hydrography contributes to strategic research by providing authoritative data for watersheds including streamflow statistics and geographic features.
MCA_ID:	3777021849_2
Organization Type:	State Government
Organization Name:	Texas Parks and Wildlife Department
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Highly Desirable

Requirements	
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Lidar, historic photos, surface geology. While not strictly hydrography, these datasets compliment the NHD for some research like change detection and streamflow patterns.

Current Benefits	
Total Annual Program Budget:	$20 million
Current Annual Benefits ($):	$2 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$3 million
Future Benefits Description:	Operational time and cost savings is likely to be the most significant benefit experienced by our agency. If data are available in sufficient detail then staff doesn't need to perform field studies or derive data from other sources.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

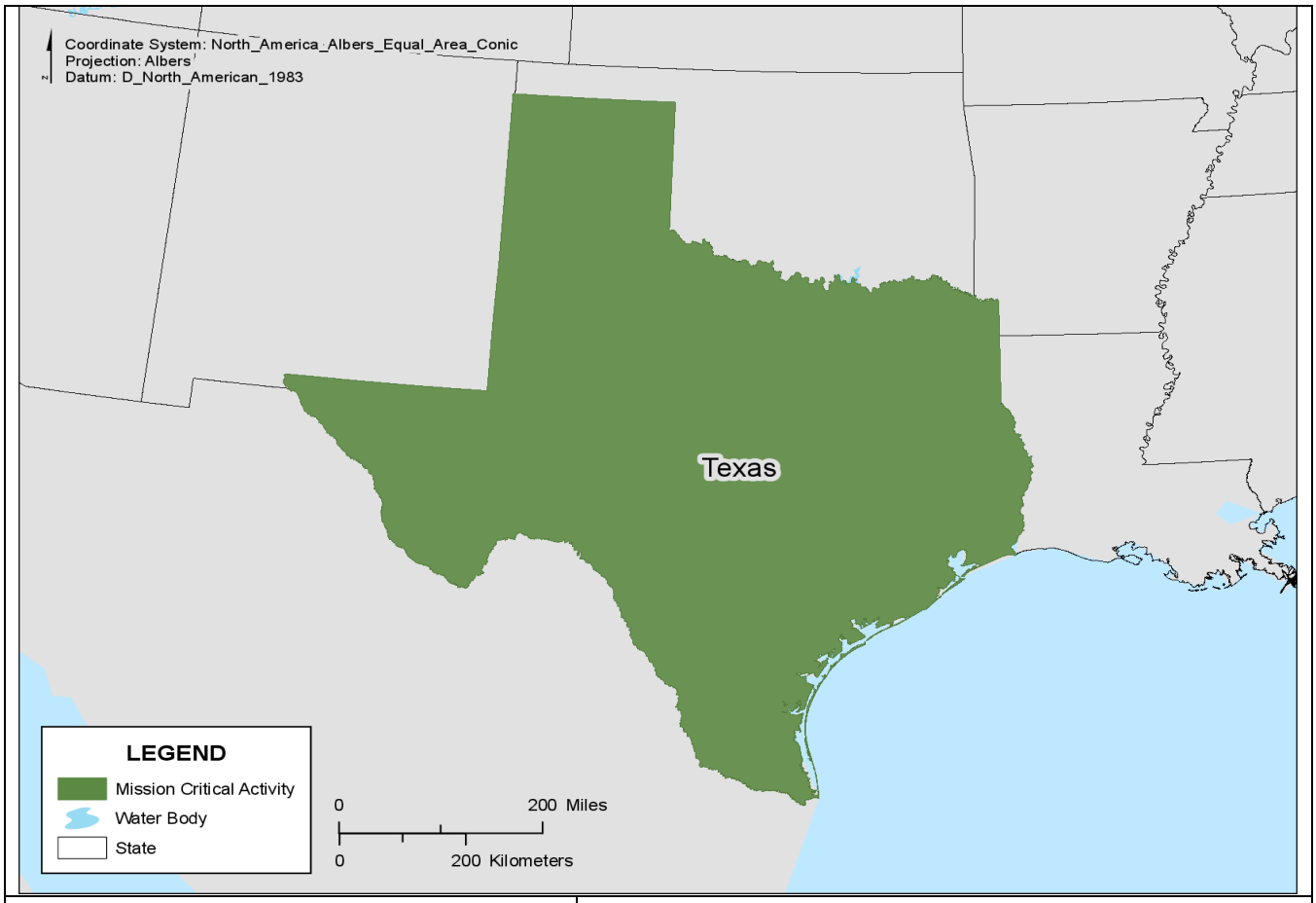
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Sustaining Healthy Water and Ecosystems



Mission Critical Activity Title:	Sustaining Healthy Water and Ecosystems
Mission Critical Activity Description:	Texas is blessed with a bounty of aquatic resources. The abundance and high quality of fishing opportunities within these waters is a major reason why Texas ranks second in the nation in the amount of money and number of days spent fishing. Texas's coastal waters also support economically-important commercial oyster and shellfish fisheries. Although the agency has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders to develop environmental flow and water quality management strategies, increase knowledge about spring habitats, help recover threatened and endangered species, control the spread of invasive species, and address other challenges confronting the future of Texas's aquatic habitats. Hydrography data contribute to TPWD's understanding and research into the complex interactions that impact fisheries and their essential habitats, water quality, and natural ecosystems.
MCA_ID:	3777021849_3
Organization Type:	State Government

Organization Name:	Texas Parks and Wildlife Department
Business Use:	River and Stream Flow Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$2 million
Future Benefits Description:	Major new benefits from improved hydrographic information would include higher quality scientific data and materials, which improve the ability to communicate with the public about water-related issues vital to healthy aquatic habitats.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Other (please specify the importance and highest analysis level):		

Water Rights Permitting and Administration

Mission Critical Activity Title:	Water Rights Permitting and Administration
Mission Critical Activity Description:	Process new water rights and amendments, and in some areas of the state administer water rights on a real-time basis.
MCA_ID:	3797680501_1
Organization Type:	State Government
Organization Name:	Texas Commission on Environmental Quality
Business Use:	River and Stream Flow Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	

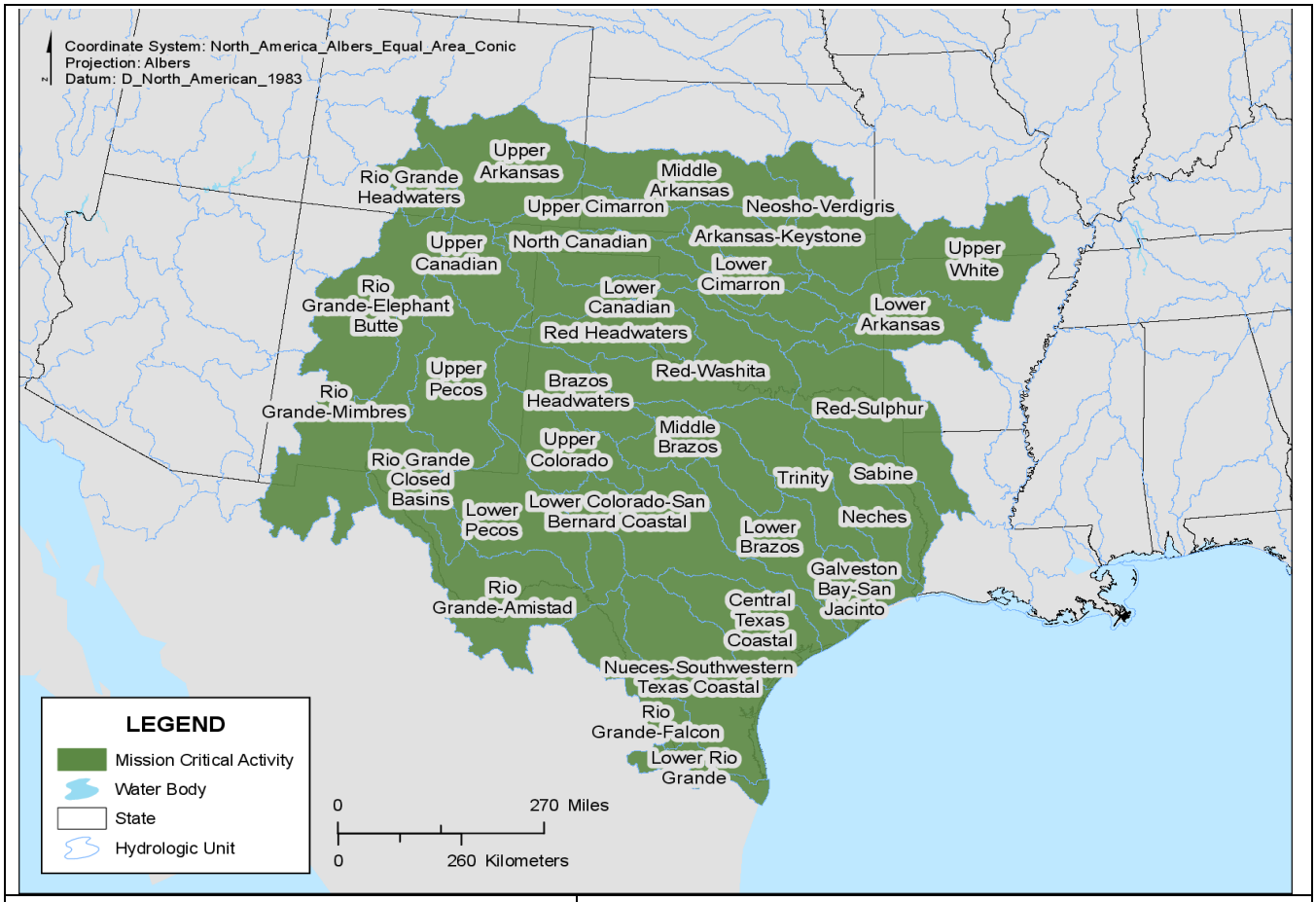
Future Benefits	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Nice To Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Nice To Have	Visual Inspection
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Implementing Programs of the Clean Water Act



Mission Critical Activity Title:	Implementing Programs of the Clean Water Act
Mission Critical Activity Description:	Supporting requirements of the CWA Sections 305(b), 303(c, d), 319, 320, and 604(b): Texas Integrated Report for Clean Water Act, Water Quality Standards, Total Maximum Daily Loads Program, Nonpoint Source Program, National Estuary Program, and Water Quality Management Plan.
MCA_ID:	3836990518_1
Organization Type:	State Government
Organization Name:	Texas Commission on Environmental Quality
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$16 million
Current Annual Benefits ($):	$2 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$3 million
Future Benefits Description:	Improved data and metadata accuracy which will result in a better assessment and restoration of the state's surface water quality.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate

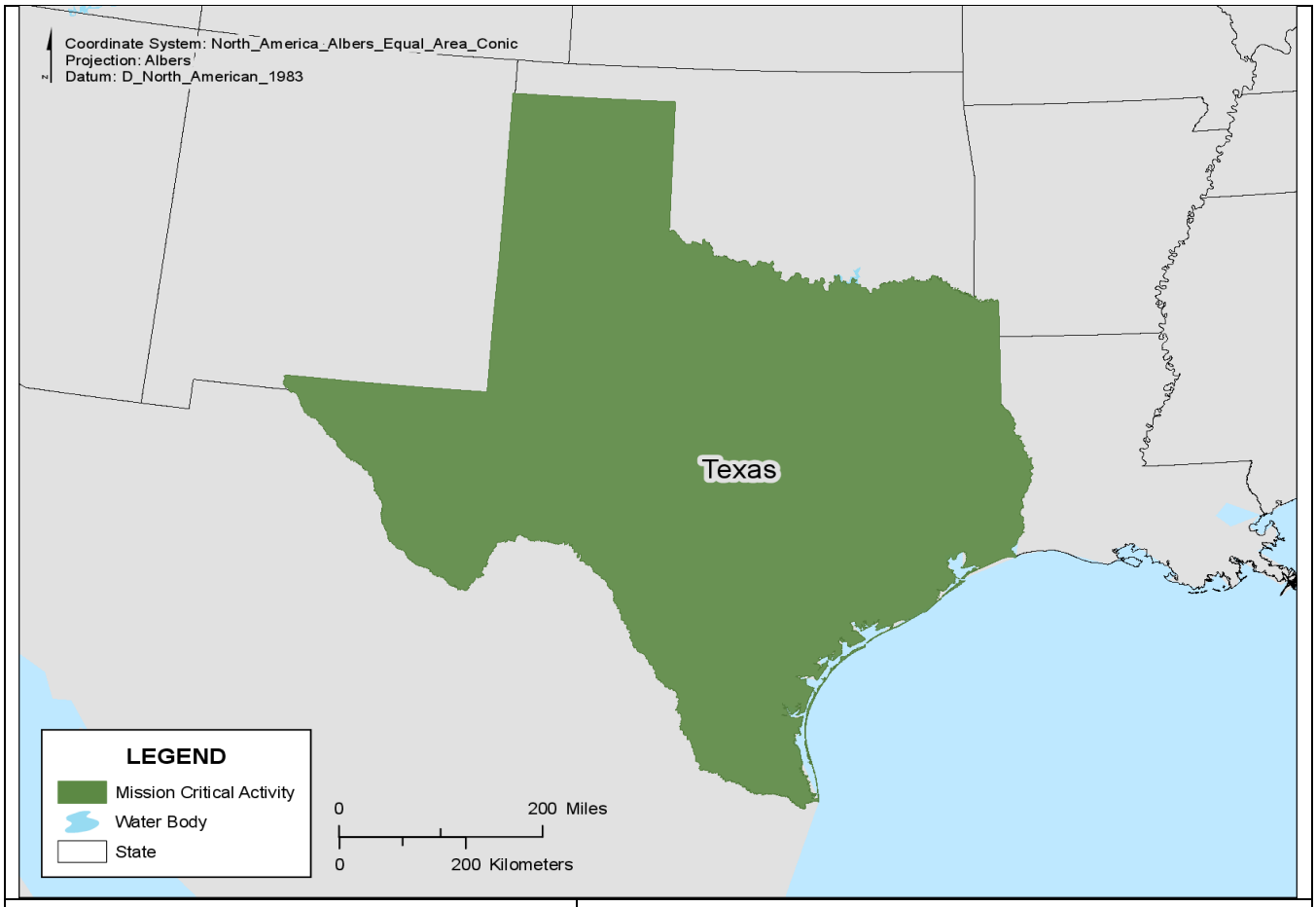
Future Benefits	
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice To Have	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Not Required	None
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Surface Water Data Collection and Analysis



Mission Critical Activity Title:	Surface Water Data Collection and Analysis
Mission Critical Activity Description:	Furnish regional and state water planners with up-to-date information about the storage capacity of state reservoirs and environmental flow needs of the state's rivers and estuaries for use in developing regional and state water plans to meet present and future needs of all Texans.
MCA_ID:	3836990517_1
Organization Type:	State Government
Organization Name:	Texas Water Development Board
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Hypsography, DRG, historical DRG, NWIS, lidar, NAWQA.

Current Benefits	
Total Annual Program Budget:	$4 million
Current Annual Benefits ($):	$200,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	Societal Economic savings – Moderate.

Future Benefits	
Future Annual Benefits ($):	$400,000
Future Benefits Description:	Potential increased accuracy of lake and floodplain modeling; environmental flow estimation analysis and modeling.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	Societal Economic savings – Major.

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	Yes
	Actual submerged river channel/pre-impoundment reservoir channel; inundation footprint for various size flows at gage locations.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes

Required Analytical Functions	
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Utah

Utah has requirements for the following:

- The business process of integrating more refined, local features into the larger National Hydrography Dataset (NHD) needs to be refined and streamlined. State data stewards should be able to alter or add to the NHD quickly and easily. This would facilitate a "bottom-up" approach to updating the NHD and also allow it to develop into a "geofabric" for wider, regional water data integration (e.g. the Department of Interior's Open Water Data Initiative). It would also allow local data stewards to take more ownership of the NHD product.
- Integration of canal systems with all watercourses actively used with a maximum flow of >5 cubic feet/second (CFS), but optionally to include smaller canals. The Utah Division of Water Rights has a legislated requirement to map all canals with a CFS flow of 5 or greater for planning and public safety.
- Improved NHD and Watershed Boundary Dataset (WBD) positioning and alignment to align with high-resolution aerial photography.
- Logical network connectivity.
- Class (size) codes for general geographic context and cartographic display and labeling at a full range of current digital scales.
- Redundant to below. Standard set of river mileage markers on major and/or significant waterways for recreation, emergency response, and other general purposes.
- Better approach to the modeling and analysis of barriers within streams and watercourses (check dams, etc.). Particularly important for fish management and control of aquatic invasive species.
- More geographic feature names on water features, particularly canals. It was noted during the workshop that it takes too long to get names approved through the Geographic Names Information System (GNIS).
- Official lake elevation levels.
- Points of diversion integration into NHD events layer.
- Development of a simplified derivative NHD for general-purpose uses. Use of this dataset would not require NHD software or training. This dataset would have cross-cutting capabilities and allow for a staging area for local change and update requests for potential integration into the NHD. This would support "open data" concepts and wider discovery and use of the data (i.e., create an NHD derivative that is accessible and usable by a non-GIS "water nerd" and can be added to web maps, etc.). Data should be supplied in interoperable, standardized formats, such as web feature services and JSON/GeoJSON.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓					

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Critically Impactful

Quality Issue	Impact
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

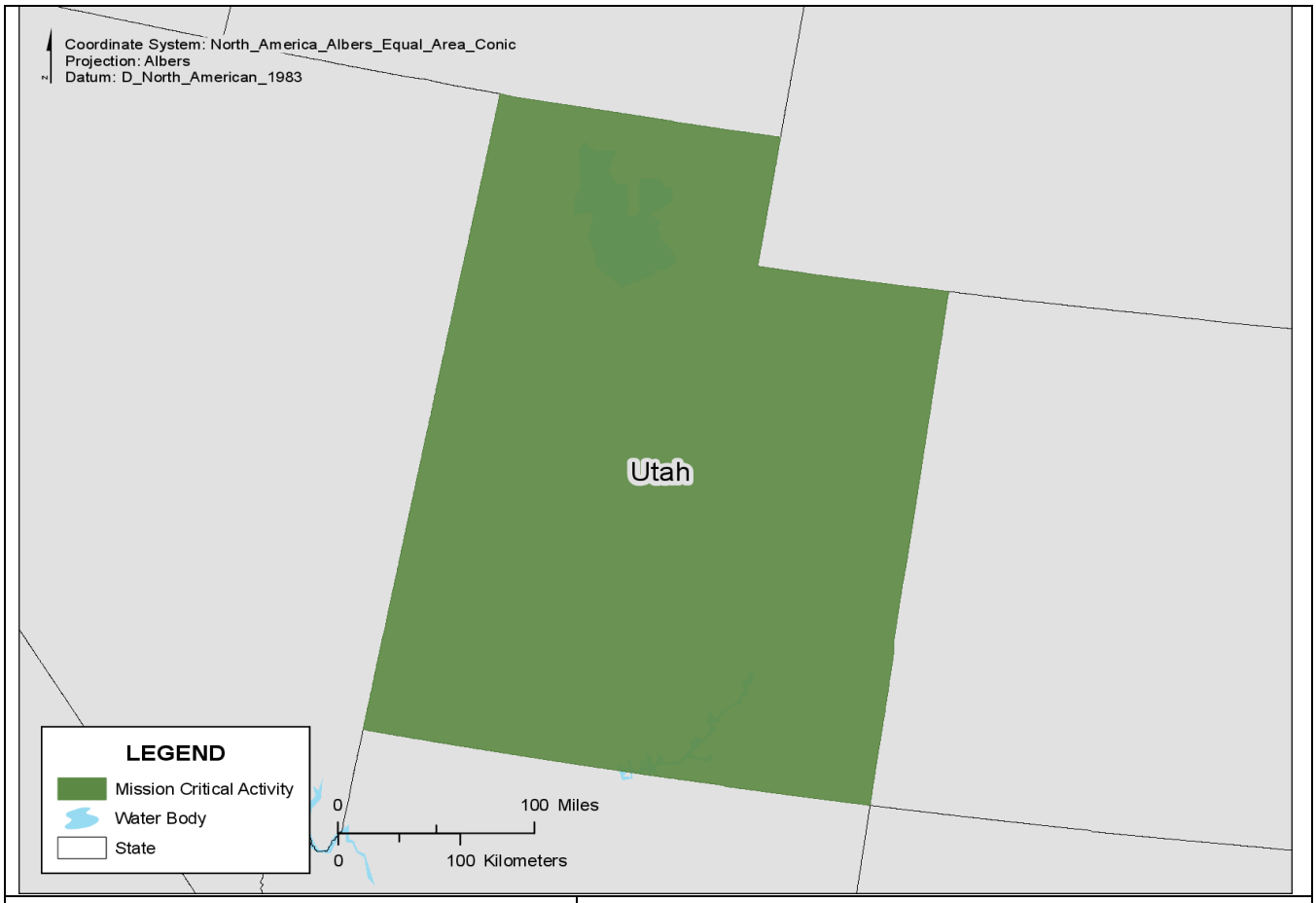
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Utah managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Forestry, Fire, and Sovereign Lands



Mission Critical Activity Title:	Forestry, Fire, and Sovereign Lands
Mission Critical Activity Description:	Forest health and sustainability. Wildfire response, reduction, and mitigation. Management of Utah's Sovereign Lands for the public trust. It is really hard to define "primary", our agency is split equally between forestry, fire, and sovereign lands.
MCA_ID:	3829195826_1
Organization Type:	State Government
Organization Name:	Utah Department of Natural Resources, Division of Forestry, Fire and State Lands
Business Use:	Forest Resources Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$20 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Don't Know
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	If we had ordinary high water mark delineations from USGS, we could use them as our sovereign lands management boundaries, saving us lots of time trying to establish from surveys or lidar. Better pond and large water body mapping would be helpful for wildfire response water acquisition. Better stream networks would be helpful for Forest Service stewardship plans. Overall better hydrography delineation will also allow us to create better maps.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

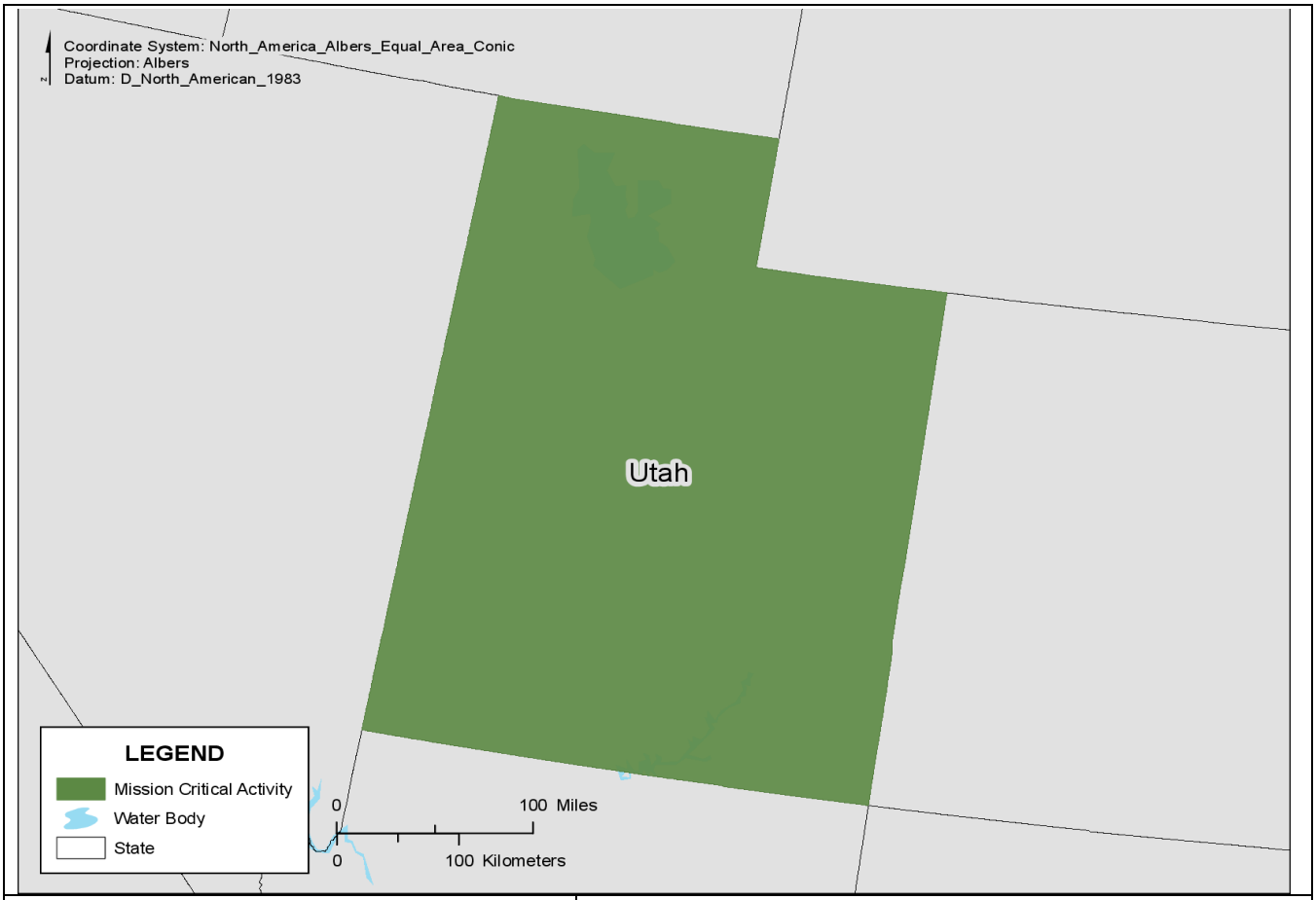
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	Yes
Other	Yes
	Ordinary high water level for delineation of our sovereign lands. Meander lines. Surface models of bathymetry (DEMs).

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	

Required Analytical Functions	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):	Land ownership and designation status (Required, PGA), Historic lake/river extents/levels (NTH, PGA)	Land ownership and designation status (Required, PGA), Historic lake/river extents/levels (NTH, PGA)

Excavation Notification Service



Mission Critical Activity Title:	Excavation Notification Service
Mission Critical Activity Description:	Notification to utility owners about upcoming excavation activity in the vicinity of their underground pipes and cables. Coverage area is state of Utah.
MCA_ID:	3801306314_1
Organization Type:	Not for Profit
Organization Name:	Blue Stakes of Utah
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$25,000
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$5,000
Future Benefits Description:	"Call 811 Before You Dig" activities -- we need the excavator to tell us where he wants to dig. Water features are a commonly-used landmark to describe site locations. These are especially important in rural areas where no addresses exist. Water features are can also be dig site locations, e.g. shoring or dredging a canal, improvements at a dam, or erosion control along a river.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Visual Inspection
Stream Flow	Not Required	None
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resources

Mission Critical Activity Title:	Water Resources
Mission Critical Activity Description:	Protect Utah's rights to interstate waters. Provide comprehensive water planning. Manage Utah's water resource project construction programs and provide funding for Dam Safety Compliance. Oversee compliance with water conservation plan requirements.
MCA_ID:	3770034172_1
Organization Type:	State Government
Organization Name:	State of Utah Division of Water Resources/Dept. of Natural Resources
Business Use:	River and Stream Flow Management
Area of Interest:	One or more Watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Stream flow records of individual stream gages.

Current Benefits	
Total Annual Program Budget:	$6 million
Current Annual Benefits ($):	$6 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$6 million
Future Benefits Description:	Timely stream flow and hydrographic information allows us to get the data for projects and implement the state water plan now.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

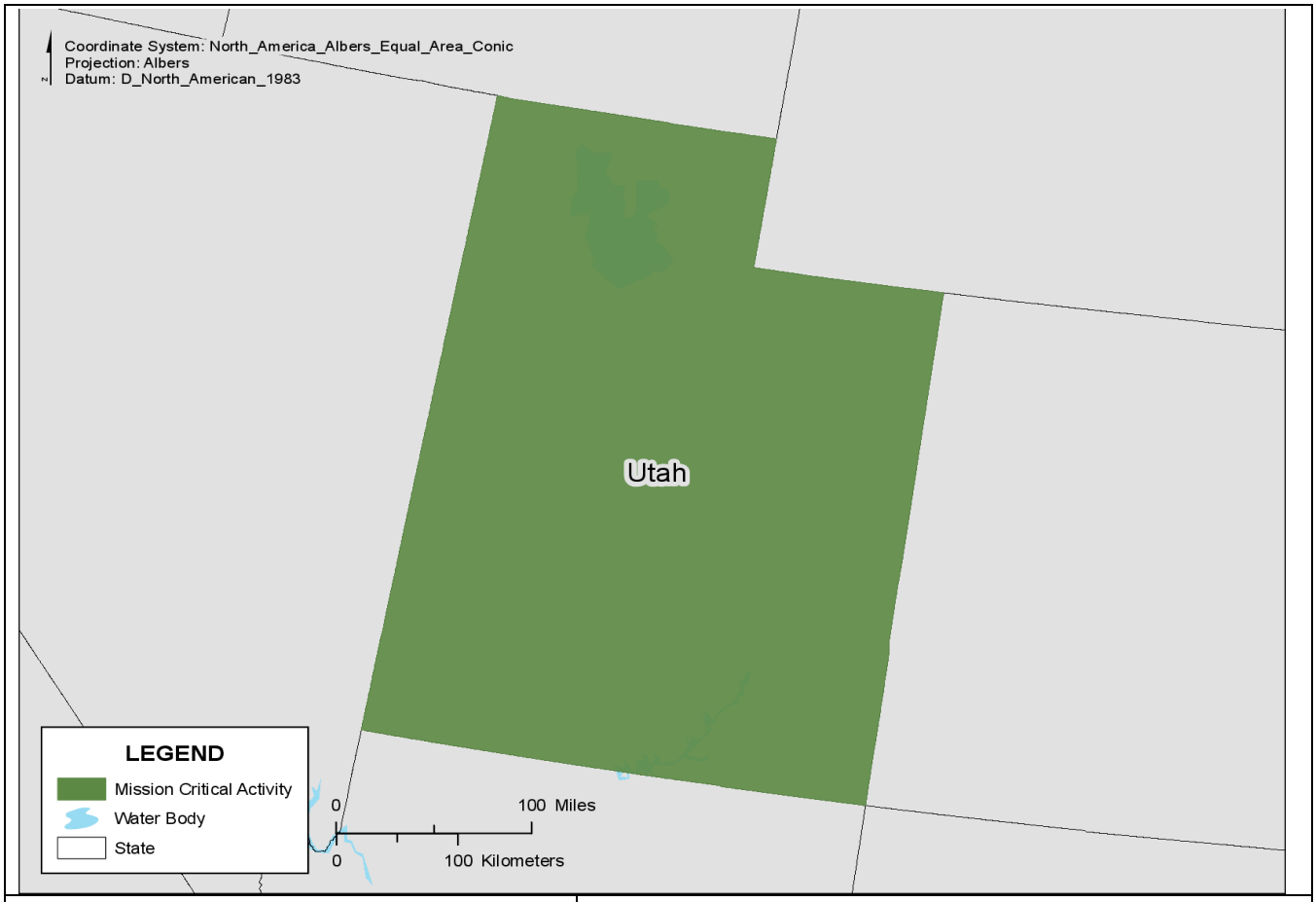
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Required	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

NHD Stewardship



Mission Critical Activity Title:	NHD Stewardship
Mission Critical Activity Description:	The Automated Geographic Reference Center (AGRC), does not have a Mission Critical Activity associated with the NHD. AGRC helps with stewardship of the NHD so the resulting data can be added to the Utah State Geographic Information Database (SGID) and benefit those working in Utah.
MCA_ID	3790849746_1
Organization Type:	State Government
Organization Name:	Utah AGRC
Business Use:	Urban and Regional Planning
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know

Requirements	
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$100,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Improved positional accuracy, additional named features, and the removal of non-existent or built-over features.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Minor

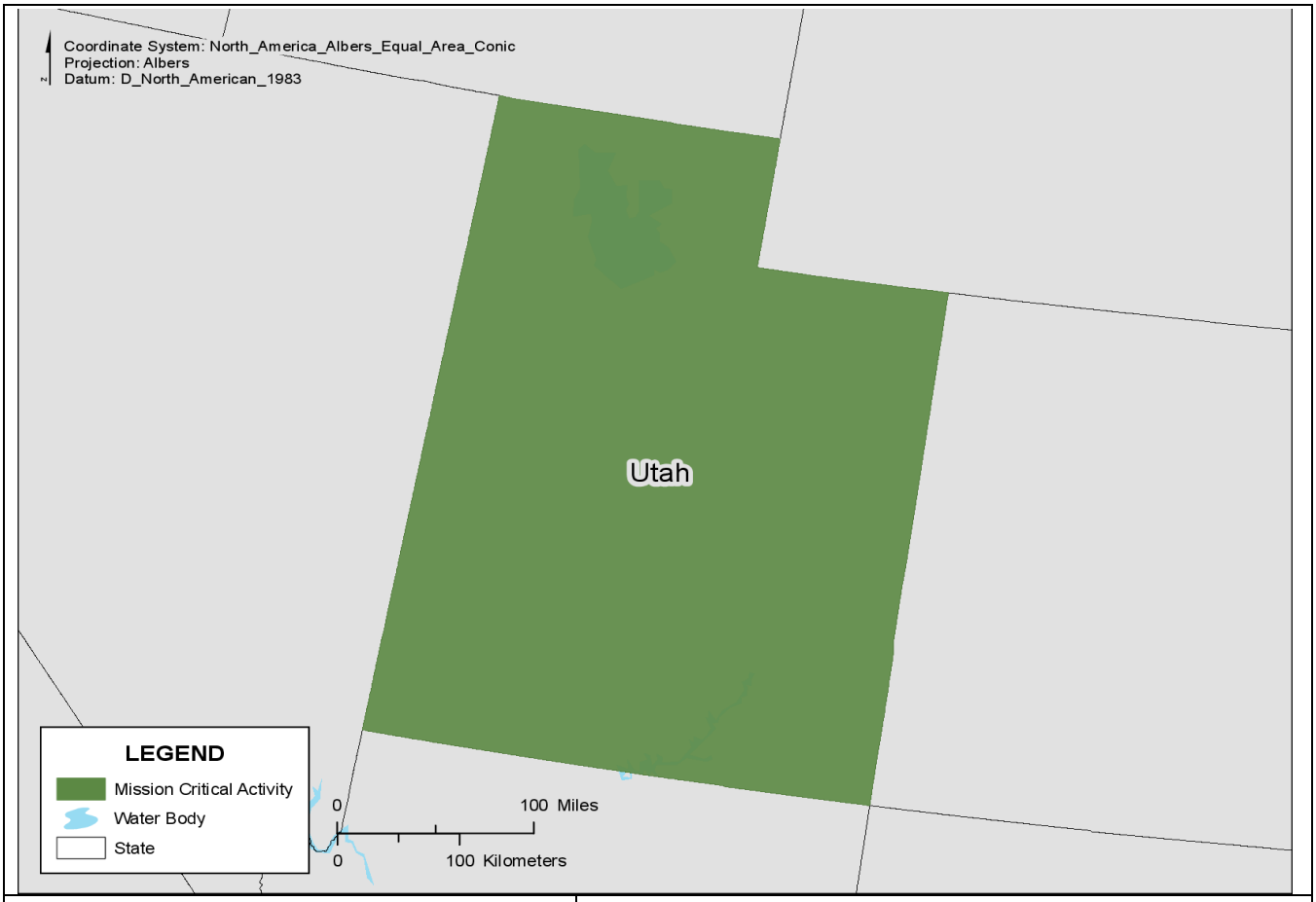
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	Yes
	Feature names.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Not Required	None
Stream Flow	Not Required	None
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Not Required	None
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Planning and Development



Mission Critical Activity Title:	Water Planning and Development
Mission Critical Activity Description:	Water Planning and Development: State water budget (accounting for water supply, inflows, outflows, and consumptive uses statewide), water supply and demand modeling (population projections, water supply and demand forecasting), state water plan (basin reports on future water needs, current conditions, conservation, agricultural uses, water storage and distribution, sedimentation, etc.); Board of Water Resources (water project funding).
MCA_ID:	3789914794_1
Organization Type:	State Government
Organization Name:	Utah Division of Water Resources
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	StreamStats.

Current Benefits	
Total Annual Program Budget:	$6 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Not Applicable
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$20,000
Future Benefits Description:	Improved products or services.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

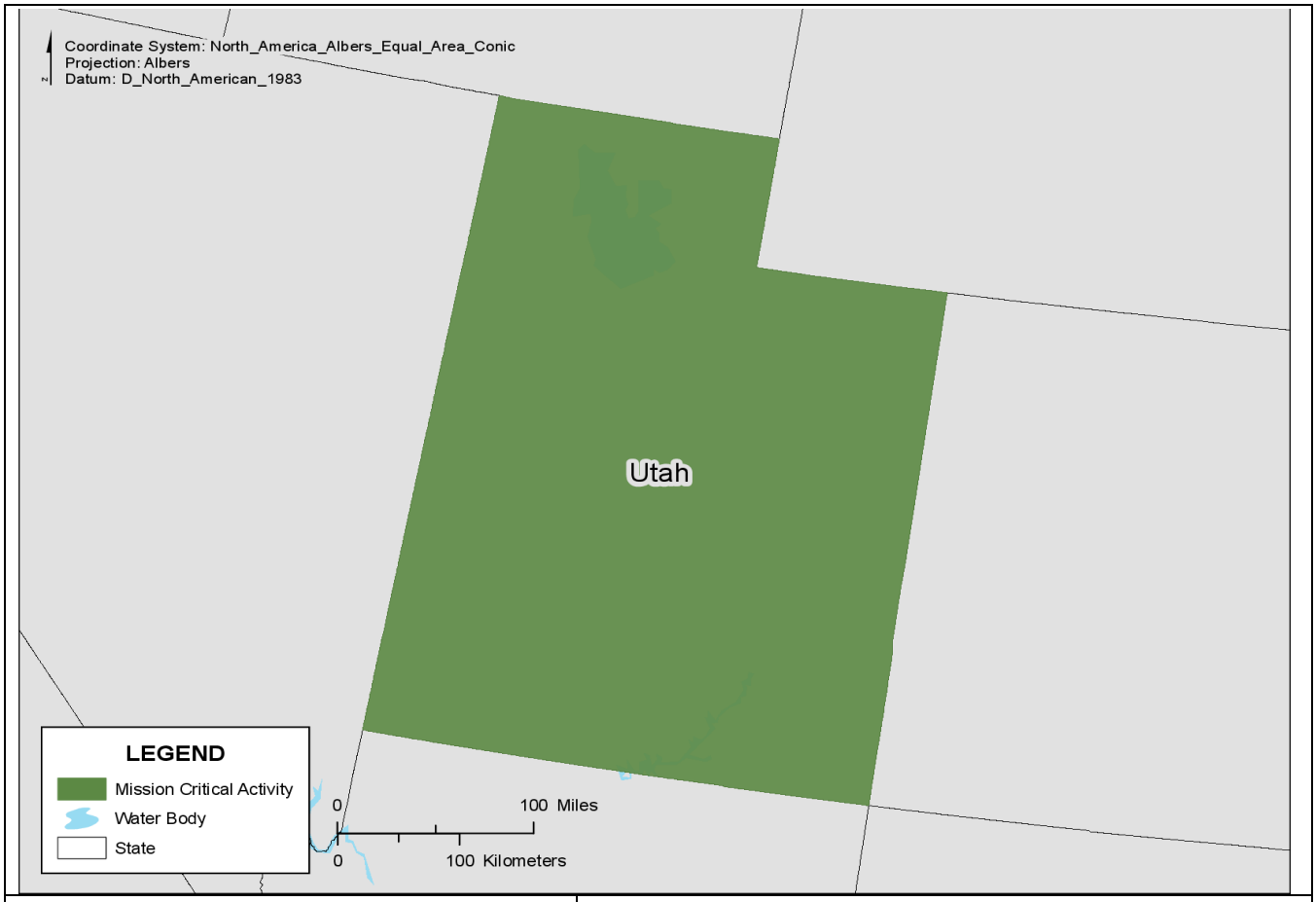
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	

Required Analytical Functions	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Rights Administration



Mission Critical Activity Title:	Water Rights Administration
Mission Critical Activity Description:	Water rights administration.
MCA_ID:	3829285047_1
Organization Type:	State Government
Organization Name:	Utah Division of Water Rights
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	I don't know
Smallest Contributing Area:	I don't know
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$8 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

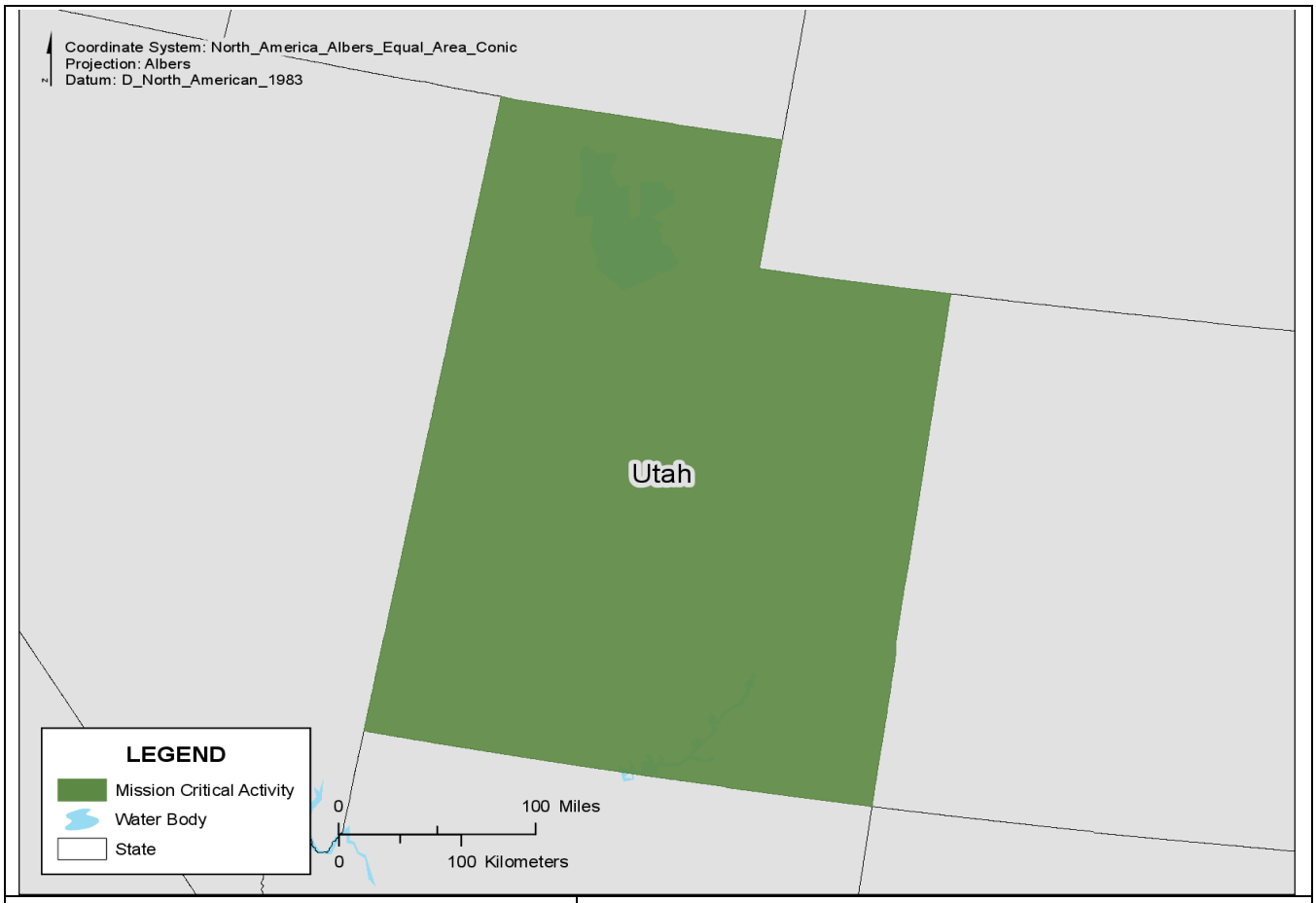
Future Benefits	
Future Annual Benefits ($):	$60,000-$80,000
Future Benefits Description:	If data are kept up-to-date, especially stream and canal data, there would be time saved not having to generate data for use on future projects.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	Perform Geospatial Analysis
Soils	Not Required	Perform Geospatial Analysis
Surficial Geology	Not Required	Perform Geospatial Analysis
Bathymetry	Not Required	Perform Geospatial Analysis
Climate	Not Required	Perform Geospatial Analysis
Contaminant Sources	Not Required	Perform Geospatial Analysis
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Nice To Have	Perform Geospatial Analysis
Wetlands	Not Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	Perform Geospatial Analysis
Aquifers	Not Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Wildfire Response, Mitigation, and Reduction



Mission Critical Activity Title:	Wildfire Response, Mitigation, and Reduction
Mission Critical Activity Description:	Wildfire response, mitigation, and reduction.
MCA_ID:	3829195826_2
Organization Type:	State Government
Organization Name:	Utah Department of Natural Resources, Division of Forestry, Fire and State Lands
Business Use:	Wildfire Management, Planning, and Response
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	6-10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$20 million
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$10,000
Future Benefits Description:	Better pond and large waterbody mapping would be helpful for wildfire response water acquisition.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform geospatial analysis
Soils	Required	Perform geospatial analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):	Land ownership and designation status (Required, PGA), Historic lake/river extents/levels (NTH, PGA)	Land ownership and designation status (Required, PGA), Historic lake/river extents/levels (NTH, PGA)

Vermont

Mission Critical Activities (MCAs) identified for Vermont include Land Cover Mapping, Modeling of Nutrient Loads, Watershed Protection, Stream Bank Regulation, Water Quality Protection, Mosquito Habitat, Erosion Mitigation, and Protect, Enhance, and Restore the Quality of Surface Water.

Four Business Uses (BUs) were identified. They include River and Stream Ecosystem Management, Water Quality, Water Resource Planning and Management, and Natural Resources Conservation.

Future annual benefits were estimated at $258,000.

There were four respondents to the survey in the State of Vermont. Three were concerned with various water quality issues. Due to the density of dairy farms in Vermont, water quality is a primary concern.

University of Vermont – Land Cover Mapping.

State of Vermont, Agency of Agriculture, Food and Markets - Mission is regulation of agriculture to ensure water quality.

State of Vermont, Agency of Natural Resources – Various aspects of watershed management.

Lake Champlain Basin Program – LCBP is a nonprofit organization funded by various Federal agencies and deals with various Lake Champlain issues. They gave no cost estimate, which is due to the international activities they support.

These were not noted, but in Vermont the major issues are water quality, especially concerning agricultural runoff, and flooding. Because Lake Champlain is partially located in Quebec, water quality is an international issue.

Two future improvements were noted: increased detail of densification on networks and improved horizontal accuracy. Survey respondents noted that this would improve the quality of the datasets derived from the NHD.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓				✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	**Esri shapefiles**	**Esri file geodatabase**	**NetCDF**	**GeoTIFF**	**NITF**	**Esri Grid**	**Other**
✓		✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Nice To Have
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable

Data Type	Elevation Data Integration	Requirement
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Critically Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Somewhat Impactful
A second order stream flow direction is reversed.	Somewhat Impactful
A third order stream flow direction is reversed.	Somewhat Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Vermont managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Land Cover

Mission Critical Activity Title:	Land Cover
Mission Critical Activity Description:	Land over mapping.
MCA_ID:	3803933928_1
Organization Type:	State Government
Organization Name:	University of Vermont
Business Use:	Natural Resources Conservation
Area of Interest:	Nationwide

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$450,000
Current Annual Benefits ($):	$12,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$8,000
Future Benefits Description:	Improved derived products.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor

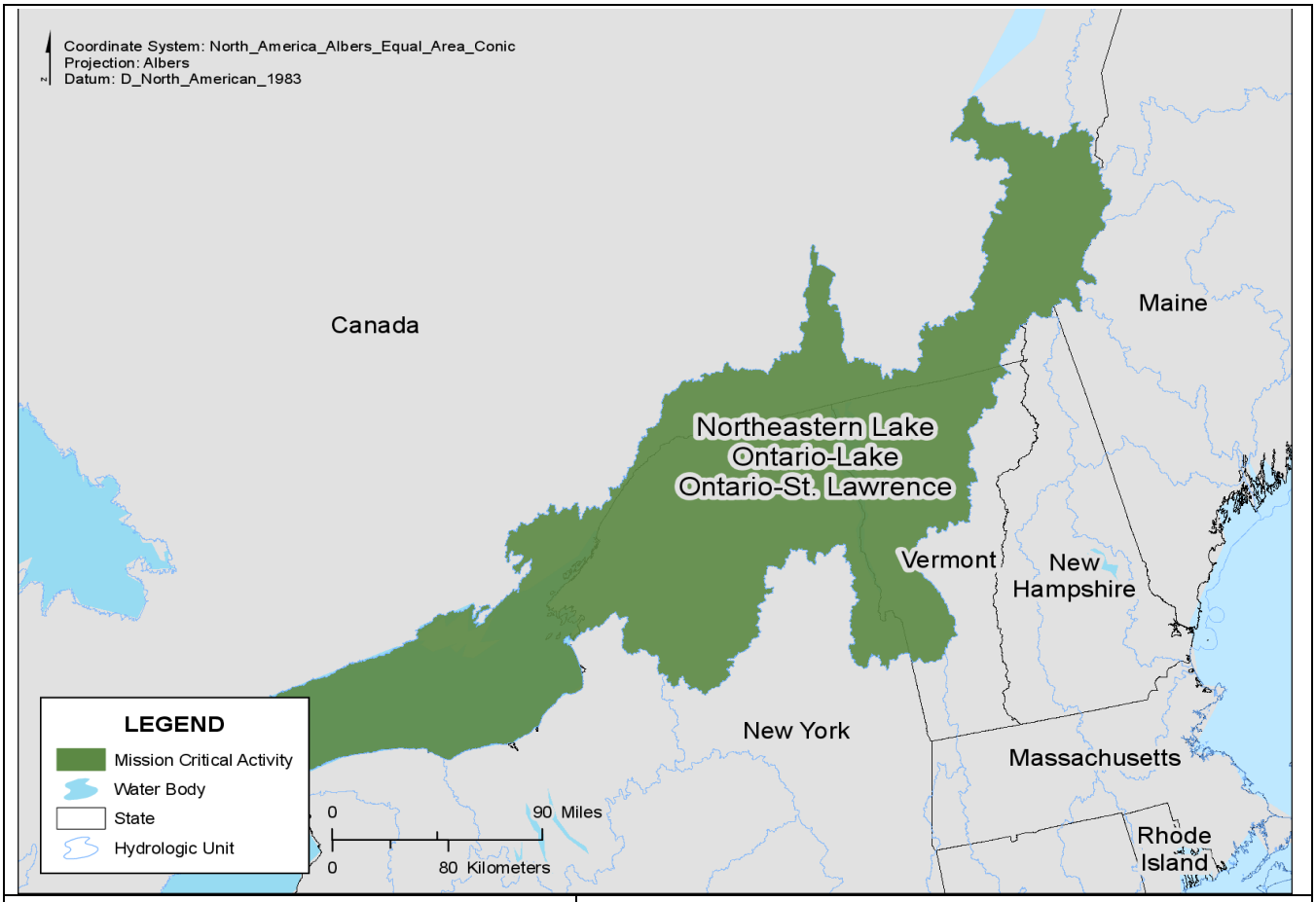
Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice to Have	Associate Selected Data Type
Climate	Nice to Have	Associate Selected Data Type
Contaminant Sources	Nice to Have	Associate Selected Data Type
Elevation	Required	Associate Selected Data Type
Stream Flow	Nice to Have	Associate Selected Data Type
Wetlands	Nice to Have	Associate Selected Data Type
Census (population statistics)	Not Required	Associate Selected Data Type
Aquifers	Not Required	Associate Selected Data Type
Point Discharges	Not Required	Associate Selected Data Type
Water Use: Diversions	Not Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Not Required	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Modeling



Mission Critical Activity Title:	Watershed Modeling
Mission Critical Activity Description:	Modeling of nutrient loading of tributaries and from shorelines of Lake Champlain.
MCA_ID:	3828925046_1
Organization Type:	Not for Profit
Organization Name:	Lake Champlain Basin Program
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	
Stream Density:	
Smallest Contributing Area:	
Smallest Mapped Waterbody:	
Level of Detail:	

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Data not provided.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

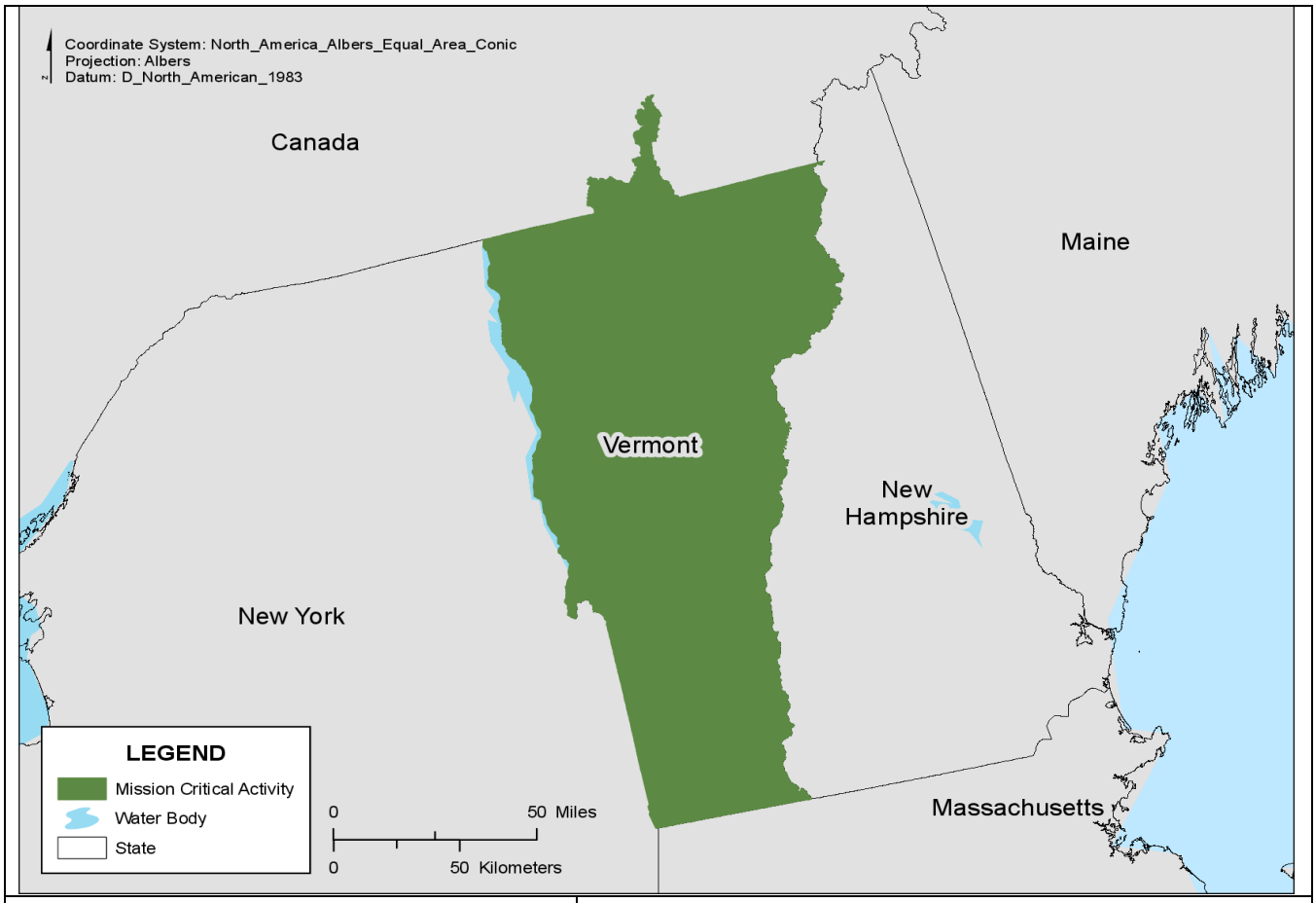
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover		
Soils		
Surficial Geology		
Bathymetry		
Climate		
Contaminant Sources		
Elevation		
Stream Flow		
Wetlands		
Census (population statistics)		
Aquifers		
Point Discharges		
Water Use: Diversions		
EPA - National Pollutant Discharge Elimination System (NPDES)		
EPA - STOrage and RETrieval Data Warehouse (STORET)		
USACE - National Inventory of Dams (NID)		
USDA - National Agriculture Statistics Service (NASS)		
USFWS - National Wetlands Inventory (NWI)		
USGS National Water Information Sites (NWIS)		
USGS National Water-Quality Assessment Program (NAWQA)		
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Watershed protection, stream bank regulation, water quality protection, mosquito habitat, nutrient management from livestock waste and fertilizer, erosion mitigation.
MCA_ID:	3794785469_1
Organization Type:	State Government
Organization Name:	Vermont Agency of Agriculture, Food and Markets
Business Use:	Water Quality
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000 -scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$10 million
Current Annual Benefits ($):	$100,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

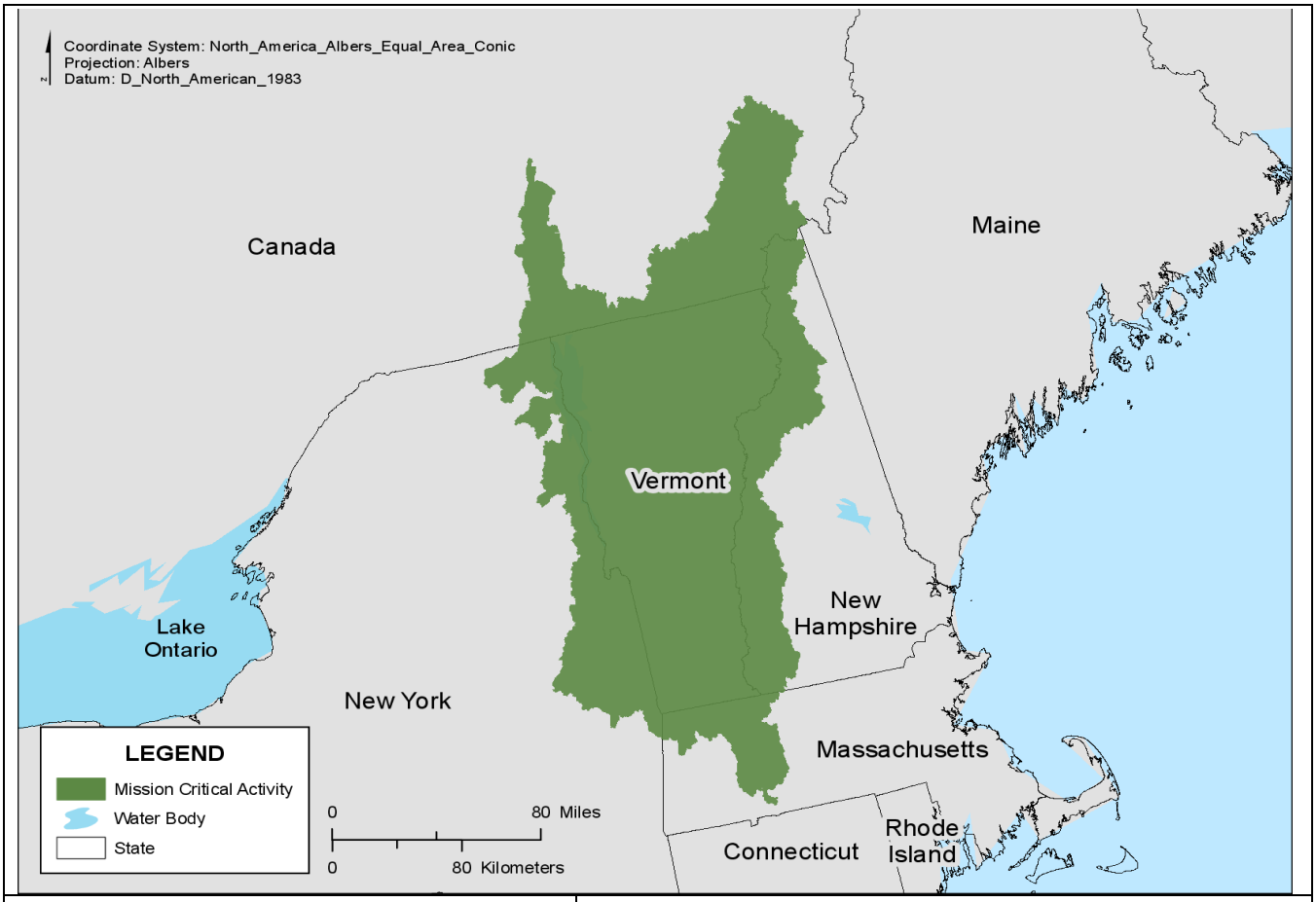
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	With the improved data we could do much more detailed site evaluation prior to field work.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Visual Inspection
Soils	Required	Visual Inspection
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Highly Desirable	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Nice to Have	Visual Inspection
Stream Flow	Nice to Have	Visual Inspection
Wetlands	Required	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Visual Inspection
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Required	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Watershed Management



Mission Critical Activity Title:	Watershed Management
Mission Critical Activity Description:	The Watershed Management Division of the Department of Environmental Conservation is the best example (there are many others) of hydrography being the organization's primary activity. The Division's primary mission is to protect, maintain, enhance, and restore the quality of VT's surface water resources through its stormwater, wastewater, wetlands, watershed, river corridor, and floodplain management programs.
MCA_ID:	3809720038_1
Organization Type:	State Government
Organization Name:	Agency of Natural Resources, Vermont
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	WBID - an alpha-numeric code used to locate waters in VT (old EPA source maybe?); tactical Basins: VT concentric planning basins (political) for watershed planning.

Current Benefits	
Total Annual Program Budget:	Don’t know.
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$250,000
Future Benefits Description:	There are so many other derivative datasets that use the NHD as a baseline. All those products would benefit most from reporting on overlapping features.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	None
Soils	Nice to Have	Associate Selected Data Type
Surficial Geology	Not Required	None
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice to Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Virginia

Four state-level entities responded to the USGS Hydrography Requirements and Benefits Study (HRBS) survey and identified a total of five Mission Critical Areas (MCAs).

The HRBS survey results for Virginia noted requirements for improved and coordinated hydrography data covering a range of MCAs in support of:

- Water resource management with regard to monitoring and assessing both surface and ground water quality for environmental regulation
- Nonpoint source pollution and assessment
- Watershed management and protection

The primary reported Business Uses (BUs) of Water Resources Planning, Watershed or Stream Management, Water Quality Monitoring, and Natural Resources Conservation are reflected in the MCAs. Most of the reporting entities had a working familiarity of the National Hydrography Dataset (NHD) and the Watershed Boundary Dataset (WBD). Only one respondent used the NHDPlus. Coastlines, estuaries, and wetlands were seen as required data characteristics. Calculating drainage areas was a key analytical function. In terms of integrating with other datasets, land cover and elevation were rated as required by a majority of respondents. Most respondents favored the use of 12-digit Hydrologic Unit Codes (HUCs) as a management unit, and Esri geodatabases, shapefiles, and raster grids as the preferred file formats. To varying degrees, ancillary national datasets, such as the National Wetlands Inventory (NWI), STORET, National Agricultural Statistics Service (NASS), National Pollutant Discharge Elimination System (NPDES), and National Water Information System (NWIS), as well as specialized hydrography-related datasets are used to augment programmatic needs to meet business requirements. Virginia respondents defined business requirements for more current and complete hydrographic data to augment analysis integrating other framework layers that include improved alignment of NHD data with high resolution elevation data (DEMs) as lidar elevation data become the increasingly available standard.

For Virginia respondents, program budget information was reported for two entities at $5 million and $4.1 million, but other respondents were unsure of the exact amounts. Water programs are generally embedded in larger departments, and may operate on a mix of appropriated funds, non-appropriated special revenue, or grants funding. A recent transfer of water management programs between two agencies in the Virginia state government also made budgetary assessment for the NHD difficult. Quantitative fiscal benefits, both current and future, were similarly difficult to ascertain, and formal budgetary cost-benefit analysis or return-on-investment scenarios have not been performed regarding hydrographic data specifically.

The respondents reported that improving NHD data and stewardship provide qualitative benefits to their work, such as providing better products and more value-added services to agency employees and the public; time savings for field work, data management, and revision; and improved data accuracy and spatial delineation for analysis and modeling purposes.

Virginia currently has no centralized way to coordinate with state, Federal, and local agencies to collect and leverage resources to prioritize NHD updates. NHD stewardship was formalized by an MOU in 2008, and is currently maintained by one contractor working for the VA Department of Conservation and

Recreation (DCR). The NHD is currently available at 1:24,000 scale, but funds and staffing resources are not available for comprehensive updates or improvements to the data.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓		✓	✓	✓	✓	✓		✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
	✓	✓		✓		✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Nice To Have
Services that allow combination of visualizations with other visualization services (mash-ups)	Nice To Have
Services to create generalized versions of hydrography (different scales and level of detail)	Nice To Have
Services to support online analysis of hydrography information (such as StreamStats)	Nice To Have

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Not Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Not Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Somewhat Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Little or No Impact
A large reservoir is misnamed.	Little or No Impact
A first order stream flow direction is reversed.	Somewhat Impactful
A second order stream flow direction is reversed.	Somewhat Impactful
A third order stream flow direction is reversed.	Somewhat Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Somewhat Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Little or No Impact
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Highly Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Virginia managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Natural Resources Conservation

Mission Critical Activity Title:	Natural Resources Conservation
Mission Critical Activity Description:	Biodiversity conservation. The Natural Heritage Program's work is focused on science-based conservation to protect Virginia's native plant and animal life and the ecosystems upon which they depend.
MCA_ID:	3777218422_1
Organization Type:	State Government
Organization Name:	Virginia Dept. of Conservation & Recreation
Business Use:	Natural Resources Conservation
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Wetlands Inventory (NWI).

Current Benefits	
Total Annual Program Budget:	$4.1 million
Current Annual Benefits ($):	Difficult to quantify.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know
Future Benefits Description:	Improved delineation of areas needed to conserve plants, animals, and ecological communities of concern. In coastal areas, more frequently updated hydrography data would be especially helpful.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable

Future Benefits	
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

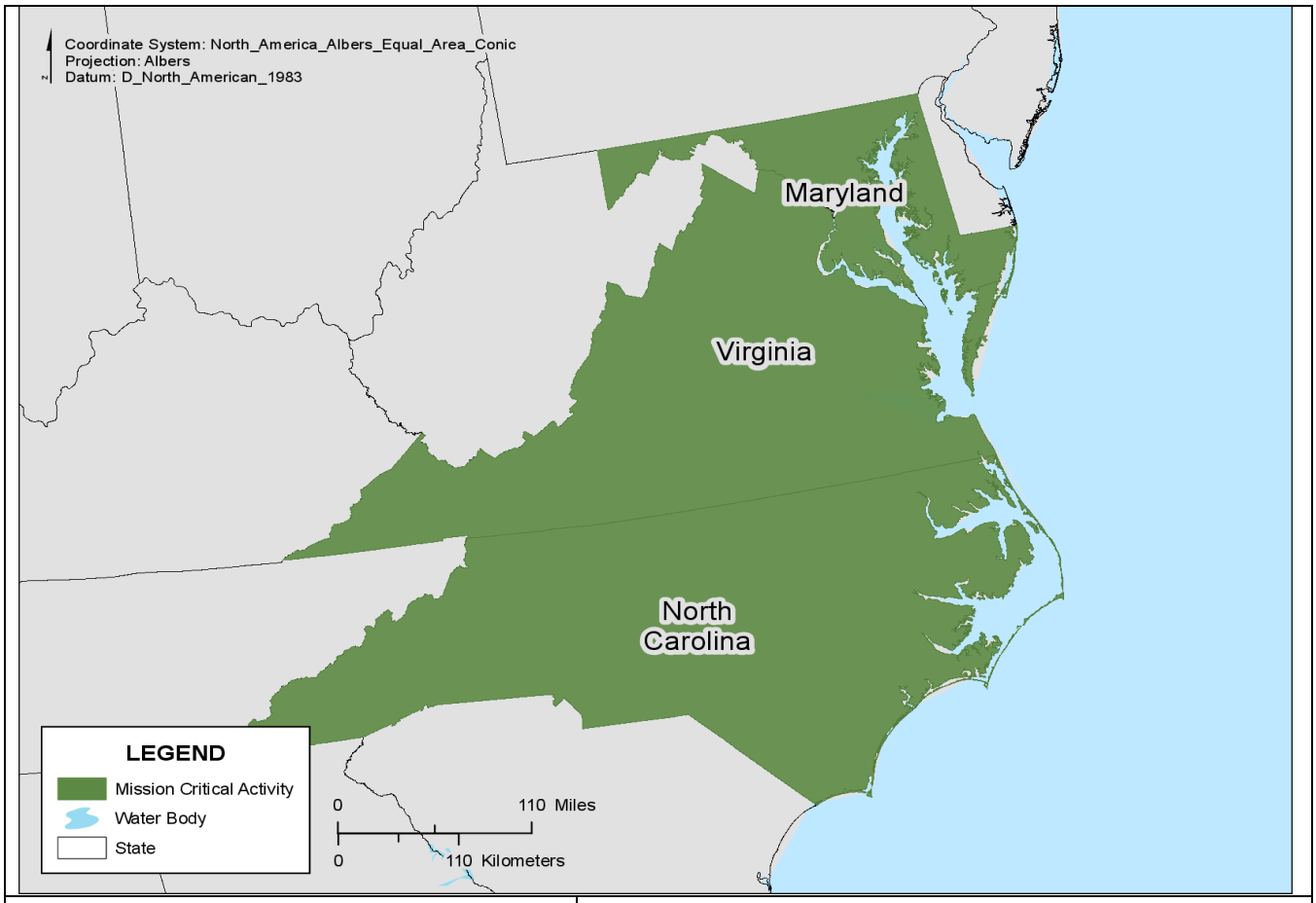
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	Yes
	Karst and caves; riparian areas.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice To Have	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

River and Stream Ecosystem Management



Mission Critical Activity Title:	River and Stream Ecosystem Management
Mission Critical Activity Description:	Healthy waters protection.
MCA_ID:	3819640923_1
Organization Type:	State Government
Organization Name:	Virginia Commonwealth University
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	I don't know
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Not sure.
Current Annual Benefits ($):	Not sure.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Don't Know
Current Customer Service Benefits	
Current Products or Services Benefits:	Don't Know
Current Response or Timeliness Benefits:	Don't Know
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Don't Know
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

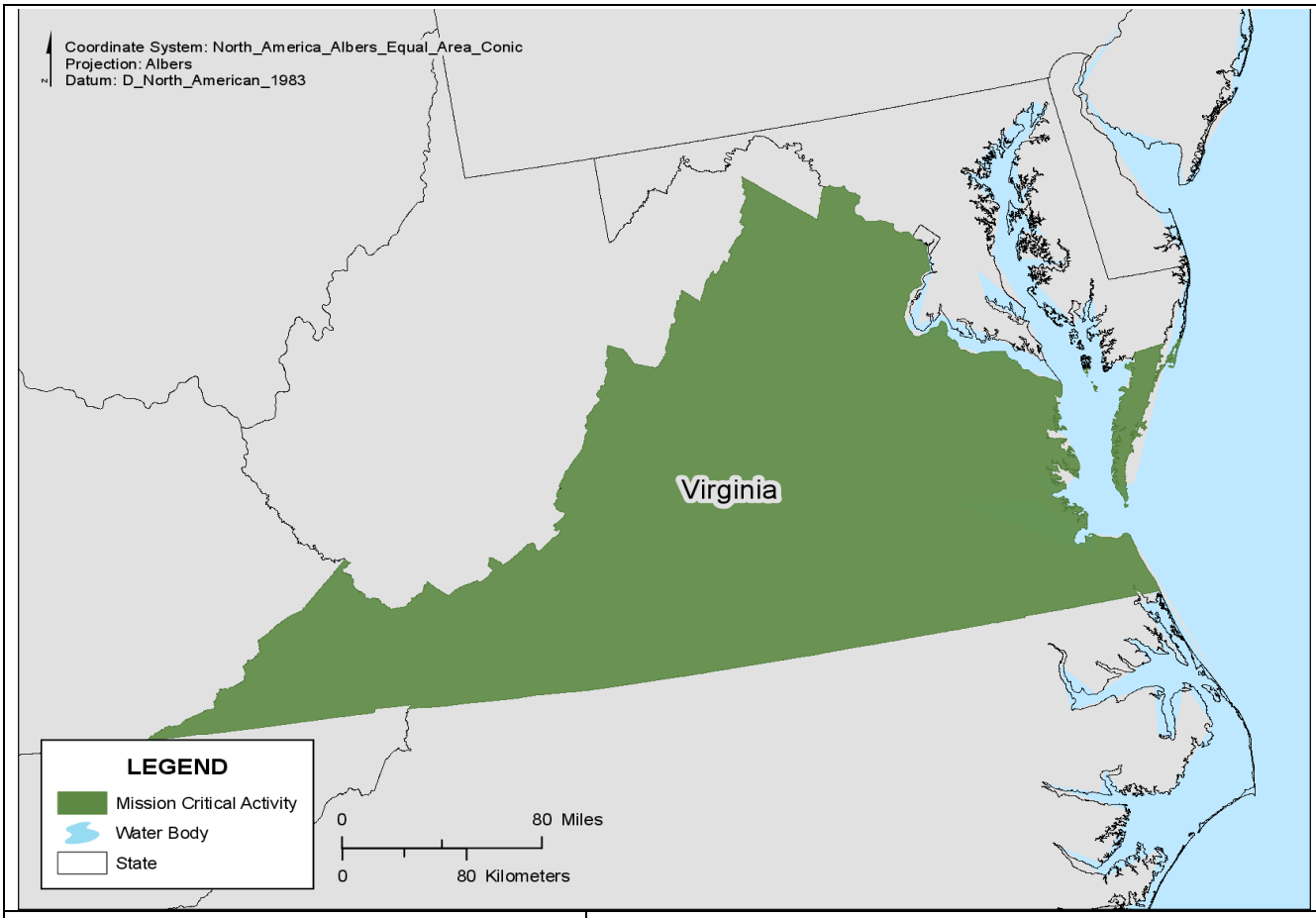
Future Benefits	
Future Annual Benefits ($):	Not sure.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Don't Know
Future Response or Timeliness Benefits:	Don't Know
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Don't Know
Future Environmental Benefits:	Don't Know
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Nice To Have	None
Elevation	Nice To Have	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Surface Water Quality Assessment



Mission Critical Activity Title:	Surface Water Quality Assessment
Mission Critical Activity Description:	Maintain statewide surface water feature data for incorporation into the Clean Water Act (CWA) mandated water quality assessment report that is published biennially.
MCA_ID:	3773670692_1
Organization Type:	State Government
Organization Name:	Virginia Department of Environmental Quality
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	1 acre

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Water quality monitoring network.

Current Benefits	
Total Annual Program Budget:	$5 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Our staff has used currently-available NHD data to upgrade the geospatial accuracy of monitoring and assessment efforts instead of using valuable and limited man-hours to update those features themselves. We now have a consistent statewide product. The public can consume the more detailed data and put it to use as it relates to their water interests.
Future Operational Benefits	
Future Time/Cost Savings:	Don't Know
Future Mission Compliance Benefits:	Don't Know
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Not Applicable
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

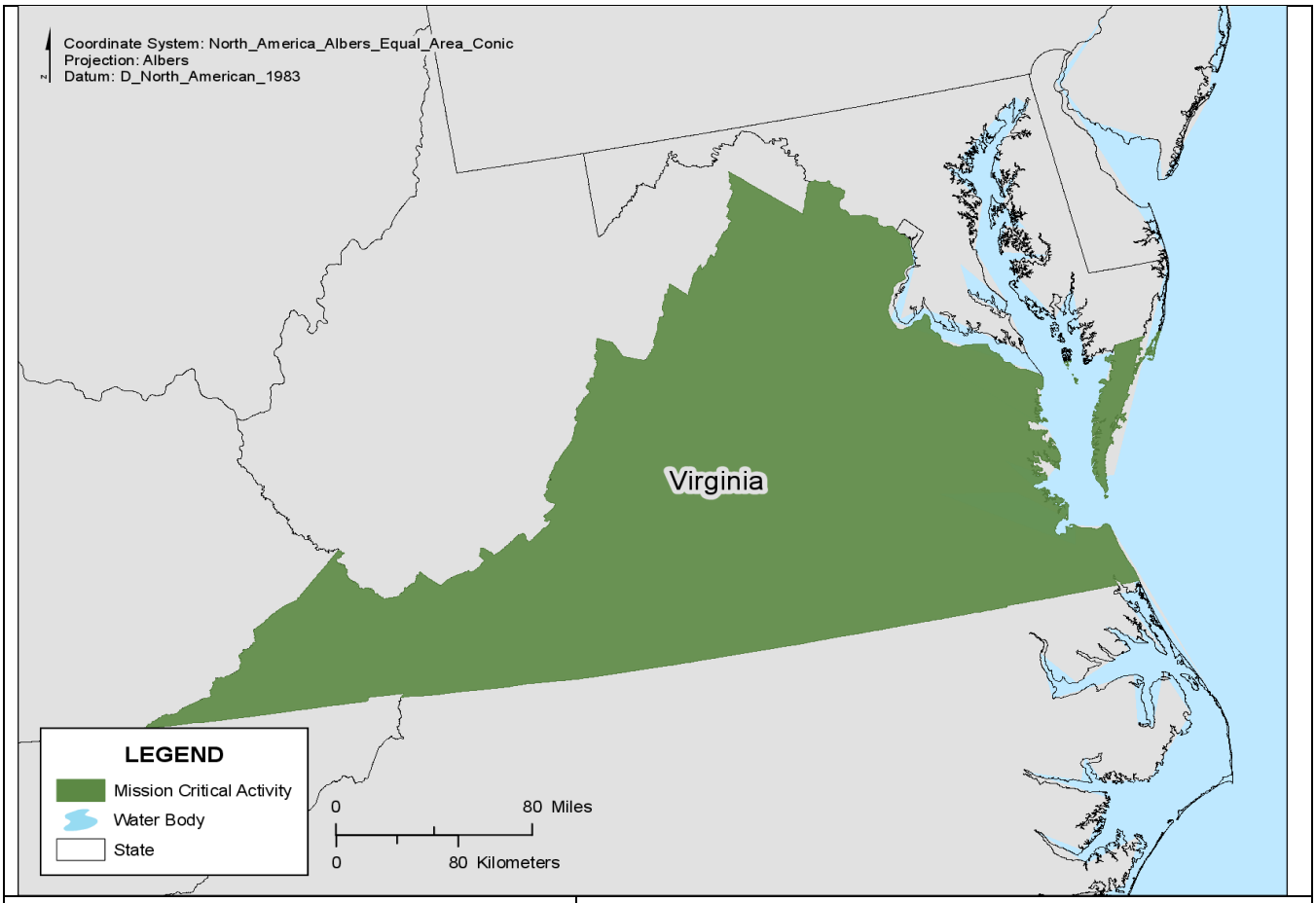
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes

Required Analytical Functions	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice To Have	Perform Geospatial Analysis
Soils	Nice To Have	Visual Inspection
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Nonpoint Source Pollution Assessment



Mission Critical Activity Title:	Nonpoint Source Pollution Assessment
Mission Critical Activity Description:	Nonpoint source pollution potential assessments.
MCA_ID:	3781517281_1
Organization Type:	State Government
Organization Name:	Virginia DCR
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NASS, National Land Cover Data (NLCD).

Current Benefits	
Total Annual Program Budget:	$42,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

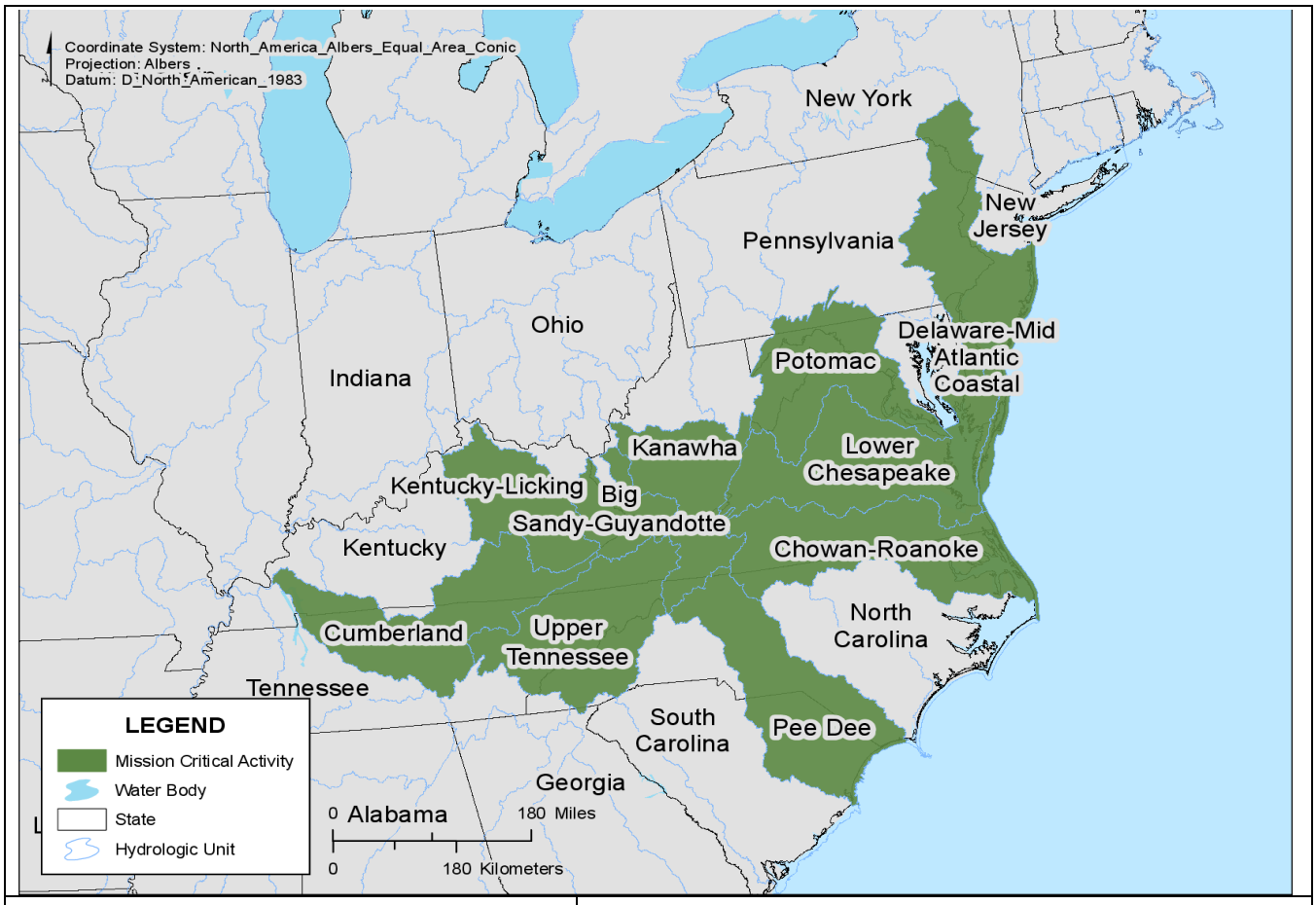
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Might have better geographic focus to lumped loadings of NPS pollutants. Can always use better-defined and more precise data as input.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Use external sources from Chesapeake Bay Program (CBP), other state data sources.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Not Required	None
Bathymetry	Not Required	None
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Not Required	None
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Resource Planning and Development



Mission Critical Activity Title:	Water Resource Planning and Development
Mission Critical Activity Description:	Development and modification to the Virginia WBD. I developed it and the state maintains its own version with non-WBD standards.
MCA_ID:	3781517281_2
Organization Type:	State Government
Organization Name:	Virginia DCR
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	Satellite imagery, Digital Raster Graphics (DRGs).

Current Benefits	
Total Annual Program Budget:	$5,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	TBD.
Future Benefits Description:	This would be due to having developed a seventh order layer, which really awaits a better NED product for VA.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable

Future Benefits	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	Yes
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Not Required	None
Surficial Geology	Not Required	None
Bathymetry	Required	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Not Required	None
Elevation	Required	Visual Inspection
Stream Flow	Not Required	None
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	None
Point Discharges	Not Required	None
Water Use: Diversions	Nice To Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Washington

In January 2011, the Washington State Information Services Board adopted the National Hydrography Dataset (NHD) as the state standard for the digital representation of surface water features. Hydrography supports the following Mission Critical Activities (MCAs) covered in this document:

- Flood Risk Mapping (King County Department of Natural Resources and Parks)
- Fish Habitat Distribution Mapping (Washington Department of Natural Resources)
- Maintaining an Inventory of Fish Passage Barriers (Washington Department of Natural Resources)
- Water Quality Monitoring, Modeling, Analysis, and Reporting (Washington State Department of Ecology)
- Water Quality Protection for Aquatic Life and Human Health (Washington State Department of Ecology)
- Administration of Water Rights (Washington State Department of Ecology)
- Stormwater Mapping and Management (King County Department of Natural Resources and Parks)
- Water Discharge Permitting (Washington State Department of Ecology)
- Wetland Protection and Restoration (Washington State Department of Ecology)
- Watershed Protection (Washington State Department of Ecology)
- Forest Harvest and Riparian Habitat Protection (Washington Department of Natural Resources)
- Stream Flow Analysis (Washington State Department of Ecology)
- Irrigation Water Rights Delivery (Washington State Department of Ecology)
- Salmonid and Other Endangered Fisheries Management and Resource Analysis (Washington State Department of Fish and Wildlife)
- Tribal Fisheries Management and Restoration (Northwest Indian Fisheries Commission)
- Shoreline Protection (Washington State Department of Ecology)
- Invasive Aquatic Weed and New Zealand Mud Snail Tracking (Washington State Department of Ecology)

The Washington State Department of Ecology (ECY) has worked with state, Federal, and tribal partners to identify and update features within the NHD. Areas that require updating include urban or irrigated areas where hydrography has been altered due to land use practices; and areas that have been impacted by scour and channel migration due to rain on snow events. These include most of Washington's large river systems that initiate in the Cascade or Olympic mountain ranges.

As use of the NHD becomes more prevalent, there will be increasing demand to add missing streams and align existing streams with current imagery and elevation layers produced from lidar. Local and county governments who submit water monitoring data to be included in Clean Water Act (CWA) analysis must submit these along with the NHD reach code and measure for each sampled stream location. Because of this requirement, many county governments want their better-resolution flowlines incorporated into the NHD in order to properly site those monitoring locations. Some public agencies base regulations on these data, which can affect the activities of businesses and the public.

The state of Washington actively coordinates with the state of Oregon and Federal agencies in the region to prioritize and leverage resources to address and coordinate updates. We do this while conforming to best practices and our stewardship agreement. Assistance from USGS in the form of grants and tool

development greatly improve our efforts to update the NHD. The ability to coordinate with USGS and the NHD community in data model updates, applications, maintenance, tools and support is important in keeping the database current and useful in Washington.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓		✓		✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Highly Desirable
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Required
Services that allow combination of visualizations with other visualization services (mash-ups)	Required
Services to create generalized versions of hydrography (different scales and level of detail)	Required
Services to support online analysis of hydrography information (such as StreamStats)	Required

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Highly Desirable
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Highly Desirable
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Nice To Have
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Highly Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1 year

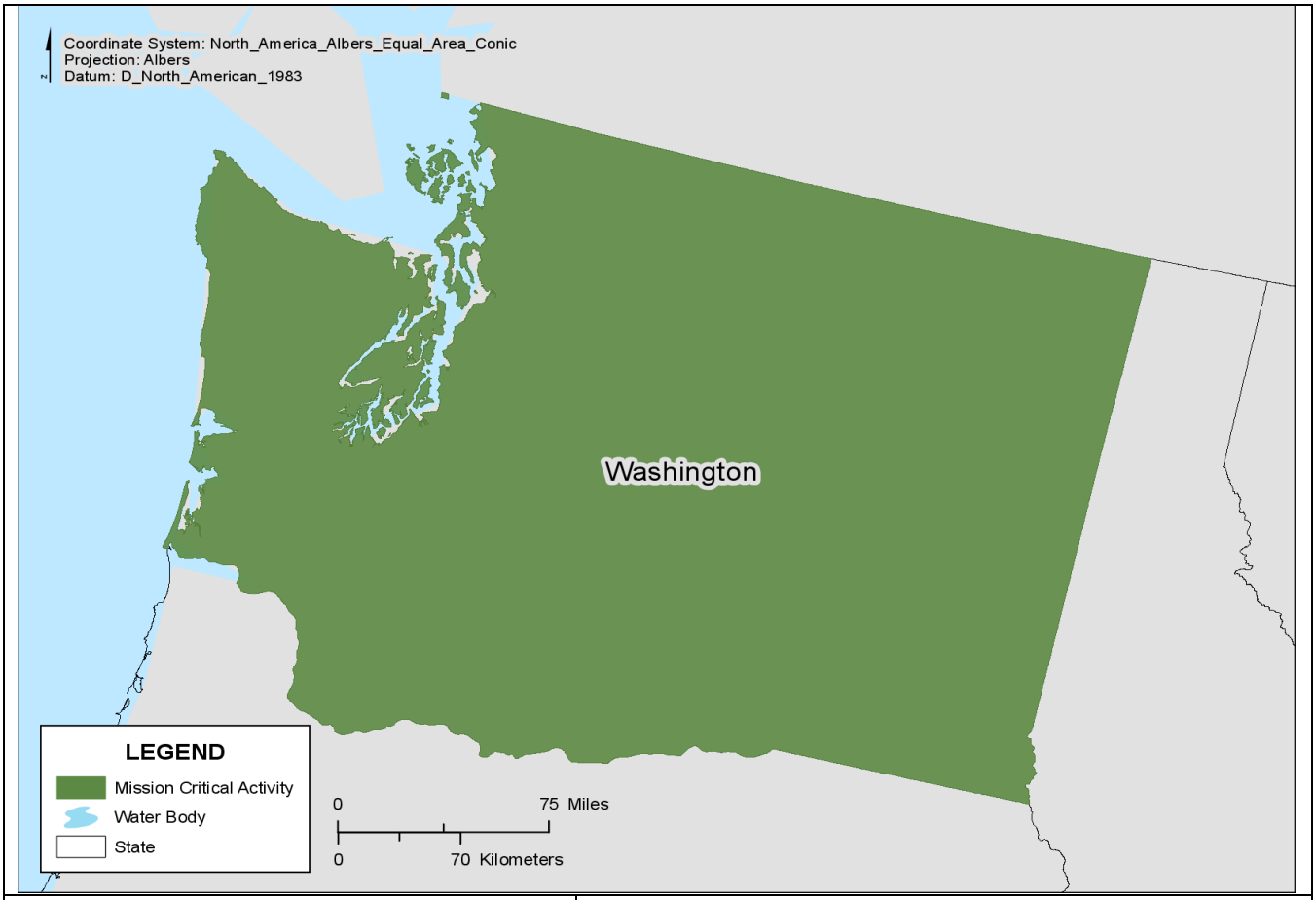
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 10% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	I don't know
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Washington managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Forest Practices



Mission Critical Activity Title:	Forest Practices
Mission Critical Activity Description:	The Forest practices water typing system is used in the planning and regulation of forest practices on state and private forest land. Forest practices water types (WAC 222-16-031) are intended for DNR forest practices regulatory purposes only.
MCA_ID:	3802728709_1
Organization Type:	State Government
Organization Name:	WA DNR
Business Use:	Forest Resources Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres

Requirements	
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	WA DNR hydro.

Current Benefits	
Total Annual Program Budget:	$385,853
Current Annual Benefits ($):	Doesn't apply. It's a resource protection issue and can't quantify. They do not use NHD, but have their own hydrography data they create and maintain.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Doesn't apply. It's a resource protection issue and can't quantify. They do not use NHD, but have their own hydrography data they create and maintain.
Future Benefits Description:	Improved NWI would help us in our forest practices regulatory efforts.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

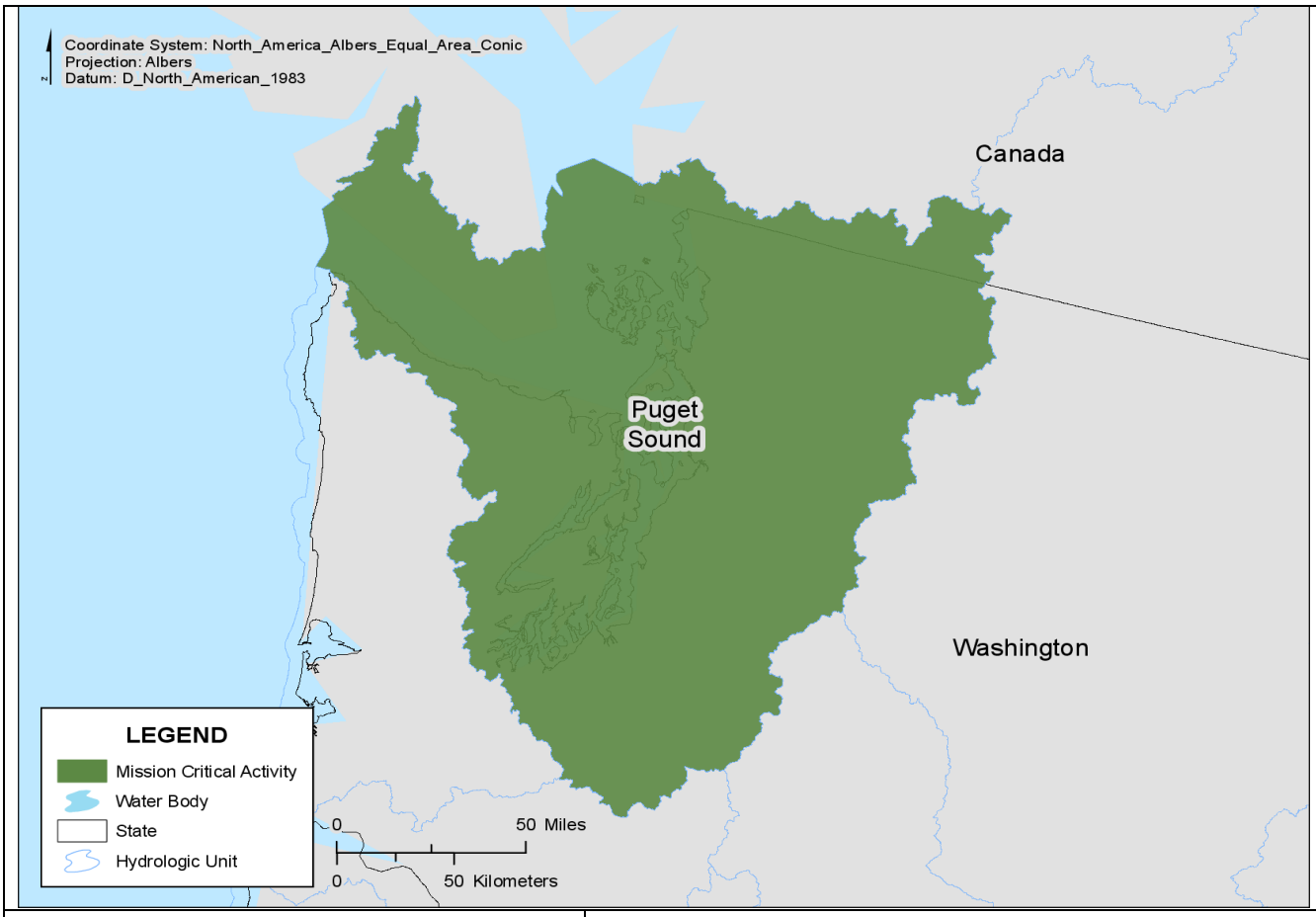
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Fish presence or absence.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Perform Geospatial Analysis
Soils	Required	Associate Selected Data Type
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Nice to Have	Visual Inspection
Climate	Nice to Have	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Nice to Have	Perform Geospatial Analysis
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Nice to Have	Visual Inspection
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Not Required	None
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Watershed Analysis



Mission Critical Activity Title:	Watershed Analysis
Mission Critical Activity Description:	Watershed protection, wetland protection and restoration. Analysis for watershed characterization that includes consideration for watershed processes and which watershed processes control wetlands, and hence restoration of wetlands.
MCA_ID:	3804670825_1
Organization Type:	State Government
Organization Name:	Washington State Department of Ecology
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$800,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	More accurate stream and wetland location improves our ability to protect and restore those resources. Higher accuracy allows better delineation and analysis work to be completed.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor

Future Benefits	
Future Environmental Benefits:	Major
Future Human Lives Saved:	Moderate
Future Other Benefits:	

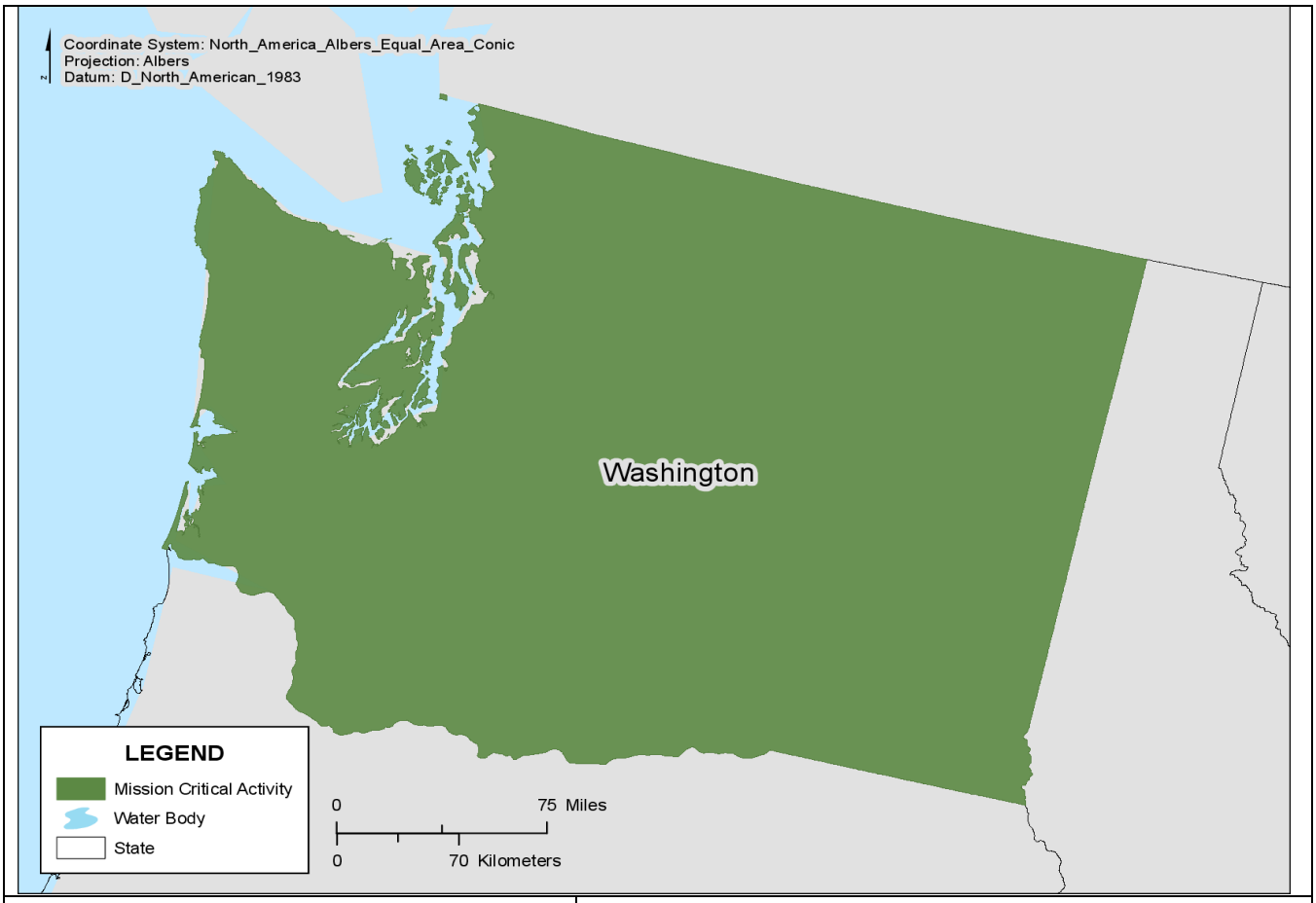
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes

Required Analytical Functions	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Not Required	Visual Inspection
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Nice to Have	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice to Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	Visual Inspection
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Monitoring



Mission Critical Activity Title:	Water Monitoring
Mission Critical Activity Description:	Status and trends monitoring of rivers and streams for chemical, physical, and biological integrity.
MCA_ID:	3805100026_1
Organization Type:	State Government
Organization Name:	Washington State Department of Ecology
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$500,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	We would have a better way to describe conditions of streams based on large-scale (watershed) conditions. Any additional information that we can use to describe or analyze randomly-selected sites, enables us to know 1) whether sites are suitable for sampling, and 2) why field results show good, fair, or poor conditions. Any automation or increase in user-friendliness will save us effort.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major

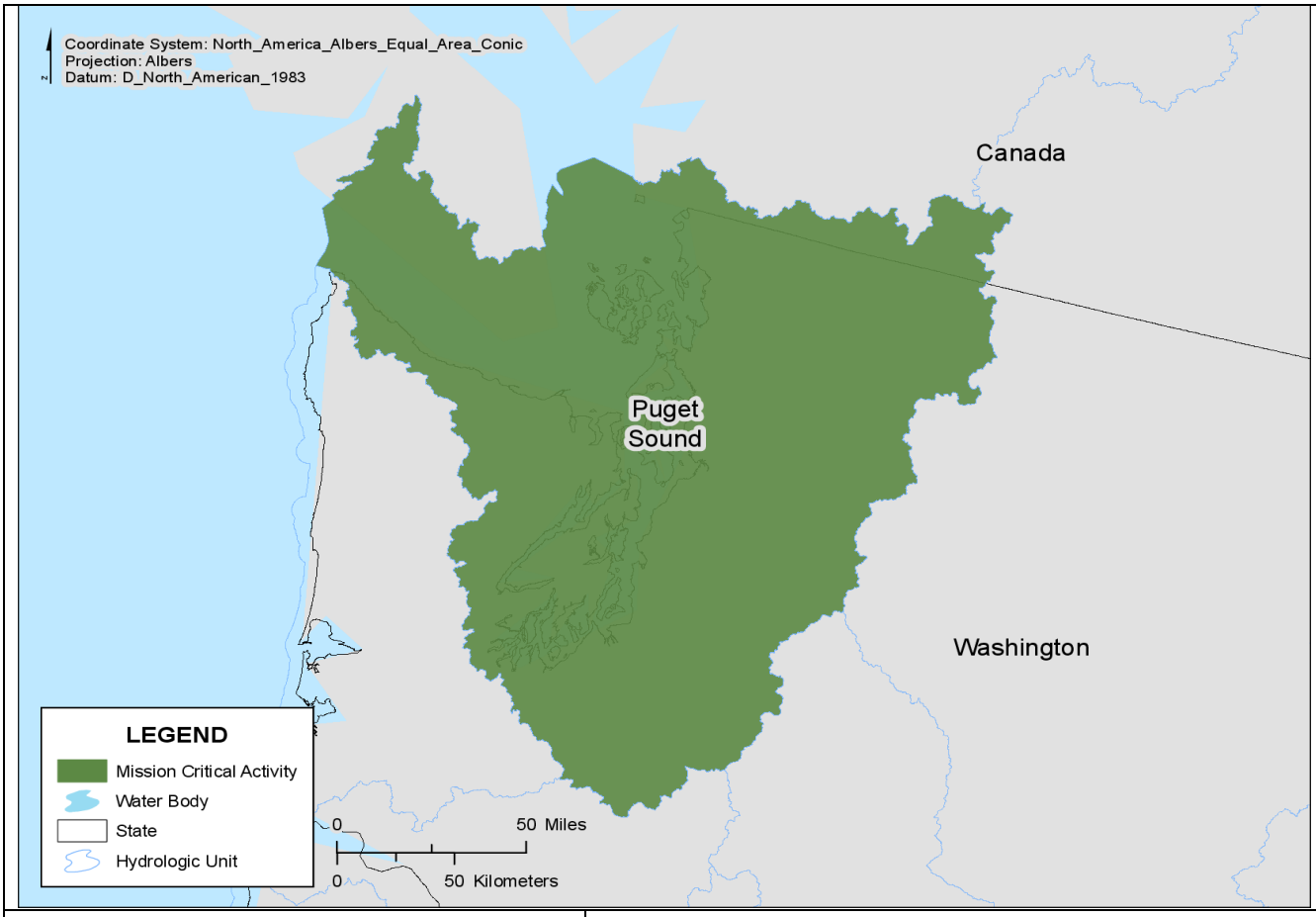
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice to Have	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Nice to Have	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Hydrographic Data Management



Mission Critical Activity Title:	Hydrographic Data Management
Mission Critical Activity Description:	As a large county natural resource agency, we have many MCAs requiring hydrographic information, including stormwater management, aquatic habitat monitoring and protection, watershed monitoring and protection, and flood risk mapping.
MCA_ID:	3802392507_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	King County Department of Natural Resources and Parks
Business Use:	River and Stream Flow Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice to Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres

Requirements	
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	In-house watercourse layer for three-county area (King, Pierce, and Snohomish counties).

Current Benefits	
Total Annual Program Budget:	$130 million
Current Annual Benefits ($):	$130 million
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$0
Future Benefits Description:	None expected.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor

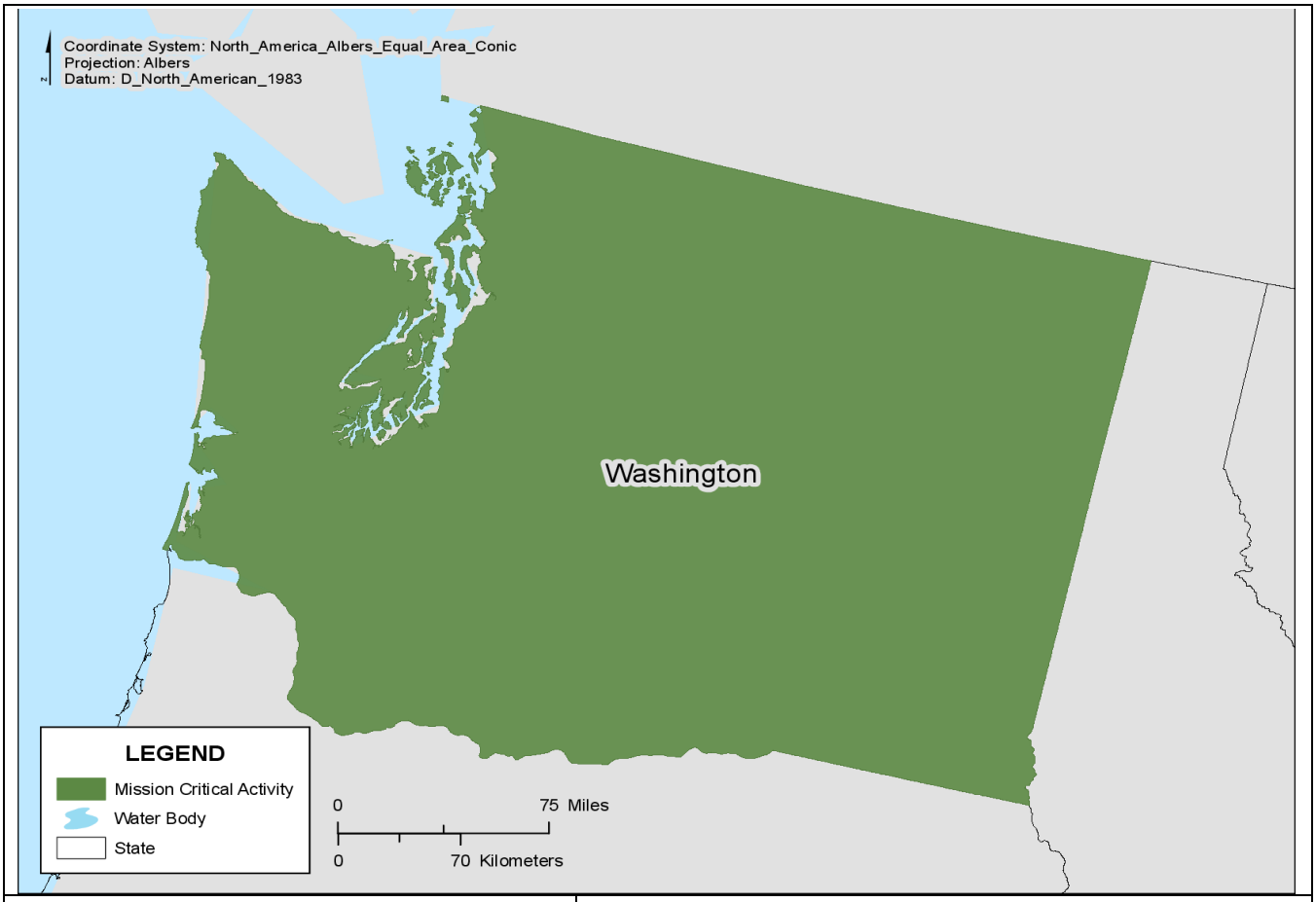
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Nice to Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice to Have	Associate Selected Data Type
Point Discharges	Nice to Have	Visual Inspection
Water Use: Diversions	Nice to Have	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

TMDL Analysis



Mission Critical Activity Title:	TMDL Analysis
Mission Critical Activity Description:	Conducting Total Maximum Daily Load (TMDL) Studies - this includes developing a field monitoring plan, collecting field and spatial data, and water quality modeling to develop pollution reduction targets. This also includes digitizing stream channels and land use within riparian buffer zones for riparian shade analysis, and identifying/analyzing relevant watershed attributes and pollutant sources.
MCA_ID:	3792526260_1
Organization Type:	State Government
Organization Name:	Washington State Department of Ecology
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$2.48 million
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000
Future Benefits Description:	More linked hydrological information would save technical analysis time and limit the amount of manual spatial analysis that would need to be done.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

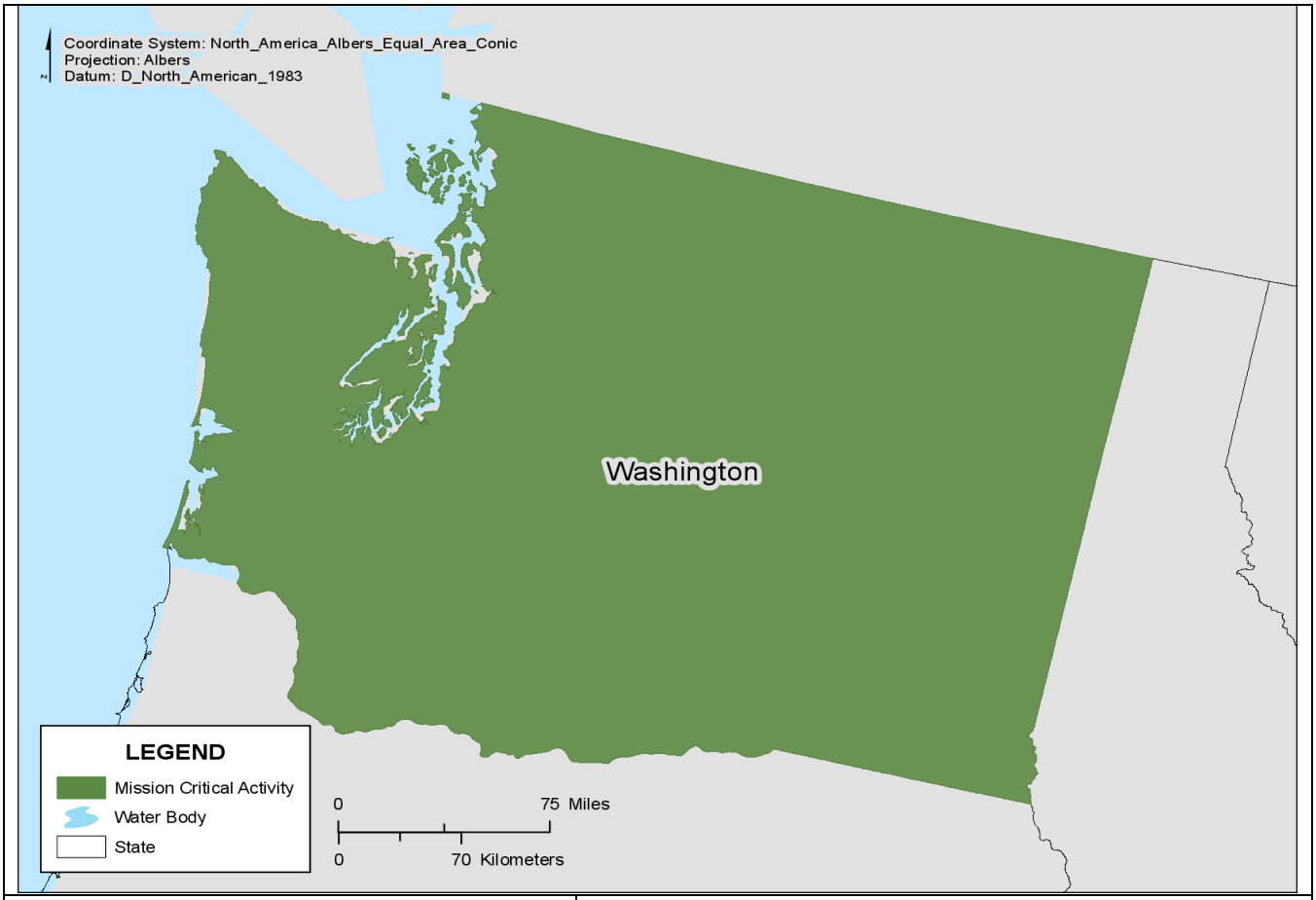
Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice to Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice to Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice to Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice to Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Quality Protection



Mission Critical Activity Title:	Water Quality Protection
Mission Critical Activity Description:	Water quality protection for aquatic life and human health.
MCA_ID:	3824447887_1
Organization Type:	State Government
Organization Name:	Washington Department of Ecology
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$400 million in permit fees.
Current Annual Benefits ($):	$3.5 million
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$500,000 based only on permit fees
Future Benefits Description:	More accurate analysis, reporting, and tracking of water quality information and permitting.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	Yes
	Stream/river confluences; irrigation diversions, ditches, canals.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Nice to Have	Associate Selected Data Type
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Required	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

West Virginia

Five state agency entities participated in the USGS Hydrography Requirements and Benefits Study (HRBS) survey and identified a total of five Mission Critical Activities (MCAs).

The HRBS survey results for West Virginia noted requirements for improved and coordinated hydrography data covering a range of MCAs in support of:

- Water resource management with regard to monitoring and assessing both surface and ground water quality for environmental regulation
- Water and wastewater utility infrastructure and public water supply protection
- Watershed management and protection
- Flood mapping and flood risk management

The primary reported Business Uses (BUs) of Water Resource Planning and Development, Water Quality Monitoring, and Infrastructure and Construction Management are reflected in the MCAs. One of the more unique BUs in West Virginia is for mapping and planning of rural water supply systems. Most of the reporting entities had a working familiarity with the National Hydrography Dataset (NHD) and the Watershed Boundary Dataset (WBD). Only one respondent reported using the NHDPlus, but a number of other specialized hydrographic datasets are also used. USGS stream gage data, flood-related data, flow periodicity, and wetlands were seen as required data characteristics. Delineating catchments and calculating drainage areas were key analytical functions. In terms of integrating with other datasets, land cover, elevation, contaminant sources, and wetlands were rated as required by a majority of respondents. The use of 8- and 12-digit HUCs were equally favored as management units, and Esri geodatabases, shapefiles, and raster grids as the preferred file formats. To varying degrees, ancillary national datasets, such as the National Wetlands Inventory (NWI), STORET, National Agricultural Statistics Service (NASS), National Pollutant Discharge Elimination System (NPDES), and National Water Information System (NWIS), as well as specialized state hydrography-related datasets are used to augment programmatic needs to meet business requirements. West Virginia respondents favored improved alignment of NHD data with high-resolution elevation data (DEMs) as lidar elevation data become the increasingly available standard.

For West Virginia respondents, reported program budget information ranged broadly from a high of $61 million to a low of $80,000, but most respondents were unsure of the exact amounts. Water programs are generally embedded in larger departments, and may operate on a mix of appropriated funds, non-appropriated special revenue, or grant funding. Quantitative fiscal benefits, both current and future, were similarly difficult to ascertain, and formal budgetary cost-benefit analysis or return-on-investment scenarios have not been performed regarding hydrographic data specifically.

Most respondents felt that improving NHD data and stewardship would provide qualitative benefits to their work, such as providing better products and more value-added services to agency employees and the public; time savings for error correction, data management, and revision; and improved data accuracy and spatial delineation for analysis and modeling purposes.

Previous work in completing the NHD for West Virginia was done in cooperation with the West Virginia GIS Technical Center and Natural Resource Analysis Center, both housed at West Virginia University (WVU). Beginning in 1996, USGS entered into a cooperative agreement with WVU to produce 1:24,000-

scale Digital Line Graph (DLG) hydrographic "blue lines." High-resolution NHD data were completed for West Virginia in 2004, and an MOU was signed in 2010. Incremental updates have since been made possible through small cooperative awards from USGS for geographic names updates (GNIS) and more recently, StreamStats development. Much of the current focus on NHD updates has been in the coal mining areas of southern West Virginia, where extensive loss of stream networks and landscape modification has occurred due to large surface mining operations. Most of the errors in the existing NHD have been identified; however, funds and staffing resources are becoming increasingly limited to complete comprehensive updates or improvements to the data in a consistent and sustained manner.

In addition to USGS sources, further information on other publicly-available hydrography related datasets for West Virginia can be found on the West Virginia State GIS Clearinghouse: http://wvgis.wvu.edu/data/data.php (inland waters); and the WV NHD Stewardship portal: http://wvgis.wvu.edu/resources/resources.php?page=dataProductDevelopment/nhdPortal

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	✓

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Required
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable

Data or Service Access Method	Requirement
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Nice To Have
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Required
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Required
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Required
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Required
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Required
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Required
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Required

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Critically Impactful

Quality Issue	Impact
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 2-30 days

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 1% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

West Virginia managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Water and Wastewater Utility Infrastructure

Mission Critical Activity Title:	Water and Wastewater Utility Infrastructure
Mission Critical Activity Description:	Our primary mission is to support water and wastewater infrastructure improvements through identifying funding sources. A critical activity is identification of areas unserved by water utilities and that have impacted water sources.
MCA_ID:	3773516555_1
Organization Type:	State Government
Organization Name:	West Virginia Water Development Authority
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)

Requirements	
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$20,000
Future Benefits Description:	A greater ability to determine potentially impacted potable water areas in conjunction with population density and proximity of existing water service is important. A greater quality dataset that works in conjunction with NPDES, EPA, and existing well data would enhance that ability greatly. Statewide analysis is time-consuming and reducing that time by having better integrated data against which to perform analysis would be a major time savings.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

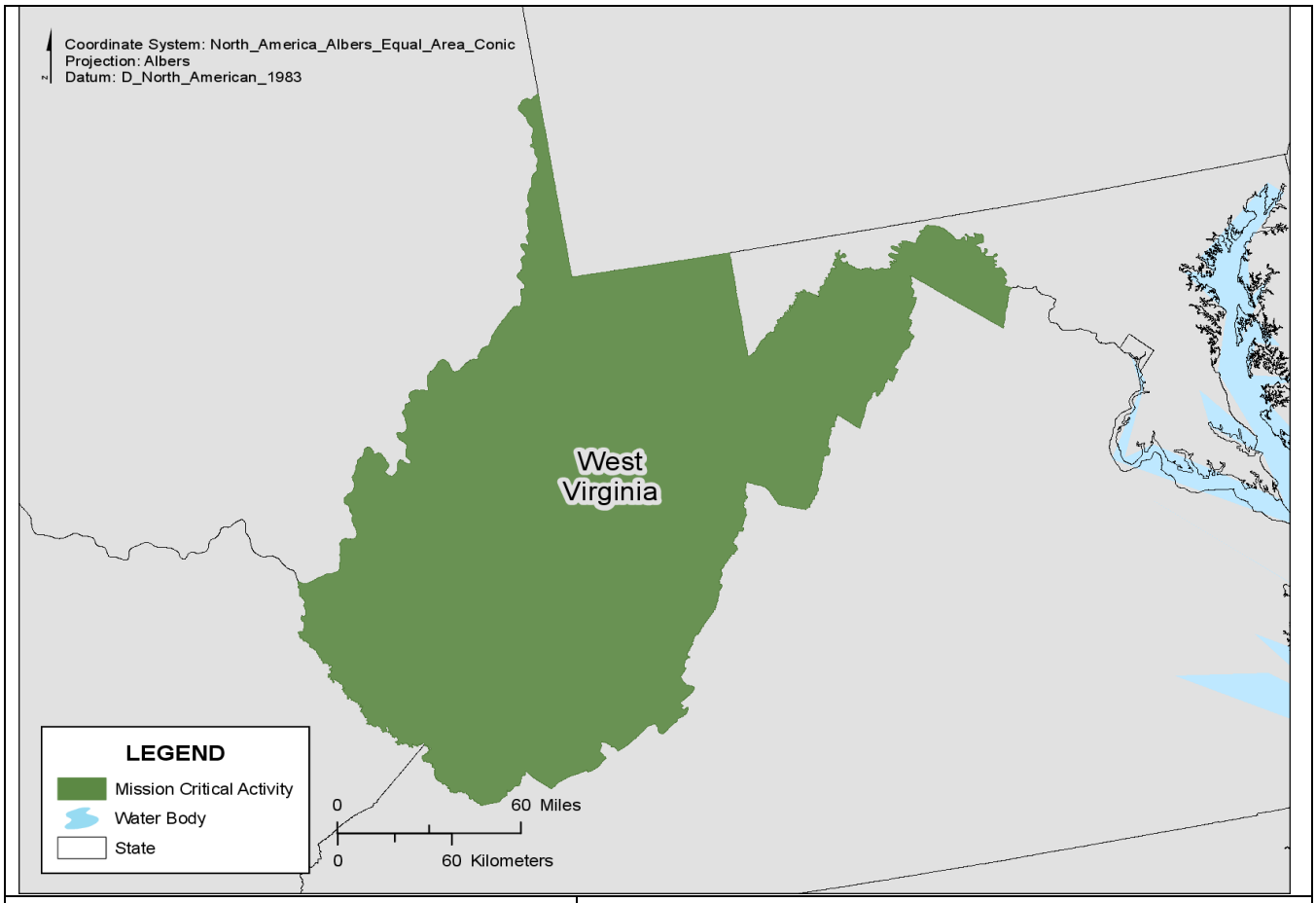
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones, average flow rate to determine capacity.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	Yes

Required Analytical Functions	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Visual Inspection
Soils	Highly Desirable	Visual Inspection
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Not Required	None
Climate	Not Required	None
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Management (Regulatory)



Mission Critical Activity Title:	Watershed Management (Regulatory)
Mission Critical Activity Description:	Comprehensive watershed management including industrial, municipal, and stormwater discharge permitting, stream restoration planning (TMDL), financing wastewater improvements, water quality standards, ground and surface water monitoring, select water withdrawal approvals, hazardous and solid waste management, spill response, and enforcement of environmental laws.
MCA_ID:	3771953992_1
Organization Type:	State Government
Organization Name:	West Virginia Department of Environmental Protection
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	3-meter DEM.

Current Benefits	
Total Annual Program Budget:	$61 million
Current Annual Benefits ($):	$15.5 million
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$775,000
Future Benefits Description:	Public, consultants, industry, municipalities, and regulators would benefit by having stream statistics readily available in GIS format (e.g. StreamStats).
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

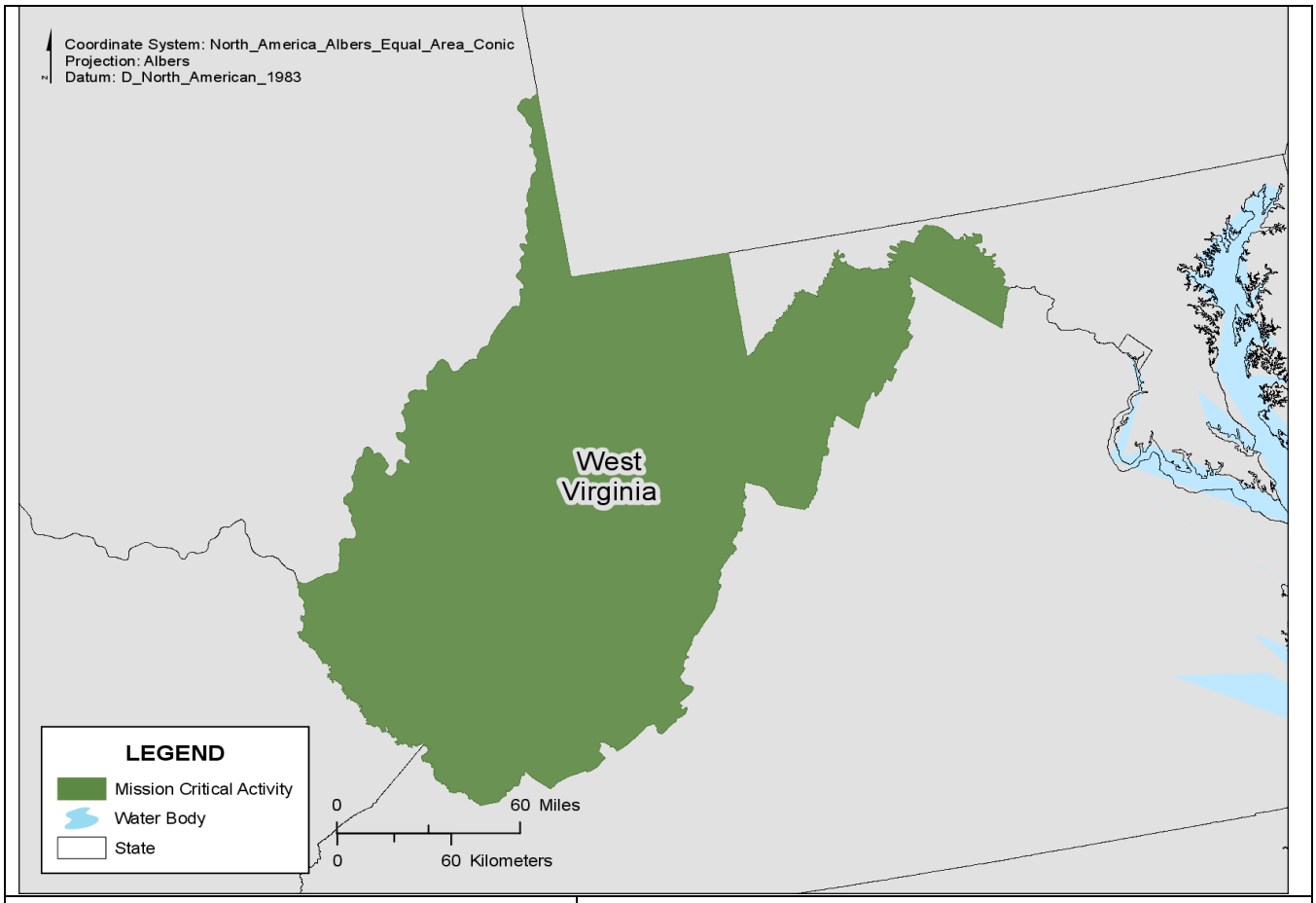
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian areas.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes

Required Analytical Functions	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Highly Desirable	Associate Selected Data Type
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	Withdrawal locations / water intakes – Perform Geospatial Analysis	Withdrawal locations / water intakes – Perform Geospatial Analysis

Flood Risk and Watershed Management



Mission Critical Activity Title:	Flood Risk and Watershed Management
Mission Critical Activity Description:	Flood risk mapping, stormwater management, and watershed management and protection.
MCA_ID:	3817055810_1
Organization Type:	State Government
Organization Name:	Office of GIS Coordination
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	WV Water Development Authority (WVWDA) data (water and wastewater).

Current Benefits	
Total Annual Program Budget:	$80,000
Current Annual Benefits ($):	Don't know. Never analyzed.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Major
Current Other Benefits:	

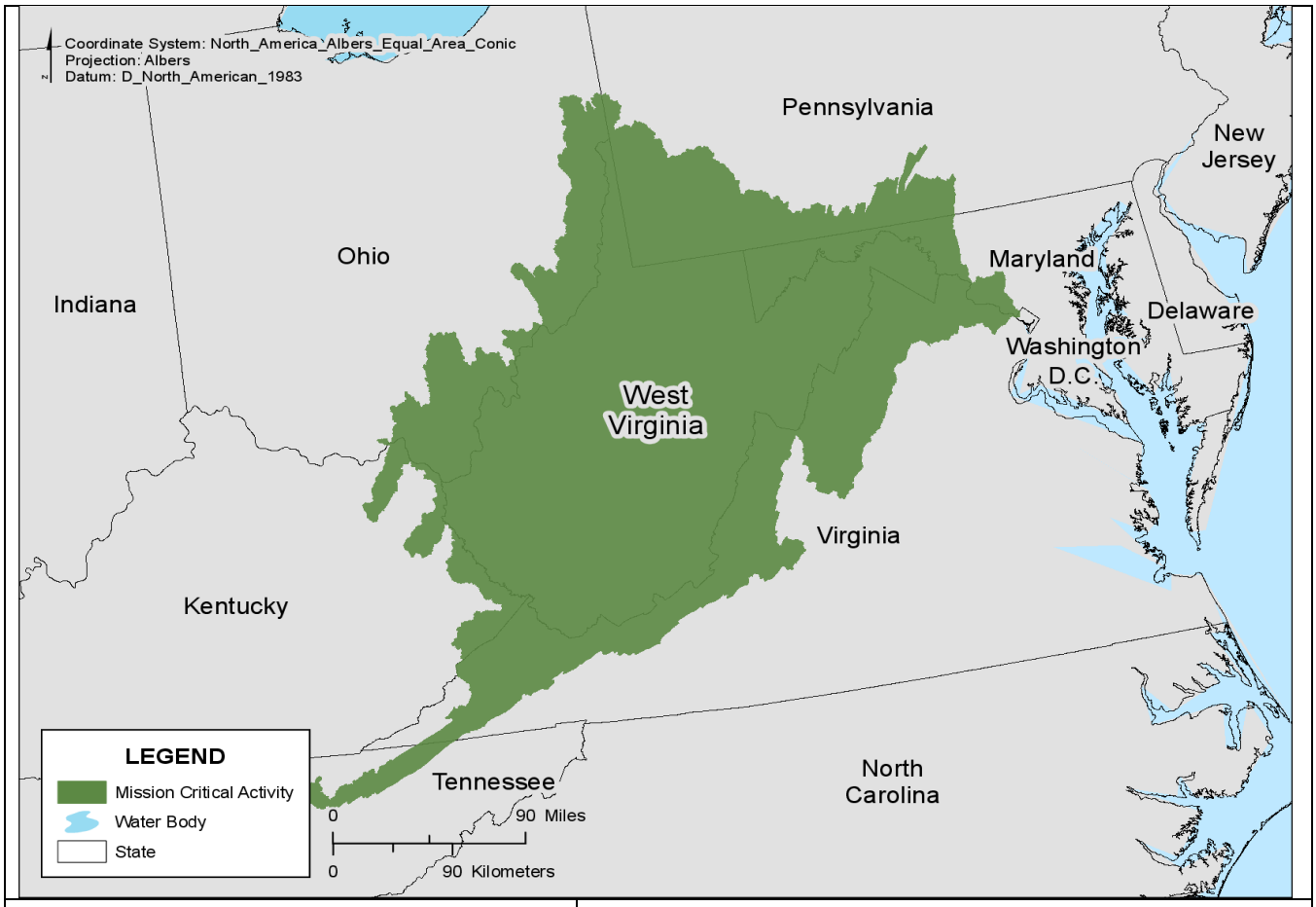
Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Human lives saved, improved education and public safety, time or cost savings, improved products and services.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Perform Geospatial Analysis
Bathymetry	Highly Desirable	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Highly Desirable	Perform Geospatial Analysis
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Watershed Management and Hydrologic Modeling



Mission Critical Activity Title:	Watershed Management and Hydrologic Modeling
Mission Critical Activity Description:	Watershed and hydrologic modeling, research, and development: we use the NHD in various research and educational applications, including investigations of the impact of surface coal mining on water quality and fish habitat, mapping zones of critical concern for surface water intake protection, and other related subjects.
MCA_ID:	3826198910_1
Organization Type:	State Government
Organization Name:	West Virginia
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Elevation Dataset, DEP lidar.

Current Benefits	
Total Annual Program Budget:	We do not have program expenditures related to this subject (university); $50-75K/year on average.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Major
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Less time spent updating/checking existing datasets for errors. More confidence in model results with existing datasets. Improved accuracy of existing datasets. Related benefits to cooperating agencies (better models of watershed properties, better delineations of zones of critical concern, etc.).
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

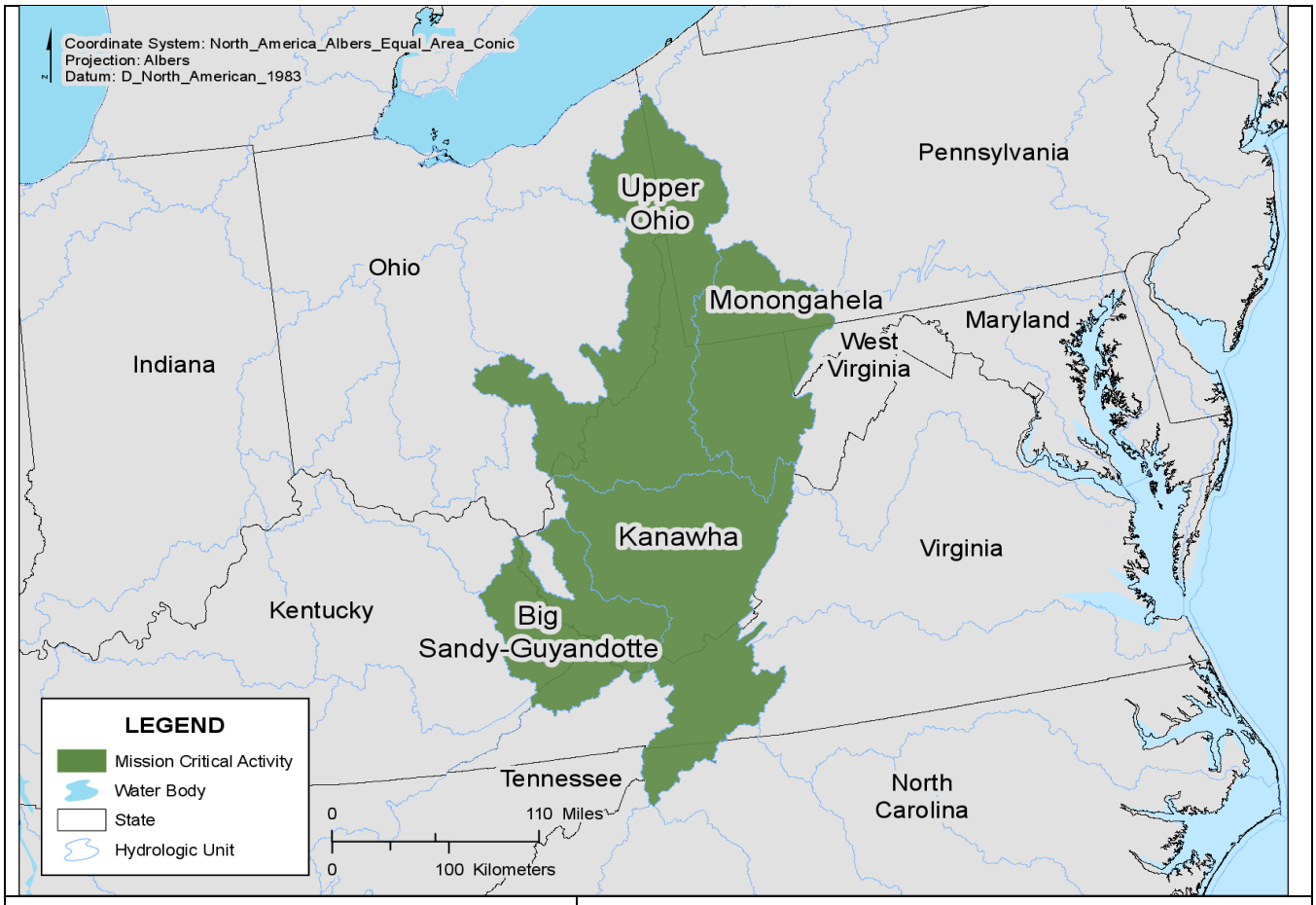
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Riparian zones, karst, underground mine pools.

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Perform Geospatial Analysis
Bathymetry	Nice To Have	Visual Inspection
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Public Water Supply Protection



Mission Critical Activity Title:	Public Water Supply Protection
Mission Critical Activity Description:	Assisting public water supplies in efforts to assess and protect their sources of drinking water, including identifying potential threats to quantity and quality of source water, prioritizing threats, developing strategies to monitor and minimize the priority threats, and identifying potential alternate sources of drinking water.
MCA_ID:	3828542681_1
Organization Type:	Not for Profit
Organization Name:	West Virginia Rural Water Association
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)

Requirements	
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	NWIS, STORET.

Current Benefits	
Total Annual Program Budget:	$105,000
Current Annual Benefits ($):	$20,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Moderate
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	More gaging stations could provide better flood warnings, as well as better estimates of stream flow velocity for tracking of spills. Adding water quality probes to gaging stations would help with understanding of changes in quality due to changes in flow, seasons or time of day, and land use. Water quality probes may also help with monitoring spills that threaten public water supplies. Sharing location information for drinking water intakes is crucial to protecting them, but in many states and at the Federal level this information is redacted due to security concerns.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major

Future Benefits	
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Nice To Have	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Associate Selected Data Type
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Associate Selected Data Type
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Highly Desirable	Associate Selected Data Type
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Required	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Wisconsin

The State of Wisconsin has requirements for high-quality hydrography and water resources data that support multiple programs and organizations. The Hydrography Requirements and Benefits Study (HRBS) survey yielded seven different responses from a combination of state, regional, local, nonprofit, and tribal agencies or organizations. Each response represented a separate Mission Critical Activity (MCA).

The significance of hydrography data is represented by four Business Uses (BUs) documented in the survey results for Wisconsin. The survey summary noted the following BU requirements:

- Water Quality (3)
- Water Resources Planning and Development (2)
- River and Stream Ecosystem Management (1)
- Infrastructure and Construction Management (1)

Water Quality was linked to two state agency MCAs and one tribal response. Water Resources Planning and Development was identified by regional and nonprofit participants. River and Stream Ecosystem had a MCA by one tribal entity and Infrastructure and Construction Management was cited by a state agency.

MCAs that referenced Water Quality as a BU also included watershed assessment and modeling activities, along with regulatory reporting, standards implementation, and water use monitoring. The Water Resources Planning and Development BU responses included a cross section of activities including wetland and watershed planning, watershed protection, and stormwater management.

There was very little data about current (monetary) benefits of hydrography data reported in the survey by Wisconsin participants. On the other hand, respondents noted significant future benefits in operations (time/cost savings and mission compliance), customer service (products and services, followed by customer response) and societal benefits (environmental and education/public safety).

The broad range of survey participants resulted in a wide assortment of requirements for hydrography data and services documented in the summary information. The areas of interest identified in the survey varied from local/regional/watershed coverage to statewide (including adjoining contributing watersheds). The largest number of participants prefer 12-digit HUCs, but several also require user-defined extents. Many responses require linkage to stream gage and other data sources, along with the requirement to have analytical capabilities such as network navigation, distance and drainage area calculation, and other functions.

These survey results are not a comprehensive list of Wisconsin' hydrography requirements, but represent a subset of program activities provided via the survey at this point in time. There are likely additional requirements that could be documented in the future with further inquiry and investigation.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓						

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓				✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Required
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Required
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Nice to Have

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required

Data Type	Elevation Data Integration	Requirement
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Required
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Highly Desirable
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Highly Desirable
	Ensure that hydrography and elevation data represent a similar point in time.	Required
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Highly Desirable
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Critically Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Critically Impactful
In a series of tributary streams, several streams do not connect with the main river.	Critically Impactful
A perennial stream is misnamed.	Somewhat Impactful
A large reservoir is misnamed.	Critically Impactful
A first order stream flow direction is reversed.	Critically Impactful
A second order stream flow direction is reversed.	Critically Impactful
A third order stream flow direction is reversed.	Critically Impactful
Two first order streams coded as perennial should be intermittent.	Highly Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Critically Impactful

Quality Issue	Impact
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Highly Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Critically Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 3-6 months

Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	Major problem – data can not be used for Mission Critical Activity
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Wisconsin managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Transportation Planning

Mission Critical Activity Title:	Transportation Planning
Mission Critical Activity Description:	Planning, development, and operation of safe, reliable, and efficient multimodal transportation systems.
MCA_ID:	3800969144_1
Organization Type:	State Government
Organization Name:	Wisconsin Department of Transportation
Business Use:	Infrastructure and Construction Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Varies annually; generally $1-5 billion.
Current Annual Benefits ($):	Unsure.
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

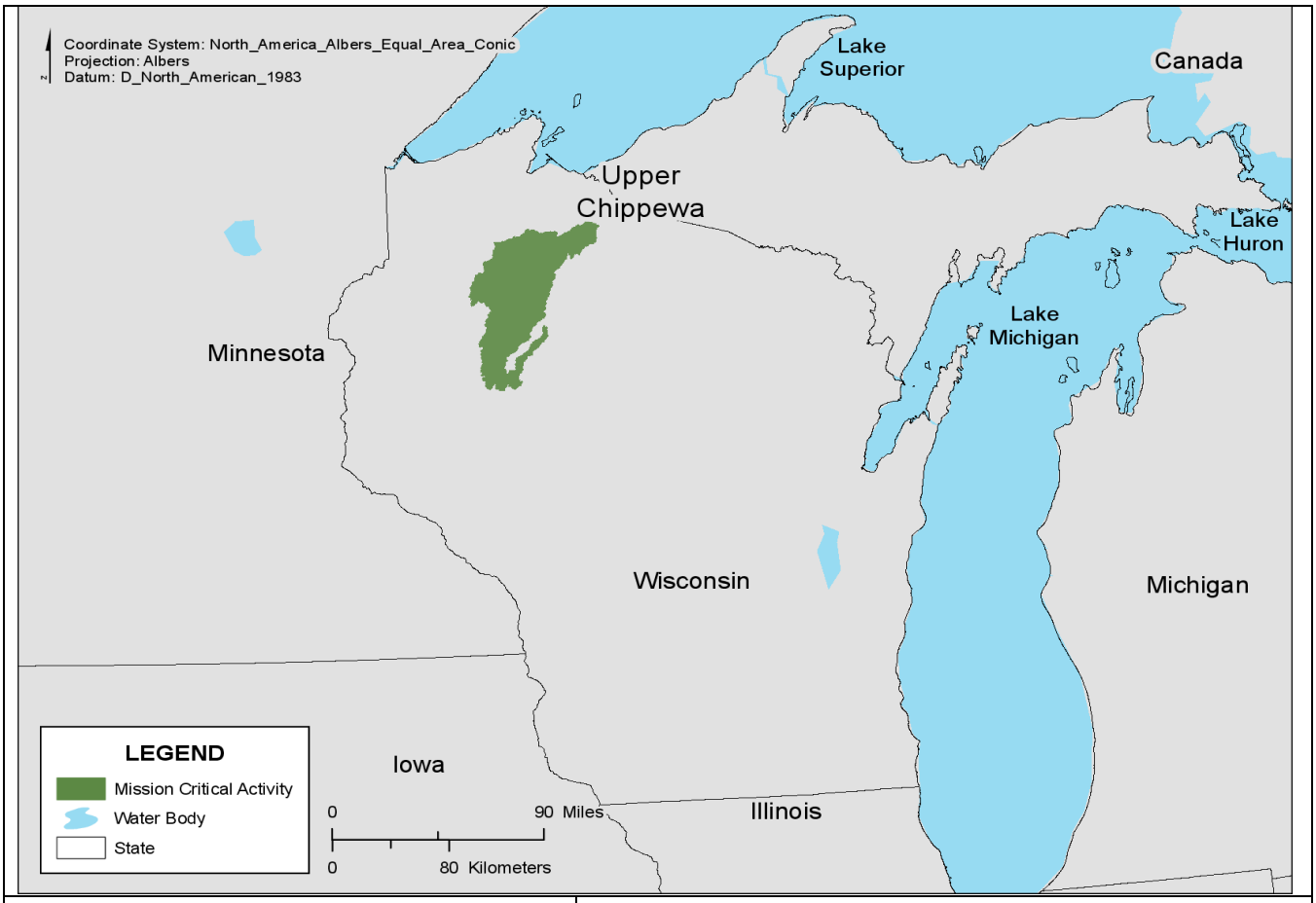
Future Benefits	
Future Annual Benefits ($):	Unsure.
Future Benefits Description:	Improved hydrographic information would provide the state with consistent data and better access to relevant data, which would allow for more accurate and consistent analysis of data for project development and overall program assessment and policy development.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	Yes
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	Yes
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Highly Desirable	Visual Inspection
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Highly Desirable	Perform Geospatial Analysis
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Highly Desirable	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Lake and Watershed Protection



Mission Critical Activity Title:	Lake and Watershed Protection
Mission Critical Activity Description:	Lake and watershed protection.
MCA_ID:	3829059979_1
Organization Type:	Tribal Government
Organization Name:	Lac Courte Oreilles Reservation
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 420 feet, 90% (1:250,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$0
Current Operational Benefits	
Current Time/Cost Savings:	Minor
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Not Applicable
Current Response or Timeliness Benefits:	Not Applicable
Current Customer Experience Benefits:	Not Applicable
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Less time would be needed to locate good, reliable data needed for watershed mapping and land use planning, which would result in cost savings.
Future Operational Benefits	
Future Time/Cost Savings:	Minor
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Not Applicable
Future Response or Timeliness Benefits:	Not Applicable
Future Customer Experience Benefits:	Not Applicable
Future Societal Benefits	
Future Education or Public Safety Benefits:	Not Applicable
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Not Required	Visual Inspection
Climate	Not Required	None
Contaminant Sources	Nice To Have	None
Elevation	Highly Desirable	Visual Inspection
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Required	Associate Selected Data Type
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Not Required	None
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Not Required	None
USGS National Water-Quality Assessment Program (NAWQA)	Not Required	None
Other (please specify the importance and highest analysis level):		

Water Quality and Watershed Assessment and Modeling

Mission Critical Activity Title:	Water Quality and Watershed Assessment and Modeling
Mission Critical Activity Description:	MCAs include watershed protection and assessment, hydrologic and water quality modeling, TMDLs, nonpoint source pollution assessment, and regulatory reporting.
MCA_ID:	3772701833_1
Organization Type:	State Government
Organization Name:	Wisconsin Department of Natural Resources
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres

Requirements	
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	Unknown.
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Major
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Unknown.
Future Benefits Description:	The Wisconsin DNR is currently using the Wisconsin Hydrography Dataset, plus a subset of the HUC-12 coverage that provides a vast array of attributes linked to any defined watershed within Wisconsin. This information has answered the call of many of the WI DNR's business needs.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate

Future Benefits	
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Major
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	Yes

Required Analytical Functions	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	Yes
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Perform Geospatial Analysis
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Highly Desirable	Associate Selected Data Type
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):	Required, Perform Geospatial Analysis The WDNR would require its own statewide dataset to replace those offered by NWI	Required, Perform Geospatial Analysis The WDNR would require its own statewide dataset to replace those offered by NWI

Water Quality Standards Implementation

Mission Critical Activity Title:	Water Quality Standards Implementation
Mission Critical Activity Description:	Application of water quality standards, targeting and tracking implementation progress is watersheds, estimating pollutant loads.
MCA_ID:	3802422645_1
Organization Type:	State Government
Organization Name:	Wisconsin Department of Natural Resources
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	5.0 miles of channel per square mile (1:5,000-scale mapping)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	>$10 million
Current Annual Benefits ($):	Don't know.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Don't Know
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Major
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Don't know.
Future Benefits Description:	While more information in a more usable format is of value, it must be asked how much more can we do with better information. I think benefits from individual datasets are marginal. On the other hand, the fact that the datasets do not relate well is a constant source of frustration and extra work; for example, WDB does not relate well to NHD and SPARROW doesn't relate well to WDB.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate

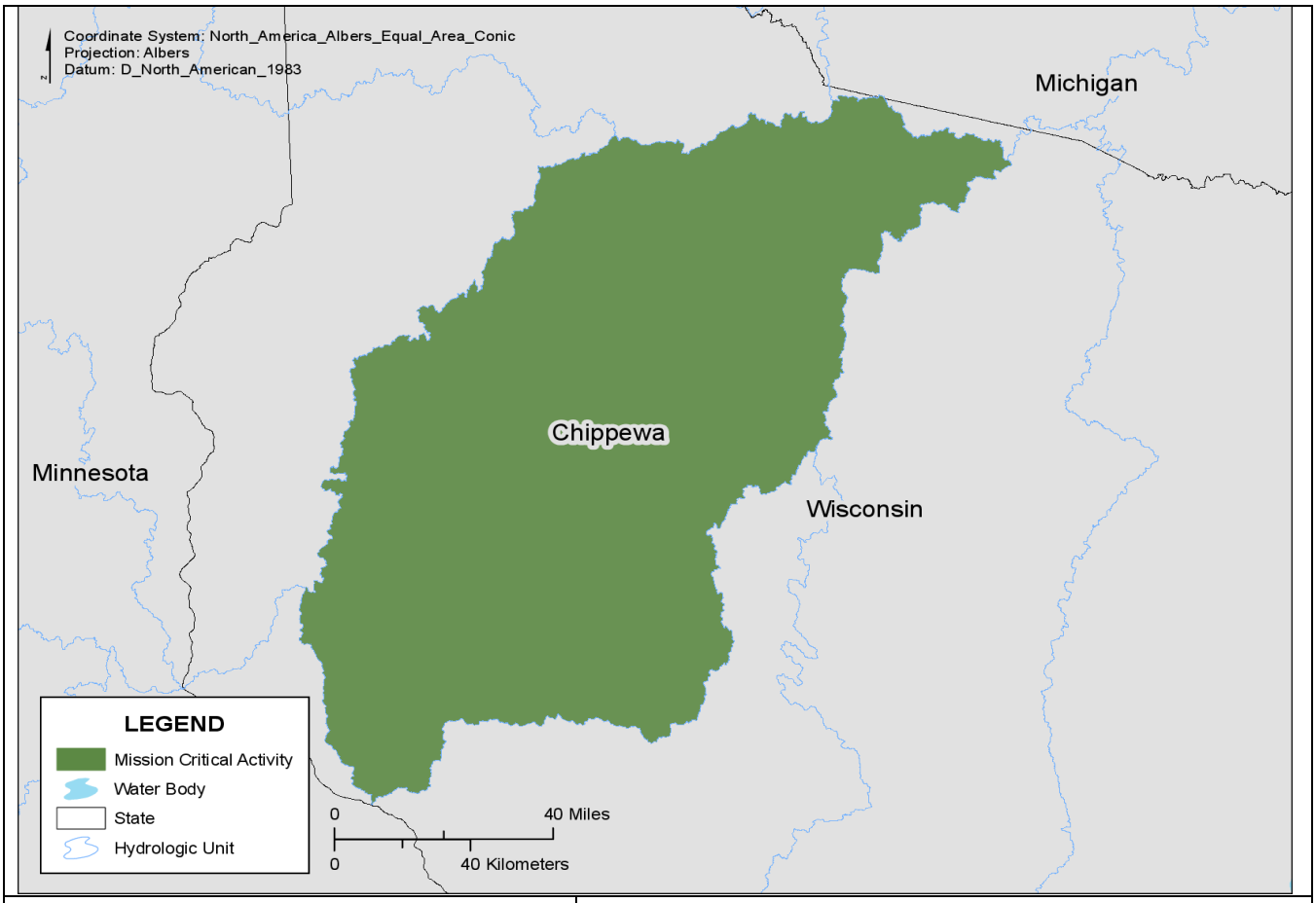
Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	Yes
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	Yes
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Perform Geospatial Analysis
Bathymetry	Nice To Have	Associate Selected Data Type
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Nice To Have	Associate Selected Data Type
Elevation	Highly Desirable	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Required	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Perform Geospatial Analysis
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Tribal Water Resource Planning and Development



Mission Critical Activity Title:	Tribal Water Resource Planning and Development
Mission Critical Activity Description:	Protect, preserve, and restore water quality for tribal use, including subsistence fishing, gathering, wild ricing, drinking, navigating, swimming, aquaculture/agriculture, and aesthetics. This is accomplished through regulation, education, and restoration. Regulations are implemented using both Federal (CWA) and tribal law. Primary MCAs are stormwater management, watershed protection, water level monitoring, nascent plant management, and pollutant tracking.
MCA_ID:	3773499734_1
Organization Type:	Tribal Government
Organization Name:	Lac du Flambeau Tribe
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Not Required
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	6 acres
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	BIA Tribal Water Layer.

Current Benefits	
Total Annual Program Budget:	$190,000
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Major
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$15,000

Future Benefits	
Future Benefits Description:	The biggest benefit would be consistency and accuracy of Federal data that could be used to justify regulatory action. Currently, we piece together data from multiple sources to create the most accurate on-the-ground decisions, but these data are disputed by permit applicants. It would save time to not go back and forth with the applicant over these issues (wetland delineations, dam ownership, pollutant loads, low water level navigation, dredging).
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Major
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	

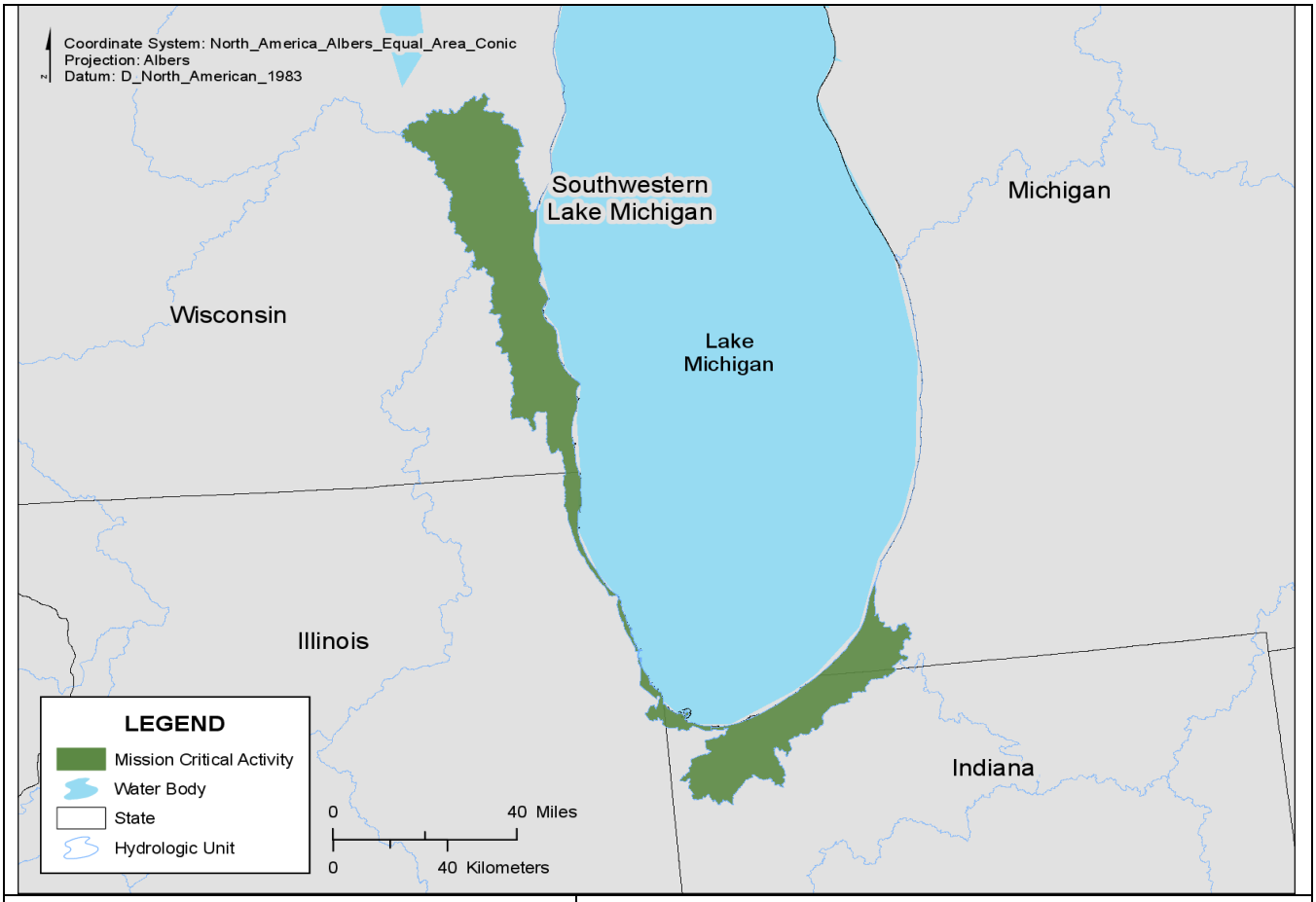
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	Yes
	Dikes.

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	Yes
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Required	Perform Geospatial Analysis
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Required	Perform Geospatial Analysis
Aquifers	Highly Desirable	Associate Selected Data Type
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Required	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Required	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):	Aquatic plants in lakes and rivers (non-wetland)	Aquatic plants in lakes and rivers (non-wetland)

Regional Watershed Planning



Mission Critical Activity Title:	Regional Watershed Planning
Mission Critical Activity Description:	Watershed planning is our primary focus within the environmental division. We do a lot of flood risk mapping in support of our watershed planning efforts.
MCA_ID:	3789844975_1
Organization Type:	Regional, County, City, or Other Local Government
Organization Name:	Southeastern Wisconsin Regional Planning Commission
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more watersheds

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	2 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$800,000
Current Annual Benefits ($):	$50,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Don't Know
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$100,000
Future Benefits Description:	Data in a format that we could more easily download and synthesize for our needs would be a major time saver for us. A one-stop shop would be really useful.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate

Future Benefits	
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Don't Know
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Don't Know
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	Yes
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	

Required Analytical Functions	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Nice To Have	Visual Inspection
Climate	Required	Perform Geospatial Analysis
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Nice To Have	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Not Required	Visual Inspection
Point Discharges	Nice To Have	Associate Selected Data Type
Water Use: Diversions	Nice To Have	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Required	Perform Geospatial Analysis
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Not Required	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Wetland and Watershed Planning

Mission Critical Activity Title:	Wetland and Watershed Planning.
Mission Critical Activity Description:	Wetland and watershed planning.
MCA_ID:	3820912744_1
Organization Type:	Not for Profit
Organization Name:	Wisconsin Wetlands Association
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	1.0 mile of surface water channel per square mile (1:100,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$50,000
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	Yes
Coastal bathymetry	
Estuaries	Yes
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	Yes
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Required	Perform Geospatial Analysis
Soils	Required	Perform Geospatial Analysis
Surficial Geology	Required	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Nice To Have	Visual Inspection
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Not Required	None
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Visual Inspection
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Wyoming

The Hydrography Requirements and Benefits Study (HRBS) survey results for Wyoming identified six Mission Critical Activities (MCAs) from five state agencies and one private consulting firm. They noted critical requirements for improved and coordinated hydrography data supporting the following activities:

- Water Management and Planning
- Protection of Fisheries
- Water Quality
- Water Rights
- Flood Risk Management

In order to satisfy their requirements, these agencies ideally need statewide spatial hydrography data that are of high positional accuracy (1:24,000 to 1:1,200); is reviewed and updated on an annual basis; includes bathymetry, small impoundments (1 acre), discharges, diversions, wetlands, water quality, and aquifers; and provides stream order, whole stream identifiers, names (including GNIS and alias names), streamflow statistics, and accurate flow periodicity (perennial, intermittent, ephemeral).

The state agencies are heavily dependent on hydrologic data, often from streams in ungaged watersheds. Improved data would allow better estimated flow, improve the ability to acquire sufficient instream flow water rights to maintain high priority fisheries, better provide for public safety, and assist in the protection of water quality. Major benefits of improved data will be realized through time savings generated by field staff in the administration and management of water rights. Combining information in a "one-stop shop" application is desirable.

Geographic Extents Required for Hydrography Data Access

12-digit Hydrologic Units	8-digit Hydrologic Units	6-digit Hydrologic Units	4-digit Hydrologic Units	2-digit Hydrologic Units	NHDPlus Catchments	State or Territory	Conterminous United States	Nationwide including Alaska and Hawaii	User defined map extent	User defined irregular area (polygon)	Other	I don't know
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

Data Types Required for Hydrography Data Access

Vector Data			Raster Data				
OGC conformant (e.g. WaterML, GeoJSON)	Esri shapefiles	Esri file geodatabase	NetCDF	GeoTIFF	NITF	Esri Grid	Other
✓	✓	✓	✓	✓	✓	✓	

Data or Service Access Requirements for Hydrography Data

Data or Service Access Method	Requirement
Services to discover standard data products	Highly Desirable
Services to download standard data products	Required
Services to create and download customized data products	Highly Desirable
Services to dynamically use data with client-based software (like a browser, GIS, or to feed other services)	Highly Desirable
Services to visualize cartographically rendered and symbolized hydrography data	Highly Desirable
Services that allow combination of visualizations with other visualization services (mash-ups)	Highly Desirable
Services to create generalized versions of hydrography (different scales and level of detail)	Highly Desirable
Services to support online analysis of hydrography information (such as StreamStats)	Highly Desirable

Requirements for Integration of Hydrography Data with Elevation Data

Data Type	Elevation Data Integration	Requirement
Vector Data	Rivers and streams in the hydrography dataset align with channels as defined from the elevation data at 1:12,000-scale or larger (3-meter DEM).	Required
	Objects defined by elevation, such as a levees, are linked to a particular river in the hydrography dataset.	Nice To Have
	Hydrography and elevation data are packaged in a single product such as a TIN or a 3-D dataset.	Highly Desirable
	Hydrography data (streams, stream gages, dams, hydrologic units) along with elevation data (elevations, catchments, levees, floodplains) coexist within a common data model.	Required
	Perform synthesis such that streamflow can be estimated from elevation-based drainage area and other factors.	Highly Desirable
	Produce data derivatives such that gradient can be calculated on a stream using elevation data.	Highly Desirable
	Manage hydrography and elevation data as a unified activity always keeping both datasets synchronized with one another.	Nice To Have
	Ensure that hydrography and elevation data represent a similar point in time.	Highly Desirable
	Both hydrography and elevation data are delivered in unison rather than two separate operations.	Highly Desirable
Raster Data	Determine new flow paths across the land surface into existing stream channels.	Nice To Have

Data Type	Elevation Data Integration	Requirement
	Determine feature on the hydrographic network to which a point (with elevation value) is connected.	Highly Desirable
	Determine the actual point location (within a DEM cell) on the hydrographic network to which a point is connected.	Highly Desirable

Hydrography Data Quality Impacts

Quality Issue	Impact
In a series of lakes formed at gravel pits, one lake is missing from the NHD.	Somewhat Impactful
In a series of lakes formed at gravel pits, all lakes are missing from the NHD.	Highly Impactful
In a series of tributary streams, several streams do not connect with the main river.	Highly Impactful
A perennial stream is misnamed.	Highly Impactful
A large reservoir is misnamed.	Highly Impactful
A first order stream flow direction is reversed.	Highly Impactful
A second order stream flow direction is reversed.	Highly Impactful
A third order stream flow direction is reversed.	Highly Impactful
Two first order streams coded as perennial should be intermittent.	Somewhat Impactful
A meandering river represented in the NHD is overlaid over a contemporary image of the river. The position of the meanders has deviated over time with a mean error of 100 feet and a maximum error of 200 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 175 feet.	Highly Impactful
An intermittent stream represented in the NHD is portrayed along with contours and shaded terrain. The stream appears to be misaligned with the terrain by a mean of 75 feet.	Somewhat Impactful
A ridge line in the WBD is portrayed along with contours and shaded terrain. The ridge line appears to be misaligned with the terrain by a mean of 70 feet.	Somewhat Impactful
Error Resolution	**Time**
Acceptable error resolution time:	Within 1-2 months

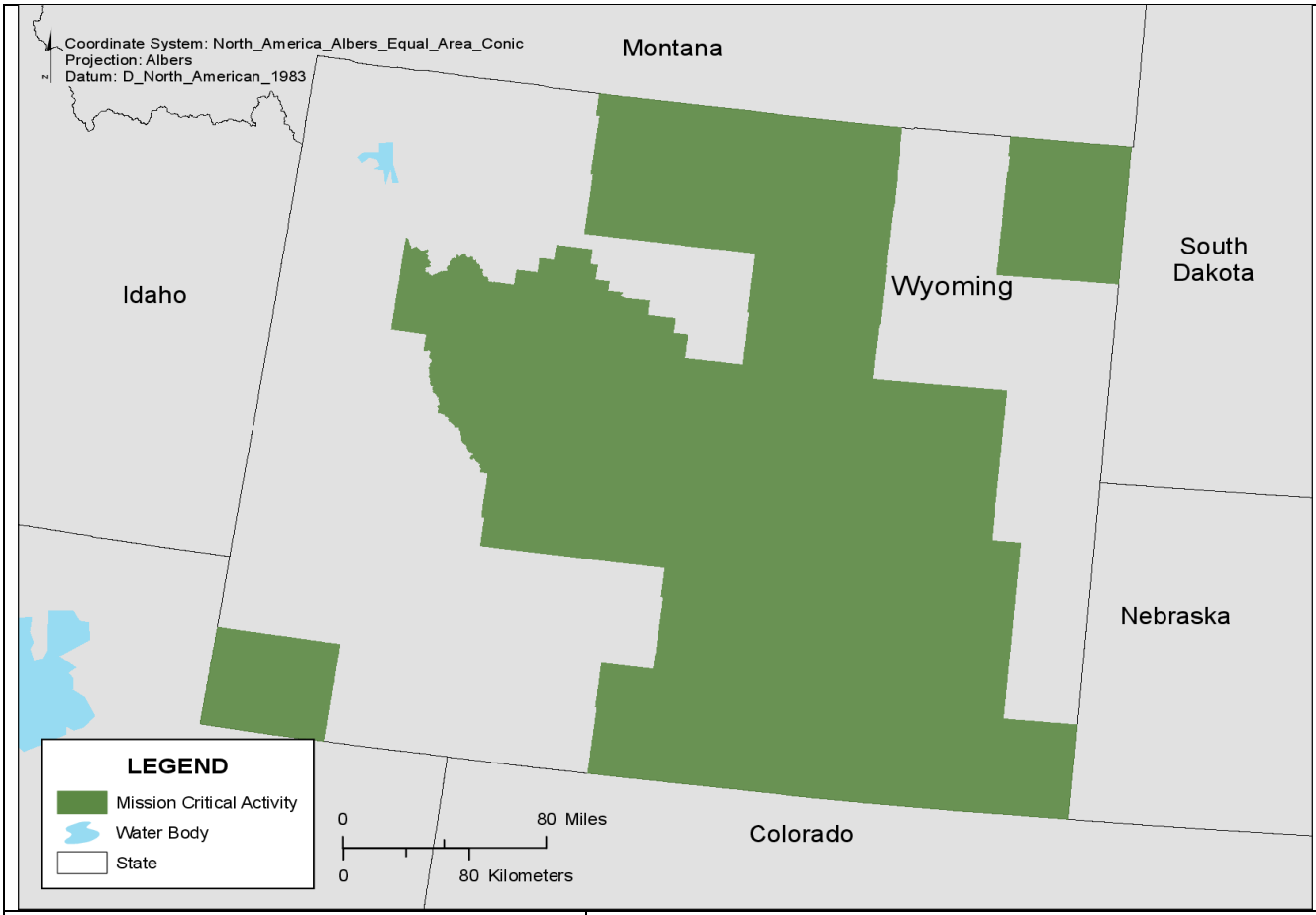
Other Requirements

Requirement	Response
Accuracy requirements for elevation derived catchments	Within 5% of actual area
Categorization of differences in definition of NHDPlus catchments vs. Hydrologic Units	No problem at all
Use of web tool for reporting hydrography data errors	Yes

Mission Critical Activities

Wyoming managers provided the following assessments of hydrography data requirements and benefits received from enhanced hydrography data. Summarized details are provided in the following pages.

Flood Risk Management



Mission Critical Activity Title:	Flood Risk Management
Mission Critical Activity Description:	Stormwater management and watershed protection.
MCA_ID:	3804008897_1
Organization Type:	State Government
Organization Name:	WY State Parks
Business Use:	Recreation
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Required
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)

Requirements	
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	60 acres
Smallest Mapped Waterbody:	10 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	Yes
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$200,000
Current Annual Benefits ($):	$10,000
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Major
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Major
Current Societal Benefits	
Current Education or Public Safety Benefits:	Major
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Major
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$50,000
Future Benefits Description:	Time and cost savings due to current budget cutting and improved education and safety are very important factors to our agency.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major

Future Benefits	
Future Customer Experience Benefits:	Moderate
Future Societal Benefits	
Future Education or Public Safety Benefits:	Major
Future Environmental Benefits:	Major
Future Human Lives Saved:	Major
Future Other Benefits:	

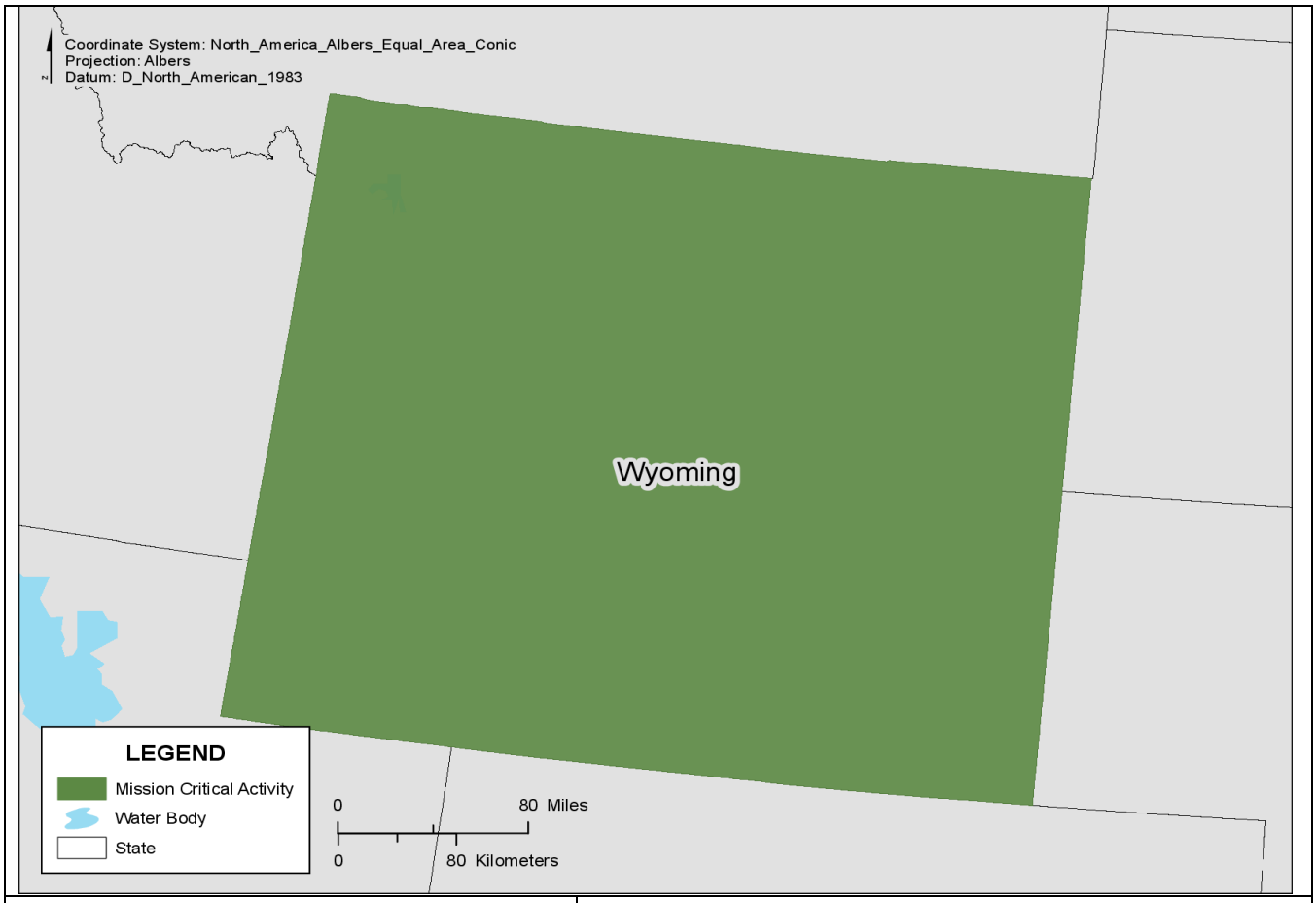
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	Yes
Accumulate upstream or downstream features	
Find upstream or downstream points	

Required Analytical Functions	
Calculate distance on network	Yes
Find events or features on network	
Preset symbolization	
User defined symbolization	Yes
Mash-ups	Yes
Animation of time-series	Yes

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Nice To Have	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Associate Selected Data Type
Wetlands	Required	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Highly Desirable	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Highly Desirable	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	Maintaining sufficient stream flow to support high-priority fisheries by acquiring instream flow water rights.
MCA_ID:	3773666275_1
Organization Type:	State Government
Organization Name:	Wyoming Game and Fish Department
Business Use:	River and Stream Ecosystem Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 3 feet, 90% (1:1,200-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	10 square miles (6,400 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$150,000
Current Annual Benefits ($):	$30,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Minor
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$30,000
Future Benefits Description:	Our program is heavily dependent on hydrology data, often from streams in un-gaged watersheds, and improved data would allow us to better estimate flows and improve the ability to acquire sufficient instream flow water rights to maintain high priority fisheries.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Major
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Minor
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Moderate

Future Benefits	
Future Human Lives Saved:	Not Applicable
Future Other Benefits:	

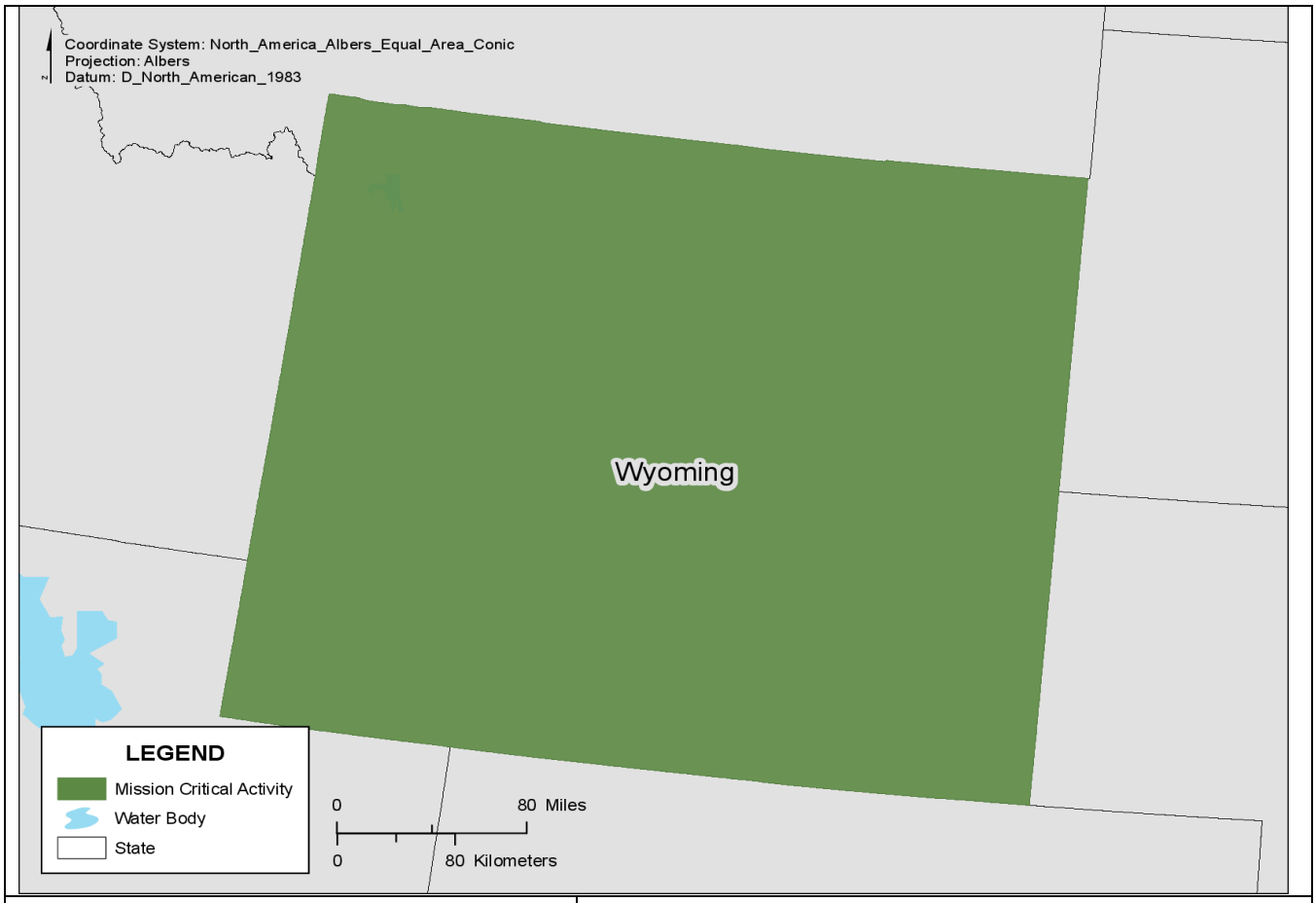
Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	Yes
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	Yes
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	Yes
Preset symbolization	
User defined symbolization	

Required Analytical Functions	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Associate Selected Data Type
Surficial Geology	Nice to Have	Visual Inspection
Bathymetry	Required	Perform Geospatial Analysis
Climate	Highly Desirable	Perform Geospatial Analysis
Contaminant Sources	Not Required	None
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Not Required	None
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Visual Inspection
Point Discharges	Highly Desirable	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Highly Desirable	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Perform Geospatial Analysis
Other (please specify the importance and highest analysis level):		

Water Quality



Mission Critical Activity Title:	Water Quality
Mission Critical Activity Description:	Regulation and permitting of pollutant discharges into Wyoming surface waters.
MCA_ID:	3783352971_1
Organization Type:	State Government
Organization Name:	Wyoming DEQ/WQD
Business Use:	Water Quality
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	>10 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	100 square miles (64,000 acres)
Smallest Mapped Waterbody:	Less than an acre
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	Yes
	National Wetlands Inventory.

Current Benefits	
Total Annual Program Budget:	$3.5 million
Current Annual Benefits ($):	Data not provided.
Current Operational Benefits	
Current Time/Cost Savings:	
Current Mission Compliance Benefits:	
Current Customer Service Benefits	
Current Products or Services Benefits:	
Current Response or Timeliness Benefits:	
Current Customer Experience Benefits:	
Current Societal Benefits	
Current Education or Public Safety Benefits:	
Current Environmental Benefits:	
Current Human Lives Saved:	
Current Other Benefits:	

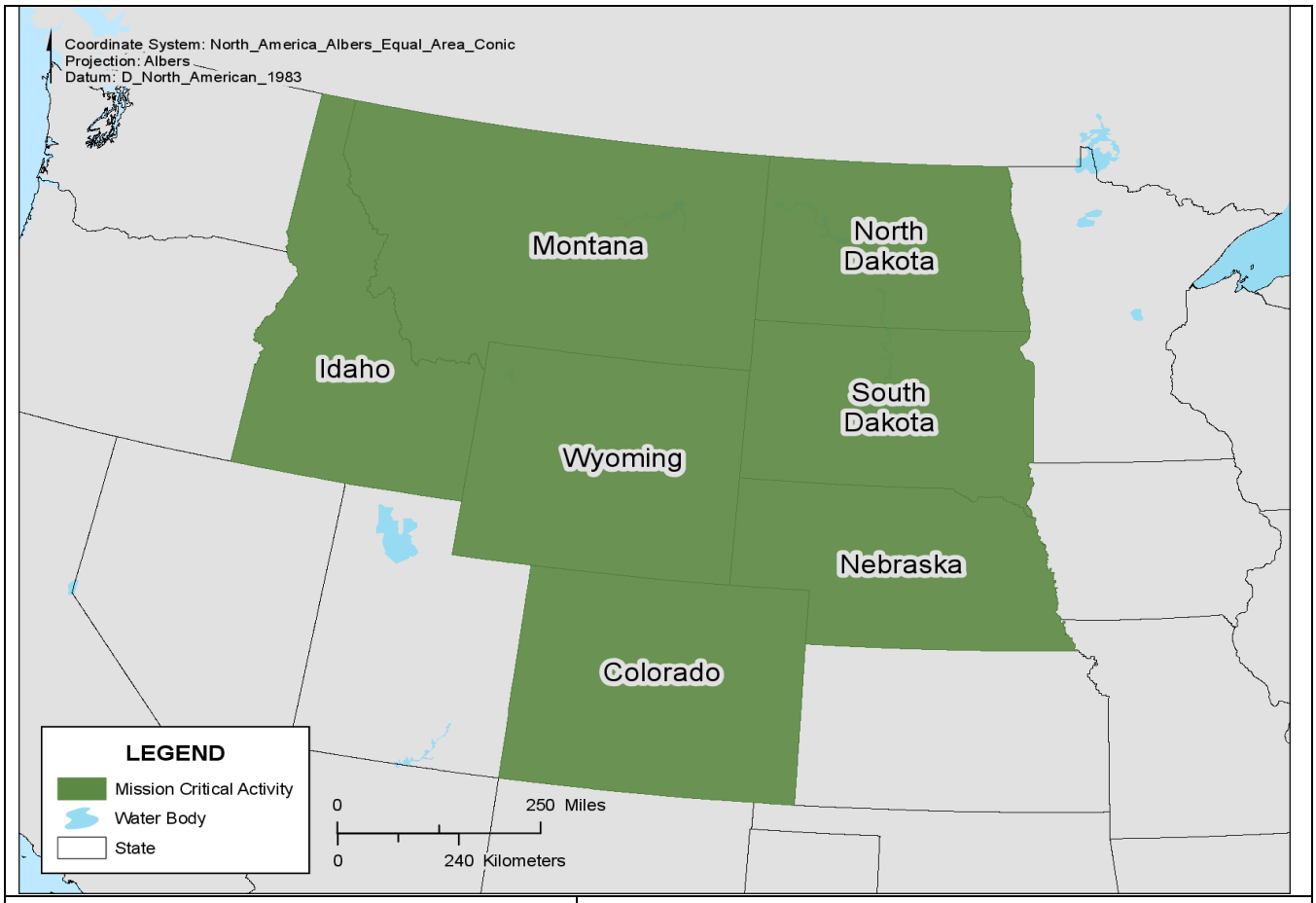
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	Yes
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Not Required	None
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Not Required	None
Climate	Nice To Have	Visual Inspection
Contaminant Sources	Highly Desirable	Associate Selected Data Type
Elevation	Not Required	None
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Required	Perform Geospatial Analysis
Census (population statistics)	Nice To Have	Associate Selected Data Type
Aquifers	Not Required	None
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Highly Desirable	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Required	Perform Geospatial Analysis
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Not Required	None
USDA - National Agriculture Statistics Service (NASS)	Not Required	None
USFWS - National Wetlands Inventory (NWI)	Required	Perform Geospatial Analysis
USGS National Water Information Sites (NWIS)	Nice To Have	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	Groundwater development.
MCA_ID:	3772694238_1
Organization Type:	Private or Commercial
Organization Name:	Brogan Hydrologic Consulting
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	2-3 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 40 feet, 90% (1:24,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	5 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$25,000
Current Annual Benefits ($):	$5,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Not Applicable
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Not Applicable
Current Other Benefits:	

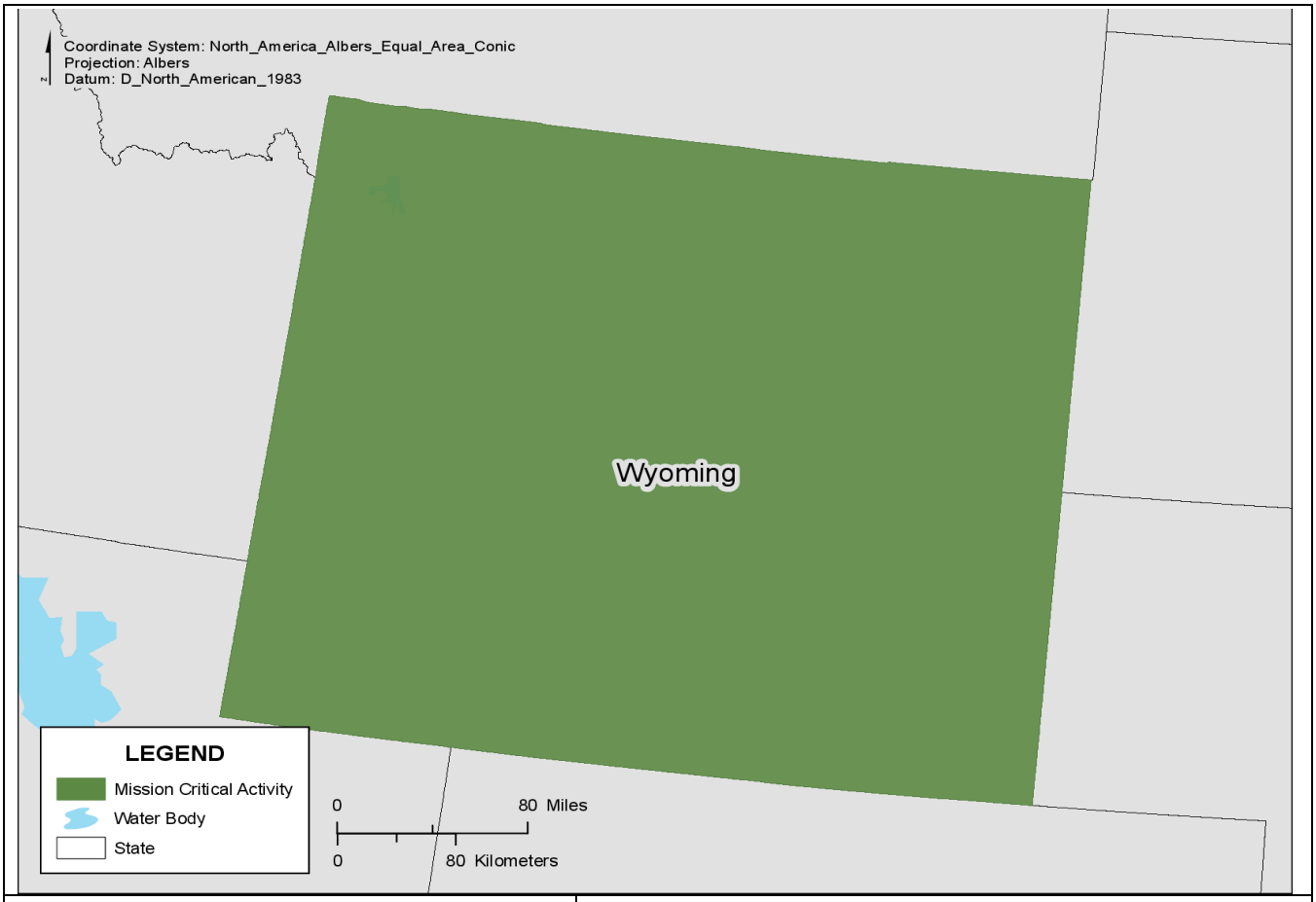
Future Benefits	
Future Annual Benefits ($):	Data not provided.
Future Benefits Description:	Data not provided.
Future Operational Benefits	
Future Time/Cost Savings:	
Future Mission Compliance Benefits:	
Future Customer Service Benefits	
Future Products or Services Benefits:	
Future Response or Timeliness Benefits:	
Future Customer Experience Benefits:	
Future Societal Benefits	
Future Education or Public Safety Benefits:	
Future Environmental Benefits:	
Future Human Lives Saved:	
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	
Leakage along lines	Yes
Leakage at points	Yes
Flood stage	
Floodplain boundary	Yes
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	
Bridges, culverts	
Diversion lines	
Deltas	
Wetlands	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Nice to Have	Visual Inspection
Soils	Nice To Have	Visual Inspection
Surficial Geology	Highly Desirable	Visual Inspection
Bathymetry	Not Required	None
Climate	Highly Desirable	Visual Inspection
Contaminant Sources	Highly Desirable	Visual Inspection
Elevation	Required	Perform Geospatial Analysis
Stream Flow	Highly Desirable	Visual Inspection
Wetlands	Highly Desirable	Visual Inspection
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Highly Desirable	Visual Inspection
Water Use: Diversions	Highly Desirable	Visual Inspection
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Visual Inspection
EPA - STOrage and RETrieval Data Warehouse (STORET)	Highly Desirable	Visual Inspection
USACE - National Inventory of Dams (NID)	Nice To Have	Visual Inspection
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Visual Inspection
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Visual Inspection
USGS National Water Information Sites (NWIS)	Required	Associate Selected Data Type
USGS National Water-Quality Assessment Program (NAWQA)	Highly Desirable	Visual Inspection
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	The mission of the Wyoming State Engineer's Office and Board of Control is to provide for the general supervision and protection of both inter- and intra-state waters of Wyoming. This includes the appropriation, distribution, and application to beneficial use of water as provided under the prior appropriation doctrine, and to maintain the flexibility within that framework to meet the changing needs of the citizens of Wyoming. The State Engineer's Office collects, analyzes, maintains, and provides water-related information for ensuring the appropriate management and regulation of Wyoming's water resources.
MCA_ID:	3783365637_1
Organization Type:	State Government
Organization Name:	Wyoming State Engineer's Office. WY State Board of Control
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	Annually
Post Event Updates:	Highly Desirable
Positional Accuracy:	+/- 33 feet, 90% (1:12,000-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	1 acre
Level of Detail:	Best Available

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	Yes
Watershed Boundary Dataset (WBD)	
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$14.9 million agency annual budget.
Current Annual Benefits ($):	Estimated $500,000 to $900,000.
Current Operational Benefits	
Current Time/Cost Savings:	Major
Current Mission Compliance Benefits:	Moderate
Current Customer Service Benefits	
Current Products or Services Benefits:	Minor
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Minor
Current Societal Benefits	
Current Education or Public Safety Benefits:	Minor
Current Environmental Benefits:	Minor
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$200,000 to $250,000
Future Benefits Description:	Major benefits will be realized through time savings generated by field staff in the administration and management of water rights, the efficient distribution and management of the resource without waste, etc. Time savings from quick decisions coming from a better informed staff. Possible decreases in some current programs as similar information can be gained through increased system, thus no duplication of services would be necessary.
Future Operational Benefits	
Future Time/Cost Savings:	Major
Future Mission Compliance Benefits:	Moderate
Future Customer Service Benefits	
Future Products or Services Benefits:	Minor
Future Response or Timeliness Benefits:	Moderate
Future Customer Experience Benefits:	Minor
Future Societal Benefits	
Future Education or Public Safety Benefits:	Minor
Future Environmental Benefits:	Minor
Future Human Lives Saved:	Minor
Future Other Benefits:	Possibly up to $500,000 additional.

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	
Left/right bank delineation	
Velocity or time of travel	Yes
Leakage along lines	
Leakage at points	
Flood stage	Yes
Floodplain boundary	
Flow periodicity	
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	Yes
Diversion lines	Yes
Deltas	
Wetlands	

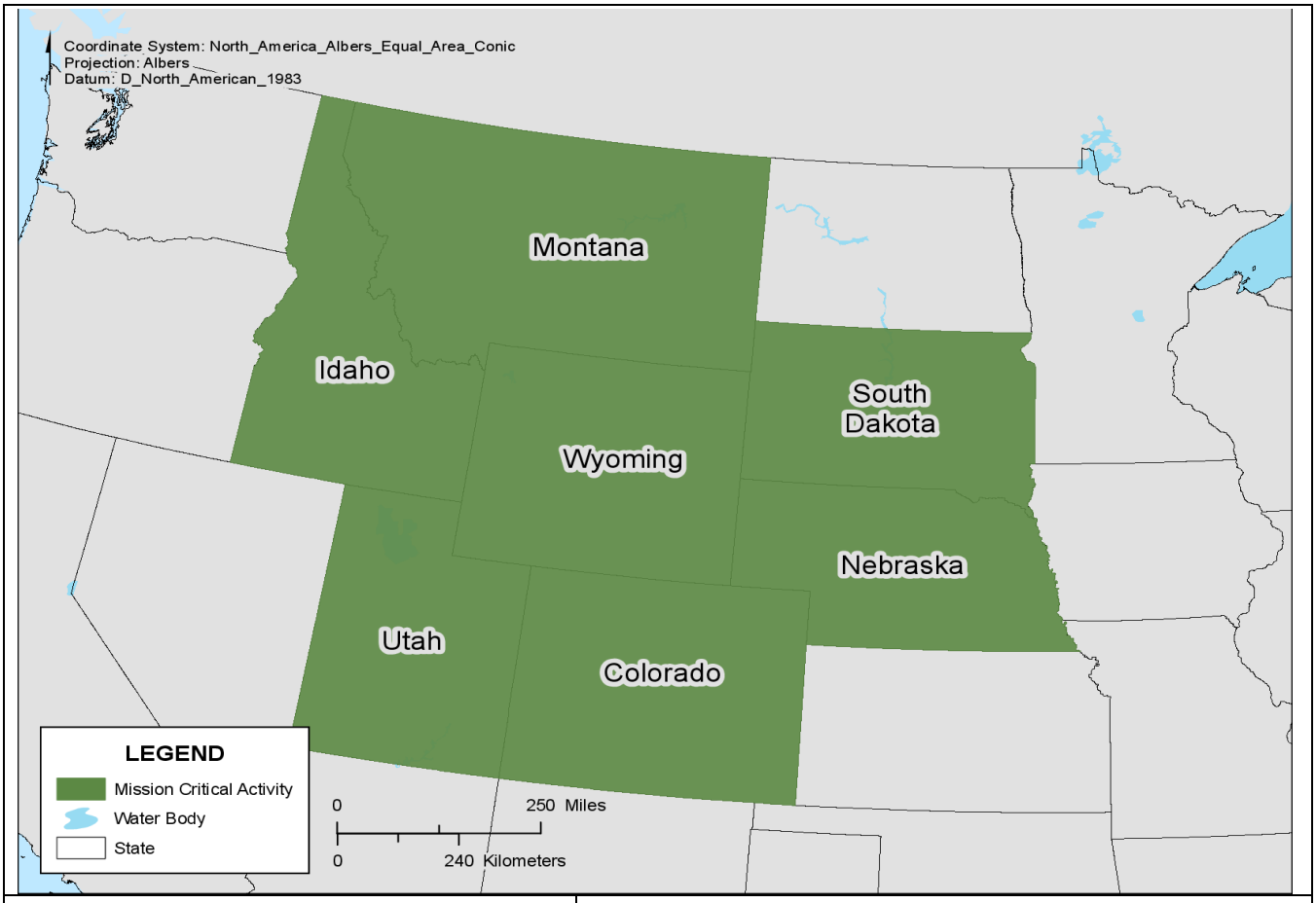
Required Characteristics	
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes
Delineate catchment	
Determine downstream flood area	Yes
Accumulate upstream or downstream features	Yes
Find upstream or downstream points	Yes
Calculate distance on network	
Find events or features on network	
Preset symbolization	Yes
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Not Required	None
Soils	Not Required	None
Surficial Geology	Nice to Have	Associate Selected Data Type
Bathymetry	Not Required	None
Climate	Nice To Have	None
Contaminant Sources	Not Required	None
Elevation	Highly Desirable	Associate Selected Data Type
Stream Flow	Required	Perform Geospatial Analysis
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Required	Perform Geospatial Analysis
Point Discharges	Required	Perform Geospatial Analysis
Water Use: Diversions	Required	Perform Geospatial Analysis
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Nice To Have	Associate Selected Data Type
USACE - National Inventory of Dams (NID)	Highly Desirable	Associate Selected Data Type

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
USDA - National Agriculture Statistics Service (NASS)	Nice To Have	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Nice To Have	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		

Water Management Planning



Mission Critical Activity Title:	Water Management Planning
Mission Critical Activity Description:	River Basin Planning provides essential information concerning the current status and future availability of water resources in Wyoming.
MCA_ID:	3824301828_1
Organization Type:	State Government
Organization Name:	Wyoming Water Development Office
Business Use:	Water Resource Planning and Management
Area of Interest:	One or more states, territories, counties, or cities

Requirements	
Update Frequency:	4-5 years
Post Event Updates:	Nice To Have
Positional Accuracy:	+/- 7 feet, 90% (1:2,400-scale)
Stream Density:	2.5 miles of surface water channel per square mile (1:24,000-scale)
Smallest Contributing Area:	1 square mile (640 acres)
Smallest Mapped Waterbody:	20 acres
Level of Detail:	Consistent Level of Detail

Hydrography Datasets Currently Used	
National Hydrography Dataset (NHD)	Yes
National Hydrographic Dataset Plus (NHDPlus)	
Watershed Boundary Dataset (WBD)	Yes
No hydrography data are currently being used	
Other dataset (please provide name and brief description):	

Current Benefits	
Total Annual Program Budget:	$700,000
Current Annual Benefits ($):	$500,000
Current Operational Benefits	
Current Time/Cost Savings:	Moderate
Current Mission Compliance Benefits:	Minor
Current Customer Service Benefits	
Current Products or Services Benefits:	Moderate
Current Response or Timeliness Benefits:	Moderate
Current Customer Experience Benefits:	Moderate
Current Societal Benefits	
Current Education or Public Safety Benefits:	Moderate
Current Environmental Benefits:	Moderate
Current Human Lives Saved:	Minor
Current Other Benefits:	

Future Benefits	
Future Annual Benefits ($):	$600,000
Future Benefits Description:	Improved hydrographic information would assist our consultants in providing our agency better information that in turn helps generate a more robust planning study.
Future Operational Benefits	
Future Time/Cost Savings:	Moderate

Future Benefits	
Future Mission Compliance Benefits:	Minor
Future Customer Service Benefits	
Future Products or Services Benefits:	Moderate
Future Response or Timeliness Benefits:	Major
Future Customer Experience Benefits:	Major
Future Societal Benefits	
Future Education or Public Safety Benefits:	Moderate
Future Environmental Benefits:	Moderate
Future Human Lives Saved:	Minor
Future Other Benefits:	

Required Characteristics	
Linkages to stream gage observations	Yes
Linkages to cross section geometry	Yes
Left/right bank delineation	Yes
Velocity or time of travel	Yes
Leakage along lines	Yes
Leakage at points	
Flood stage	
Floodplain boundary	
Flow periodicity	Yes
Riverine bathymetry	
Coastlines	
Coastal bathymetry	
Estuaries	
Diversion points	Yes
Bridges, culverts	
Diversion lines	Yes
Deltas	
Wetlands	Yes
Badlands	
Other	

Required Analytical Functions	
Navigate up or downstream on network	Yes
Calculate stream distance to points	
Calculate time of travel to points	Yes
Find upstream or downstream feature within watershed	Yes
Calculate drainage area	Yes

Required Analytical Functions	
Delineate catchment	Yes
Determine downstream flood area	
Accumulate upstream or downstream features	
Find upstream or downstream points	
Calculate distance on network	
Find events or features on network	
Preset symbolization	
User defined symbolization	
Mash-ups	
Animation of time-series	

Level of Integration with Other Datasets	Importance	Highest Level of Analysis
Land Cover	Highly Desirable	Associate Selected Data Type
Soils	Highly Desirable	Associate Selected Data Type
Surficial Geology	Highly Desirable	Associate Selected Data Type
Bathymetry	Nice To Have	Visual Inspection
Climate	Nice To Have	Associate Selected Data Type
Contaminant Sources	Not Required	None
Elevation	Nice To Have	Associate Selected Data Type
Stream Flow	Highly Desirable	Associate Selected Data Type
Wetlands	Highly Desirable	Associate Selected Data Type
Census (population statistics)	Not Required	None
Aquifers	Nice To Have	Associate Selected Data Type
Point Discharges	Highly Desirable	Associate Selected Data Type
Water Use: Diversions	Highly Desirable	Associate Selected Data Type
EPA - National Pollutant Discharge Elimination System (NPDES)	Nice To Have	Associate Selected Data Type
EPA - STOrage and RETrieval Data Warehouse (STORET)	Not Required	None
USACE - National Inventory of Dams (NID)	Nice To Have	Associate Selected Data Type
USDA - National Agriculture Statistics Service (NASS)	Highly Desirable	Associate Selected Data Type
USFWS - National Wetlands Inventory (NWI)	Highly Desirable	Associate Selected Data Type
USGS National Water Information Sites (NWIS)	Required	Perform Geospatial Analysis
USGS National Water-Quality Assessment Program (NAWQA)	Nice To Have	Associate Selected Data Type
Other (please specify the importance and highest analysis level):		