Appendix C – State, Territory, and Local Functional Activities

Alabama (AL)

The State of Alabama has requirements for accurate, reliable elevation data that serves the widest utility of all government agencies. Uses for the data include Economic Development, Emergency Planning and Response, Flood Map Modernization, Geologic Mapping, Ground-water Modeling and management, Highway Planning, and Urban and Suburban Infrastructure Engineering, just to name a few. The collection and maintenance of this data has taken place through individual, un-coordinated actions that often result in duplicated efforts at various levels of government using different standards and specifications. The majority of this data collection has taken place at the local level with varying levels of access to the data. A centrally coordinated collection effort would solve a few key issues that have been seen within the state. It would provide a data set collected with consistent standards, make the data easily accessible for all levels of government and the public, reduce acquisition costs through economy of scale, and could fill gaps in funding at the local and state level.

It is also apparent that local officials with intimate knowledge of local conditions are the best stewards of the data layers associated with their jurisdictions. State agencies typically collaborate with federal agencies, but prior to the 2010 flying season, these three groups did not collaborate, particularly at the local level. As budgets are being strained at all levels of government, the logical solution is to develop a system of partnerships across the three groups to share costs and ease the burden of funding. Large collaborations also have the added benefit of reduced costs per square mile of data thereby stretching those dollars further. Funding data over the past five years show that the sums of those amounts are nearly equal to the cost of a total statewide acquisition over the same time period. Acquiring data in this piece mil fashion has resulted in local LIDAR in 16 counties – all with varying specifications, age, accuracy, and with a very small percentage of that data in the public domain which means that it cannot be widely used across all levels of government.

There are many benefits in developing a statewide program to acquire enhanced elevation and LIDAR with very few disadvantages. In other states and within the State of Alabama at regional levels, this has repeatedly been proven. One confirmed advantage is the reduction of overall costs. This can be accomplished in several ways including reducing duplication of data, utilizing economies of scale and leveraging costs among participants. Additionally, there are benefits derived from having standard information. These include uniform accuracy, and generally greater accuracy, better decision making capability and better collaboration capabilities. It then becomes easier to manage resources in business and land development, environmental management and emergency management.
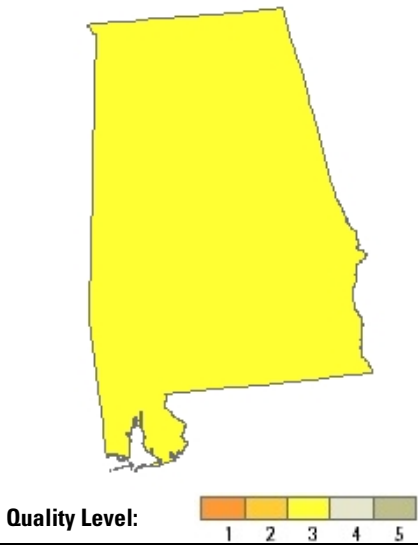
USGS has recently released LIDAR standards in anticipation of increased data acquisitions that will be absorbed into the National Elevation Database. LIDAR data acquired through this project will be collected using the USGS standards as a minimum, with FEMA standards and additional break line collection determined on a project by project basis or as funding permits. The primary intent of this specification is to create consistency across all LIDAR collections, in particular those undertaken in support of the National Elevation Dataset (NED). Unlike most other "LIDAR specs" which focus on the derived bare-earth DEM product, this specification places emphasis on the handling of the source LIDAR
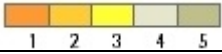
point cloud data. This is to assure that the source data collected remains intact and viable to support the wide variety of non-DEM science and mapping applications and derivatives that can benefit from LIDAR technology.
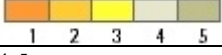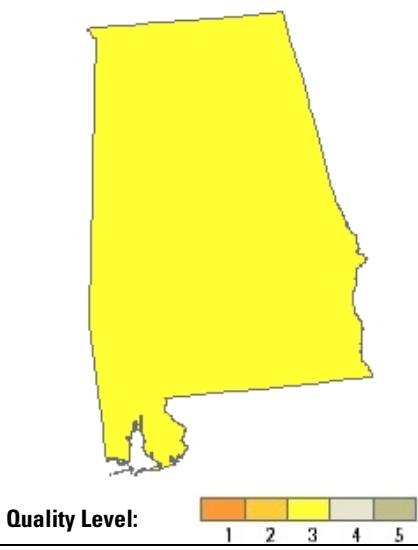
State Functional Activities

Program: Alabama Department of Economic and Community Affairs Office of Water Resources	Business Use: 14. Flood Risk Management
  Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes, Adjoining states where watershed boundaries cross	**Modernizing and Updating FEMA Flood Risk Maps:** The Alabama Department of Economic Community Affairs Office of Water Resources (OWR) administers programs for river basin management, river assessment, water supply assistance, water conservation, flood mapping, the National Flood Insurance Program and water resources development. Further, OWR serves as the State liaison with federal agencies on major water resources related projects and conducts any special studies on instream flow needs as well as administering environmental education and outreach programs to increase awareness of Alabama's water resources. **Estimated Annual Operational Benefits:** Major; $5,000,000 The data would allow users to create datasets for analysis with minimal time and effort. **Estimated Annual Customer Service Benefits:** Major; $3,000,000 Good elevation data statewide would further reduce acquisition costs and the amount of time required to complete certain phases of the project. It would also improve the quality of the data from studies and analysis. Overall this would give the public a better sense that the department is more efficient by reducing the cost and time to take a project to completion. **Estimated Strategic Benefits:** Major Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefits, Strategic/political benefits

Program: Alabama Department of Environmental Management - Water Program	**Business Use:** 2. Water Supply and Quality
Quality Level: 1 2 3 4 5	**Assessing Water Quality and Managing Impacts:** The Alabama Department of Environmental Management (ADEM) adopts and fairly enforces rules and regulations to protect and improve the quality of Alabama's environment and the health of all its citizens. ADEM monitors environmental conditions in Alabama and recommends changes in state law or revises regulations as needed to respond appropriately to changing environmental conditions.
	Estimated Annual Operational Benefits: Major; $250,000 Would allow fast and accurate creation of watersheds for determining stream health and quality. Analysis would be consistent across all areas.
	Estimated Annual Customer Service Benefits: Major; $15,000 The data would allow users to create datasets for analysis with minimal time and effort. Would all use across all of Department.
	Estimated Strategic Benefits: Major Most of the benefits center around environmental benefits. Water quality improvements would touch all other areas.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, all watersheds that extend outside of the state.	
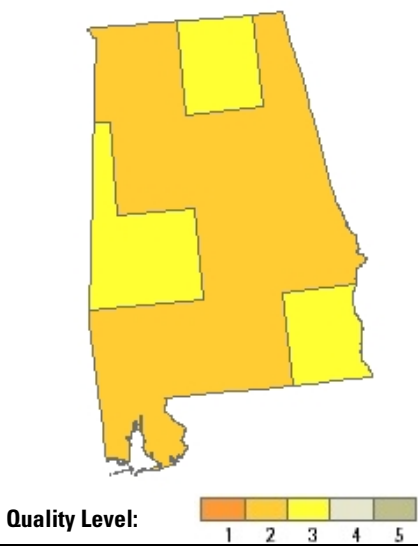
Program: Alabama Dept. of Transportation	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**The Planning, Investigation, and Preliminary Design of Roadway Projects:** The Planning, Investigation, and Preliminary Design of Roadway Projects to provide a safe, efficient, environmentally sound intermodal transportation system for all users, especially the taxpayers of Alabama. To also facilitate economic and social development and prosperity through the efficient movement of people and goods and to facilitate intermodal connections within Alabama.
	Estimated Annual Operational Benefits: Major; $2,000,000 New operational benefits would be reduced costs to acquire data on a project by project basis, quicker evaluation of proposed projects, and the overall improvement in the data resulting from studies and analysis using good data statewide. This will reduce the cost and time to take a project from conception to construction.
	Estimated Annual Customer Service Benefits: Major; $3,000,000 Good elevation data statewide would further reduce acquisition costs and the amount of time required to complete certain phases of the project. It would also improve the quality of the data from studies and analysis. Overall the public would benefit from a department that is more efficient by reducing the cost and time to take a project to construction.
Update Frequency: 6-10 years	**Estimated Strategic Benefits:** Moderate A good statewide LIDAR dataset would provide more data for evaluating existing roadway conditions and identify needs for safety projects. Statewide LIDAR data would benefit environmental efforts by providing more detailed information over larger areas on ALL projects. This would provide a more complete picture of the study area and how the proposed construction would affect those habitats.
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Occasionally- when projects come to a state line	

Program: Auburn University - Alabama Precision Agriculture	**Business Use:** 8. Agriculture and Precision Farming
 Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Design and development of site-specific management strategies and geospatial technology to implement these strategies:** The goal of the Alabama Cooperative Extension System's Precision Agriculture Program is to facilitate the adoption of geospatial technologies and site-specific management strategies. The use of these technologies positively impacts agriculture by helping farmers reduce application overlap and target crop inputs to where they are needed. This approach allows farmers to increase their efficiency in the field, maximize crop yields, and improve environmental stewardship.
	Estimated Annual Operational Benefits: Major; $100,000 Expanding the impact of such data by having it available to more producers at an affordable cost in which they can then use then improve their land and crop management.
	Estimated Annual Customer Service Benefits: Major; $500,000 These benefits would be the result of not only the farming (produce) side of it, but also the timber management side of it. LIDAR can be used to measure and model growth (forest and crop), determine suitable land for crop production, and improved machine control since they will "know" the ground surface model.
	Estimated Strategic Benefits: Major Same comment as above. It is a continuing process to educate the public and political figures that farmers and ranchers are managing lands and producing food in a much more safe and sustainable way.

Program: Alabama Forestry Commission	**Business Use:** 16. Wildfire Management, Planning, Response
 Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, fires, destructive insects do not stop at state boundaries	**Forest Resources Management:** The Alabama Forestry Commission is committed to protecting and sustaining forest resources using professionally applied stewardship principles and education. The Commission will ensure Alabama's forests contribute to abundant timber and wildlife, clean air and water, and a healthy economy.
	Estimated Annual Operational Benefits: Major; $2,500,000 Ability to determine vegetated and non vegetated area for measuring tree canopy coverage and estimate timber volumes for forested areas
	Estimated Annual Customer Service Benefits: Major; $5,000,000 Ability to provide terrain information for analysis with minimal time and effort and could be used across all Departments.
	Estimated Strategic Benefits: Major Integration of imagery and LiDAR produces valuable information for forest management, and also has application for carbon accounting to understand the ecosystem services of forests. LiDAR is a critical component for more accurate measurement of logging practices and emission and carbon sequestration calculations.

Program: Geological Survey of Alabama	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
  Quality Level: [color scale] 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, for project specific	**Geologic Mapping and Analysis:** The Geological Survey of Alabama (GSA), established in 1848, provides service and information to Alabama and its citizens as a natural resource data gathering and research agency. As part of its mission, GSA explores and evaluates the mineral, water, energy, biological, and other natural resources of the State of Alabama and conducts basic and applied research in these fields. **Estimated Annual Operational Benefits:** Major; $2,240,000 Acquisition of high resolution elevation data derived from LIDAR is an opportunity to take advantage of an extremely accurate and consistent base layer that will benefit a wide-ranging user group. Applications for this technology include Fast and accurate stream cross-section acquisition and geomorphology mapping. **Estimated Annual Customer Service Benefits:** Major; $2,240,000 Working with the point cloud data also allows experienced geo-professionals to experiment with different gridding algorithms and parameters with the objective of producing a DEM that is optimized for landform mapping in a particular project area. **Estimated Strategic Benefits:** Major Results should provide greater awareness of the value of location of hazards to politicians. When life and property are on the line, timely and accurate data is vital to decision makers. With enhanced statewide elevation data available this will help decision makers.

Program: Alabama Emergency Management Agency	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
  Quality Level: [color scale] 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, adjoining states in case of an event close to a state boundary.	**Emergency Response to a Disaster:** The Alabama Emergency Management Agency, Operations Section is responsible for coordinating support for state and local response in an all hazards concept. These responsibilities include alert and notification, activation of the State Emergency Operations Center, coordination of emergency support functions, establishing priorities for allocating resources, maintaining operational control of the State Emergency Response Team, the Mobile Operations Center, the Disaster Reconnaissance Team and the communications/state warning point section. The Operations Section also supports damage assessment after an event and assists with the transition to the recovery phase. All of these functions are directed toward the one goal of minimizing the risk and affect to people, property and the environment. **Estimated Annual Operational Benefits:** Moderate; $125,000 Potential of High quality statewide data would allow emergency management to better prepare for, respond to and mitigate damages from disasters and the ability to increase efficiency of hazard analysis and the ability to increase efficiency of hazard analysis. **Estimated Annual Customer Service Benefits:** Moderate; $25,000 High quality statewide data would allow emergency management to better prepare for, respond to and mitigate damages from disaster. **Estimated Strategic Benefits:** Major Results should provide greater awareness of the value of location of hazards to politicians. When life and property are on the line, timely and accurate data is vital to decision makers. With enhanced statewide elevation data available this will help decision makers.

Program: Alabama Department of Conservation & Natural Resources - State Lands Division Natural Heritage Section	Business Use: 7. Wildlife and Habitat Management
  Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, all watersheds that extend outside of the state.	**Wildlife and Habitat Management:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported LiDAR data could be used for field-based habitat assessment. LiDAR is a source of geospatial data that can provide fine-grained information about the 3-D structure of ecosystems across broad spatial extents. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported LiDAR would save time and funds where, data collected manually to quantify understory heights are generally limited in scale, due to the labor-intensive and seasonal nature of data collection. However, LiDAR data can be used to examine a variety of understory height metrics at spatial scales that might not otherwise have been addressed. **Estimated Strategic Benefits:** Major Policy maker's decisions are strengthened when current and accurate geospatial datasets are available in support of the informed decision making process.

Program: Alabama Department of Economic and Community Affairs - GIS Dept.	Business Use: 3. River and Stream Resource Management
  Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, all watersheds that extend outside of the state.	**National Hydrography Dataset Stewardship:** Alabama Department of Economic and Community Affairs GIS Department is the NHD Steward for Alabama. **Estimated Annual Operational Benefits:** Major; $125,000 Better elevation data would assist in the update of the NHD. **Estimated Annual Customer Service Benefits:** Major; $35,000 More efficient in the update process of NHD. **Estimated Strategic Benefits:** Major Results would provide greater awareness of the value of an updated National Hydrography Dataset which could be used to inform politicians of hazards due to flooding. When life and property are on the line, timely and accurate data is vital to decision makers. With enhanced statewide elevation data available this will help decision makers.

Program: Alabama Department of Economic and Community Affairs - GIS Dept.	**Business Use:** 27. Telecommunications

	Broadband Mapping:
	Estimated Annual Operational Benefits: Major; $120,000
	Having a dynamic 3-Dimensional model can prove to be a safety, time and cost saving benefit. The model allows for a multifaceted analysis option where problems and solutions can be discovered and remedied in a quick and efficient manner.
	Estimated Annual Customer Service Benefits: Major; $50,000
	The integration of technologies such as LiDAR and 3-Dimensional computer analysis has proven to be an effective way to complete comprehensive asset evaluations. LiDAR surveys can be conducted in a fraction of the time of a conventional survey. The data gathered is considerably more comprehensive which allows the user to create dynamic 3-dimensional computer models. These studies form an integral part of a complete asset management program.
	Estimated Strategic Benefits: Major
Quality Level: (1 2 3 4 5)	Policy makers can make better informed decisions when current and accurate geospatial datasets are available.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, would allow to model locations of towers in adjoining states.	

Local Functional Activities

City Government -- City Of Huntsville	
Program: New Shelby County DFIRMS	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $125,000
	Contours, orthophotos and change detection
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $25,000
	N/A Contours, Orthophoto's and change detection on demand
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	N/A Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefitts, Strategic/political benefits and other etc...

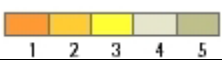| **County Government** -- Mobile County	
Program: Urban Development - Mobile, AL	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Plane Management	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided
	No costly field surveys required. Data is openly distributed which encourages development. Cost sharing to improve budget strain
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; Not Provided
	N/A Contours, Orthophoto's and change detection on demand
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefitts, Strategic/political benefits and other etc...

County Government -- Montgomery County	
Program: New Montgomery County DFIRMS	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided No costly field surveys required. Data is openly distributed which encourages development. Cost sharing to improve budget strain.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; Not Provided N/A Contours, Orthophoto's and change detection on demand
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	N/A Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefitts, Strategic/political benefits and other etc...

County Government -- Shelby County Commission	
Program: New Shelby County DFIRMS	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

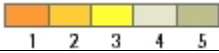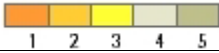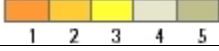|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $125,000 Contours, orthophotos and change detection
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $25,000 N/A Contours, Orthophoto's and change detection on demand
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	N/A Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefitts, Strategic/political benefits and other etc...

Alaska (AK)

The State of Alaska has very little existing high quality geospatial data. Alaska lacks a statewide elevation dataset of any kind. Alaska does not have state wide imagery in a consistent useable resolution and quality standard. In short, Alaska lacks the basic geospatial infrastructure that is considered to be essential for the rest of the United States. A consistent state wide digital elevation model (DEM) based on quality level 5 IFSAR data is required to serve as a foundation for building a useable set of geospatial data upon. The accuracy and utility of imagery, transportation, hydrography, and other geospatial data will be greatly increased by the creation of a statewide DEM.

State Functional Activities

Program: Aviation Safety / Arctic Ports and Harbors	**Business Use:** 20. Aviation Navigation and Safety
	Aviation Safety, Ports / Harbors and Synthetic Vision for Terrain Navigation:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The creation of three dimension (3D) flyable terrain models with poor elevation data is time consuming and voids must be filled with best guess. Recognizable terrain features in low resolution data sets are not pronounced which is critical in teaching pilots terrain recognition/situational awareness. Incockpit maps are highly unreliable and pose a very serious danger to those who use them in Alaska. Three dimension flyable dataset for use in aviation simulators are faithful to terrain and an incockpit map could save a significant amount of lives each year by blunting the number of CFIT (Controlled Flight Into Terrain) fatalities each year. If half the CFIT fatalities were eliminated over the past ten years the cost saving in terms of lives would exceed $100 million (Federal Aviation Administration (FAA) values a human life at $2 million).
	Estimated Annual Customer Service Benefits: Major; $10,000,000 The creation of 3D flyable terrain models with poor elevation data is time consuming and voids must be filled with best guess. Recognizable terrain features in low resolution data sets are not pronounced which is critical in teaching pilots terrain recognition/situational awareness. Incockpit maps are highly unreliable and pose a very serious danger to those who use them in Alaska. Three dimension flyable dataset for use in aviation simulators are faithful to terrain and an incockpit map could save a significant amount of lives each year by blunting the number of CFIT (Controlled Flight Into Terrain) fatalities each year. If half the CFIT fatalities were eliminated over the past ten years the cost saving in terms of lives would exceed $100 million (FAA values a human life at $2 million).
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major; Terrain familiarization and situational awareness improves dramatically saving lives. Having faithful and complete elevation data saves time in creation of the datasets. Improved mapping correlates to an accurate moving map in the cockpit which will save many lives. Products perform a function but are not as true to terrain as needed and data voids require a lot of time to correct. The Alaska National Elevation Dataset has demonstrated errors in excess of 300 meters and it cannot be relied upon for safe navigation.
Update Frequency: > 10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Program: **National** Flood Insurance Program and Flood Mitigation Assistance Grant Programs	**Business Use:** 14. Flood Risk Management
	Hydrologic and Hydraulic Modeling to Produce Flood Insurance Rate Maps: Secondary and tertiary functional activities all are related to the flood risk section, from that comes insurance, building codes, regulatory, compliance, risk reduction, mitigation and preparedness. If the state cannot portray correctly the flood risk, within a reasonable error tolerance factor, the ability for the public to accept that risk is diminished. Then their ability to determine their risk tolerance is limited and largely their willingness to act in advance of the next flood is reduced.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Refinement of data leading to flood risk reduction decisions on infrastructure development, flood disaster and recovery response, and flood mitigation efforts. Federal Emergency Management Agency (FEMA) is responsible to communities in the National Flood Insurance Program (NFIP) to produce hydrology and hydraulic studies. The studies produce new or revised Flood Insurance Studies (FIS) and Flood Insurance Rate Map (FIRM). Enhanced topographic information would facilitate the production of these products in a timely (expedited) manner.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Refinement of data leading to flood risk reduction decisions on infrastructure development, flood disaster and recovery response, and flood mitigation efforts. FEMA is responsible to communities in the NFIP to produce hydrology and hydraulic studies. The studies produce new or revised FIS and FIRM. Enhanced topographic information would facilitate the production of these products in a timely (expedited) manner.
Quality Level:	**Estimated Strategic Benefits:** Major; The public has a high standard for flood risk information, when purchasing a home. They do not understand the complexities of producing flood studies. Tolerance for incorrect information is being tested in an environment of enhanced technological advances. Alaskan residents would have a flood risk picture that is realistic and valid. Reliability of the products and immediate resolution of discrepancies would result from refined information and appropriate topographic information.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: no	

Program: Determine potential for metals, minerals, fuels, and geothermal resources; locations/supplies of construction material; and geologic hazards to infrastructure.	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic Mapping:
	Estimated Annual Operational Benefits: Major; $100,000
	Time savings equals money savings to assess areas of high-interest infrastructure for geology/hazards. Mission compliance facilitated. Having data available for use instead of having to contract and oversee the collection and provide data dissemination infrastructure ourselves would be a huge time and cost savings. Would greatly facilitate mission compliance by allowing Alaska to work in high-interest areas under short notice in response to immediate needs instead of experiencing delays due to the need to collect the elevation data first. Less likely to have to redo maps later because the base data will be better quality than currently exists.
	Estimated Annual Customer Service Benefits: Major; $100,000
	Time savings equals money savings to assess areas of high-interest infrastructure for geology/hazards. Mission compliance facilitated. Having data available for use instead of having to contract and oversee the collection and provide data dissemination infrastructure ourselves would be a huge time and cost savings. Would greatly facilitate mission compliance by allowing the state to work in high-interest areas under short notice in response to immediate needs instead of experiencing delays due to the need to collect the elevation data first. Less likely to have to redo maps later because the base data will be better quality than currently exists.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Major;
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	Having this data provided to Alaska rather than the state producing it will greatly enhance efficiency and work flow. Additional projects would be able to benefit from the data and enhance their output because the information would be readily available statewide instead of limited focus areas. Products are of higher quality, greater accuracy, and more utility for customers. Allow the state to provide services not previously possible (for example, elevation-derived analysis and products). Product timeliness is improved because data are high quality and facilitate more efficient analysis.
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Program: Urban planning, Transportation, Agriculture, Recreation, Energy, and Forestry	Business Use: Natural Resources Conservation

	Environmental Change, Impact Monitoring and Adaptation:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	Benefits Description Not Provided.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Benefits Description Not Provided.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Don't Know
Update Frequency: 4-5 years	Benefits Description Not Provided.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: University Research	Business Use: 25. Education K-12 and Beyond
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Environmental, Social and Economic Research:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported High quality digital elevation data critical to in-situ and remote sensing efforts in many areas of research from coupled climate modeling, climate adaptation strategies, wildlife habitat research, permafrost research, fresh water ecosystem analysis, hazard mapping, resource assessment and energy systems research. Better and current base line data at an appropriate scale for ecosystem scale analysis. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported High quality digital elevation data critical to in-situ and remote sensing efforts in many areas of research from coupled climate modeling, climate adaptation strategies, wildlife habitat research, permafrost research, fresh water ecosystem analysis, hazard mapping, resource assessment and energy systems research. Better and current base line data at an appropriate scale for ecosystem scale analysis. **Estimated Strategic Benefits:** Major; Better accuracy and the public availability of the data will benefit the public and private sectors. Great public benefit.

Local Functional Activities

Regional Government -- Kenai Peninsula Borough	
Program: Coastal Zone Management	**Business Use:** 4. Coastal Zone Management
Functional Activity: Control Development In Coastal Zone	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Avoid development in coastal zone that would adversely affect marshlands and bluff erosion.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Elevation data aids development decisions that adversely affect the coastal zone Elevation data aids development decisions that adversely affect the coastal zone
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Avoids costly mistakes developing land along the coast. Avoids costly mistakes developing land along the coast.

Regional Government -- Kenai Peninsula Borough	
Program: Land Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: New Subdivision Design	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Cost to acquire elevation and slope data for each proposed subdivision and road right of way.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Don't know Avoids delays and cost of land survey in order to complete subdivision requirements
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	Better horizontal alignments for new road construction

Regional Government -- Kenai Watershed Forum	
Program: Wetland classification	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Wetland Classification And Hydrological Modeling	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $300,000 LiDAR low resolution allows us to delineate watershed divides in large wetland complexes. Updated data would allow change detection for anthropogenic activities and expanding the area coverage would allow more mapping to be accomplished
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Ability for greater area coverage Hydrologic modeling using regional regression curves is very poor. Accurate watershed delinations assist in flow prediction
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Greater area covered Flood plain mapping for enhanced hazard mapping

Tribal Functional Activities

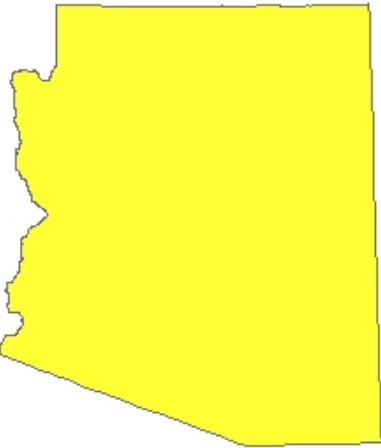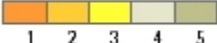| Alaska Village Initiatives	
Program: Alaska Carbon Exchange, Private Lands Wildlife Management, Tribal Conservation Districts	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Cultural Preservation, Wildlife Habitat Manaement, Economic Development, Natural Resource Conservation	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $5,000,000 Minimal benefits now as this data is non-existent or largely inaccessible. New data will allow informed decisions - business and socio-political decisions require information not currently available. Conservation and development decisions will be based on accurate data.
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Provided Substantial improvement in the conservation services provided, and particularly with the end customer as accurate data will be available to improve the conservation need and impact of programs. Sufficient data not available.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Having appropriate data will greatly improve management of resources and provide for decision making on a level not currently possible. Resource management on public and private lands will benefit from accurate data, and costs for programs and projects will decrease substantially. As data is not not currently sufficient, no beneifts are being provided from the quality level.

Arizona (AZ)

The State of Arizona has a variety of requirements for higher quality elevation data. Hazards identification and mitigation is a high priority area of applications in the State where improved elevation data would have value. This includes the Department of Water Resources' (DWR) Dam Safety program and the Arizona Geological Survey's ability to more effectively identify potential seismic hazards. A number of the requirements fall into a broad category of water applications: DWR needs better elevation data to improve groundwater modeling and land subsidence monitoring; the Department of Game and Fish needs better data on stream channel characteristics for fish habitat related work. The Department of Environmental Quality's water quality modeling and assessment activities would be enhanced with better elevation data. Other applications in the State where improved elevation would have a benefit include habitat inventory and improvement, geologic mapping, air quality monitoring, and transportation planning. In addition, there are some important homeland security/law enforcement related requirements in Arizona that were not captured during the questionnaire process. These include plume modeling and tactical applications for 3-dimensional urban and rural landscapes.
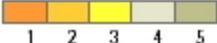
State Functional Activities

Program: Statewide Groundwater Modeling	**Business Use:** 2. Water Supply and Quality
	Groundwater Monitoring: More accurate elevation data will allow the Department of Water Resources to establish more accurate elevations for groundwater wells, resulting in improved depth-to-groundwater values and groundwater elevations. This improved data would help in providing higher quality data to be used by the public and the Department's stakeholders in various types of hydrological and geological projects.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Having access to a more accurate digital elevation model would allow the Department to establish more accurate elevations for groundwater wells, resulting in improved depth-to-groundwater values and groundwater elevations.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Customer service will be enhanced through access to more accurate information for various types of hydrological and geological projects.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major; More timely and accurate information will be available to the public.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Water Quality Division	**Business Use:** 2. Water Supply and Quality

	Water Quality - Modeling, Assessment, and Permitting: Higher quality elevation data will improve understanding of surface water dynamics (flow, catchments, etc.) that will assist in the assessment of actual and potential water quality issues.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported More accurate data can improve understanding, analysis, results, and decision making based on solid information.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Customer service will be enhanced through access to more accurate information.
	Estimated Strategic Benefits: Moderate; More timely and accurate information will be available to the public.
Quality Level: 1 2 3 4 5	
Update Frequency: > 10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Geologic and Economic Resources, and Environmental Geology	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic Mapping and Analysis: LiDAR data will allow the Arizona Geological Survey to more accurately create geologic maps, assess seismic, debris flow/landslide, and other geologic hazards, and to better assist the public and other state agencies. LiDAR will be particularly helpful to understand the geomorphic relationships of surfaces in areas of low relief and to assess hazards from Quaternary faults.
	Estimated Annual Operational Benefits: Moderate; $30,000 QL2 LiDAR will allow Arizona Geological Survey (AZGS) to more accurately map the geology and geomorphology of the state, conduct seismic hazard studies, and to assess and provide mitigation information for other geologic hazards such as floods and debris flows.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported LiDAR data will allow AZGS to provide better technical advice and assistance in geology to the public and state and local government agencies.
	Estimated Strategic Benefits: Moderate; More accurate geologic maps and hazard assessment will provide the public and local and state agencies with better information regarding geologic resources and hazards in the state.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Statewide Dam Safety Program	Business Use: 14. Flood Risk Management
Quality Level: 1 2 3 4 5	**Flood Risk Mapping:** Having the data available will greatly improve the State's ability to assist dam owners and local communities in developing accurate flood hazard mapping for emergency action planning. There would be a direct impact on public safety and flood hazard risk reduction through the development of dam failure inundation mapping for emergency action planning and preparedness.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Having the data available will greatly improve the State's ability to assist dam owners and local communities in developing accurate flood hazard mapping for emergency action planning.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Provide dam failure inundation mapping service to dam owners and local communities.
	Estimated Strategic Benefits: Major; There would be a direct impact on public safety and flood hazard risk reduction through the development of dam failure inundation mapping for emergency action planning and preparedness.
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	
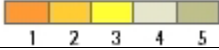
Program: Land Subsidence Monitoring Program	Business Use: 15. Sea Level Rise and Subsidence
Quality Level: 1 2 3 4 5	**Land Subsidence Monitoring:** The Department of Water Resources uses X-band InSAR data in conjunction with 1- and 3-meter digital elevation models (DEMs) to monitor land subsidence. LiDAR data would provide a higher quality DEM that would allow the Department to better utilize the X-band InSAR in monitoring efforts.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The Department currently uses X-band InSAR data along with 10- or 30-meter DEM data to monitor land subsidence. Having higher quality elevation data available, such as a 2-ft DEM, would result in better utilization of the InSAR and more accurate subsidence data.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported A higher quality DEM would allow the Department to provide improved land subsidence products to its stake holders and provide deformation data that would be used by engineers, hydrologists, geologists, land planners, surveyors, geographic information system professionals, etc.
	Estimated Strategic Benefits: Major; Higher quality land subsidence products would be available to the public.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Road Centerline management and Highway Performance Monitoring System	**Business Use:** 22. Urban and Regional Planning

	Transportation Planning: Higher quality elevation data will improve road grade reporting accuracy, aid road safety assessments, and enhance road design efforts.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Improved elevation data would provide better profile representation of roadway data.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Providing customers with more and better data for decision making.
	Estimated Strategic Benefits: Moderate; More timely and accurate information will be available to the public.
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Fisheries	**Business Use:** 2. Water Supply and Quality

	Stream Channel Analysis and Mapping: LiDAR data will provide much more precise and complete stream channel characteristics for use in supporting fish habitat identification, restoration and improvement.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported More accurate information on existing or potential fish habitat. Better data to support habitat restoration and improvement.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More effective interagency planning, improvement, and restoration efforts.
	Estimated Strategic Benefits: Moderate; Potential for increased or improved access to fisheries.
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Air Quality Division	**Business Use:** 23. Health and Human Services
Quality Level: [scale 1 2 3 4 5]	**Air Quality Modeling - Pollution Issues:** The Air Quality Division currently uses existing 10- and 30-meter digital elevation model data to support air modeling analysis. More accurate and current elevation data would improve modeling and enhance the reliability of analysis.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported More accurate data can improve understanding, analysis, results, and decision making based on solid information.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Customer service will be enhanced through access to more accurate information.
	Estimated Strategic Benefits: Moderate; More timely and accurate information will be available to the public.

Update Frequency: > 10 years
Bathymetric Data: No
Tide-Coordinated: No
Data Outside State Needed: Not Provided

Program: Habitat Evaluation and Protection	**Business Use:** 7. Wildlife and Habitat Management
Quality Level: [scale 1 2 3 4 5]	**Habitat Inventory, Improvement, and Restoration:** High quality elevation data will help Game and Fish make more accurate assessments of site characteristics for habitat inventories, improve the ability to identify potential habitat, and more effectively plan improvement and restoration efforts.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Better models, more accurate assessments of site characteristics, better ability to identify potential habitat or make improvements.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More effective interagency planning, improvement, and restoration efforts.
	Estimated Strategic Benefits: Moderate; Will improve conservation, enhancement, and restoration of Arizona's wildlife resources and habitats and provide wildlife resources for the enjoyment, appreciation, and use by present and future generations.

Update Frequency: 4-5 years
Bathymetric Data: Yes
Tide-Coordinated: No
Data Outside State Needed: Not Provided

Program: Dam Safety	Business Use: 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**Inventory and Maintenance of Dams:** Game and Fish is responsible for many reservoirs in Arizona, many of which are small isolated features. LiDAR data has the potential to improve their inventory of dam related features while reducing field work and travel costs for inventory efforts. It also has the potential to help make dam maintenance programs more efficient and effective and therefore enhance dam safety.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Reduced field work and travel costs, improved inventory of facilities.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Potential for a more effective and efficient maintenance program.
	Estimated Strategic Benefits: Moderate; Improved dam safety.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

County Government -- Pima	
Program: FEMA Map Modernazation, and local floodplain studies.	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping And Analysis	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Having the ability to accurately model flood hazard zones at the local level, using locally accurate elevation data. Having the ability to map areas that are not mapped by FEMA, and to supplement the FEMA floodplain data with localized mapping and analysis.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Improved visualization, e.g. 3D, localized mapping and analysis. The ability to map previously unmapped areas, and improve subsidence monitoring.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Better data, e.g. more accurate, better visualization through our online mapping systems, e.g. hillshades, better data and visualization for policy decisions.

County Government -- Pima	
Program: Roadway design, and drainage analysis.	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Road Infrastructure	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Ability to more accurately evaluate design, construction, and maintenance in 3D. More accurate and effective analysis of drainage. Ability to evaluate temporal changes.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Providing customers with more and better data for decision making.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Ability to provide more detailed views of proposed roadway designs, and construction impacts.

Arkansas (AR)

Over the last few years the State of Arkansas has seen a significant increase in LiDAR activity due to the availability of Federal funding. With the increasing awareness of the value and benefits of LiDAR, there has become a growing interest in LiDAR acquisition. However, it is unobtainable in most cases due to the lack of funding availability.

In 2010 Arkansas completed a State Strategic Business Plan which included input from state and local stakeholders. Elevation was discussed at all workshops and identified as a high level data theme; however it ranked below recurring orthophotos, statewide parcel data, political and administrative boundaries and roads data. The business plan was focused toward obtaining and maintaining sustainable funding for framework data layers from state legislators. With that being the case, a statewide LiDAR dataset would have been unattainable in the current economic environment.

The main LiDAR requirement for counties is to support urban development and flood risk mapping. The state agency requirements include flood risk management, recreation, river and stream resource management, public safety and natural resource conservation.
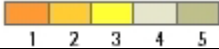
There have been numerous LiDAR projects over the past several years, covering a small portion of the state. The majority of recent projects were small in geographic area with the exception of the federally funded acquisitions that focused on entire drainage basins. However, this still leaves the majority of the state with inadequate elevation data to support critical needs. For example, the necessity for high resolution elevation data in response to recent flood events.
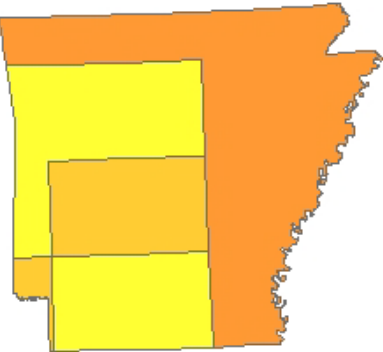
State Functional Activities

Program: Wildlife Management Waterfowl Program	Business Use: 1. Natural Resources Conservation
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Modeling of Biological and Ecological Systems:** **Estimated Annual Operational Benefits:** Major; $250,000 Time and Resource savings. Enhanced ability to more accurately model the biological and ecological systems. Improved planning on green tree reservoirs, most soil units and hydrologic and habitat impacts of flooding. **Estimated Annual Customer Service Benefits:** Major; $250,000 This is more of a value added benefit and it is hard to place a true dollar amount on it. **Estimated Strategic Benefits:** Major; Flood risk models and mapping would be enhanced. Regulations could be validated as appropriate.

Program: **National** Hydrography Dataset and Stream Bank Assessment Programs	Business Use: 3. River and Stream Resource Management
Quality Level: [scale 1 2 3 4 5, level 3 highlighted yellow] **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, should extend to the hydrologic unit boundary.	**Stream Channel and Stream Bank Analysis:** **Estimated Annual Operational Benefits:** Major; $100,000 If the entire state of Arkansas were able to receive LiDAR, the program's mapping efforts would be more efficient. The LiDAR data would help to better see the features that need studying. **Estimated Annual Customer Service Benefits:** Major; $100,000 This is more of a value added benefit and it is hard to place a true dollar amount on it. **Estimated Strategic Benefits:** Major Again, the same benefits would be in place here, just more efficiently.

Program: Fisheries Management Program	Business Use: 3. River and Stream Resource Management
Quality Level: [scale 1 2 3 4 5, level 2 highlighted orange] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Lakes and Rivers Habitat Management:** **Estimated Annual Operational Benefits:** Major; $50,000 A more comprehensive overview of water resources would be obtainable. Habitat management would be improved, stream bank stabilization could be identified statewide, and planning at watershed level could be achieved. Flood risk modeling and planning. Water control structure planning based on hydrology. **Estimated Annual Customer Service Benefits:** Major; $50,000 Angler maps could be created for all lakes which could result in increased traffic and revenue. Time savings on production of products would be increased. Habitat improvements would result in better experience on lakes and rivers for public. **Estimated Strategic Benefits:** Major; Map publications which could include underwater hazards, habitat planning at watershed level, response to point and non-point source pollutants, identification of critical stream bank stabilization areas. Science based regulations. Flood prone regulations and flood inundation predictions.

Program: Education and Information Program	**Business Use:** 26. Recreation
	Mapping and Guides:
	Estimated Annual Operational Benefits: Major; $50,000 Ability to produce water trail maps with water depth. Ability to produce WMA and lake maps with elevation and/or bathymetric data included.
	Estimated Annual Customer Service Benefits: Major; $50,000 Quality of products will improve with inclusion of additional features, which should improve customer experience significantly. Time savings will be realized by data being readily available as opposed to collecting on the ground.
	Estimated Strategic Benefits: Major; Lake maps which will include bathymetric data will be a new product. Strategic planning and policy decisions can be made where elevation is a factor. The agency is building additional mobility impaired trails. Elevation data is critical to these types of trails.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Enforcement Disaster Response Program	**Business Use:** 14. Flood Risk Management
	Flood Inundation Mapping:
	Estimated Annual Operational Benefits: Major; $25,000 This could potentially enhance the ability for emergency response during flooding events and therefore save lives and resources.
	Estimated Annual Customer Service Benefits: Major; $25,000 This is more of a value added benefit and it is hard to place a true dollar amount on it.
	Estimated Strategic Benefits: Major Flood risk models and mapping would be enhanced.
Quality Level: 1 2 3 4 5	
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes, should extend to watershed boundary.	

Local Functional Activities

County Government -- Benton County	
Program: Urban development	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Land Development And Flood Risk Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $5,000 Eliminated field work for preliminary design data collection. Allows users to quality control GPS elevation values from their desktop. Allows for vertical profiles to be run for line of sight analysis. Allows for material estimates to be done for laying new pipe, or road survaces to use the z value of the terrain. Allows for more accurate water pressure calculations from points of service. Will allow for better ortho photo rectification, better hydraulic modleing, line of sight can take into account buildings and other surface features. Allows for high resolution visualization of small drainage features when mapping storm water assets. Allows for more precise excavation volumne calculations when locating new tanks, etc.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Give more accurate information, but very hard to place a dollar value on?
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	More accurate information.

Regional Government -- Northwest Arkansas Or Benton And Washington Counties	
Program: Not Provided	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Data For All Local, State And Federal Needs Including Transportion, Flood Risk Mapping, Stormwater, Stream Flow, Emergency Response, Etc.	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

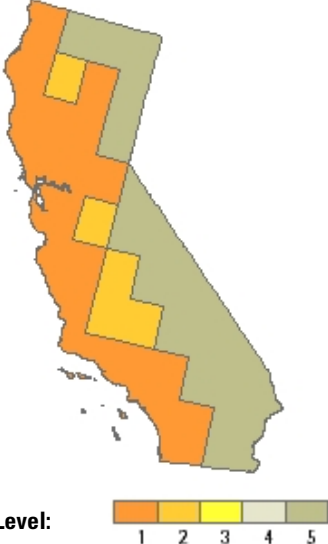| Regional Government -- Pulaski Area Geographic Information System	
Program: Pulaski Area Georaphic Information System Consortium	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Land Development Preliminary Design	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Eliminated field work for preliminary design data collection. Allows users to quality control GPS elevation values from their desktop. Allows for vertical profiles to be run for line of sight analysis. Allows for material estimates to be done for laying new pipe, or road survaces to use the z value of the terrain. Allows for more accurate water pressure calculations from points of service. Allows for better ortho photo rectification, better hydraulic modleing, line of sight can take into account buildings and other surface features. Allows for high resolution visualization of small drainage features when mapping storm water assets. Allows for more precise excavation volumne calculations when locating new tanks, etc.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Give more accurate information
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	More accurate information

California (CA)

The state of California needs a variety elevation products at different quality levels, generally coincident with several major land uses/covers, to serve a number of functional areas. The California coastal zone was seen to have the need for the highest level of data - quality level 1. This is due to an ever changing coastline, climate change, large urban populations, geological hazards, infrastructure concentration, and a wide variety of habitat and land cover to analyze. Related functional areas include flood risk mapping, climate change adaptation and modeling, urban and regional planning, and habitat inundation and restoration. The next level of quality concerns the California Central Valley which needs quality level 2. The Central Valley is a very flat area with little relief that is subject to both flooding and subsidence, and land use changes that can alter the terrain. Thus a higher level of data is needed. Functional areas include flood risk mapping and assessment, urban and regional planning, wetland mapping, habitat assessment, hydrography mapping, and sea level rise modeling (some parts of the Central Valley are considered coastal). Quality level 3 data was recommended for the remainder of the state, conforming to the scrub and woodlands along with the desert land covers. Between the vegetated (scrub and forest) and desert regions, the vegetated lands were judged to have a greater need for higher resolution elevation data. However, there were enough general statewide functional areas such as regional planning and infrastructure, along with an increased importance on renewable energy development and utilities to warrant quality level 3 data for the arid regions. The scrub and forested portions of the state support numerous functional areas such as fire hazard assessment and investigation, vegetation and forest mapping, and canopy structure and modeling. Regardless of area, state agencies frequently work in these functional areas with the cooperation and coordination of municipal, local, and regional organizations.

Several major points concerning use of elevation data, beyond the general elevation need described above need to be noted. These include (1) elevation data used for modeling and sampling, (2) the need for rapid data production when required, (3) the benefits of collecting high quality imagery with LiDAR, and (4) the continued use of photogrammetry for detailed infrastructure planning.

For general forest mapping and canopy modeling, a moderate elevation quality level is required. However, there is a need for obtaining data samples at a higher quality level to aid in model building. When and where the samples are needed cannot be shown in the study but this occasional need for small areas of higher quality data needs to be noted. Plus the planned use of elevation data for modeling purposes rather than just mapping needs to be documented.
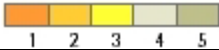
State agencies also need a means to gather elevation data rapidly in case of an emergency or for site specific applications. These datasets may have a higher unit cost or a rapid turnaround time but the need is present. California Department of Transportation expressed the value of collecting imagery in conjunction with elevation so that a better record of ground features can be seen, especially in gathering higher quality elevation data. The agency will also continue to use photogrammetric methods for elevation data gathering in support of infrastructure projects even if the highest quality level of elevation data becomes available. The need for photogrammetrically generated elevation data and its specialized application need to be taken into account.
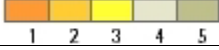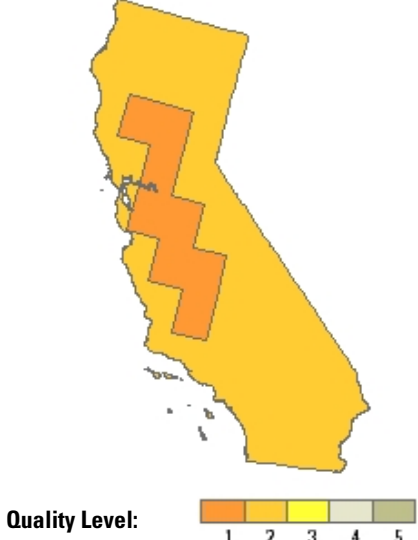
State Functional Activities

Program: Coastal Planning; Delta Levees; Agriculture and Precision Farming	**Business Use:** 14. Flood Risk Management
  Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Flood Risk Mapping And Flood Assessment:** Primary flood risk mapping activities that require elevation data or for which better elevation data would improve functional activities: (1) Identification of low lying areas vulnerable to sea level rise; (2) Information about the hydrological processes that occur at a regional scale; (3) Characterization of existing shoreline protection devices which will further assist with climate change adaptation planning; and (4) assessment of levees in terms of the $85 million figure reflects only the Central Valley flood risk mapping. Does not reflect program costs for coastal flooding assessment and risk mapping. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improved operational mapping and defensible science-based decision making for planning purposes, monitoring, restoration, and protection. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Improved transparency, improved public safety, improved emergency response time, improved water availability and quality. **Estimated Strategic Benefits:** Major; Improved preservation of life and property.
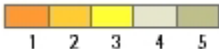
Program: Cost Recovery; Fire protection	**Business Use:** 16. Wildfire Management, Planning, and Response
  Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, buffer outside to 8-digit HUC watershed boundary.	**Fire Response, Fire Behavior Modeling, Post Fire Damage Assessment and Litigation:** Primary fire-related activities that require elevation data or for which better elevation data would improve functional activities are grouped into 3 categories: (1) Preburn statewide Quality Level (QL) 5: used for assessment in most areas in California (excluding the Central Valley and SE deserts); (2) Preburn statewide QL3: used for determining canopy, vegetation structure, developing fire behavior models (excluding the Central Valley and SE deserts); and (3) Postburn QL1: used for structure and habitat damage assessment, remediation by response teams, litigation and cost recovery, identifying slopes likely to experience landslide or debris flows State CalFire makes use of 1 meter digital elevation data for most of the fire work currently done in the state. Event-driven collection is critical for subsequent possible loss of life and property due to landslides and debris flows in burned areas, and also for litigation/cost recovery purposes. **Estimated Annual Operational Benefits:** Major; $16,000,000 Increased successful litigation; improved postfire vulnerability assessment (landslides and debris flows) to minimize loss of life and property; **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Likely increased protection of life and property. **Estimated Strategic Benefits:** Major; Benefits Description Not Provided.

308

Program: Ecosystem Assessment and Evaluation; Ecosystem Conservation; Coastal Planning; and Fire and Resource Assessment	Business Use: 4. Coastal Zone Management

	Coastal Planning and Resource Management; Sea Level Fluctuation; Climate Change Adaption; Habitat Assessment and Purchase; Impacts on Oceans: Primary coastal-related activities that require elevation data or for which better elevation data would improve functional activities include: (1) Monitoring of Marine Protected Areas; (2) Improved models for climate change variability; (3) Characterization of shoreline protection devices which assist with climate change adaption planning; (4) Improved models for tsunami behavior upon coastlines; (5) Improved storm and tsunami readiness; (6) Improved sediment movement modeling; (7) Management of forest watersheds within coastal zones; (8) Planning for restoration projects and fish passage improvement (coastal stream, beach, water diversions, etc.); (9) Revision of wetland inventory maps; and (10) Mosquito abatement programs. Some of the work identified within the coastal-focused functional activities is performed for benefit of and jointly with local coastal counties and communities, so this functional area needs further expansion into more specific local functional activities.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported High quality elevation data will result in more defensible sea level rise estimates and better planning decisions for coastal communities. State agencies such as the Ocean Protection Council and Coastal Conservancy have mission critical need to provide the best scientifically based scenarios for impacts along the coast.
Quality Level: 1 2 3 4 5	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Improved access to tailored information products is a key ideal for the future. Improved access to public beaches and trails.
Update Frequency: 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Estimated Strategic Benefits:** Major; These data are needed to fuel the science, and the science in turn will help to more effectively inform the public. The state is currently working off so many rough estimations of sea level rise (SLR) that politically as well as socially the process has ultimately been a disservice. More defensible science needs to be part of the SLR story, as well as tools needed for effective planning/decision support would be provided to local governments.

Program: Highway Design; Hydraulics; State Transportation	Business Use: 21. Infrastructure and Construction Management

<table>
<tr><td rowspan="5">

Quality Level:

1 2 3 4 5

Update Frequency: 2-3 years
Bathymetric Data: Yes
Tide-Coordinated: Yes

Data Outside State Needed: No
</td>
<td>**Roadway, Culvert, and Bridge Design; Hydrologic Modeling; Intra-, Interstate, and Regional Transportation Modeling and Planning:** Primary infrastructure-related activities that require elevation data or for which better elevation data would improve functional activities include: (1) Road design and engineering; (2) Hydraulic modeling for better design of structures (bridges and culverts) to accommodate runoff and flooding from big rain events; (3) Assessment of effects of sea level rise on California's infrastructure; (4) Assessment of climate-induced ecological effects of fire, heat, and hydrologic changes; (5) Assessment of public health effects of altered hydrology, inundation, and heat; and (6) Transportation planning (highway, transit, high-speed rail, rail, air). Work contained in this functional area reflects preliminary findings for regional and local functional activities and will be further expanded to include regional, county, and urban jointly performed functions. This functional area also needs further development for public utilities, telecommunications, alternative energy deployment, high speed rail initiatives, and other areas of state work.</td></tr>
<tr><td>**Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported
Having data available for the entire district would reduce or eliminate the need to acquire and pay for such data on a project by project basis. Better hydraulic modeling.</td></tr>
<tr><td>**Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported
Having elevation data available would minimally improve the ability to do pre-design work, and to design projects somewhat more quickly.</td></tr>
<tr><td>**Estimated Strategic Benefits:** Moderate;
A statewide elevation dataset would facilitate communication and interoperability between State, Regional, and local Transportation Organizations. This will result in time and cost savings in project planning, approval and delivery. Working from a shared common elevation dataset will foster cooperation at all levels of government. It will allow for consistent decision making resulting in cohesive implementation in the areas of hydrology, stormwater runoff, sea level rise / climate change, and solar policy. It will facilitate enhanced educational opportunities in K-12 and higher geospatial sciences.</td></tr>
</table>

Program: California Land Cover Mapping and Monitoring Program	Business Use: 5. Forest Resources Management

<table>
<tr><td rowspan="4">

Quality Level:

1 2 3 4 5

Update Frequency: 4-5 years
Bathymetric Data: No
Tide-Coordinated: No
Data Outside State Needed: Yes, cover watersheds extending beyond state boundary.
</td>
<td>**Forest mapping and vegetation assessment:** Vegetation Composition and Structure Mapping, forest mapping, and habitat assessment.
Activities revolve around updating various vegetation mapping extents - which in turn are used to assess habitat, wildlife, and forest cover and fuel loads. Vegetation mapping is strongly tied to land use/land cover mapping (such as National Land Cover Database) so that land cover change data could be used to guide where detailed vegetation and habitat analysis should be performed.</td></tr>
<tr><td>**Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported
Detailed information on canopy is critical though forest and veg mapping covers large areas and highest point cloud densities not necessary.</td></tr>
<tr><td>**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported
Pared down cloud could help a lot for improving quality of vegetation structure mapping. Good vertical range of canopy structure is more important that digital elevation data density.</td></tr>
<tr><td>**Estimated Strategic Benefits:** Major;
Public safety benefit of improved veg structure maps for fire threat could be major. Mapping of late seral/old growth might also be improved for environmental benefits. One near-future application is carbon credit modeling, where details on vegetation mass and location will be critical.</td></tr>
</table>

Program: Fish Passage Improvement; Delta Habitat And Conservation/Conveyance Plan; Bay-Delta Conservation Plan; FloodSAFE	**Business Use:** 3. River and Stream Resource Management

	Inland Water Mapping And Stewardship: This functional area concerns general hydrographic and watershed mapping. Coastal and near-coastal hydrographies are in separate functional areas. General hydrographic mapping includes stewardship of National Hydrography Dataset which is being performed by several organizations now, with more likely to join the effort. Support watershed assessments and evaluate resource management issues in riparian areas.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Elevation data already needed for watershed and hydrography work. New data will benefit watershed delineation and also location of hydrography for mapping.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Enhanced elevation data would be available to stewardship organizations at state and local levels updating National Hydrography Dataset (NHD). Elevation very useful as accompanying dataset in determining changes to hydro.
Quality Level:	**Estimated Strategic Benefits:** Major; LiDAR would benefit the generation of NHD linework and other alternative methods for NHD improvement.
Update Frequency: Not Reported	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, need data for watersheds extending into adjacent states and Mexico.	

Program: Seismic Hazards Zonation Program; Regional Geologic Mapping	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

Geologic Mapping: Geologic applications concerning elevation fall into two groups, (1) general geologic mapping as a basemap resource and (2) mapping and modeling of geologic and seismic hazards.

General geologic mapping concerns an ongoing need to generate geologic maps across the state as needed. This also supports related applications such as stream channel analysis, water supply source, erosion control, and coastal mapping (sediments, fluvial migration, and coastal terrace elevations).

Geologic and seismic hazards are primarily concerned with mapping landslides, faults, and regions affected by seismic hazards (liquefaction, earthquake-induced landslides, and tsunami inundation zones). There are also special coastal geologic hazards to consider including beach morphology studies, monitoring bluff erosion rates and probabilities of failure, and coastal fault mapping. Data are used for modeling in addition to mapping feature locations.

One major note regarding geology and elevation data concerns update frequency. While general elevation update frequency varies by application, should a major earthquake occur then new elevation data will be needed as soon as possible to help assess changes to terrain and elevations.

There are a number of geologic map products available in California though many are concentrated where population is greatest and best base map data exist. Enhanced elevation helps make it easier to develop maps as needed throughout the state.

Estimated Annual Operational Benefits: Major; $50,000

For geologic mapping, elevation data provide ability to measure some geomorphic features in office rather than through field surveys which does save some time. It has not been cost-effective to obtain LiDAR data for small project areas and yet a larger amount of money to purchase LiDAR for larger areas has not been available. Geologic project work tends to be focused on relatively small land areas, dispersed across the state, but most often occur near populated areas, forested areas, or state park lands, and is often related to geologic hazards or economic aspects. Improved elevation data will result in higher accuracy of erosion hazard model products.

For geologic and seismic hazard mapping, elevation data in general offer improved accuracy of landslide hazard models, Alquist-Priolo Earthquake Fault Zones, and tsunami inundation zone models. Uniform elevation data leads to increased uniformity of map products. Cleaner elevation data without edge effects would reduce time needed to correct artifacts, but higher resolution data may increase model processing time (net effect unknown). Higher accuracy data would greatly help support the regulatory function of the hazard zone maps. Enhanced elevation also increases uniformity in analysis for slope calculations and base map generation.

Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported

More accurate erosion hazard maps are more useful to customers when making decisions about their property. Enhanced elevation would allow for these maps to be produced wherever needed.

In general, higher accuracy elevation results in greater map accuracy which produces a higher confidence in product. Having a better statewide elevation base may allow state products to better match the base maps in use by different counties.

Estimated Strategic Benefits: Major;

For both general geologic mapping and seismic hazards mapping, elevation allows for more accurate mapping of landslides and other geomorphic features, resulting in an increased level of public safety. Environmental benefits include more effective protection of water sources from sedimentation through more accurate predictive modeling of erosion potential. Enhanced elevation would permit more accurate mapping for project areas across the state. Better products increase inter-agency cooperation through increased appreciation of products from partner agencies.

Enhanced elevation data would make it possible to construct more accurate tsunami hazard zone maps, and construct new maps for areas where they currently don't exist. This would be a great benefit to public safety and to the land use and maritime planning communities. Increased inter-agency cooperation through increased appreciation of products from partner agencies.

Quality Level:
1 2 3 4 5

Update Frequency: 4-5 years

Bathymetric Data: Not Reported

Tide-Coordinated: Not Reported

Data Outside State Needed: Yes, buffer appropriate to mapping faults or other geologic features into adjacent states and Mexico.

Program: Strategic Growth Council Integrated Resource Planning and Decision Support	**Business Use:** 22. Urban and Regional Planning

Quality Level: (scale 1 2 3 4 5) **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Land Use Planning:** The urban and regional planning functional area includes long-term sustainable economic and environmental planning, land use planning, flood risk mapping, and climate change adaptation. In California, particular attention can be paid to the coastal region which combines a coastline that is always affected by environmental and economic change with the large urban population base. A large component of urban and regional planning is based on land use and land cover data and a major input to that is elevation. Changes in elevation, combined with a move to higher accuracy data, can signal changes affected planning decisions, especially along the coast.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported

Elevation data is used to identify low lying areas vulnerable to sea level rise. The data also provides info about the hydrological processes occurring at a regional scale. Improved elevation data is essential for assessing many effects of sea level rise on California's infrastructure, on climate-induced ecological effects of fire, heat, and hydrologic changes, and on public health effects of altered hydrology, inundation, and heat.

Ideally, new data will also characterize existing shoreline protection devices which will further assist with climate change adaptation planning efforts.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported

Ideally, new data will also characterize existing shoreline protection devices which will further assist with climate change adaptation planning.

Estimated Strategic Benefits: Major;

Elevation data is critical in furthering understanding of the coastal zone and its multiple uses. Higher resolution and future elevation data will be critical in improving this understanding and providing more details for coastal change.

Local Functional Activities

County Government -- Los Angeles County	
Program: LA County Enterprise GIS Program	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk And Tsunami Mapping	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided We provide elevation data to programs within the County that use it for analysis. Reduced work in the field by County staff.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Updated information would be useful to expand the analytical capabilities since our existing information is in older formats. We have been able to develop a number of derived products (Raster buildings, Solar Models, tree canopy models) from our existing data.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	More recent information would help. Our elevation data is used for flood modeling, fire fighting, and infrastructure planning

County Government -- Marin	
Program: Community Development Agency (County of Marin); MarinMap (local agency consortium)	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Delineation Of Protected Stream Reaches	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $60,000
	As of 2009, our creek mapping progress was on track to provide fair detail countywide by 2019; Now, using terrain-derived hydrologically enforced flow lines, we reviewing a draft of complete countywide flow lines below mere 1000-square-meter catchments---40,000 km of candidate flow line features in our 1300 square km county. The countywide draft has been prepared for review for about $15,000 in four months, a very significant time savings, and a large improvement in both detail and quality---as a terrain-derived product. To the extent that full-waveform LiDAR might better refine bare-earth surface through moderately dense tree canopy, we should be able to position surface flow line features through important areas that are inaccessible due to private ownership. More accurate and defensible creek locations help us to effectively enforce project setback and review requirements. Accurate creek locations that are not contested could save applicants some project costs related to topographic mapping of project and adjacent parcels.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided
	Project applicants will be able to review online the mapped location of protected creek features in advance of a visit to the planning counter. 1000-square-meter (0.25 acre-) catchments have proved useful to inform analysis of proposed construction projects that might increase mud and debris flow to downhill parcels---not always in a straight line. Being able to predict the affected pathways based on surface flow can help both planning and project notification requirements. By deriving creek locations from modeled surface flow lines that are both parcel-scale precise and accurate, creek setbacks will be consistently enforceable countywide. Field visits will be reduced, and the time required to determine creek setback requirements on projects will be known as soon as the project appears, since they will have been pre-computed countywide.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Urban and rural-area creek maps that are highly detailed and accurate serve to reduce project costs, and also engage public awareness of the creeks in their midst. Whether as urban flood channel, anadromous fish habitat, attractive natural feature, or recreational site, more mapped creek detail leads to more creek interaction and appreciation. Improved runoff calculations from surface flow line modeling are being used by public works engineers to inform storm drain capacity issues. Improved floodplain delineation reduces the burden on local agencies to file LOMA, LOMR, and LOMC with regard to Digital Flood Insurance Rate Maps, because both FEMA and the local agency are sharing a common surface model when estimating inundation extent. More accurate floodplain mapping pleases local agency public works directors and saves local funds.

County Government -- Marin	
Program: Community Development Agency (County of Marin); MarinMap.org (local agency consortium)	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Parcel Slope Analysis	

Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $35,000
	For the specific activity of Parcel Slope, we are able to summarize countywide a parcel average slope (based on contour length), and parcel slope statistics (from the DEM). For each planning occurrence where these data are used, 2 hours of staff time are saved. Improved DEM would provide minor cost savings for parcel slope usage; accurate stream location is a major improvement to mission compliance for creek protections.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided
	For our rural areas, improved (or in many areas, first-time) LiDAR coverage will greatly increase the accuracy of our existing terrain model. The terrain has supported a significantly enhanced topographic base map at 1:1200 scale that is most relevant to the parcel-centric concerns of most applicants for permits at Community Development Agency.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Where new LiDAR data refines our rural areas, accurate delineation of stock ponds, vernal pools, and tidal wetlands will increase our ability to protect natural resources. This is a derivative of terrain that will please both our public and our Board of Supervisors. Local schools are pleased to see their context in detailed topographic mapping, and the public will be realizing the benefits as our new base maps are more widely released. Community planning projects use topo base maps when considering redevelopment areas. Improved emergency planning support pleases our Board of Supervisors.

County Government -- Monterey	
Program: Monterey Peninsula Water Management District - Mitigation Program	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Hydrologic Modeling	

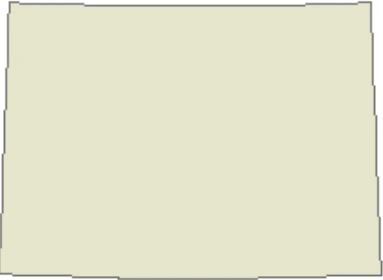|	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided
	Ability to define hydrologic feature and develop a comprehensive surface and sub-surface model. Also useful for planning and natural resource projects
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided
	Don't know This data is being used for our modeling project and provides more relistic predictive forecasts and senario analysis
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Dont know Provides an ability to leverage information with Orthoimagery data collection, watershed analysis and natural resource monitoring.

Colorado (CO)

Elevation data that currently exists for the State of Colorado is used to assess wildfire risk, respond to wildfires, plan post-wildfire strategies, identify geologic hazards to life and property, conduct flood plain mapping, and conduct forest inventories. The existing elevation data has been found to be inaccurate. More accurate or enhanced elevation data exists however this covers a small percentage of the State, individual data sets have different accuracies, and the data are not widely available.
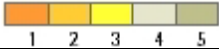
Responses to the survey are a sampling of potential requirements from the State for enhanced elevation data. Overall, State agencies indicated requirements for enhanced elevation data Quality levels of 1, 3, and 4.
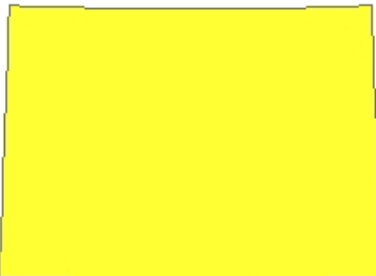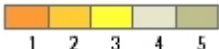
A program for enhanced elevation data would reduce duplication and make data available for stakeholders at a lower cost. A program would also provide a mechanism or leverage capabilities to manage this difficult and resource intensive data acquisition.
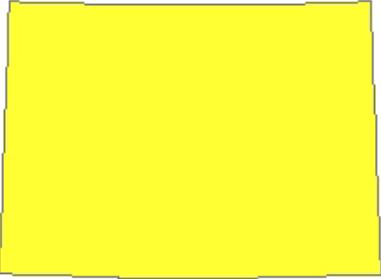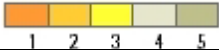
Enhanced elevation data would result in more accurate flood plain mapping, reducing time and expense for forest inventories, new urban forestry analysis, improve wildfire risk assessment for public safety, improve wildfire fuels mitigation, and more cost efficient planning for road construction.
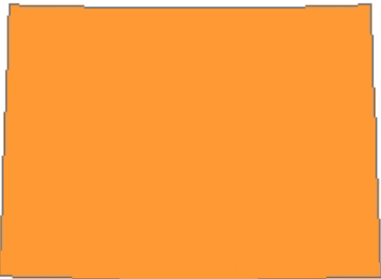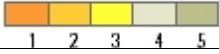
State Functional Activities

Program: Geologic Hazards	**Business Use:** 16. Wildfire Management, Planning, Response
  Quality Level: (1 2 3 4 5) **Update Frequency:** > 10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Post Wildfire Debris Flow Susceptibility:**
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The existence of topographic data and digital elevation models (DEMs) allows digital interpretation of debris flow channels and fans. The imagery exists.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported The data already exists. Topography and DEM are used to rapidly estimate the debris flow susceptibility even during a wildfire burn.
	Estimated Strategic Benefits: Major Data already exists. Being able to rapidly identify structure vulnerability to post-wildfire debris flows provides potential level of safety for structures and people. DEM also helps to plan reseeding efforts. All of this ability helps local governments plan post-wildfire strategies.

Program: STATEMAP	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic Mapping:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Geologic mapping is placed on topographic base. The geologic contacts are draped on a digital elevation model. Digital elevation data are available at 1:24,000 scale for the entire state of Colorado.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Topographic data are currently available for the entire state. The ability to drape geological data on a digital elevation model enables customers to better understand the geological conditions.
Quality Level: (1 2 3 4 5)	**Estimated Strategic Benefits:** Major The level selected already exists. Geologic hazards are able to be identified, thus protecting life and property for the citizenry of Colorado.
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Forest Stewardship and Wildfire Protection	Business Use: 5. Forest Resources Management

	Forestry Tree inventory and Identification; Stand Structure; Vertical Arrangement of Vegetation; Forest Fuels Assessment and Topographic Interpretation: The 30 meter National Elevation Dataset is not accurate in many locations. However, the 10 meter is more accurate but hard to use with a slow personal computer. New LiDAR data would help in forest inventory, urban forestry canopy assessments and wildfire fuels mitigation. Applications would be mostly for a surface model however a nice terrain model that was highly accurate would be beneficial also. In urban forestry or wildfire, the State would potentially be spending money on a grant to acquire or interpret this data regardless. The State might be acquiring this data anyway. If a central agency already acquired it then there might be a substantial savings to the State.
	Estimated Annual Operational Benefits: Moderate; $50,000 Having data that would enhance forest inventory activities would save a lot of time and expense. It would also greatly contribute to the State's understanding of fuel loading and identification. Some if this will probably be addressed in individual grants or projects that are conducted by contractors. As stated above, some fuels assessments and wildfire risk assessments will be conducted with existing data however forest conditions are changing very quickly. So the State needs fresh data. Some of this is addressed with new projects carried out by contractors.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported New benefits might include urban forestry applications where the State traditionally has not done any broad based analysis. The State does tree inventories but those are manual. The State does a lot of outreach with a variety of people and organizations.
Quality Level: (1 2 3 4 5)	**Estimated Strategic Benefits:** Major The potential to rework wildfire risk assessments with better quality and timely data is a critical public safety need. Using this data in urban forestry tree canopy assessments would be a new direction. This would allow the State to simply do its core mission areas better like forest inventory or wildfire risk assessment.
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: FEMA Map modernization now known as Risk Map.	Business Use: 14. Flood Risk Management
	Flood Risk Mapping:
	Estimated Annual Operational Benefits: Moderate; $100,000
	Topography is needed for providing new or updating hydrologic and hydraulic analyses as part of the State's flood mapping program. If the topography is provided, consultants do not have to add it to their scope of work. In addition, the topography would only cover the project area, so it was very limited in order to keep costs down. The projects would be better planned by knowing there is topography in the area of interest. In addition, larger areas could be studied since a large portion of the budget would not have to go towards obtaining topography as part of the project.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Would allow for more accurate water surface elevation to be provided instead of approximate flood zone.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Moderate
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	Local communities would benefit from having the LiDAR data available to them. Homeowner pays $3,000 to $5,000 for survey to determine if their home is in flood zone, instead use elevation data to determine if outside of flood zone and therefore don't pay insurance.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Department of Transportation Project Development	Business Use: 21. Infrastructure and Construction Management
	Water, Sewer and Powerline Planning and Analysis; Stormwater Modeling; Cut and Fill Analysis for Earth-Moving; and Building Site:
	State Transportation infrastructure was not addressed as a core business use; this was not offered as a choice for either a business use or functional activity.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	Project development is done through computer aided design software to widen roads for example. The State must design the changes to the roads. Elevation data from LiDAR would allow designers to be more accurate with their designs with respect to the actual surface of the Earth.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Will enhance contract bidding companies' understanding of the project scope and thus improve their cost estimates. The State needs more realistic cost estimates.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Moderate
Update Frequency: Annually	It could be used for environmental stewardship of right of ways.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

County Government -- Mesa	
Program: GIS/Flood Admin	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

	Estimated Annual Operational Benefits: Major; $100,000
Quality Level: QL 3 Elevation Data from LiDAR	Essential to map flood waters for emergency management and law enforcement. Law enforcement uses this information to use 911 in reverse and notify potentially affected property owners on flood potential. More accurate elevation data would allow us to build maps and better predict flood potential that would be used for public safety. Also would use it for wildfire fighting and mapping.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $30,000 Use of elevation data increased the accuracy for mapping of flood waters and therefore improved the map.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Mesa State College uses elevation data in their hydrolics classes and mapped a major basin that is a public safety issue. The basin was analyzed and identified as a place where flash floods are likely to occur.

County Government -- Park County	
Program: Park County Land Use Regulations	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Planning Activites	

	Estimated Annual Operational Benefits: Moderate; $100,000
Quality Level: QL 2 Elevation Data from LiDAR	We have no elevation data to support needs required for planning activities. We are limited to 40' or 20' contour data currently. Ability to produce 1-2' contours would enhance planning activities for staff and citizens for construction site development. Could also be used for hazard mitigation planning and recreation planning.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Citizens (customers) would no longer need to hire a surveyor or engineer to comply with Land Use Regulations. Citizens could use elevation data to help in the home site development process. Outdoor recreation users could have access to much improved tourism/recreation maps and data.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Reduced costs to developers and citizens. Better stewardship of natural resources and hazard planning/mitigation.

County Government -- Pueblo County	
Program: Community Planning & Design	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Comprehensive Plan Development	

	Estimated Annual Operational Benefits: Moderate; $50,000
Quality Level: QL 1 Elevation Data from LiDAR	Improved decision making ability for large urban design projects, urban revitalization and new subdivision activity.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $150,000 3D modeling of urban environment, viewshed mapping ability, highly accurate digital orthophotography, additional data collected that could not be collected in other ways 3D modeling of urban environment, viewshed mapping ability, highly accurate digital orthophotography, additional data collected that could not be collected in other ways
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	3D modeling of urban environment, viewshed mapping ability, highly accurate digital orthophotography, additional data collected that could not be collected in other ways. 3D modeling of urban environment, viewshed mapping ability, highly accurate digital orthophotography, additional data collected that could not be collected in other ways.

County Government -- Pueblo County	
Program: Emergency Services	**Business Use:** 16. Wildfire Management, Planning, And Response
Functional Activity: Fire Risk Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $300,000 Improved accuracy for wildfire mitigation planning, wildfire response, and wildfire recovery efforts.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; $250,000 Improved mapping within wildland urban interface. Improved mapping within wildland urban interface.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Enhanced public safety, better environmental management practices. Enhanced public safety, better environmental management practices.

County Government -- Pueblo County	
Program: Geographic Information Systems	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $50,000 Floodplain mapping, flood levee certification, urban planning, subdivision processes. Flood height determination, line of sight and 3D modeling, police/SWAT.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; $40,000 Improved accuracy of data for subdivision processes for private developers, shortened engineering timeframes. Improved subdivision processes for private developers, significantly shortened engineering timeframes.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Improved accuracy and shortened engineering & construction timeframes for public utility and streambed projects. Improved accuracy and shortened engineering & construction timeframes for public utility and streambed projects.

Regional Government -- San Luis Valley (6 Counties)	
Program: The San Luis Valley GIS/GPS Authority.	**Business Use:** 22. Urban And Regional Planning
Functional Activity: We Provide All Aspects Of GIS/GPS Services	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $50,000 Much better floodplain designation, solar site locations. Having access to this type of data when we have never had access to it.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The ability to offer that data and the various analyses. We do not currently have LiDAR data.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: Not Provided	The benefits come from having the data to offer in all areas. Don't have the data.

Regional Government -- San Luis Valley GIS/GPS Authority	
Program: Not Provided	**Business Use:** 5. Forest Resources Management
Functional Activity: Multiple Functional Activities - Full Service Provider Of GIS And GPS Services.	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

Tribal Functional Activities

Southern Ute Indian Tribe	
Program: Not provided	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Erosion Change Detection	
Quality Level: Not Provided	**Estimated Annual Operational Benefits:** Don't know; Dollar Value Not Provided Not Provided
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Don't know; Dollar Value Not Provided Not Provided
Bathymetric Data: Not Provided **Tide-Coordinated:** No	**Estimated Strategic Benefits:** Don't know Not Provided

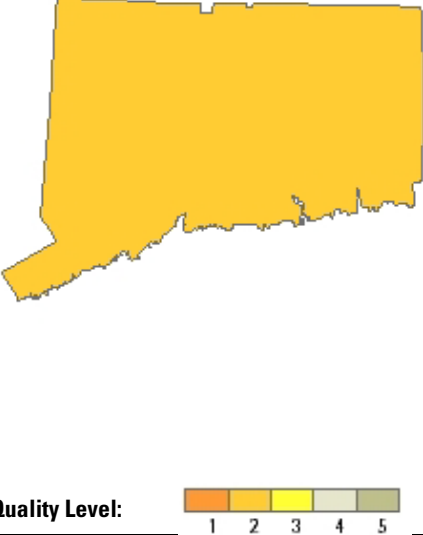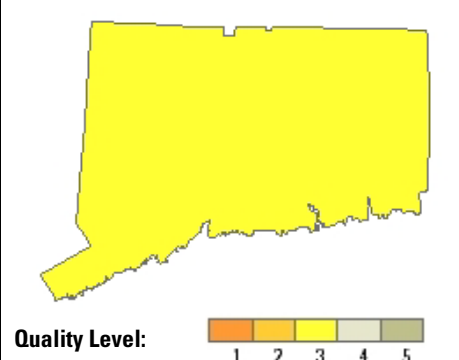| Southern Ute Indian Tribe	
Program: Department of Natural Resources, Water Resources Division program	**Business Use:** 2. Water Supply And Quality
Functional Activity: Pine River Indian Irrigation Project Water Delivery And Management	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Dollar Value Not Provided Improved decision making with quality data without actually going to the field.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Provided Obtaining Lidar data that is ready to use with GIS software would increase the performance and use of the product. Since we have not had Lidar Data before it is hard to determine how much or how little it would actually be used.
Bathymetric Data: Not Provided **Tide-Coordinated:** No	**Estimated Strategic Benefits:** None Don't know. None.

Connecticut (CT)

Currently, the State of Connecticut has statewide LiDAR coverage that was collected in 2000. The Army Corps of Engineers collected data in 2004 along the Connecticut River flood zone. The Federal Emergency Management Agency collected for the approximate extent of the 100-year coastal flood plain coastal LiDAR in 2006 and for the Quinnipiac River watershed during the Fall of 2010. The Natural Resource Conservation Service collected LiDAR data east of the Connecticut River in the Fall of 2010 which is expected to be released in September, 2011. The New England LiDAR Project (http://www.neurisa.org/NE_LiDAR_Project) has collected data for southeastern and southwestern Connecticut. The southeastern Connecticut data should be available in September, 2011; however, the southwestern Connecticut area needs to be reflown this Fall.
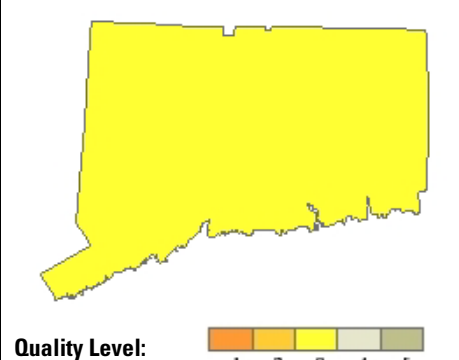
The State of Connecticut needs Quality-Level 2 LiDAR data to include full point-cloud, digital elevation models, with and without hydro processing, and breaklines to be used for watershed and other environmental analyses including flood frequency analysis. The State also needs the ability to generate accurate digital terrain and surface models as well as accurate 2-foot contours. Also, Slope and Aspect data layers are necessary components of watershed analysis used to evaluate the effects of land use/land cover and climate change.
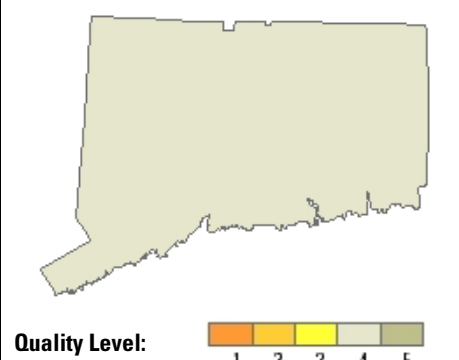
State Functional Activities

Program: Land Use and Land Cover	Business Use: 1. Natural Resources Conservation
Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Land Cover Evaluation:** Provide information, education and assistance to land use decision makers, in support of balancing growth and natural resource protection by conducting remote sensing research, develops landscape analysis tools and training, and conducts outreach education programs. The availability of good elevation data increases the quality of the land cover products. It is hard to place a dollar benefit value to good data.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Addition of elevation data with spectral information could make creating and updating land cover data more efficient and faster.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Land cover, especially high resolution land cover, would be more accurate and have more detail that would increase the number of users and applications.
	Estimated Strategic Benefits: Major; If enhanced land cover was available for the entire state, it would have many social and environmental benefits. Many groups use the current land cover and the user base would likely grow if this new information was available and included.

Program: Office of Long Island Sound Programs	Business Use: 4. Coastal Zone Management

Coastal Storm and Sea Level Rise Erosion/Inundation Mapping: Coastal storm and sea level rise erosion/inundation mapping would use high accuracy topography data to generate surfaces used to base various inundation scenarios on (static sea level rise, event driven inundation, etc.). The same surfaces would be used to identify and quantify areas of erosion hazards. Utilities of such activities range from providing better hazard related data to managers and end users, extending the ability of planners to assess longer term effects of natural processes, and to better define and develop local and regional sediment management plans for the state.

NOTE: Regarding the hydro flattening/enforcing question, Connecticut would prefer the approach that retains high level details under coastal waters recently developed for the USGS Northeast LiDAR Project.

Estimated Annual Operational Benefits: Moderate; $80,000
(assumes 2 percent cost savings based on overall program budget) Ability to address project level issues relating to coastal hazard analysis / monitoring / mapping / modeling; ability to perform advanced site level assessment remotely. Ability to reduce additional aspects of field work by using remote sensing data.

Estimated Annual Customer Service Benefits: Major; $3,500,000
(assumes a 2:1 to 4:1 benefit/cost ratio based on State of Nebraska analysis using collection costs of $1.15 million for CT coastal areas (approximately 950 square miles at $125 per square mile). Ability to provide project level data relating to coastal hazard analysis / monitoring / mapping / modeling to organizations that need it but could not otherwise afford it. Ability to address project level issues relating to coastal hazard analysis / monitoring / mapping / modeling.

Estimated Strategic Benefits: Moderate;
Higher degrees of flood plain management, coastal hazard assessments, both of which address benefits to the environment and public safety. Additionally the ability to share/provide more accurate and better resolution products to other organizations provides a measure of strategic political benefit.

Quality Level:

1	2	3	4	5

Update Frequency: 6-10 years

Bathymetric Data: Yes

Tide-Coordinated: Yes

Data Outside State Needed: Capturing data that could extend to the approximate limit of the localized drainage basins would be beneficial to hydrologic modeling. This includes the small area of the Connecticut watersheds in Canada.

Program: University Extension Forestry - Forest Stewardship	Business Use: 5. Forest Resources Management

	Management Plans and Prioritization of Resources:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Allow for more localized analysis for smaller areas, such as landowners. Current data is more appropriate at the regional level.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improved data allows for higher quality results at the local level leading to better management of forested properties.
	Estimated Strategic Benefits: Major; Vast improvement in analysis at the local level focusing on land owners of forested property.
Quality Level:	
Update Frequency: 4-5 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: Not Reported	
Data Outside State Needed: Not Provided	

Program: Environmental Protection	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic Resource Mapping: The availability of accurate elevation data is critical for most environmental applications and decisions that result from them. However, calculation of an accurate dollar benefit is very difficult.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Better resolution of geologic mapping issues, research needs, scientific publications and educational products.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Enhancements to mapping capabilities, products, land management reviews, and resource estimates.
	Estimated Strategic Benefits: Major; Better collaboration with neighboring states on joint hazards and environmental projects.
Quality Level:	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Not Reported	
Data Outside State Needed: Not Provided	

Program: Geographic Information Systems Unit	Business Use: 27. Telecommunications

	Exclusive Jurisdiction Over the Siting of Power Facilities, Transmission Lines, Hazardous Waste Facilities and Telecommunication Sites Within the State of Connecticut:
	Estimated Annual Operational Benefits: Moderate; $5,000 Could be used to produce more accurate telecommunications coverage modeling for cities and towns throughout the state.
	Estimated Annual Customer Service Benefits: Minor; $10,000 A more accurate and comprehensive product delivered on a timely basis.
	Estimated Strategic Benefits: Minor; There are always benefits to enhanced capabilities for accuracy within the state's siting work.
Quality Level:	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities
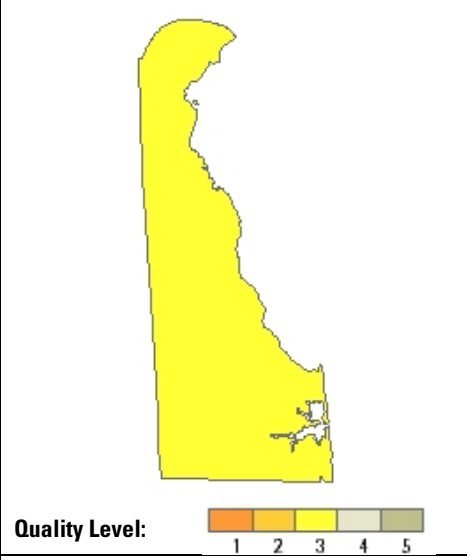
City Government -- Town Of Newington	
Program: Planning, zoning, and community development	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Steep Slope Analysis Is A Functional Activity Of Natural Resources Conservation- We Regulate Development Based On Steep Slopes Over 15%	

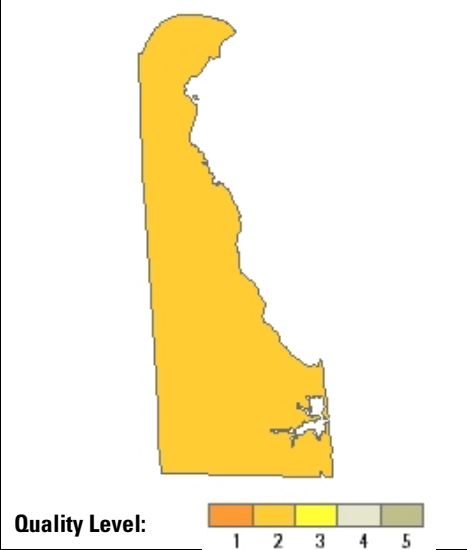|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided The elevation data allows us to evaluate land that would be suitable for developement, thus increasing the overall town fiscal assets. It eliminates the need to spend time on general data collection, and increases the accuracy of the data used for evaluation and analysis. An increase in accuracy and updated currency of the elevation data through LiDAR would add a level of substantiation to our claims based on the analysis of that data.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The new data would raise the accuracy of our existing elevation mapping, and thus allow for a much more accurate product overall. This increase in accuracy would have benefit to the applicant in community development proposals. It would also allow the town planner to make decisions with more supporting data. Currently, we develope maps and address concerns with our existing elevation data. This is done with a caveate that the analysis is only as good as the data used. The data we currently use is a few years old, and changes that have occured have not been adjusted for.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	It is difficult to evaluate relative to the program budget, as a return on investment in this area is difficult to document. The environmental benefits from the use of good elevation data are significant. Our current zoning regulations stipulate that no structure or development can take place in an area of greater than 15% slope. This helps to prevent drainage issues, washouts, landslide, and the like.

Delaware (DE)

The most active and continuous elevation activity in the State of Delaware takes place in the Department of Natural Resources and Environmental Control (DNREC). The DNREC is the state agency responsible for both enacting Federal Emergency Management Agency (FEMA) flood studies, and understanding sea level rise impacts on coastline and coastal habitats. Unfortunatly DNREC was not one of the respondants to this survey, but DNREC is easily the most intense user of LiDAR data in the state. The Delaware Department of Transportation's of LiDAR is expected to increase dramatically over the next 3-5 years. The state does not have LiDAR point-cloud data (.las data) which is their most pressing need at present. The data for Sussex County exist, but in the Experimental Advanced Airborne Research LiDAR Airborne LiDAR Processing System data format. The data could be processed to ascii points at least. DNREC could use the point cloud to model vegetation and habitat especially. Other parts of state government would benefit from infrastructure extraction. Point-cloud data was not a deliverable for Kent or New Castle County either, because the agency most vocal for deliverable data was the Delaware Geological Survey, who wanted state-wide 2-foot contours. Two-foot contours from LiDAR exist statewide, and are downloadable from the Delaware Data Mapping and Integration Labratory.

State Functional Activities

Program: Sediment and Stormwater Program	**Business Use:** 3. River and Stream Resource Management
	Hydrologic and Hydraulic Modeling for Stormwater Management Regulatory Compliance: Business Use 3 sediment and stormwater management which in turn is used by Delaware Department of Transportation to monitor/model total daily maximum loads road runoff into streams/rivers/ditches.
	Estimated Annual Operational Benefits: Major; $150,000 Modeling stormwater runoff from desktop instead of site survey will be more efficient, and reproducable. Identifying and analyzing changes in conditions are improved in watershed impacts.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Communicating results to local communities/residents and regulators will be easier.
Quality Level: (scale 1 2 3 4 5)	**Estimated Strategic Benefits:** Major High-resolution elevation data will help residents visuize the issue, and help with environmental compliance of stormwater and sediment loading from roadways.
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Geologic Mapping	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
	Geologic Mapping: Business Use 4, 9, 15. Mapping coastal change and coastal resources is key for the tourism based economy especially in Sussex County.
	Estimated Annual Operational Benefits: Moderate; $5,000 Updated contours have been excellent to add to new geologic mapping products.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Citizens occasionally ask for contour data to check elevation above sea level or flood plain.
	Estimated Strategic Benefits: Moderate As inundation events increase in frequency and extent, a need for better, or more recent data will be considered.
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

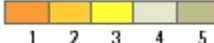| **Program:** Aviation Navigation and Safety	**Business Use:** 20. Aviation Navigation and Safety
	Aviation Hazards and Safety for Commercial and Private Airstrips: Leaves-on LiDAR data is strongly preferred.
	Estimated Annual Operational Benefits: Don't Know; Dollar Value Not Reported The use of LiDAR data for this application is too new to assess the value at this time.
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported Improved updating of aeronautical charts, higher safety margins for civil and commercial aviation at and around low-level flight operations.
	Estimated Strategic Benefits: Don't Know Potential is high to identify existing or future hazards to air safety.
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Local Functional Activities

None

Florida (FL)

As a low-lying coastal state with a population that ranks fourth in the nation, Florida has a critical requirement for current and accurate high resolution topographic and bathymetric elevation data. Priority applications for this fundamental geospatial data layer include natural systems management, infrastructure development, and emergency response programs.

The state's five Water Management Districts and Department of Environmental Protection require high accuracy LiDAR-derived elevation datasets to support fresh water quality and quantity programs which have a direct impact upon Florida's resident population which is nearing 19,000,000. The Florida Department of Transportation relies upon precise ground surface and structure measurements derived from LiDAR to meet mounting demands associated with transportation network expansion. Given its unique location, Florida is extremely vulnerable to the devastating effects of seasonal hurricanes tracking across both the Atlantic Ocean and warm waters of the Gulf of Mexico. In preparation for the next inevitable severe weather disaster, the Florida Division of Emergency management recently completed a statewide project to collect coastal LiDAR data in support of storm surge modeling and evacuation route planning.
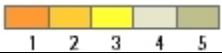
While LiDAR coverage now exists over approximately 65% of Florida, improved standardization associated with fundamental product characteristics such as accuracy and data format would better enable the state to leverage its investment in this critical geospatial dataset. Florida supports a national enhanced elevation program to better meet the increasing demand for current and accurate elevation data.
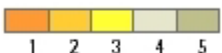
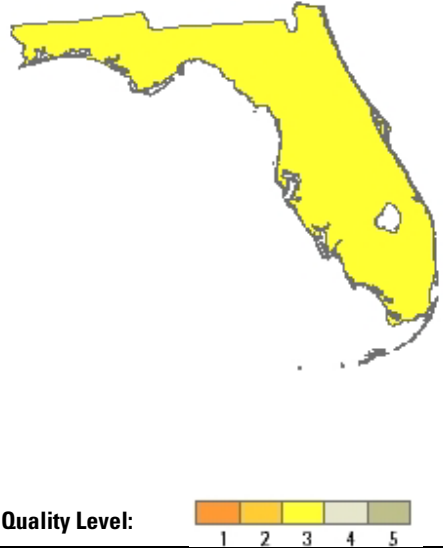## State Functional Activities

Program: Comprehensive Everglades Restoration Program, Natural Estuary Conservation Program, Florida Department of Transportation Mitigation Program, Upper St. Johns River Restoration Program	Business Use: 1. Natural Resources Conservation

	Natural Systems Conservation/Restoration: This includes assessment, inventory and restoration of the state's river and wetland systems.
	Estimated Annual Operational Benefits: Major; $3,400,000 Increased quality of modeling and analysis are achieved by having high accuracy topographic information derived from LiDAR. Increased ability to identify the extent of hydrologic alteration in areas of dense canopy allow improved estimation of project scope and costs. In some remote areas LiDAR is the only feasible option for obtaining high-accuracy surface elevation data.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Customer benefits have been identified for the Florida Department of Transportation as it pertains to their habitat restoration activities. The availability of LiDAR data has facilitated efficient identification of natural resource conservation and restoration opportunities and requirements. Customer benefits also include expansion of improved recreational opportunities within the state.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major Protection of natural environments that are important for water resource management activities; improved water quality; increased habitat for game and non-game wildlife; increased opportunities for cooperative environmental education ventures with elementary and secondary schools to areas where data are not currently available.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

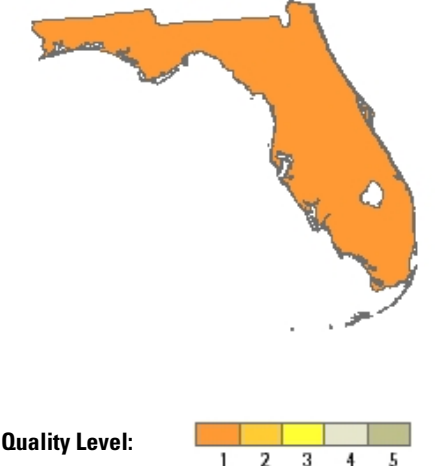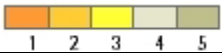| **Program:** State Mandated Water Supply Planning, Central Florida Coordination Area	**Business Use:** 2. Water Supply and Quality
  Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Protection of Surface and Groundwater Supplies:** This includes planning and modeling activities associated with identifying and protecting surface and groundwater supplies and sources. **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Statewide approximately 90% of the water supply is derived from groundwater. The primary benefits of LiDAR derived elevation data are associated with construction of reservoirs for surface water supplies and evacuation planning activities in the event of a reservoir failure. The LiDAR data also supports development of integrated ground and surface water models used to identify impacts to aquifers from pumping as well as water distribution systems. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Current and accurate high-resolution elevation data directly contributes to programs designed to ensure a sustainable water supply which the public can depend upon. **Estimated Strategic Benefits:** Moderate The ability to more accurately model water use and ensure sustainability of supplies.

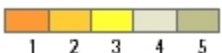| **Program:** Surveying and Mapping in support of Transportation Infrastructure Development	**Business Use:** 21. Infrastructure and Construction Management
  Quality Level: 1 2 3 4 5 **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** no	**Transportation Design, Construction, and Maintenance:** This includes the use of LiDAR point cloud as well as derived Digital Surface Models and Digital Terrain Models for planning and construction of roads, overpasses, bridges and other transportation features. **Estimated Annual Operational Benefits:** Major; $500,000 Use of high accuracy elevation data derived from LiDAR results in improved intermodal planning, safety and management of statewide resources. Reduction in on-site field survey activities results in significant operational cost savings. **Estimated Annual Customer Service Benefits:** Major; $150,000 The availability of current and accurate statewide vertical dataset would significantly improve quality of agency products and services to the citizens of Florida in terms of timely project completion at a reduced cost. to the taxpayer. **Estimated Strategic Benefits:** Moderate Enhanced public safety and efforts to minimize negative impacts of construction projects in and around environmentally sensitive areas are strategic goals supported by readily available high accuracy LiDAR-derived elevation datasets.

Program: Environmental Resource Permitting	**Business Use:** 1. Natural Resources Conservation

Soils and Wetland Conservation
The Environmental Resource Permit Program (ERP) regulates activities involving the alteration of surface water flows. This includes new activities in uplands that generate stormwater runoff from construction, as well as dredging and filling in wetlands and other surface waters. Enhanced elevation data facilitates the ERP program's soils and wetland conservation by improving the accuracy and precision of wetland delineations.

Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported
LiDAR derived enhanced elevation datasets would allow the ERP program to moreaccurately establish elevations for the seasonal high of a wetland or mean/ordinary highof a surface water which could in turn be used to better map the landward extent of thesystem, determine the historic elevation of a wetland prior to impact or what it shouldbe when restored and to better track sheet flow across an area.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
LiDAR derived elevation datasets improve the ERP programs ability to evaluate the impact of a proposed project on uplands/wetlands and communicate this to permit seekers. This will result in the expediting of the permitting process and serves the public in that it helps to assure that lands are either protected or allowed to be used for appropriate purposes according to a correct wetland or upland classification.

Estimated Strategic Benefits: Moderate
Through improved wetland delineations, the availability of an enhanced elevationdataset products will limit, indicate the need for mitigation or prevent unwantedenvironmental impacts of projects that alter the terrain and/or wetlands.

Quality Level: 1 2 3 4 5
Update Frequency: 4-5 years
Bathymetric Data: Yes
Tide-Coordinated: Yes
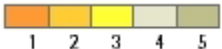**Data Outside State Needed:** no

---

Program: Federal and State Total Maximum Daily Load Program	**Business Use:** 2. Water Supply and Quality

Hydrologic Modeling of Surface Waters for TMDL Purposes
The use of high accuracy LiDAR derived elevation datasets will improve implementation of Florida's Total Maximum Daily Load Program (TMDL) by providing more resolute elevation data for pollutant loading models than currently exist for large gradually sloped areas and and by supporting decisions aimed at collectively and effectively reducing pollution.

Estimated Annual Operational Benefits: Major; $33,000
LiDAR enhanced elevation data will permit a greater degree of precision in the development of pollutant loading models. It will permit model inputs to be developed more quickly and accurately. This results in a faster completion of model runs with an elevated confidence level in the outcomes . Improved bathymetric and stream cross section information will allow many expensive field based activities to be performed in the office in addition to improving model accuracy.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
Basin Management Action Plans (BMAP) are "blueprints" designed to reduce pollutant loadings to meet allowable limits established in a TMDL. These plans are developed with local stakeholders and successful outcomes resulting from implementation of these plans rely upon stakeholder input and commitment. Stakeholder confidence in the accuracy of data sources and model outputs is key in solidifying their commitment. Use of LiDAR enhanced elevation data improves the State of Florida's ability to assess the effectiveness of remediation projects, which then contributes to lower implementation costs, greater stakeholder confidence and an improved overall commitment to collectively reducing pollution and serving public health and safety.

Estimated Strategic Benefits: Major
The use of high accuracy LiDAR derived elevation datasets improves the TMD program's ability to meet requirements of the Federal Water Pollution Control Act and Florida Constitution and in doing so allows Florida's waters to more readily meet their intended designated uses (i.e., potable water supplies, aquatic life support, recreational and other uses).

Quality Level: 1 2 3 4 5
Update Frequency: 4-5 years
Bathymetric Data: Yes
Tide-Coordinated: Yes
Data Outside State Needed: HUCs that are hydrologically connected to FL in AL & GA

Program: Emergency Management	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
	Landform Evaluation to Support Disaster Response: LiDAR derived elevation data improves support efforts to predict and reduce risk and respond to damage resulting from natural and anthropogenic hazards that threaten life and property in the state, including but not limited to the following: floods, hurricanes and coastal storms, severe storms and tornadoes, wildfire, erosion, dam / levee failures, sinkholes seismic events, and tsunamis.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported LiDAR derived elevation data allows emergency management staff to produce Regional Evacuation Study recommendations which more closely match real world phenomena. Study recommendations may be improved in that they rely upon analyses which benefit from the creation of grid rasters with a more detailed horizontal pixel resolution than currently exist for a large portion of the state. This is important in determining which critical facilities might be harmed by hazards, population clearance times in advance of predicted events like hurricanes and demographic analyses that indicate what resources need be provided to support citizens.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported LiDAR derived elevation data will improve the accuracy of community vulnerability study recommendations by providing local and state emergency management officials data that more realistically and currently models real world conditions. LiDAR derived elevation data facilitates the effective and efficient distribution of resources in response to natural and other public disasters. This reduces waste and alleviates risks to human health and safety.
Quality Level:	**Estimated Strategic Benefits:** Moderate LiDAR derived elevation data enhances emergency responder's ability to protect citizens and provide for thier needs.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: no	

Program: Fish and Wildlife Conservation	**Business Use:** 15. Sea Level Rise and Subsidence
	Scientific Support of Fish and Wildlife and their Habitats This includes assessment, inventory, and management of fish and wildlife habitats with a focus on model species distribution and habitat change over time and space
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Many species and habitats of interest are elevation dependent and reside within low-lying coastal areas sensitive to changes in sea level. Elevation data enhances ability to accurately measure and model effects of changes in sea level as it pertains to sensitive wildlife habitats.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Better support public education and tourism through improvement of fish and wildlife conservation programs.
	Estimated Strategic Benefits: Major Current and accurate LiDAR-derived elevation data supports improved models for forecast, emergency response, and essential habitat management.
Quality Level:	
Update Frequency: > 10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Geologic and Hydro-Geologic Investigations	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
	Geologic Mapping and Karst Evaluation: High accuracy LiDAR derived elevation data supports the establishment of a geologic framework through detailed mapping of areas determined to be vital to the economic, societal, and/or scientific welfare of Florida. Geologic mapping is a fundamental activity of the Florida Geologic Survey (FGS) and support many land-use decisions. Florida's low topographic relief makes it all the more necessary to have accurate elevation data
	Estimated Annual Operational Benefits: Major; $10,000 Accurate digital elevation data allow more accurate geological maps to be created especially in Florida where topography is limited. FGS continues to produce geological cartographic products that will require the mapping of features that can only be resolved through the use of higher accuracy LiDAR derived elevation data.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Coastal geologic and bathymetric mapping will be a critical component of Florida's future due to the potential threat of sea-level rise. Accurate elevation maps can also help with hurricane damage mitigation. Highly accurate geologic maps are valued products that the FGS produces. They support many other state agency and private company missions. Environmental resource protection and public outreach and education are both greatly enhanced by having accurate elevation data.
Quality Level: **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** yes, at least 50mi into Georgia and Alabama	**Estimated Strategic Benefits:** Major Florida's karst regions and coastal areas are vulnerable to hurricane activity and sinkhole development. It is of great benefit to society to show the distribution of these vulnerable areas and construct probability maps showing where land areas have the highest probability of impact due to natural processes With these data more accurate geologic maps can be created and more types of maps, in addition to surficial bedrock geology, can be constructed. With accurate elevation data the state can construct vulnerability maps for karst areas and for drinking water aquifers.

Program: Regional Evacuation studies, water management operations	**Business Use:** 14. Flood Risk Management
	Hydologic/Hydraulic Modeling, Flood Control Operations, Storm Surge Analysis: With the availability of current and more accurate LiDAR-derived elevation data the Florida Division of Emergency Management (FDEM) can continue to revise storm surge models as erosional/depositional and Land use changes occur. Florida's Water Management Districts (WMD's), particularly those in the very large flat portions of the peninsula rely upon accurate and highly precise elevation data to effectively plan and execute flood control activities through hydrologic modeling efforts.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Sea, Lake and Overland surges from Hurricanes (SLOSH) GIS models run by FDEM rely on topographic data as input layers to create accurate elevation grid cells which are in turn used to derive depths of storm surge over land surfaces. LiDAR derived Digital Elevation Models may be used to improve the resolution and currency of SLOSH model outputs
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported LiDAR derived higher accuracy elevation datasets benefit communities which are required to obtain flood insurance. Benefits include lowered rates for citizens and businesses who are living or work in areas which have been erroneously classified as being within flood zones. Benefits to WMD's include model output scenarios which more closely match real-world hydrologic conditions, improving the ability to more effectively store water in drought conditions and move water through pumping and other control activities in advance of predicted storms.
Quality Level: **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** no	**Estimated Strategic Benefits:** Major High accuracy LiDAR derived elevation datasets will be used in the protection of property and lives, in the determination of lowered costs to citizens associated with property and elevation surveys required for flood insurance purposes, and for future planning to avoid development in flood prone areas. Extension of these benefits to a broader geographic area.

Program: Urban Forestry, State Lands management, Wildfire Mitigation	**Business Use:** 16. Wildfire Management, Planning, Response

	Canopy Closure, Canopy Base Height, and Fuels: Estimates of surface fuels and canopy closure are important variables in complex wildfire behavior models and provides information that assists in the restoration of wetlands in state lands and urban forestry impact studies. Enhanced elevation information improves the Department of Agriculture and Consumer Services (DACS) ability to correctly respond to wildfires and improve the siting of trees in urban areas.
	Estimated Annual Operational Benefits: Major; $1,280,000 Canopy and fuel volume information are variables used in fire behavior models. LiDAR based elevation products, specifically point cloud datasets and bare earth models, will allow analysts to estimate this information more accurately and with a higher degree of confidence.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Urban Forests are important in flood control programs, reducing utilities consumed and other community related activities. Enhanced LiDAR derived data leads to higher detailed and improved impact and planning studies. Improving the siting of forest resources in urban planning activities leads to reductions in utility costs for individual citizens and communities. Accurate wildfire models reduce the loss of life and property.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate LiDAR based elevation products will improve DACS wildfire and flood prediction and control operations. This will enhance DACS's ability to meet its mission of protecting citizens and property.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, at least 50 miles in Alabama and Georgia	

Program: Public Lands Archaeology	**Business Use:** 13. Cultural Resources Preservation and Management

	State Lands Archaeological Evaluations and Site Preservation: Archeological evaluations and preservation programs rely upon LiDAR processed to bare earth as a key data source in determining site locations.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported High resolution LiDAR bare earth data allows the state to locate archaeological targets of significance. Subsequent field ground truth activities have been shown to yield a a site identification accuracy exceeding 95 percent at this point. The type of sites being identified are prehistoric middens and mounds as well as historic earthworks, stone structures and other features hidden under tree canopy.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Customer benefits include all state agencies that are responsible for managing resources on Florida lands as well as the general public. LiDAR greatly facilitates cost effective survey and assessment of a state property that has never been surveyed though traditional land management agencies (State Forestry, Game and Fish, and the Department of Environmental Protection).
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major With high resolution LiDAR the state can more accurately and efficiently locate and understand the cultural resources which provides significant opportunities for public education, strategic site preservation needs and, in some cases, state park creation.
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: The greater the accuracy of the LiDAR the better the chances for accurate site ID using LiDAR. 3 ft or coarser resolution is useless except for very large archaeological sites.	

Local Functional Activities

County Government -- Leon County, City Of Tallahassee	
Program: Local government GIS Analysis	**Business Use:** 14. Flood Risk Management
Functional Activity: Multi-Disciplinary Topographic Analysis	

Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Current, high-detail, high accuracy elevation data provided many benefits from elevation determination, drainage delineation, hydrologic analysis, to aquifer vulnerability. Detailed topography for all areas contributing drainage to Leon County, Florida would improve drainage analysis and flood simulation capabilities
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The ability to map regional watersheds would improve hydrologic analysis capabilities. Due to the heavy vegetation landcover, LiDAR has provided the best terrain mapping solution for this region
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Public Safety enhanced as a result of more accurate floodplain maps, flood control. Enhanced ability to manage public water supply resources.

County Government -- Volusia	
Program: Drainage Task Team - Stormwater Management Program	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Allows the County to better manage the flow of water during and immediately after a rainfall. Elevation data derived from LiDAR is used reduce flooding, to control pollutant runoff and assit with planning for future development. Volusia has improved the quality of information for our maintained stormwater asset assets, including 173 miles of canals, 450 miles of roadside ditches, 11,816 + drainage structures, 66 miles of storm and sewer pipe, 424 Retention areas. Recently received hurricane storm surge data will be supplemented with updated FIRM data both generated in part from LiDAR data acquision and will greatly enhance stormwater planning and management as well as supporting emergency management applications
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided We anticipate this data will continue to be employed for stormwater planning, and mitigation, primariy in regard to stormwater infrastructure, e.g.canals, ditches, and retention areas and provide managers the ability to quickly create crossections of these assets for analysis. The LiDAR product acquired and paid for by Volusia County Public Works in 2006/2007 has been widely employed not just by the stormwater management program, but by multiple County departments.The same data has also been provided at no charge and is used extensively by the local surveying and engineering community. The data has also been used by regional and state agencies to further their own programs.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Provides the ability to monitor landform changes over time to better serve the public use requirements. Further, improved data handling tools and improvements in local expertise in employing this type of data will open a range of additional benifits as the data is compared to other GIS data sets. A variety of Green initiatives have been discussed (solar, wind, etc.) but are as yet have not been acted upon locally. This data has been used to confirm or replace historic data regarding run off models, been used extensively by the local engineering community to reduce costs or as a preliminary resource prior to conductiing detailed surveys. Has been used as evidence in court cases regarding run off, to include local flooding and has benefited the environmental community in regards to monitoring pollutant runoff.

Georgia (GA)

The state of Georgia, located in the southeastern United States, has an area of 59,425 square miles (159,909 km^2). It embraces parts of varying physiographic regions, including the Appalachian Blue Ridge Mountains in the north, the central Piedmont, and the extensive continental coastal plains. The 2010 US Census reported 9,687,653 residents, making Georgia the ninth most populous state. The Census Bureau ranks it eighth in population projections, growing 46.8-percent from 2000 to 2030, to over 12-million residents.

Its administrative division into 159 counties and 535 cities is a particular challenge to coordination of interagency projects to compile statewide geospatial data. Even so, during recent decades the state has been a particularly active partner in various federal mapping initiatives.

During 1995, Georgia's GIS Coordinating Committee (GISCC), now the state's longest standing interagency technical body on the subject, identified several core base maps for development and set about the work in partnership with the states university system and several federal agencies. It was one of the first states to acquire complete coverage under the National Digital Orthophoto Program, which immediately supported 1:24,000-scale Digital Line Graph prototype projects for transportation and hydrography. Georgia was one of the first to complete its digital National Wetlands Inventory. These rich framework layers proved indispensable to the state's early participation in US Census Bureau's MAF/TIGER Accuracy Improvement Project, which, in conjunction with its long-standing support of the Census Bureau's annual Boundary and Annexation Survey and near complete local government participation in the decennial Local Update of Census Addresses programs, has provided some of the most accurate census maps in the nation. Georgia has also actively contributed to the National Geospatial-Intelligence Agency's Homeland Security Infrastructure Program maps. Although the GISCC had identified improved elevation data as one of the critically needed core base maps, it remains to date, the single such identified layer with which the state has made the least progress to completion.

During 2010, a legislatively created Georgia Geospatial Advisory Council conducted a statewide survey of assets and needs. In its 2011 report to the state legislature, statewide LiDAR acquisition to provide enhanced elevation data for detailed flood studies was identified as one the state's principal needs. Unfortunately, to date, LiDAR data has been collected in only 55 of Georgia's 159 counties. During 2011, the GISCC formed a new Technical Working Group for Enhanced Elevation which is developing statewide program of education, promotion, and support for a multi-year interagency contracting mechanism to acquire aerial photography and LiDAR. This is the first statewide effort in Georgia to coordinate the local acquisition and standards for these geospatial products. Hopefully these alignments between local acquisition efforts with similar state and federal requirements and resources will provide mutual value in lower project costs and improved standard products to all partners.

State Functional Activities

Program: Watershed Protection	**Business Use:** 2. Water Supply and Quality
	Watershed delineation, Reservoir siting:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Not sure what the time/cost benefits would be but the improved mission compliance would greatly benefit from more accurate and defensible source data.
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported Customer service benefits would improve.
	Estimated Strategic Benefits: Major Environmental and political benefits would be impacted in that the state would have much more accurate and defensible source data. Public safety in relation to environmental emergencies would greatly benefit public safety.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes	

Program: GDOT Survey Team	**Business Use:** 13. Cultural Resources Preservation and Management
	Cultural Resource Mapping:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported As technology is advanced and incorporated into the overall GDOT business practice, then operational benefits are anticipated to further increase.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Making data a standard operating procedure will streamline the transportation planning process.
	Estimated Strategic Benefits: Major Savings in taxpayer dollars will be realized with better data and a streamlined transportation planning process.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

336

Program: Georgia Southern University, Dept. of Sociology and Anthropology	Business Use: 13. Cultural Resources Preservation and Management
Quality Level: (1 2 3 4 5)	**Archaeological Site Recordation and Preservation:**
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported Benefits Description Not Provided
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: comprehensive planning	Business Use: 22. Urban and Regional Planning
Quality Level: (1 2 3 4 5)	**Comprehensive planning:**
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Better planning, protection and enforcement of planning rules with respect to Protected Mountain Areas, Wetlands, Protected River Corridors
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Better planning, protection and enforcement of planning rules with respect to Protected Mountain Areas, Wetlands, Protected River Corridors
	Estimated Strategic Benefits: Major Better planning, protection and enforcement of planning rules with respect to Protected Mountain Areas, Wetlands, Protected River Corridors, Better Floodplain Management
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: yes	

Local Functional Activities

City Government -- City Of Savannah	
Program: Not Provided	**Business Use:** 14. Flood Risk Management
Functional Activity: Provide Eductional Outreach Information To Citizens Calling For Floodplain Information	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: No	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

County Government -- Bibb County	
Program: Local Government	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Not Provided	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: No	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

County Government -- Newton County	
Program: Watershed and Water Resource Management	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Whole watersheds need to be modeled and analyzed for impact. Data credibility is key. Engineering acceptance and data availability speed compliance.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Unknown but necessary. Assisting community with floodplain management issues. Resource sharing and planning with neighboring communities. Coordination of "Greenspace" requirements and floodplain management.

Regional Government -- Atlanta Regional Commission	
Program: Regional planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Aging, Environmental, Transportation And Geographic Support For Our Local Constituents	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: No	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

Hawaii (HI)

Hawaii is unique among the other US states by being the only tropical and completely island state. There are eight main Hawaiian Islands, divided up into 5 counties. The capitol and population center is on the Island of Oahu, in Honolulu. Hawaii's 2010 total state population of 1.36 million is up 12% from 2000. It has a land mass of 16,637 square kilometers.
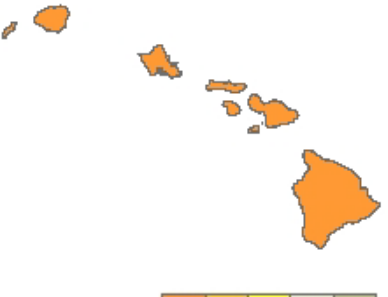
While a small sized state, Hawaii has various landforms and ecosystems, ones not found anywhere else in the USA. From tropical beaches to the 13,000 snow covered alpine volcanic peaks, there is a great need for accurate and current elevation models. The uses of elevation data are many, for the purposes of the Enhanced Elevation study six categories were identified as priority: Risk management, Disaster Response, Construction and Engineering, Natural Resource Management, Law Enforcement, Planning and Permitting.
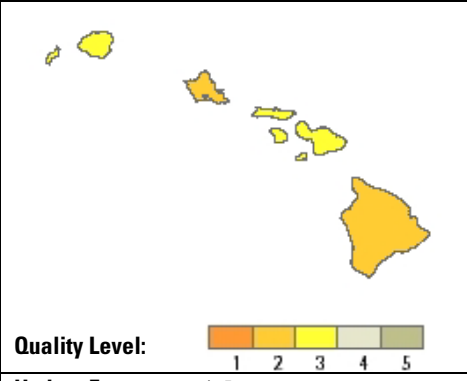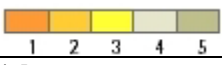
Each of the six identified areas is important. A state-wide survey was conducted asking for input. Critically important projects are reflected in the broad topics summarized in this report. Items such as solar and wind energy projects, tsunamis mitigation planning and recovery, dam safety, a new rail rapid transit system, Height Modernization are just some of the practical applications enhanced elevation data would be used for, and is critically needed. Hawaii has the USGS 10 meter DEM, an Ifsar 5 meter DEM, and a handful of uncoordinated and discontinuous LiDAR datasets. There is a real need for a current and comprehensive enhanced Elevation dataset in the 1 meter resolution scale to meet the states needs as a whole.
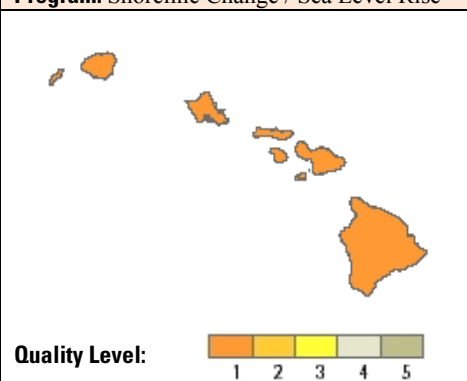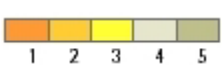
Currently most of the data collection for high resolution elevation data is done by various entities and most often not coordinated. There is duplication of efforts and limited data access or sharing. Having a comprehensive approach by a single agency and then distributed out state-wide would be the best use of limited resources and to the public benefit.
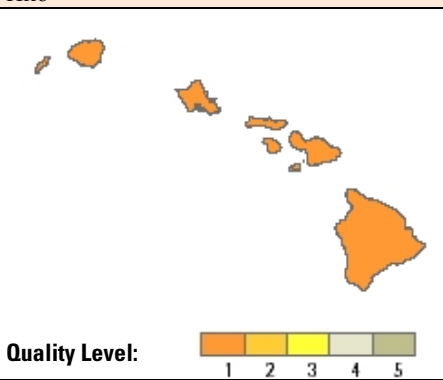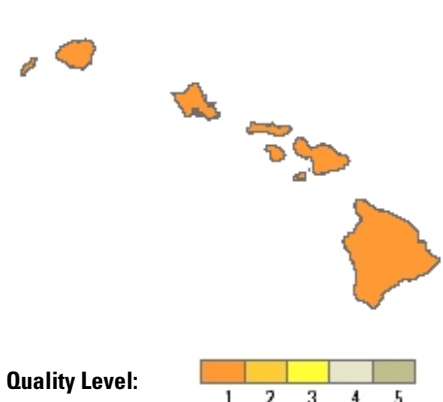
State Functional Activities

Program: Height Modernization	Business Use 21 Infrastructure and Constructin Mgt.
          Quality Level: **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Infrastructure and Construction:** lack of accurate elevation data restrict development and engineering projects statewide.
	Estimated Operational Benefits – Major; $5,000,000 Enhanced elevation data will improve survey and engineering accuracies. It will enable the State of Hawaii to use the NAVD88.
	Estimated Customer Service Benefits – Moderate In addition to flooding, sea level rise and tsunami mitigation planning, airport safety, major constuction such as mass transit, and alternate energy projects
	Estimated Strategic Benefits – Major Hawaii has no modern elevation (vertical) datum. Large-scale projects and navigation are hampered and will only get worse in the future due to the tectonic movement. Ground water measurements, interisland energy corridors, aviation instrument landing, rail transit all require a standard and accurate elevation base, Height Modernization is the foundational task for many of the other business and program needs.

Program: Highway Performance Monitoring System	**Business Use:** 22. Urban and Regional Planning
          Quality Level: **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Highways LiDAR Collection and Data Integration with Roadway Condition and Performance Information:**
	Estimated Operational Benefits – Major All district offices would benefit instead of just Honolulu (present) and Hawaii County (LiDAR late 2012).
	Estimated Customer Service Benefits – Major All district offices would benefit instead of just Honolulu (present) and Hawaii County (LiDAR late 2012).
	Estimated Strategic Benefits – Major All district offices would benefit instead of just Honolulu (present) and Hawaii County (LiDAR late 2012).

Program: Miconia Survey and Control	**Business Use:** 1. Natural Resources Conservation
  Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** Not Reported **Tide-Coordinated:** Not Reported **Data Outside State Needed:** Yes, topographic and bathymetric LiDAR is need from Pacific Basin Islands.	**Invasive Species Control:** **Estimated Operational Benefits –** Moderate Improve the efficiency and safety of field operations by increased accuracy when planning areas to search for Miconia by ground and air. Modeling to check for Miconia in areas not surveyed yet. **Estimated Customer Service Benefits –** Moderate Improve the efficiency and safety of field operations by increased accuracy when planning areas to search for Miconia by ground and air. Modeling to check for Miconia in areas not surveyed yet. **Estimated Strategic Benefits –** Moderate Improve the efficiency and safety of field operations by increased accuracy when planning areas to search for Miconia by ground and air. Modeling to check for Miconia in areas not surveyed yet.

Program: Shoreline Change / Sea Level Rise	**Business Use:** 4. Coastal Zone Management
  Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, topographic and bathymetric LiDAR is need from Pacific Basin Islands.	**Shoreline Change and Coastal Geomorphology:** **Estimated Operational Benefits –** Major; $50,000 Allow shoreline variability in the short term to be monitored and quantified. Sand resource management is of great concern within specific littoral cells around the island. **Estimated Customer Service Benefits –** Major Customers (planners, local decision makers and engineers) would benefit from having improved, repeated surveys that provide a more complete picture of beach morphology and sand volume change to both identify existing resources and active sand budgets and help site new construction out of harm's way. **Estimated Strategic Benefits –** Major New product development for identifying sand budgets in decline, which pose threats in the form of increased erosion and endangerment of infrastructure, property, and lives. Development plans could be drafted with this knowledge in hand to change setbacks along the coastline, adapting to eroding shoreline.

Program: Spatial Data Analysis Labs at University of Hawaii at Hilo	**Business Use:** 25. Education K-12 and Beyond
  Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, topographic and bathymetric LiDAR is needed from Pacific Basin Islands.	**Spatial Data Analysis Education for Undergraduates and Master Degree Candidates:** **Estimated Operational Benefits –** Major; $500,000 Building geospatial capacity through higher education for Hawaii Ecosystem research & spatial data analysis techniques. **Estimated Customer Service Benefits –** Major Hawaii's customers are students and researchers. The results of their efforts will be greatly improved and most likely new concepts will be derived from their work. The students will enhance the capability of the local workforce and the researchers will be able obtain additional grant dollars improving the economy of the State of Hawaii. **Estimated Strategic Benefits –** Major A geospatial technology savvy workforce capable of producing the highest caliber work and able to fulfill the requirements of employers in the natural resource conservation community, throughout the state.

Program: Risk and Vulnerabiltiy Assessmnet	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
  Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, topographic and bathymetric LiDAR is needed from Pacific Basin Islands.	**Diaster Management -- Hazard Modeling and Risk Assessement** **Estimated Operational Benefits –** Major Higher accuracy DEM yields better flood, tsunami run-up, landslide, etc. maps. **Estimated Customer Service Benefits –** Moderate Higher accuracy DEM yields better flood, tsunami run-up, landslide, etc. maps. **Estimated Strategic Benefits –** Major Higher accuracy DEM yields better flood, tsunami run-up, landslide, etc. maps.

Local Functional Activities

County Government -- City And County Of Honolulu	
Program: Subdivision, Building, and Infrastructure Permitting	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Subdivision, Building, And Site Development	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Depending on the quality, elevation data could assist greatly in reducing permit review times, and in saving both the applicant and government significant amounts of funding.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Ability to technologically enhance site development and facility construction plan reviews. None
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Will improve the data quantity and quality to make informed decisions. None

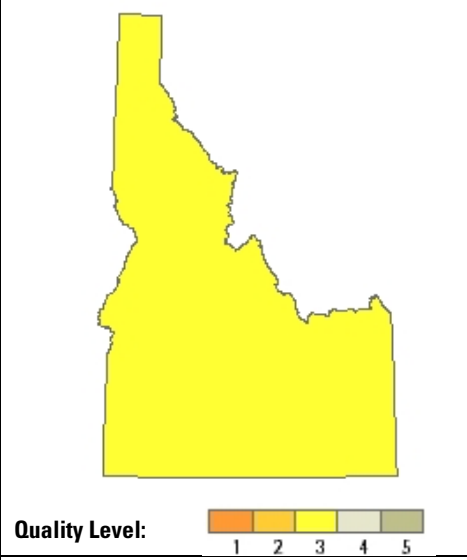| County Government -- County Of Kauai	
Program: Dam and reservoir evacuation analysis and flood analysis	**Business Use:** 14. Flood Risk Management
Functional Activity: Risk Mapping In Regards To Flooding - Reservoir Dam Evac Analysis	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Currently we only have a relatively small part of the island with LiDAR coverage. Having more complete or more accurate elevation data would increase our analysis accuracy which in turn could help save property and lives during a possible dam breach. More accurate elevation data could also be useful in overall flood mapping and used by our CFPM in the building permit process. Having more complete or more accurate elevation data would increase our analysis accuracy which in turn could help save property and lives during a possible Dam Breach. More accurate elevation data could also be useful in overall flood mapping and used by our CFPM in the building permit process.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Having more complete or more accurate elevation data would increase our analysis accuracy which in turn could help save property and lives during a possible Dam Breach. More accurate elevation data could also be useful in overall flood mapping and used by our CFPM in the building permit process. This could help speed up the permitting process for the citizens of Kauai. Currently we only have a small portion of the island covered with LiDAR. Having more complete or more accurate elevation data would increase our analysis accuracy which in turn could help save property and lives during a possible Dam Breach. More accurate elevation data could also be useful in overall flood mapping and used by our CFPM in the building permit process.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	Having more complete or more accurate elevation data would increase our analysis accuracy which in turn could help save property and lives during a possible Dam Breach. More accurate elevation data could also be useful in overall flood mapping and used by our CFPM in the building permit process. This could help speed up the permitting process for the citizens of Kauai.

County Government -- Maui County	
Program: Countywide geographic services for government agencies including police, fire and civil defense.	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: Spatial Analysis For Emergency Services Planning, Risk Assessment And Response	

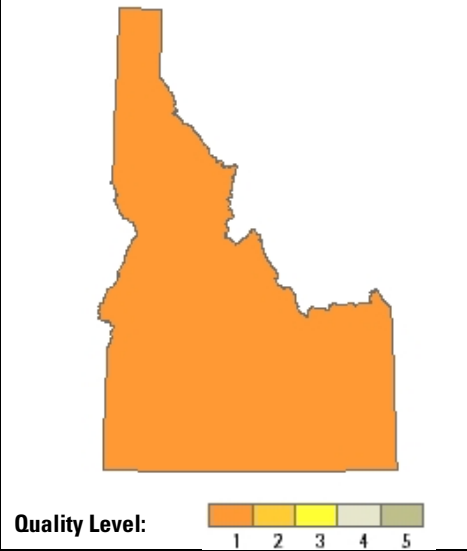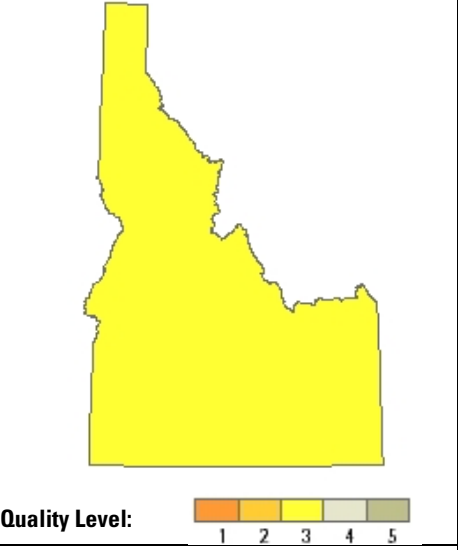|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Line of sight modeling for location of communication towers for emergency services. Calculation of burn areas for wildfires. Improved orthorectification of aerial imagery. Ability to generate more accurate 3-D models and renderings. Improved ability to accurately analyze geographic issues without staff or consultants having to do field work.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Extend flood inundation risk modeling to areas not covered by FEMA FIRM maps. Improved site selection for communications towers. Elevation calculation and obstruction height estimates for site specific incident response - e.g. mountain rescue, police special response unit activities. Better visualization and analysis through 3D modeling. More accurate surface area calculations.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Improved inundation risk assessment improves and facilitates political decision making, as well as, pre-planning by emergency services agencies such as police, fire and civil defense. 3-D modeling being used in public safety. Also, 3-D modeling being used in meetings and hearings which provide for more informed decisions.

Idaho (ID)

The State of Idaho has requirements for high resoulution elevation data for land resource management and research on the vast amounts of public lands, private forest lands, and grazing lands in the state. The state also needs high quality data for transportation planning projects and hazard mitigation planning (floods and fires). Idaho also needs improved elevation data in order to improve the resolution and accuracy of its hydrography data.

State Functional Activities

Program: Public And Private Timber Management. Land Resource Management, and Hazard Mitigation	Business Use: 1. Natural Resources Conservation
Quality Level: (1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, all adjacent states.	**Biomass Mapping:** Mapping of forest, sagebrush, grasslands, and estimating timber stocks, monitoring growth rates, land cover changes, and estiamting fire fuel loads.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided.

Program: Geologic Mapping Program	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** > 10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Geologic Mappng, Active Fault Mapping, and Landslide Mapping:** Geologic Mapping
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Enhanced elevation data will allow the state's organizations to improve the quality of geologic mapping and begin to accuarately map the location of active faults and landslides.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Enhanced elevation data will allow the state to produce much more accurate mapping products as well as active fault and landlside inventories. This will allow Idaho to meet its needs and users of the data.
	Estimated Strategic Benefits: Moderate These data will enable the state to generate more accurate assessments of geologic hazard potential.

Program: Risk MAP	Business Use: 14. Flood Risk Management
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, watersheds that cross state lines into adjacent states.	**Floodplain Mapping:** Hydraulic modeling and mapping in support of floodplain mapping.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Increased gov efficiency associated with cost savings realized thru bulk acquision, local floodplain managment, watershed based studies, risk assessment, Digital Flood Insurance Rate Maps, etc
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Acquiring LiDAR at higher resolutions satisfies innovation in all levels of Government, private and not-for-profit sectors. For example, engineering, preliminary plats, viewsheds, locating untaxed outbuildings, U.S. Environmental Proteciton Agency Remediation efforts (Silver Valley), U.S. Army Corps of Engineers studies, National Weather Service establishing flood stages, U.S. Geologicla Survey measuring deformations of the Earth, Idaho Bureau of Homeland Security, land slides, Idaho Department of Water Resources, mapping flood hazards, and ad hoc analysis.
	Estimated Strategic Benefits: Major A strong case can be made to the Federal Emergency Management Aagency for increasing the number, quality and extent of Risk MAP activities in Idaho, due to the Partnership (Risk MAP appropriation identifies 25 percent of Risk MAP funds being dedicated to Cooperating Technical Partners that can show a match).

Program: State Transportation Department Road Construction and Maintanance	Business Use: 21. Infrastructure and Construction Management
	Manage Transportation Corridors: Manage Transportation Corridors
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided.
Quality Level:	
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Local Functional Activities

None

Tribal Functional Activities

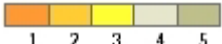| **Coeur D'alene**	
Program: GIS	**Business Use:** 27. Telecommunications
Functional Activity: Determine Line Of Site Model For Broadband	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Provided Minimize on ground survey need for initial planning. New data would be great since our last flight was in 2005. Trees and other obstacles have grown and new lidar will be more needed by 2015.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Provided Real time assessment is possible with LiDAR data, where we would have had to otherwise conduct a ground survey.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Better environmental planning is possible. And having better data allows us to avoid political/strategic conflicts. Better environmental planning is possible. And having better data allows us to avoid political/strategic conflicts.

Illinois (IL)

The Illinois Department of Transportation (IDOT) began acquiring LiDAR data on a systematic basis in 2008, and the use of the this enhanced elevation data is resulting in dramatic time savings for hydraulic surveys, as well as making it possible to precisely locate previously unidentified hydraulic problems. As LiDAR data are collected for additional IDOT Districts, the agency anticipates the applications and cost benefits will expand significantly.
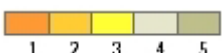
Illinois Regional Planning Departments (RPCs) across the State use LiDAR enhanced elevation data to evaluate new development projects. For example, when used to support hydraulic bridge surveys, LiDAR elevation information reduces the cost of a single bridge replacement study by approximately $15,000-$20,000. The RPCs also use this enhanced elevation data to inventory tree canopy height to ensure airport clear zones are not violated, as an aid to archeological research in detection of ancient burial mounds and road traces, and in direct line of sight analysis for positioning mobile cell phone repeaters.
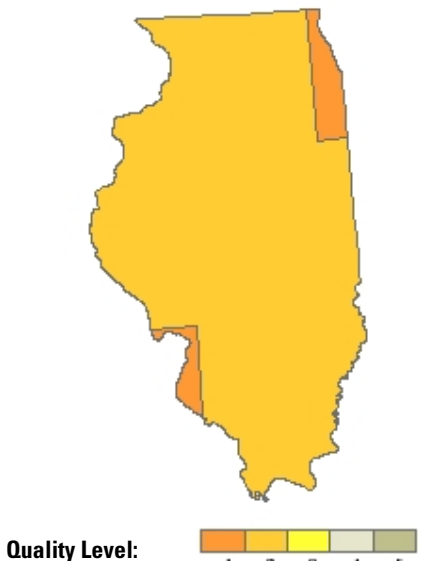
Enhanced elevation information would:

● Provide more precise measurement of levee heights to improve flood prediction, modeling, management and control, and serve as a key component to real-time flood forecasting.

● Support the Illinois portion of Federal Emergency Management Agency's Floodplain Modernization Program by greatly simplifying and accelerating the map production for the state's 100-year floodplains.

● Significantly reduce surveying costs of construction sites for new homes and businesses, highways and streets, maintenance of drainage canals and engineered structures.

● Dramatically improve precision farming. Variations in local relief affect the variable rate application of agricultural chemicals, thereby yielding significant cost savings and reduced agricultural pollution. Approximately two-thirds of the land area of Illinois is devoted to agricultural uses.

● Improve the accuracy of aerial photography orthorectification.

● Assist in positioning of erosion control structures, and be a valuable tool for determining where wetland and other types of habitat can be restored.

● Validate surface mine maps by measurement of extent of settlement and drainage diversion in surface mined areas, as well as subsidence and surface drainage disruption associated with subsurface mined areas.
● Be a support component involving simulations of contaminant dispersal in surface waters, as well as in selection of suitable staging areas for evacuation and emergency relief.
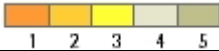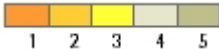
State Functional Activities

Program: Natural History Survey/Department of Military Affairs	**Business Use:** 1. Natural Resources Conservation

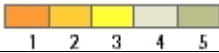|	**Natural Resource Management:** Soils and wetland conservation; modeling of biological and ecological systems.
	Estimated Annual Operational Benefits: Moderate; $90,000 Centralized procurement, having information that the state may not be able to afford but could share.
	Estimated Annual Customer Service Benefits: Moderate; $100,000 Be able to properly review new and proposed actions, determine changes from previous data, and facilitate the National Environmental Policy Act. Soldier training, review of infrastructure and natural resource development.
	Estimated Strategic Benefits: Major Cost sharing, reducing dollars, reduction of data redundancy.
Quality Level: [1 2 3 4 5]	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Natural History Survey, National Environmental Policy Act, Integrated Resource Management Plans, and Recreation Districts	**Business Use:** 7. Wildlife and Habitat Management

	Improving Vegetation Characterization and Mapping of Wildlife Habitats: Environmental Mitigation, Resource Conservation, National Environmental Policy Act, Integrated Resource Management Plans, Park and Recreation Sustainability, Management and Mitigation of Species and Habitat LiDAR-based bare-earth and surface elevation models provide excellent tools for woodland patch description, allowing for the estimation of biophysical properties such as canopy height and biomass. Such information will become increasingly important.
	Estimated Annual Operational Benefits: Moderate; $154,000 Current effort to predicted species distribution with traditional remote sensing data (for example Landsat) indicate that the distribution of many wildlife species likely has been overestimated due to the incapability of incorporating information (that is constraints) about vegetation structure. This information is useful but contains some level of uncertainty or error which affects species conservation and management decisions. Being able to identify habitat structure variables and important topographic features (i.e., rocky outcrops), which can be obtained from LiDAR data, would greatly improve the predicted species distributions for species with these kind of habitat preferences and in turn help the state to make better management decisions.
	Estimated Annual Customer Service Benefits: Major; $156,000 Be able to properly review new and proposed actions, determine changes from previous data, and facilitate National Environmental Policy Act. Soldier training, review of infrastructure and natural resource development. The state would be able to provide users with better predicted distribution maps for species with habitat structure preferences.
	Estimated Strategic Benefits: Minor High quality data with complete coverage will allow the existing public, social and/or political benefits to extend across the entire area of interest, and would also create additional opportunities for wide area studies.
Quality Level: [1 2 3 4 5]	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	
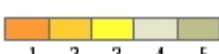
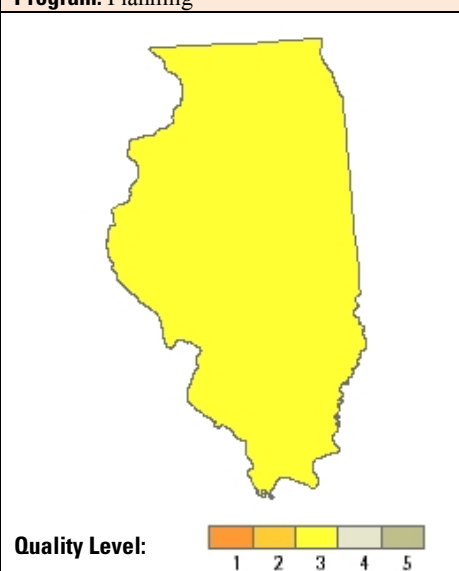| Program: Water Resources, FEMA RiskMAP	Business Use: 14. Flood Risk Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, to include watershed boundaries that cross over into surrounding states.	**Flood Risk Mapping:** Flood inundation modeling, more accurate delineation of floodplain boundaries, better watershed delineation assume quality level 2 on bathymetry.
	Estimated Annual Operational Benefits: Major; $21,100,000 Bare-Earth LiDAR allows the limit of field surveys and perform analysis in a more timely fashion. Illinois has also developed new geographic information system (GIS) applications related to mapping river forecasts and distributing to flood responders in advance of a flood. The GIS applications related to mapping river forecasts and distributing to flood responders in advance of a flood will be expanded to most rivers with LiDAR and hydraulic modeling exist. Hydraulic analysis in general will improve by providing accurate topography over a larger area than the state could have acquired via traditional land surveys.
	Estimated Annual Customer Service Benefits: Major; $10,520,000 The mapping results are greatly improved and more accurate when LiDAR is available. The state produces inundation maps for emergency responders. LiDAR where available is used for this mapping. Improved public trust from better mapped products. Improved public trust from better mapped products.
	Estimated Strategic Benefits: Major; If LiDAR was available in more areas and hydraulic modeling exists, the state plans on expanding the river forecast mapping to more rivers in the State. Illinois maps the depth and extent of flooding before and during flood events for emergency responders on a small number of rivers. Emergency responders utilize the inundation depth maps to locate sand bags. Improved public trust from better mapped products. Improved public trust from better mapped products.

Program: Transportation-Highways	Business Use: 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** Not Reported **Tide-Coordinated:** Not Reported **Data Outside State Needed:** Yes, the roadway network does not end at the State line, and the bridges cross rivers connecting Illinois to other states. Illinois can benefit from an overlap into every surrounding state - a few thousand feet to 1 mile.	**Road Infrastructure:** studies/planning purposes to support engineering projects
	Estimated Annual Operational Benefits: Moderate; $62,500,000 Not necessarily new benefits, but benefits that would be available to all district offices.
	Estimated Annual Customer Service Benefits: Moderate; $2,500,000 Not necessarily new benefits, but benefits that would be available to all district offices.
	Estimated Strategic Benefits: Moderate; Not necessarily new benefits, but more widespread benefits that would be available to all district offices.

Program: STARRS	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
Quality Level: [1 2 3 4 5] **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Homeland Security:** Illinois State Police Megahertz Program, Department of Military Affairs, Fire Departments-Pagers, Illinois Terrorism Task Force.
	Estimated Annual Operational Benefits: Major; $3,200,000 Telecommunications (emergency), Line of site analysis.
	Estimated Annual Customer Service Benefits: Major; $3,200,000 Emergency communications.
	Estimated Strategic Benefits: Major; Emergency communications.

Program: State Geological Survey	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: [1 2 3 4 5] **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Geologic Mapping Program:** Geologic resource assessment and hazard mitigation, resource mining, renewable energy resources, oil and gas resources.
	Estimated Annual Operational Benefits: Major; $500,000 Increased horizontal and vertical accuracy that is essential for providing additional scientific information regarding near surface processes.
	Estimated Annual Customer Service Benefits: Moderate; $200,000 Improved mapping accuracy for large-scale geologic maps.
	Estimated Strategic Benefits: Minor Improved mapping accuracy will help expand mapping program budgets when discussing annual budgets with congressional officials.

Program: Land Development	**Business Use:** 3. River and Stream Resource Management
Quality Level:	**Impervious Surface Water Runoff:** Field crews will be better prepared to assess plans as they do inspections. This budget is an example for one county in the State.
	Estimated Annual Operational Benefits: Major; $10,000 Control of storm water runoff. Assessment of developer plans for controlling storm water funoff in new developments.
	Estimated Annual Customer Service Benefits: Major; $2,000 Mitigation of storm water runoff.
	Estimated Strategic Benefits: Major; Better assessment of plans for storm water runoff and mitigation strategies as development proceeds to protect the waterways, streams and creeks.

Quality Level: 1 2 3 4 5

Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, watersheds that reach beyond the boundaries of the state.	

Program: Water Quality	**Business Use:** 2. Water Supply and Quality
	Lake Management:
	Estimated Annual Operational Benefits: Moderate; $62,000 A regular update cycle for this data layer would help in all aspects; change detection, quality, accuracy, etc.
	Estimated Annual Customer Service Benefits: Moderate; $43,000,000 Predict potential impacts from nutrients and pollutants entering water resources.
	Estimated Strategic Benefits: Moderate Aids in a more accurate, informed delineation of watersheds and run off concerns.

Quality Level: 1 2 3 4 5

Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes, watersheds that extend beyond the boundaries of the state.	

Program: Planning	Business Use: 22. Urban and Regional Planning
Quality Level: 1 2 3 4 5	**Regional Planning:** Feature mapping, regional transportation planning, hazardous mitigation planning, and soil info for taxing farmland (rural info also important).
	Estimated Annual Operational Benefits: Major; $55,000 Assistance with engineering construction and design, data available for flood analysis.
	Estimated Annual Customer Service Benefits: Major; $117,500 Better able to provide municipalities and engineering firms with accurate data.
	Estimated Strategic Benefits: Moderate Cost sharing, reducing dollars, reduction data redundancy, informed decisions.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Local Functional Activities

County Government -- Lake	
Program: Internal Day-to-Day Operations (County Depts)	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Inundation Modeling	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $294,000 Contours and more specifically the Digital Elevation Model developed from LiDAR data allow our agency to produce accurate flood inundation models for affected areas within the county as well as create more accurate reports on potentially affected properties and structures. A regular update cycle would be beneficial, not only for change detection but also because of the technological advancements in the derivative products and accuracy.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; $129,000,000 More accurate delineation of floodplain boundaries and flood inundation models.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Same as above but with a more regular update cycle. Better watershed delineation, septic system placement, flood inundation models and more efficient permit review.

County Government -- Lake	
Program: Internal Day-to-Day Operations (County Depts)	**Business Use:** 2. Water Supply And Quality
Functional Activity: Lake Management	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $62,000 Map watersheds of lakes an ponds. A regular update cycle for LiDAR data capture would help in all aspects; change detection, quality, accuracy, etc.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; $4,000,000 More accurately do the above. This information is used to predict potential impacts from nutrients and pollutants entering water resources in the County. It also assists in refining recommendations to land and water resources managers.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	More accurately do the above. Aids in a more accurate, informed delineation of watersheds and run off concerns.

353

County Government -- Sangamon County	
Program: Information Systems	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: New Bridge Location Planning \ New County Highway Corridor Planning \ Flood Risk Mapping	

Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $60,000 Reduce the need to have prior survey crews cross section river / stream for a hydrology study to support the planning of a new bridge at a desired location. It would help us research areas where homes have been previously labeled as being within the flood plain and having to carry the additional insurance.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; $30,000 Our Customers are internal but our County Highway department would be able to plan for new bridges and higway improvements with less need of sending survey crews out.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	We would try to use the information to help Identify homes at risk to flooding and also to identify those that far removed from the risk but are identified as being within the flood zone by the most recent FEMA flood mapping. Used a TIN that was created from LiDAR information to identify a portion of the old Edward's Trace through Sangamon County

County Government -- St. Clair County	
Program: Zoning/Development permitting	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Impervious Surface Water Runoff	

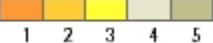|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $10,000 We don't have any data to realize existing operational benefits for controlling storm water runoff. Elevation data would allow the County to accurately assess developer plans for controlling storm water runoff in new residential and commerical developments.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; $2,000 If allowed to license the data, we see a major impact and improveient in the plans the County requires and receives for new development construction and the mitigation of storm water runoff. We don't have elevation data to provide customer service benefits.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	We will be able to better assess plans for storm water runoff and mitigation strategies as development proceeds to protect the waterways, streams and creeks of St. Clair County. We don't have elevation data to realize public, social or political benefits.

Regional Government -- Champaign County Regional Planning Commission	
Program: Champaign County GIS Consortium	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Feature Mapping, Regional Transportation Planning, Hazardous Mitigation Planning	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $1,000,000 Data for contour generation, assistance with engineering construction and design, accurate DEM generation, data available for flood analysis.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; $600,000 None at this time - Able to provide customers (municipalities and Engineering firms) with accurate data for their desired uses.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	None at this time Hazardous Mitigation Planning, Flood analysis, Engineering Construction and Design

Indiana (IN)

The State of Indiana has requirements for Quality-Level-2 and Quality-Level-3 LiDAR acquistions, including collection of bathymetry data for stream channel cross-sections. LiDAR derived enhanced elevation data will support Hazard Flood Inundation Mapping, FEMA RISK Floodplain mapping, Indiana Statewide Road Development, Surface and Ground Water Quality and Assessments, and Geologic Mapping. Over the next 3 years (beginning in 2011) Indiana will be collecting LiDAR derived elevation data, as Quality-Level-3 (at an average post spacing of 1.5 meters which supports a 2-foot contour interval), for the entire state. During the state's 3-year acquisition period, individual cities, towns and counties have the option to buy-up to an increased average post spacing of 1 meter, which will support a 1-foot contour interval.

State Functional Activities

Program: Statewide LiDAR Program	**Business Use:** 14. Flood Risk Management
   Quality Level: 1 2 3 4 5 **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Floodplain Mapping and Flood Event Modeling:** An estimate of total damages (combining losses from Residential, Commercial, Infrastructure and Agriculture) caused by flooding events in Indiana in 2003 and 2008 are $27 million and $126 million dollars respectively (Ball State Univ. Preliminary Flood Damage Assessments, June 1, 2008 report) If a 10 percent reduction in flood loss, through preventive and predictive measures, using the benefits of enhanced elevation data, then a savings of $27 million and $12.6 million respectively could be realized. Alternatively, a 5 percent reduction would provide a savings of $13.5 million and $6.3 million respectively, which is double to quadruple the cost of a statewide LiDAR acquisition.
	Estimated Annual Operational Benefits: Major; $19,800,000 This amount is the potential savings associated with the value of statewide LiDAR data for two major flooding events Enhanced elevation data will allow more accurate floodplain/flood-inundation mapping which will provide the state with better knowledge of flood predictions, response and mitigation, thereby reducing costs and saving lives associated with flooding.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Free access to accurate statewide data to a completely new user community. Storm water quality permitting, pollution control studies are produced from this data for customers.
	Estimated Strategic Benefits: Major With ubiquitous access to Indiana's new 2011 - 2013 statewide LiDAR and Ortho data Indiana expects even greater ROI than the 2005 Ortho project. The 2005 Orthoimagery was calculated to support a 34:1 ROI (at the time of publication <http://igic.org/projects/indianamap/IndianaMapNews.pdf> in the fall of 2008, the imagery had been in the public-domain just under three years). Indiana expects an even greater ROI from LiDAR because it will greatly enhance statewide activities (hydrologic modeling, flood inundation mapping, etc.) associated with flood mitigation, preparedness, response and recovery. In addition, having all of the data in one location makes it easier to share with customers saving them time and money and promoting business.

Program: Surface and Ground Water Quality and Resource Assessments	**Business Use:** 2. Water Supply and Quality
                Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, for edgematching, to maintain continuous watershed delineation, and to provide surface-water flow connectivity.	**Surface and Ground Water Quality and Assessments:** In some cases, Quality-Level 2 may be needed in small areas (that is square miles) to capture stream channel bathymetry and/or in heavily forested steep sloped areas and in Great Lakes Coastal areas containing complex hydrography and hydrology. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Enhanced digital elevation data would allow current (or recent) ground conditions to be modeled with greater accuracy. The need to travel to study areas with survey-grade equipment would be greatly reduced, along with associated costs, risks, and inefficiencies. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Enhanced digital elevation data would allow current (or recent) ground conditions to be modeled with greater accuracy; currently, modifications to the landscape such as new construction, ditch dredging or widening, or mine reclamation land sculpting have to be estimated, ground-surveyed, or ignored in a given project. The availability of accurate data would enhance all modeling and derivative products. **Estimated Strategic Benefits:** Major Enhanced relevance and usefulness would be achieved with better (and more recent) base topographic data for the purpose of watershed hydrologic modeling for nonpoint and point-source applications. Highly accurate elevation data would also allow features that currently appear spurious in elevation datasets to be identified and employed in a given project, such as wetland function or wetland mitigation studies.

Program: Geologic Mapping	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
                 Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Geologic Mapping:** A major program is to automate the identification of impervious surfaces and of structures. The LiDAR will validate data from other sources and improve the overall accuracy of the product. In some cases, Quality-Level-2 may be needed in small areas (i.e. square miles) to capture the ground in heavily forested steep sloped areas and in the complex hydrologically/geologically Great Lakes Coastal region and to capture stream channel bathymetry. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Currently do no have enhanced elevation data statewide. Geologic features and contacts could be identified with precision, rather than the degraded scale currently used. Enhanced elevation data would negate the need to take survey-grade equipment to the field to accurately locate geologic contacts or faults, and bathymetric data availability would allow contacts to be extrapolated across the landscape with greater certainty. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported The quality of products delivered would increase by using LiDAR data. More accurate geologic maps will support many different customer needs with respect to natural or industrial resources assessment, aquifer sensitivity evaluation, seismic hazards analysis, mine reclamation studies, geologic framework modeling, karst hazards analysis, and so on. **Estimated Strategic Benefits:** Major Public safety will have improved response times potentially saving lives. Many public safety benefits could be realized by improved geologic maps; however, the mere presence of improved topographic data does not mean that the geologic maps would be produced in an automated way. But the improved precision for maps completed using the improved topographic base would enhance the uses and users of the products. Many accurate surficial geologic derivative products could be developed that would be protective of the near-surface environment, such as groundwater and wetlands protection.

Program: State Road Infrastructure	Business Use: 21. Infrastructure and Construction Management

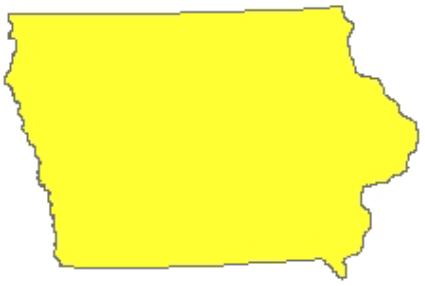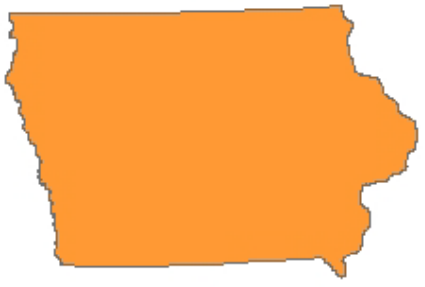|	Road Development:
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported
	Large project areas are better managed, higher accuracy in cut/fill calculations and estimates. Enhance elevation data could allow for standardization of practices in hydraulic engineering and earthwork design by using a standard data source across the state on all size projects. Smaller projects that may not be able to afford full topographic studies could also enjoy the benefit of statewide highly accurate elevation/surface data.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Benefits to larger projects that have a separate LiDAR contract could be realized on many more of the smaller projects that currently rely on traditional survey methods or older existing datasets.
Quality Level:	**Estimated Strategic Benefits:** Moderate
1 2 3 4 5	Could show more statewide savings on smaller projects as well as larger design/construction projects.
Update Frequency: 2-3 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, in some cases (i.e. Bridge construction).	

Local Functional Activities

None

Iowa (IA)

The State of Iowa's statewide LiDAR program was completed within last year, with contracting assistance from the USGS Mid-Continent Mapping Center, under their CSC-2 program. Iowa's LiDAR program was funded with $4.3 million from the Iowa Dept. of Natural Resources, Iowa Dept. of Agriculture, the state office of the USDA Natural Resource Conservation Service and the Iowa Dept of Transportation. Nominal horizontal resolution was 1.4 meters with a vertical accuracy of 18.5 cm RMSE (quality level 3), covering and area of 56,000 square miles, acquired over a 4 year period.
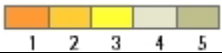
Beginning in 2006 when the project began, users have been steadily increasing their use of LiDAR elevation data and seeing significant benefits. The raw data and derivative products are freely shared with any user including city, county, states and federal agencies and private engineering firms. Benefits and cost savings have been seen in numerous areas including: reducing the cost of planning topographic surveys for designing construction projects, county planning for wind farm and industrial siting, city water and sewer improvement projects, and emergency and disaster management. The savings are being realized by state and federal project partners, county engineers and other county offices, transportation agencies, and private businesses. These benefits are backed up by a recent Return on Investment study done by the Iowa Geographic Information Council that showed an estimated benefit of $5 Million per year. Iowa's LiDAR data is being used as the basis for new approximate floodplain maps for the entire state, sparked by the massive damage from the 2008 floods.
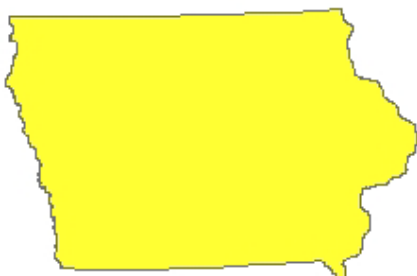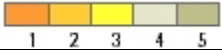
While quality level 3 LiDAR is adequate for most users in the state at this time, many users in the future will likely desire higher accuracy and a denser point cloud, especially for construction surveys and urban infrastructure design. For state projects, communication with the data contractor and quality control were the main issues affecting the project. The state of Iowa urges close attention to establishing good communication between state and local partners, the contractor and federal partners when setting up a national enhanced elevation program, especially to avoid data quality issues during the acquisition and processing of the data.
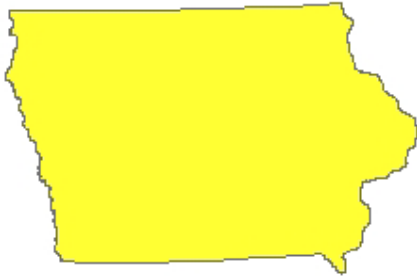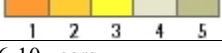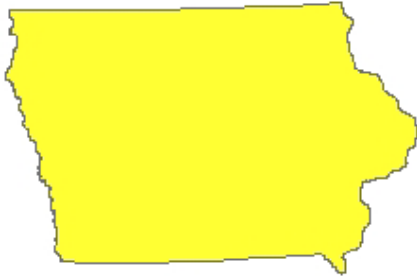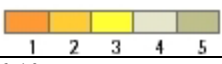
State Functional Activities

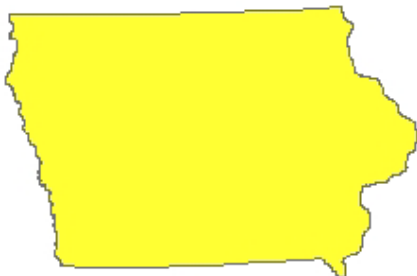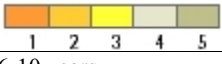| Program: Emergency Preparedness	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response
  Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Flood Risk Mapping:** Editor's note: While Iowa Homeland Security and Emergency Management Division only describes minor program impact, Iowa would not be doing a complete revision of its floodplain mapping program without the avaiability of statewide LiDAR. Ultimately this will provide millions in benefits due to lives and property not lost during future flooding events. **Estimated Annual Operational Benefits:** Minor; Dollar Value Not Reported None of the programs see a monetary benefit from the LiDAR data in Iowa. Iowa uses what is available. **Estimated Annual Customer Service Benefits:** Minor; Dollar Value Not Reported State decision makers and operations staff benefit greatly from the best "products" available. **Estimated Strategic Benefits:** Minor Better products aid improved decision making.

Program: Transportation - office of location and environment	Business Use: 21. Infrastructure and Construction Management
  Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Bridge replacement cultural survey and wetland mitigation:** Iowa Department of Transportation Office of Location and Environment (OLE) studies factors affecting bridge replacements. Bridge replacements require cultural surveys (archeaology) that cost $25,000 on up. OLE does wetland mitigation studies as well. LiDAR is used to replace construction surveys on 8-10 projects per year. **Estimated Annual Operational Benefits:** Major; $150,000 On weekly basis they use LiDAR to determine the need for a cultural survey. Using minimum of $2,500 per survey x 50 weeks = $125,000 minimum saving due to LiDAR. Wetland mitigation ground surveys $2,500 per site, 10 sites per year, about $25,000 savings. **Estimated Annual Customer Service Benefits:** Not Reported; Dollar Value Not Reported Benefits Description Not Provided **Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided

Program: Transportation - Office of Design	**Business Use:** 21. Infrastructure and Construction Management
	Various Planning Studies: Corridor studies done by the Iowa Department of Transportation Office of Design, Planning Section; borrow designs by the Soils Section; Rush projects for the Road Design Section and hydraulic studies for the Bridge Section.
	Estimated Annual Operational Benefits: Major; $100,000 LiDAR replaces standard photogrammetry products for Corridor studies @ $70,000 per year, digital orthos for borrow studes @ $6,000 per year, rush projects $1,800 per year and hydraulic studies it saves $20,000 per year
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: County and City government for 90 small rural counties	**Business Use:** 21. Infrastructure and Construction Management
	Road maintenance, planning and design (county engineer); floodplains, wind farms and other zoning apps (county planning and zoning), and city engineers:
	Estimated Annual Operational Benefits: Major; $2,250,000 For 90 smaller counties, estimate $2,250,000 per year savings. Broken down at $10,000 for road design, gravel grading, culvert design and other projects; floodplain permiting, windfarms and other zoning ($10,000 each), and small cities doing water treatment improvements, streets, etc ($5,000)
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: no	

Program: County and City Government for 9 large counties	**Business Use:** 21. Infrastructure and Construction Management
	Road maintenance, planning and design (county engineer); floodplains, wind farms and other zoning apps (county planning and zoning), and city engineers:
	Estimated Annual Operational Benefits: Major; $1,350,000 For large counties, estimate $1,350,000 per year savings. Broken down at $90,000 for road design, gravel grading, culvert design and other projects; floodplain permiting, windfarms and other zoning ($25,000 each), and large cities doing water treatment improvements, streets, etc ($25,000)
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: no	

Program: Natural Resources	**Business Use:** 1. Natural Resources Conservation
	Floodplain permitting, construction surveys, and other natural resources applications:
	Estimated Annual Operational Benefits: Major; $452,500
	Using LiDAR to determine elevations in floodplains for permits (saves permittee surveyors costs, $250 each x 50 per year); replace topographic surveys for Iowa Department of Natural Resources construction projects (130 per year at $3,000 each); miscellaneous uses $50,000 per year.
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported
	Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: no	

Program: Agriculture and Soil Conservation Agencies	**Business Use:** 1. Natural Resources Conservation
	Construction Projects: Construction projects: terraces, water retention structures, farm ponds, culverts and other projects requiring a topgraphic survey
	Estimated Annual Operational Benefits: Major; $1,000,000
	Benefit calculated at 1 percent of total construction cost $100 million per year
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported
	Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

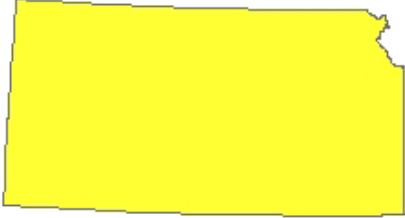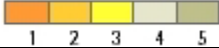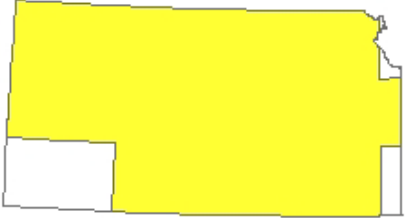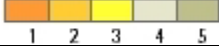Included with state Functional Activities above

Kansas (KS)

The State of Kansas has focused on enhanced elevation data for several years. High-resolution digital elevation data were identified as the highest programmatic goal in the Kansas GIS Strategic Plan. In 2008, the GIS Policy Board adopted a business plan for Improved Elevation Data for Statewide Applications. The Kansas GIS Policy Board Elevation Team also recently completed a State of Kansas LiDAR Implementation Plan.
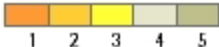
Kansas has been successful in creating several multi-agency partnerships among State, federal, and local governments to acquire LiDAR data. To-date, LiDAR data acquisition is underway or completed for 34 full counties and 7 partial counties for a total of 24,957 square miles or approximately 30 percent of the state.
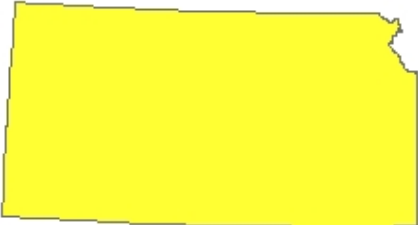
All of the LiDAR data in Kansas is at least quality level 3. The more recent and current projects are done to the vertical accuracy of USGS LiDAR Specification version 13, which states 12.5 cm root-mean-square error in open terrain. While seven of the nine business uses listed in this report indicate that quality level 3 would be adequate, Kansas would prefer a vertical accuracy that falls between quality level 2 and 3 to match the USGS specification.

The nine functional activities provided by several State agencies demonstrate the current and future applications of LiDAR throughout Kansas, and show the continued need for state-wide high-resolution elevation data.

State Functional Activities

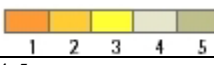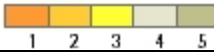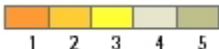| Program: Emergency Management, Floodplain Management, Flood Inundation Mapping, Bridge and Road Design	Business Use: 14. Flood Risk Management
Quality Level: (color scale 1 2 3 4 5)	**Flood Risk Mapping, Hazard Identification and Hydrologic Analysis:** This includes flood risk mapping for FEMA as conducted by the Kansas Dept of Agriculture, flood inundation mapping by the Kansas Biological Survey, hazard analysis by Emergency Management, and hydrogic analysis for roads and bridges by the Kansas Dept of Transportation. Hydrologic analysis includes the determination of watershed characteristics in support of highway drainage and structure sizing, identification of channel alignment changes (with surveys at regular intervals), identification of potential flooding locations.
	Estimated Annual Operational Benefits: Moderate; $2,000,000 Having updated and enhanced elevation data statewide has the potential to increase the efficiency of hazard analysis. The State Hazard Mitigation plan currently costs State 2.5 million every 5 years, with better data it might be possible to save a majority of the cost. More accurate maps will allow for the development of more timely and accurate post-flood damage assessments. Additionally, LiDAR is well suited for hydrologic analysis in support of transportation infrastructure design, dam breach analysis, and flood inundation mapping.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported High quality, statewide data would allow state agencies to better prepare for, respond to, and mitigate damages from disasters, and improve derived products from hydrologic modeling.
	Estimated Strategic Benefits: Major With enhanced elevation state-wide, crucial decisions can be made with accurate, current data, allowing for the best protection of life and property. Accurate data help minimize the economic and environmental impacts of disasters.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes for bounding watersheds.	

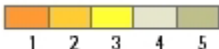| Program: Federal Reservoir Sustainability Initiative	Business Use: 2. Water Supply and Quality
Quality Level: (color scale 1 2 3 4 5)	**Watershed Assessment:** This includes assessment of watersheds above federal reservoirs for reservoir sustainability as led by the Kansas Water Office. Watershed assessment includes wetlands identification, streambank stabilization, soil erosion, and reservoir volume analysis.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported LiDAR provides more presise methods for analysis that will extend the life of reservoirs used for public water supply.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Enhanced elevation data will be used to evaluate and prioritize watershed restoration, stream bank restoration, and wetland area enhancement projects. The result will be policies and programs that improve the quality of Kansas water supply and ensure that the state has the quantity of supply needed to meet the needs of customers (comprising about 75 percent of the State's population).
	Estimated Strategic Benefits: Moderate Results should bring greater awareness of the value of state federal reservoirs and a greater sense of individual responsibility in treatment of the watersheds above the reservoirs.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes for bounding watersheds.	

Program: Training, Safety, and Readiness	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response

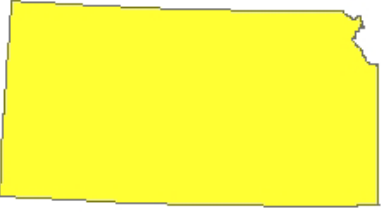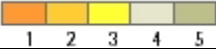|	**Geographic Visualization:** Geographic Visualization includes line-of-sight analysis and creation of 3-D models for homeland security, training, and disaster response activities conducted by the Kansas Adjutant General's Department, the Kansas Division of Emergency Management, and the Kansas National Guard.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Enhanced elevation would be used to provide more realistic data for training, increased ability to analyze safety concerns, perform line-of-sight analysis based on real world conditions, map obstacles to flying, and create 3d models of an area.
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported Enhanced elevations gives the state the ability to visualize and analyze a better model of the real world, which leads to better products, training, and understanding.
Quality Level:	**Estimated Strategic Benefits:** Moderate With improved safety and 3D visualization there is less potential for accidents. 3D visualization can also be used to help respond to and prepare for potential terrorist threats.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, the Kansas City metro area includes Jackson, Cass, Clay, and Platte counties in Missouri.	

Program: Wetlands	Business Use: 1. Natural Resources Conservation

	Wetland Resource Inventory and Management: This includes wetland identification and inventory for ecological function, hydrological function, and resource management for the Kansas Biological Survey. The importance of high quality, high resolution elevation data for wetland identification cannot be overstated. Existing wetland inventory data for Kansas are widely known to be highly incomplete and inadequate for reliable research sampling design in field studies. In addition to being a rich source of biodiversity, wetlands serve a wide variety of important ecological and hydrological functions, including runoff filtering, groundwater and aquifer recharge, and floodwater storage during flood events. These functions and others cannot be properly understood and evaluated without more complete and more accurate wetland data, and the most reliable and efficient way to improve the state's wetland inventory is using LiDAR-based elevation data.
	Estimated Annual Operational Benefits: Major; $50,000 High quality data greatly facilitate wetland identification and inventory development, ecological analysis and assessment, and hydrological analysis and assessment. Most of these benefits are only realizable using data with at least the specified quality level.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported High quality data improve the accuracy and detail of inventory tabulations and ecological and hydrological analyses, which increases the utility of (and confidence in) these products for end users. Most such benefits are only realizable using data with at least the specified quality level.
Quality Level:	**Estimated Strategic Benefits:** Major High quality data with complete coverage will allow the existing public, social and/or political benefits to extend across the entire area of interest, and would also create additional opportunities for wide area studies. These wide area studies will improve citizen awareness and also increase educational opportunities for students in ecology, biology, and environmental studies. Statewide assessments will facilitate improved wetland management decision making at the state level, and will also help the state better understand the role of wetlands in groundwater recharge and floodwater storage for flood mitigation.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Infrastructure planning	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: [color scale 1 2 3 4 5]	**Infrastructure Planning and Design:** This includes highway planning and preliminary design for the Kansas Dept of Transportation, and construction and facilities mangement for the Kansas National Guard.
	Estimated Annual Operational Benefits: Moderate; $524,000 Accurate elevation data can be used for preliminary highway alignment and design, estimation of earthwork quantities, and potential environmental impacts on construction projects.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported LiDAR allows for more cost effective work in the office and less costs for surveying contracts.
	Estimated Strategic Benefits: Moderate LiDAR improves the ability to predict enviromental impact and remediation.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Geologic Mapping and Geotechnical Services	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: [color scale 1 2 3 4 5]	**Geologic Mapping and Geotechnical Evaluation:** This includes geologic mapping, geologic hazard identification, and geotechnical evaluation for highway construction by the Kansas Geological Survey and Kansas Dept. of Transportation.
	Estimated Annual Operational Benefits: Moderate; $5,000 Elevation data reduces the time required to generate data features for mapping products and improves overall data quality. It also provides enhanced feature detection capabilities for identification of areas of subsidence near salt mines, karst formations, and other areas of interest.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Reduction in time for local surveys and field data collection. Allows for high-resolution derivative products (hillshade, contour lines, etc) to enhance the quality of cartographic products.
	Estimated Strategic Benefits: Moderate Improvements to the quality of geologic databases and maps would provide better information to the scientific community as well as policy makers. Enhanced feature detection of geologic hazards could also provide valuable information to emergency management personnel and public safety. Improve public safety by identifying hazardous ground subsidence that could lead to highway embankment failure.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Forest Inventory for resource management and wildlife habitat improvement	**Business Use:** 5. Forest Resources Management
	Forest/Native Vegetation Management: This includes assessment, inventory, and management of forest resources and grassland by the Kansas Forest Service and the Kansas Biological Survey. LiDAR-based bare-earth and surface elevation models provide excellent tools for woodland patch description, allowing for the estimation of biophysical properties such as volume and woody biomass, density, age, percent canopy cover, canopy height, and areas of forestland. Such information will become increasingly important as resource management and carbon budgeting become more pressing matters at various levels of government. Woody encroachment on grassland can also be identified in support of rangeland management planning.
	Estimated Annual Operational Benefits: Moderate; $100,000 LiDAR would provide the ability to assess forest resources across a much larger geographic area than could be accomplished manually, and has the potential to provide local data at a level that does not currently exist through traditional inventory and assessment methods.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported High quality data improve forest inventory estimates and land cover change assessments, which faciliate the development of more accurate forest resource managment decisions by state officials and land owners.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major The ability to more accurately and regularly quantify the size, condition and issues associated with forest and agroforestry resources is important for environmental assessment. Wide area studies will improve citizen awareness and increase educational opportunities for forestry and ecology students, and will foster improved forest management decision making at the state level.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, seamless LiDAR coverage across state boundaries is needed to address regional issues.	

Program: Fire Management Program	**Business Use:** 16. Wildfire Management, Planning, Response
	Wildland Fire Management: This includes determination of wildland fire risk and occurance based on fuel loading within wildland urban interface areas by the Kansas Dept. of Wildlife, Parks and Tourism.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported LiDAR has the potential to help identify areas of extreme wildland fire risk based on fuel loading data.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate Allows the state to be proactive in reducing fuel loads where fire risk is significant due to fuel loading (eastern red cedar).
Update Frequency: Annually	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, for partnerships across State boundaries.	

Program: Improvement of Wildlife Habitat on Private And Public Lands	**Business Use:** 7. Wildlife and Habitat Management

	Wildlife Habitat Management: This activity includes improving wildlife habitat based on vegetative structure on private and public lands for the Kansas Department of Wildlife, Parks and Tourism.
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Kansas has not used LiDAR data yet, so is not sure about program impact. It is hoped that LiDAR Point Cloud data or digital surface model would provide the ability to determine existing vegetation for wildlife habitat. LiDAR has not yet been used for this activity, so the state is not sure of the benefit amount.
Quality Level:	**Estimated Annual Customer Service Benefits: Not Reported**; Dollar Value Not Reported LiDAR would improve the ability to target types of wildife habitat needed in certain areas of the state.
Update Frequency: > 10 years	**Estimated Strategic Benefits: Not Reported** LiDAR would improve understanding of existing wildlife habitats.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Local Functional Activities
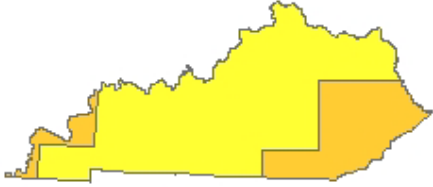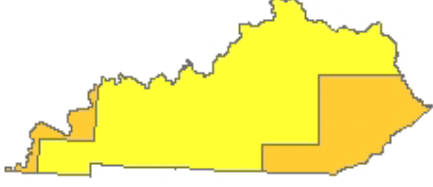
City Government -- City Of Wichita	
Program: Storm Water Management	**Business Use:** 14. Flood Risk Management
Functional Activity: Stormwater Management, Flood Modeling, & Levee Certification	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $750,000 LIDAR has become and indispensable tool for daily operations in the Wichita Stormwater Management & Engineering. Flood modeling for 300 detailed miles at $2500 per mile saves $750,000 in surveying costs.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; $275,000 Wichita responds to approx 400 drainage complaints per year. Most complains are now resolved in the office saving 4 hours of surveying at $110/hr. Additionally, approx 300 flooplain determinations are done for citizens. LIDAR saves 3 hours of surveying at $110/hr totaling $99,000
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	LIDAR was used to certify levees that protect $6 billion in property. The potential insurance cost had the levees not been certified is unkown.
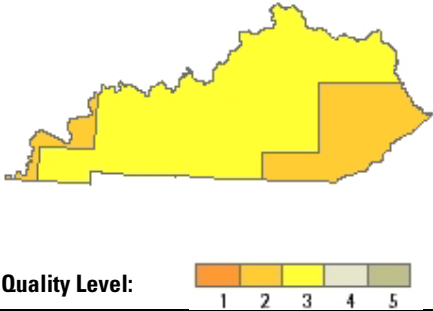
County Government -- Jefferson County	
Program: County Government	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Orthoimagery Procuction	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $13,000 Having LIDAR data since 2006 has provided a usable DEM for ortho imagery production in 2009 and future acquisitions. Cost savings are approximately $40,000 per acquisition every 3 years.
Update Frequency: > 10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Get customer requests to see elevation data for home buiiding, surveying, utility projects, and quarry activities.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Providing people with accurate data during a decision making process is always a benefit.

Kentucky (KY)

The State of Kentucky has requirements for Quality-Level-2 (supports a 1-foot contour interval) and Quality-Level-3 (supports a 2-foot contour interval) LiDAR acquistions, including collection of bathymetry data for stream channel cross-sections. LiDAR derived enhanced elevation data will support Hazard Flood Inundation Mapping, FEMA RISK Floodplain mapping, Transportation Mapping, Surface and Ground Water Quality and Assessments, and Geologic Mapping. Over the next 3 years (beginning in 2012) Kentucky will be collecting LiDAR derived elevation data for the entire state.

State Functional Activities

Program: Risk Map	Business Use: 14. Flood Risk Management
  Quality Level: **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, for edgematching, watershed delineation, stream flow connectivity.	**Flood Risk Mapping:** Quality-level-2 data will be required in steep forested topographies to capture the ground and possiby to capture stream channel bathymetry and/or for very flat, hydrologically complex floodplains. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Better identification of flood hazards, creation of flood depth grids, improved hydraulic modeling. Enhanced mitigation alternatives. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Provide ranchers on the east side of the state with better plan reviews. Provide the Soil and Water Conservation Districts on the east side improved analysis of erosion/sediment. Additional coordination between user agencies. **Estimated Strategic Benefits:** Major Increased awareness, enhanced credibility of Risk MAP program.

Program: State Road Infrastructure	Business Use: 21. Infrastructure and Construction Management
  Quality Level: **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Bridge construction	**Transportation Infrastructure Development and Management:** Quality-level-2 data will be required in steep forested topographies to capture the ground and/or for very flat, hydrologically complex floodplains. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improves planning, hydrologic modeling, and Phase 1 design work for Highway Design. Expedites design build process. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Detailed elevation data cuts down on time and manpower needed for design build. **Estimated Strategic Benefits:** Major Benefits Description Not Provided

Program: Geologic Mapping	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation
	Geologic and Hazard Mapping: Quality-level-2 data will be required in steep forested topographies to capture the ground and/or for very flat, hydrologically complex floodplains.
	Estimated Annual Operational Benefits: Moderate; $100,000 More accurate landform visualization and analysis for surficial geologic mapping and landslide identification. Improved detail and accuracy of mapped landforms and deposits.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More accurate and detailed map products, improved efficiency of production.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Moderate Improved awareness of geologic hazards, improved knowledge of environmental context, improved basis for policy decision making.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

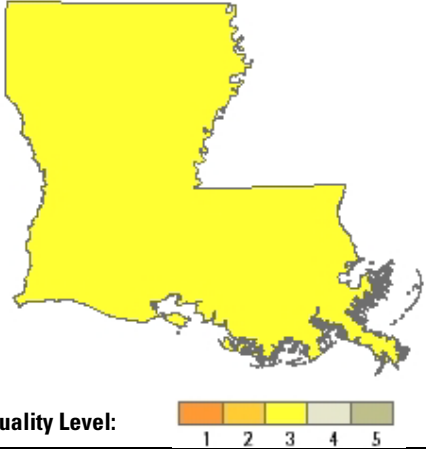| Regional Government -- Louisville And Jefferson County Metropolitan Sewer District / Louisville/Jefferson County Information Consortium	
Program: Basemap update	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Basemap Maintenance	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $300,000 LiDAR used as control for aerial orthoimagery and replaces photogrammetric compilation of mass points for update of 2-foot terrain contours. Acquisition of LiDAR and breaklines would allow in-house generation of updated terrain contours. LiDAR and terrain data would be available for use by local agencies and consultants for myriad economic development projects as well as transportation and utility infrastructure management.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided LiDAR and terrain data could be updated internally more efficiently and made available for use more rapidly than via contracted photogrammetric services. Updated contours and terrain datasets would be accessible to local agencies and the public via web services. Elevation data is crucial for local stormwater management, development review, flood insurance determinations, property assessment and hazard mitigation activities.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Terrain data is shared with local universities and public schools for GIS and environmental education, as well as the private sector to support economic development, planning and construction operations. Terrain data is and essential part of our community's basemap and is available to the public via web services. Terrain data is crucial to local development, stormwater management and various emergency management operations.

Regional Government -- Msd/Lojic	
Program: LOJIC GIS	**Business Use:** 14. Flood Risk Management
Functional Activity: Floodplain/Stormwater Management	

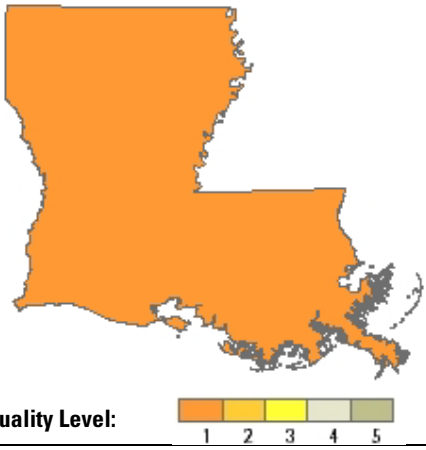|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $600,000 Accurate terrain data from which to derive watershed delineation, flow models, up-to-date floodplain limits, development controls for slope. Update of existing topographic data, development change detection, automated feature extraction, web-based access to regional terrain data.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Rapid generation of high accuracy local flood models and disimination of information to emergency responders and the public. Updated floodplain delineation toward most effective flood insurance rolls; generation of terrain datasets for ready access to scalable elevation and slope surfaces via the community's shared GIS. Local agency and public access to accurate, up-to-date terrain data for local stormwater management and floodplain delineation.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Updated floodplain delineation toward most effective flood insurance rolls; generation of terrain datasets for ready access to scalable elevation and slope surfaces via the community's shared GIS. Accurate terrain data to be shared with local university and public schools, emergency responders.

Louisiana (LA)

The State of Louisiana has requirements for elevation data which meet the business uses and functional requirements for sectors including oil and gas, homeland security, flood risk mapping, wildlife and habitat mapping, bridge and road design, coastal restoration and management, nonpoint source pollution modeling, and stream management. The major terrain types in Louisiana are wetlands, forested, agriculture, and developed. The terrain type and application of the elevation data must be considered when determining requirements for quality level. LiDAR data is used extensively in the energy sector (oil, gas, and minerals) for risk management. Louisiana's statewide LiDAR project started in 2000, largely in response to the high flood loss rates reported by the Federal Emergency Management Agency (FEMA)'s National Flood Insurance Program and the private insurance industry in the state. Following Hurricane Katrina, FEMA used the data to estimate flood damage throughout the impacted areas of Louisiana. LiDAR data is needed to improve models that predict the capacity of floodways during events such as the spring 2011 floods. The state also has LiDAR requirements for natural resource applications, including modeling plant and wildlife habitats, modeling forest canopies, and constructing water quality management projects.
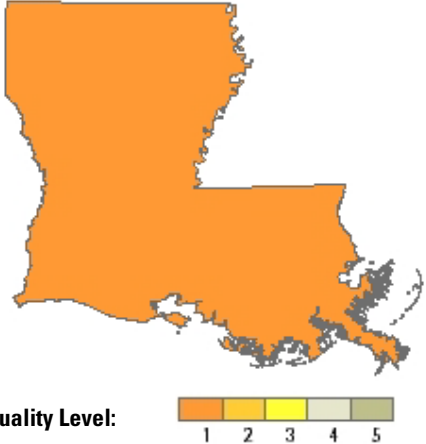
State Functional Activities

Program: Technical Assistance Program within the Louisiana Oil Spill Coordinator's Office	Business Use: 12. Oil and Gas Resources
Quality Level: 1 2 3 4 5 **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes, at the Watershed level	**Building Geospatial Infrastructure for Oil Spill Prevention, Planning, Response and Damage Assessment:** Based on Hurricane Katrina the LA LIDAR dataset, through cost avoidance, had a 10:1 return on investment. LA LiDAR dataset offered FEMA significant cost savings in performing damage assessment and timely assistance to citizens.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Performing oil spill risk assessment is one of the major operational benefits. Updating of an oil spill risk assessment would provide a moderate (current) benefit by allowing the state to see changes in potential risks.
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Updating of an oil spill risk assessment would provide public and private sector entities with quantifiable data allowing the state to see changes in potential risks, allowing for improved oil spill prevention and contingency planning. On average, an oil spill costs $5,000,000; therefore alleviating one (1) oil spill by using LIDAR based topography combined with flood modeling provides a significant positive environmental impact.
	Estimated Strategic Benefits: Major The current benefits have been defined fairly well. Social benefits include improved assessment in hurricane flood modeling leading to improved evacuation planning for citizens. Improved flood modeling allows industry to better understand the oil spill risk from storm surges allowing the public and private sector to avoid (prevent) devastating environmental injury.

Program: Wildlife Division GIS Program	**Business Use:** 7. Wildlife and Habitat Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 2-3 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Flood Risk Mapping, Habitat Terrain Evaluation:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Ability to gain elevation data without field surveys. Ability to map areas estimated to be flooded by events such as the Mississippi River flooding event of May 2011. LiDAR at a higher resolution would allow better habitat terrain mapping and modeling of flood events as well as visualization of textured environments such as forests. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Biologists supported by the GIS Section would be better able to perform their duties managing habitats throughout Louisiana. Customers often request products including LiDAR elevation at the existing available resolution. Higher resolution is often requested. **Estimated Strategic Benefits:** Major Additional ability to accurately model, map and manage public Wildlife Management Areas. Any tool that allows the state to better manage LA public Wildlife Management Areas is an asset to state programs.

Program: Not Reported	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Road and Bridge Design:** **Estimated Annual Operational Benefits:** Not Reported; Dollar Value Not Reported Benefits Description Not Provided **Estimated Annual Customer Service Benefits:** Not Reported; Dollar Value Not Reported Benefits Description Not Provided **Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided

372

Program: Office of Coastal Management	Business Use: 4. Coastal Zone Management
	Enforcing coastal use regulations:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	According to Louisiana Revised Statute 49:214.34 Activities not requiring a coastal use permit A. The following activities shall not require a coastal use permit. (1) Activities occurring wholly on lands five feet above mean sea level except when the secretary finds, subject to appeal, that the particular activity would have direct and significant impact on coastal waters. LIDAR is a very useful starting point in determining whether or not coastal use permit applications meet this requirement. LIDAR information is the starting point when it comes to making the best decisions on where to construct a water quality management project. Due to the sediment distribution and accumulation during high water events across the Atchafalaya Basin Floodway System the most effective means of tracking the changes in elevation in this vast freshwater swamp is through LIDAR. LIDAR allows the Atchafalaya Basin Program and its Technical Advisory Group to identify the feasibility and cost effectiveness of proposed projects in a very efficient and effective manner.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Benefits Description Not Provided
Quality Level:	**Estimated Strategic Benefits:** Major
	Benefits Description Not Provided
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Program: Nonpoint Source Pollution Program	Business Use: 2. Water Supply and Quality
	Nonpoint source pollution modeling:
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported
	Elevation data is used to model nonpoint source pollution runoff in impaired watersheds. The results are included in watershed implementation plans which are then forwarded on to watershed coordinators and the Department of Agriculture and Forestry for implementation. High-resolution land use data, including crop type, is being collected. This data, along with the Natural Resources Conservation Service Soil Survey Geographic Database detailed soils data, complement the high-resolution LiDAR data.
Quality Level:	**Estimated Strategic Benefits:** Not Reported
	Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Homeland Security and Emergency Preparedness	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response

	Developing appropriate geospatial base layers for emergency preparedness, disaster response and hazard mitigation analysis.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported During operational phases LiDAR is used to assess potential flood concerns and to support modeling operations.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Provides primary basis for identification of surface elevations needed for all hazard mitigation projects submitted to FEMA.
Quality Level:	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided
Update Frequency: 2-3 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

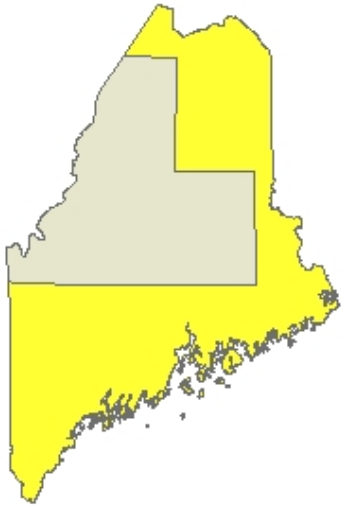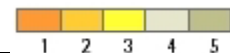| **County Government** -- Terrebonne Parish Consolidated Government	
Program: GIS Mapping	**Business Use:** 4. Coastal Zone Management
Functional Activity: Hydrologic And Hydraulic Modeling (Used In Flood Risk Mapping)	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Establishing Flood Zones and base floor elevation data and levee height requirements, improved base floor elevation requirements
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Online elevation data for public use
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Aid in locating roads that flood during hurricanes

County Government -- Terrebonne Parish Consolidated Government	
Program: GIS Mapping	**Business Use:** 14. Flood Risk Management
Functional Activity: Hydrologic And Hydraulic Modeling	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Data would be used in flood plain mapping
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Updated LIDAR data could be used for obtaining online data
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Improved levee design

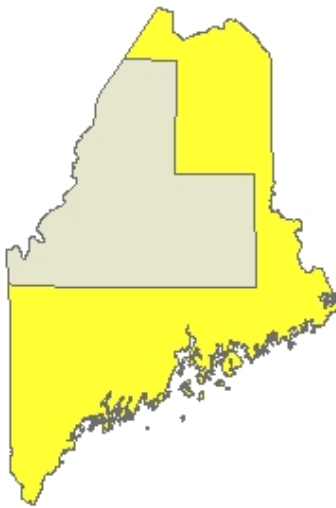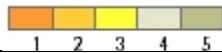| **County Government** -- Terrrebonne Parish	
Program: Not Provided	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Firm Modeling	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

Maine (ME)

Maine is 33,215 square miles in size with topography ranging from the western mountains to the sandy southern coastal plain to the rocky shoreline "down east". The highest elevation is Mount Katahdin at 5,268 feet and the lowest points are sea level where Maine meets the Atlantic Ocean. It is a rural state with approximately 1.3 million residents. 50 % of the state consists of unorganized territories having a total year round population just over 20,000. This area includes the western mountains and much of the ownership is in the form of very large tracts of land mainly for forestry related operations. Accurate elevation data is important to many programs but based on the current priorities the following activities are the most important: flood risk mapping, watershed delineation and hydrography mapping and mapping landslide hazards away from the coast. Currently 10 meter DEMs are available for the entire state from USGS. 5 meter DEMs are available statewide for purchase from Intermap with licensing restrictions. LiDAR data at accuracies ranging from 15 to 18.5 cm RMSEz is available for approximately 10% of the state primarily as a result of the New England LiDAR project funded in part with American Reinvestment and Recovery Act Funds. 2 meter DEMs or better are available for these areas. The 2008 Maine GIS Strategic Plan identifies the acquisition of accurate elevation data as a priority.

State Functional Activities

Program: mapping hydrography, watershed boundaries, coastline, and offshore	Business Use: 1. Natural resources conservation
Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Need data for watersheds spanning the New Hampshire and Canadian border	**Watershed delineation and hydrographic mapping:** Improvements in delineating watersheds and hydrography including very detailed delineations of small watersheds in urban areas for stormwater managemnent. **Estimated Annual Operational Benefits:** Major; $500,000 Those benefits are what the state realizes now for the small areas in which have LiDAR. Same benefits would be expanded geographically. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported These benefits would continue, but would cover a larger area. **Estimated Strategic Benefits:** Major The benefits would be increased to a larger geographic area.

Program: Geologic hazard assessment	Business Use: 9. Geologic resource assessment and hazard mitigation

	Geologic hazard mapping: Assessments of landslide hazards away from coastal areas including more accurate mapping of historic landslides in key areas.
	Estimated Annual Operational Benefits: Not Reported; $200,000 Highly improved assessments on landslide hazards away from coastal areas. More accurate mapping of historic landslides in key areas.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Highly improved assessments on landslide hazards away from coastal areas. More accurate mapping of historic landslides in key areas.
Quality Level:	**Estimated Strategic Benefits:** Major Greater ease of identifying/mapping historic landslides - improved presentation to public.
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Not Provided	

Program: Maine Flood Plain Management Program	Business Use: 14. Flood risk management

<table>
<tr><td rowspan="6">

Quality Level:

1 2 3 4 5</td><td>Flood Risk Mapping: The Maine Floodplain Management Program (MFPM)working with FEMA's Risk MAP Program is focused on bringing outdated and invalid flood studies into compliance with scientifically-proven methodologies, including re-delineating floodplain boundaries using high-resolution topographic data. MFPM will use this new data to not only improve its floodplain mapping inventory, but also to develop new interactive mapping products for communities to utilize when communicating risk. These products require accurate topographic and scientific studies. The FEMA business model quantifies cost versus risk levels to determine how to prioritize new and revised mapping. Historically, when this type of qualifying criteria is used, however, Maine loses out to more densely populated areas of the country.</td></tr>
<tr><td>Estimated Annual Operational Benefits: Not Reported; $1,200,000
If LiDAR products were available off the shelf to support Maine's Flood Plain Management Program, the Program would likely leverage $12,000,000 of FEMA money over a ten year period of remapping. This would improve Maine's ability to produce flood maps, protect lives and minimize property and public infrastructure damage.</td></tr>
<tr><td>Estimated Annual Customer Service Benefits: Not Reported; $720,000 to $3,600,000
Experience shows that 25% of properties receiving disaster relief are not in mapped floodplain. Maine has nearly 9,000 flood insurance properties and the average home value is $160,000 in todays market. 2,250 properties across the state ae estimated to be at risk in the event of a 100 year flood (i.e., average of 22.5 homes/year). Structure damage ranging from 20% to 100% of property values are possible which would result in losses of $72 to $360 million dollars over a 100 year period. Mortgage companies, real estate, insurance companies etc. use better data to make better decisions</td></tr>
<tr><td>Estimated Strategic Benefits: Not Reported
Having reliable data to make sound economic development and planning decisions is the key to building a sustainable community. Currently thousands of acres of land are mistakenly identified as being in a mapped floodplain when they are not. Conversely thousands more are not mapped in when they should be and development activity is allowed in these high risk areas. Knowing the flood risk mitigates potential loss of life and property damage.</td></tr>
</table>

Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program once nationwide information has been collected once.	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Not Provided	

Local Functional Activities

City Government -- Town Of York	
Program: The Town of York Comprehensive Plan is the driving force behind the need to come up with a better methodology for planning with the Town of York.	**Business Use:** 21. Infrastructure And Construction Management

Functional Activity: Stormwater Mapping And Modeling For Low Impact Development Analysis	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Good elevation data has a much greater use than it's original intent and is integral to assisting people with visualizing what maps are trying to demonstrate. Increased relevance and credibility in our methods of analysis.
Update Frequency: > 10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Again it is the ability to remain relevant and credible. The general reaction to the fact that the Town has elevation data is 'Wow, really!' It has identified us a professional and serious player in the GIS world.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Again it is the ability to remain relevant and credible. The ability to do our own analysis in-house has increased the ROI on the GIS system as it provides better data for decision making processes.

County Government -- Hampden	
Program: Comprehensive plan	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Municipal Mapping - Tax Parcels, Zoning, Building Footprints, Impervious	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided There is no good data available. Better data would help with businesses moving to town for site plan purposes, other town planning
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Engineers and surveyors that ask me for elevation data would actually be able to receive some, whereas right now I have none to give. no good data available
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Would help with site plans for developments no good data available

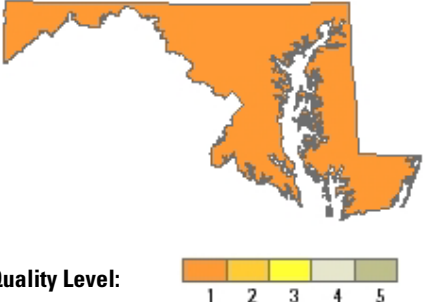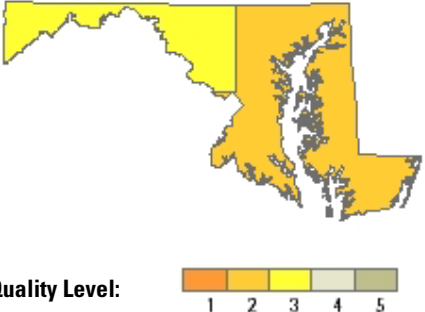| Regional Government -- Greater Portland Council Of Governments	
Program: Regional Sustainable Communities Planning Grant	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Transportation Planning, Transit Planning, Resource Conservation, Watershed Management, Coastal Hazard Evacuation Planning, Zoning, Landuse Identification, Etc	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided This is a regional comprehensive planning effort which include York and Cumberland Counties. The planning and analysis will integrate land use, transportation, infrastructure, watershed, natural resource preservation, housing and other land data to develop policies for sustainable development. Comprehensive regional data sets would reduce the time required for gathering the base data and conducting the analysis.
Update Frequency: > 10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided All the towns in York and Cumberland County will benefit from analysis and policy recommendations based on accurate data. None
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Visual planning and mapping tools that could be created to display existing and or future conditions would be very useful for informing and gathering plan support from the general public and elected officials. None

Tribal Functional Activities

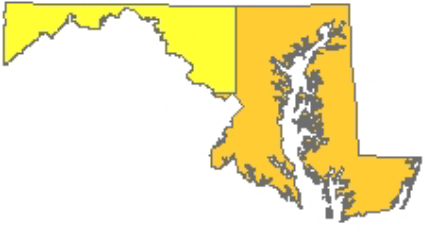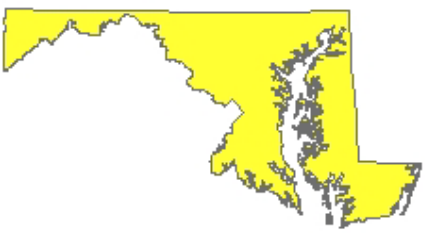| Penobscot Indian Nation	
Program: Forest Resource, Water resource, Wildlife, Fisheries, Air Quality	**Business Use:** 5. Forest Resources Management
Functional Activity: Forest Resources Management, Water Quality Monitoring	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Provided Forest management planning, water quality monitoring design, sampling management. Forest management planning, water quality monitoring design, sampling management
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Provided Timber type inventory, harvest management, water quality monitoring, remediation.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Hunting mapping, Camp mapping, student delivery, tribal event management, Clinic visitor locating

Maryland (MD)

The two main applications for LiDAR use are: 1) to manage, identify, analyze, monitor living resources especially with regard to Chesapeake Bay, and 2) Flood Risk mapping associated with Flood Insurance Rate Mapping and educating elected officials, planners, and code enforcement officers on the effects of possible sea level rise in coastal communities. Understanding flood hazards includes mapping natural features and man-made structures that may be impacted by sea level rise.
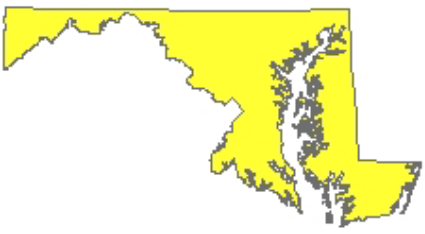
State Functional Activities

Program: Highway Storm Water Modeling	**Business Use:** 2. Water Supply and Quality
Quality Level: (1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes	**Storm Water Management/Total Maximum Daily Load (TMDL):** Storm water management, TMDL monitoring, transportation planning. State Highway Administration has never funded LiDAR acquisition. Fastest growing user of LiDAR in Maryland. **Estimated Annual Operational Benefits:** Not Reported; $200,000 Benefits Description Not Provided. **Estimated Annual Customer Service Benefits:** Not Reported; Dollar Value Not Reported Benefits Description Not Provided. **Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided.

Program: Chesapeake Bay Critical Area	**Business Use:** 1. Natural Resources Conservation
Quality Level: (1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Not Reported **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes	**To manage Natural Resources:** Department of Natural Resources programs supported: fisheries, submerged aquatic vegetation, sea level rise, near-shore critical area, coastal zone management, state lands management. The Maryland Department of Natural resources is the largest investor to date in LiDAR, acquiring nearly all counties with tidal waters. No funds to identify a second maintenance collection are identified. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Benefits Description Not Provided. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Benefits Description Not Provided. **Estimated Strategic Benefits:** moderate Benefits Description Not Provided.

Program: Flood Risk	Business Use: 14. Flood Risk Management
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Digital Flood Insurance Rate Map Generation (DFIRM):** FEMA Flood Risk Mapping includes short and long term coastal inundation and change. LiDAR is now a standard component of DFIRM content. It is essential to have LiDAR data to have an approved DFIRM.
	Estimated Annual Operational Benefits: Major; $40,000 Maintenance of FIRM and DFIRM.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Mitigation of flood damage, insurance claims.
	Estimated Strategic Benefits: Minor Flood losses in Maryland are not significant in the past 10 years. However, flood losses may increase over the next several decades as increases in sea levels compound flooding events.

Program: Property Value Assessment	Business Use: 22. Urban and Regional Planning
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**State Land Use and Regional Planning:** Maryland Department of Planning is interested primarily in parcels, and the value of structures on property. LiDAR is a great source for structures/buildings. Statewide planning issues are vetted here, such as Base Realignment And Closure planning at Aberdeen Proving Ground. LiDAR was used to plan for new residential areas.
	Estimated Annual Operational Benefits: Moderate; $200,000 Benefits Description Not Provided.
	Estimated Annual Customer Service Benefits: Moderate; $200,000 Benefits Description Not Provided.
	Estimated Strategic Benefits: Major Benefits Description Not Provided.

Program: Maryland Emergency Manangement Agency	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes	**Emergency Response Applications:** The Maryland Geospatial Information Officer (GIO) sits in the Department of Information and Technology. The GIO sees the many uses within the state and local government including the economic development/opportunity (wind power) and increasingly the emergency response sector.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided.
	Estimated Strategic Benefits: Minor Benefits Description Not Provided.

Local Functional Activities
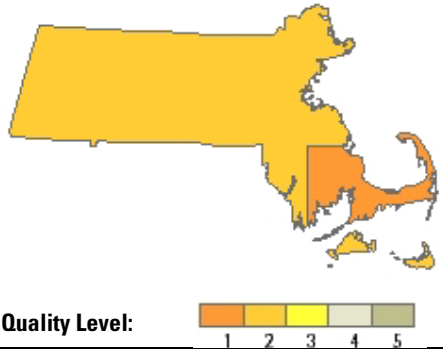
County Government -- Anne Arundel County	
Program: Watershed, Ecosystems, and Restoration Services	**Business Use:** 2. Water Supply And Quality
Functional Activity: Resource Management For Water Quality And Development Review	

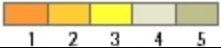|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Better deliniation of drainage areas, better data for water quality modeling, and planning of restoration projects. Each acquisition data quality has improved.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Better data available will decrease processing time of requests. Periodic updates will descrease staff time messaging data and explaining results that don't make sense when modeled with 5 year old elevation data. Timeliness
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Yes	Development review and emergency response of spills. Data already used for these purposes since 1995.

Regional Government -- Baltimore Metropolitan Council	
Program: Baltimore Metropolitan Council	**Business Use:** 22. Urban And Regional Planning
Functional Activity: We Will Be Studying Transportation Including Long Range Transportation Planning, Transportation Improvement Program, Etc.	

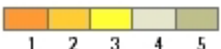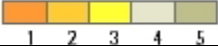|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

Massachusetts (MA)

Massachusetts is 10,555 square miles in size with topography ranging from the Atlantic coastal lowland to the Connecticut River to the Berkshire Hills and Taconic Mountains. The highest elevation is Mount Greylock at 3,487 feet and the lowest points are sea level where Massachusetts meets the Atlantic Ocean. The eastern part of the state including Boston is densely populated with the western Berkshire Hills and Taconic Mountains being the most rural part of the state. Accurate elevation data is important to many programs but based on the current priorities the following activities are the most important: flood risk mapping, water resource assessment, building feature extraction and climate change adaptation for habitat and infrastructure. Currently, Massachusetts has a statewide DEM that is 3m vertical gridded to 5m which was photogrammetrically derived from 2005 imagery. 30 meter DEMs are available for the entire state from USGS. FEMA and MassGIS have collected significant LiDAR data over the past few years and DEMs ranging from 1 to 3 meters will be available for most of the eastern half of the state. Significant additional areas were acquired as a result of the New England LiDAR project funded in part with American Reinvestment and Recovery Funds. The 2007 Strategic Plan for Massachusetts Spatial Data Infratstructure identifies LiDAR as a priority.
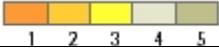
State Functional Activities

Program: Watershed assessment and planning	**Business Use:** 3. River and Stream Resource Management
	Water Resource Assessment: The GIS Program supports 25+ GIS users in the Department as well as supplying direct support in data development and analysis. Particular attention to watershed deliniation and water supply protection areas.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Improved resource assesment
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Not Provided	

Program: Flood Hazard Management Program	Business Use: 14. Flood Risk Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Not Provided	**Flood Risk Mapping:** The development of new or updated FEMA flood risk products.
	Estimated Annual Operational Benefits: Major; No Dollar Value Reported Widely available LiDAR data statewide would have great benefits in the development of new or updated FEMA flood risk products. The time and cost savings would be achieved by Federal Emergency Management Agency (FEMA) and its mapping contractors. My program's coordination role would be easier and better performed by widespread (that is statewide) availability of the data.
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Availability of a statewide elevation dataset would vastly improve the ability of communities to use the FEMA flood data in a consistent manner, as well as allow for improved statewide analysis of the data.
	Estimated Strategic Benefits: Minor It appears likely that acceptance of the flood products would be improved with better elevation data as their basis.

Program: Massachusetts Spatial Data Infrastructure - Structures and Public Safety Requirements	Business Use: 22. Urban and Regional Planning
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Building Feature Extraction In Context Of Object-Oriented Image Classification:** Building feature extraction primary in support of E911.
	Estimated Annual Operational Benefits: Not Reported; $50,000 If the state had LiDAR data at the desired Quality Level, it could do building masses from elevation data. LiDAR elevation and intensity values would help with classification of orthophoto imagery. Massachusetts would also be able to support classification of forest and urban forest species, which would further improve classification of impervious surface.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Massachusetts can increase the quality of the product delivered using LiDAR data. The accuracy and precision will benefit primary customers, which is State 911. There is a need for very complete classification without errors or omissions which LiDAR will help achieve.
	Estimated Strategic Benefits: Major Public safety will have improved response times potentially saving lives. In other application areas, emergency response will benefit from ability to do real-time flood mapping, environmental users will benefit from resource identification, economic development will also benefit from quicker and cheaper site evaluation.

Program: Climate change adaptation	**Business Use:** 21. Infrastructure and Construction Management

Risk management, development of adaptation strategies: Climate change adaptation. Climate change is the greatest environmental challenge of this generation, with potentially profound effects on the economy, public health, water resources, infrastructure, coastal resources, energy demand, natural features, and recreation. The Commonwealth of Massachusetts is committed to doing its part to mitigate and adapt to this challenge, recognizing the necessity of engaging in adaptation planning today by taking a close look at strategies that could help the state become more resilient and ready to adapt to climate change as it occurs.   Regarding infrastructure, the most significant vulnerability of existing structures stems from the fact that most were built based on historic weather patterns, not taking into account future predicted changes to sea level, precipitation, and flooding. This puts such infrastructure at increased risk of future damage and economic costs. Therefore, having more accurate maps and surveys - such as LiDAR (Light Detection and Ranging) elevation surveys - will help update current conditions, identify vulnerable facilities, and improve predictive capability. Incorporating these changes into the repair and upgrade of existing infrastructure, as well as the improved siting and design of future infrastructure, will help minimize the anticipated impact of climate change effects on the infrastructure network. Key strategies include bolstering infrastructure resources by increased conservation, efficiencies, reuse of resources, and timely maintenance; building system redundancies; updating land use, siting, design, and building standards to include climate change projections; using natural systems for enhanced protection; and increasing resilience of infrastructure and the built environment.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
Elevation data will help update current conditions, identify vulnerable facilities, and improve predictive capability. Incorporating these changes into the repair and upgrade of existing infrastructure, as well as the improved siting and design of future infrastructure, will help minimize the anticipated impact of climate change effects on the infrastructure network.

Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
Elevation data will identify specific neighborhoods, busnesses and infrastructure at risk in flood events which will allow for customers to take adaptive measures.

Estimated Strategic Benefits: No Reported

Quality Level:

1 2 3 4 5

Update Frequency: 6-10 years

Bathymetric Data: No

Tide-Coordinated: no

Data Outside State Needed: no

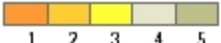| **Program:** Climate change adaptation	**Business Use:** 7. Wildlife and Habitat Management
	Habitat inventory, development of adaptation strategies: Various adaptation alternatives, opportunities, and measures are available to address vulnerabilities arising from climate change. Strategies vary by type, scale, scope, and institutional responsibility. An analysis of natural resources and habitat identifies potential strategies to enable the four broad ecosystem types in Massachusetts - forested, aquatic, coastal, and wetland – to adapt to climate change. These include protecting ecosystems of sufficient size and across a range of environmental settings, maintaining large-scale ecosystem processes and preventing isolation, limiting ecosystem stressors, and maintaining ecosystem health and diversity. These also include using nature-based adaptation solutions, embracing adaptive management, and developing a unified vision for conservation of natural resources, which can be carried out on a collaborative basis.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	A variety of applications for elevation data in developing adaptation strategies for important habitat types were identified. For aquatic habitats, detailed elevation data support modeling of streamflow to identify vulnerable intermittent headwater streams and their buffer areas. For coastal ecosystems, elevation data will help identify undeveloped areas that are upgradient from coastal wetlands to allow wetland migration and buffer intact ecosystems. LiDAR data will also identify and prioritize protection of areas that may become wetlands in the future as sea level rises. As sea levels continue to rise, the whole system of coastal wetlands and subtidal habitats will move inland. Data will also be used to identify, assess and mitigate existing impediments to inland migration of coastal wetlands, which cannot occur in areas where either the topography does not permit it, or where barriers, such as roads, seawalls, or settlements, prevent it. For wetlands ecosystems, LiDAR can be used to identify important wetlands and both aquatic and terrestrial connectivity between wetlands and associated upland.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported
Quality Level: [color scale 1 2 3 4 5]	
Update Frequency: > 10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Local Functional Activities

City Government -- Town Of Amherst	
Program: FEMA FIRM Map Revision	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
	Estimated Annual Operational Benefits: Major; Not Provided
Quality Level: QL 1 Elevation Data from LiDAR	We are not yet into the production stage of our FEMA FIRM Map revisions, but we have already seen significant savings in the cost of obtaining elevation data by using LiDAR, as opposed to traditional photogrammetry as we have done in the past. The level of detail in elevation data from LiDAR also is much greater than what we have been able to obtain in the past. Use of LiDAR appers to decrease the amount of labor necessary to process elevation data for the purposes for which we need it.
	Estimated Annual Customer Service Benefits: Moderate; Not Provided
Update Frequency: 6-10 years	Not sure. We are able to use a more detailed DEM & Hillshade image as well as 1' Elevation Contours in our maps, online & as downloadable data. These are better products that what we had available in the past.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Not sure. Our local zoning includes a flood protection zone that differs from the FEMA FIRM flood zones. The zone is based upon elevation in many areas, and we were unable to accurately map it to match our current basemap until we got our current LiDAR-generated terrain model. We are currently re-mapping this zone to match the definition and our modern basemap.

Michigan (MI)

The State of Michigan does not yet have statewide LiDAR and LiDAR-based high-resolution digital elevation (DEM) data but has requirements for this type of data. The requirements documented through this survey are related to flooding, wildfires, and transportation infrastructure. Other State level requirements and more quantitative benefit information were not yet documented through this survey due to low response rate and limited availability of key stakeholder groups for the intensive survey.

State Functional Activities

Program: Hazard mitigation planning	**Business Use:** 14. Flood Risk Management
	Flooding: Flooding / Hazard mitigation planning / Flood risk management
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported A GIS-based analysis could allow consistent statewide analysis to replace inconsistent local analyses. This could identify and prioritize areas most likely to benefit from multi-structure flood mitigation projects, tying in with FEMA funding, and benefit-cost justification.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported A statewide GIS analysis could allow the flood portions of dozens of local hazard mitigation plans (plus the state hazard mitigation plan) to be produced more quickly and consistently, allowing comparisons and prioritizations between alternative flood mitigation projects.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate A more consistent and comprehensive statewide analysis of at-risk properties could be obtained and used in hazard mitigation plans at the state and local levels, allowing the identification and prioritization of flood risks and flood mitigation projects.
Update Frequency: > 10 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

386

Program: Wildfire vulnerability analysis	Business Use: 16. Wildfire Management, Planning, Response
  Quality Level: [1 2 3 4 5] Update Frequency: 6-10 years Bathymetric Data: Not Reported Tide-Coordinated: No Data Outside State Needed: Not Provided	**Wildfire:** Wildfire / Wildfire vulnerability analysis / Wildfire management planning and response. It is expected that these activities would be much improved by high-quality elevation and vegetative cover data.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported 1. Not certain that appropriate quality of required elevation data was selected - need a quality that allowed vegetative cover to be identified, ideally along with tree heights, as well as the identification of built structures in the area. 2. A statewide GIS analysis of that data could then allow wildfire risk areas to be identified, and wildfire vulnerabilities to be assessed, in order to identify and prioritize wildfire mitigation projects throughout the state.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Good elevation data, including forest types and tree height information as well as the identification of structure locations, would allow a great expansion of the quality and consistency of wildfire analyses throughout the state, both in local hazard mitigation plans and the state hazard mitigation plan. This would allow the identification and prioritization of wildfire mitigation projects to take place, and to justify the benefits of these projects for FEMA funding.
	Estimated Strategic Benefits: Moderate Good elevation data, including forest types and tree height information as well as the identification of structure locations, would allow a great expansion of the quality and consistency of wildfire analyses throughout the state, both in local hazard mitigation plans and the state hazard mitigation plan. This would allow the identification and prioritization of wildfire mitigation projects to take place, and to justify the benefits of these projects for FEMA funding. This would be expected to include enhanced life safety, infrastructure protection, transportation/emergency access, and economic/tourism benefits.

Program: no program	Business Use: 21. Infrastructure and Construction Management
  Quality Level: [1 2 3 4 5] Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program Bathymetric Data: Yes Tide-Coordinated: No Data Outside State Needed: Not Provided	**Transportation planning:** Transportation infrastructure preliminary design, planning, and construction management
	Estimated Annual Operational Benefits: Minor; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Minor Benefits Description Not Provided

Local Functional Activities

City Government -- City Of Lansing	
Program: Emergency Operation Center Hazard and Vulnerability Analysis	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Mapping, Hazard And Vunerability Analysis	

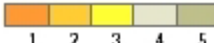|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided
	Elevation data will be used for planning, identifying, and educate the public of the impact of inundation as the result of an 100-year flood. This data will also be used identify potential properties to be acquired within the floodplain to be restored to a natural setting. New benefits will be the ability to generate 3D models to show the potential impact of a 100-year flood. Other benefits will include using this accurate data for a dam breach inundation study.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided
	From an emergency management perspective, elevation data provides a new resource for us to better plan for an event. Without this data we can only guess at the potential impact of an event.More up to date and improve accuracy in data allows for a better quality product. Improvement the the delivery of any product will be dependent on the purchase of software to analyze the data. We anticipate a moderate improvement in this area. None
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	The social and benefits will be our ability to better educate the public of the impact of a 100-year flood. This is a responsibility the we have in protecting public health and safety. Our property acquisition program anticipates acquiring property in the floodplain, razing the buildings, and restore the land to a natural environment. None

City Government -- City Of Lansing	
Program: Planning and Neighborhood Development	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Developing Building Footprints And 3D Models	

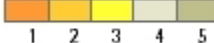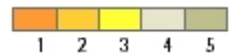|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided
	Elevation data with software to analyze the data will provide the necessary tool conduct view shed analysis. This is a service we currently do not provide. This will save staff time in preparing presentation material for public input on development activities, cell tower locations, and demolitions.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided
	The benefit is to provide a service we currently do not provide and save in transportation cost to the site. This will also allow us do it in a timely manner. The public will be able to better visualize the impact or benefit within the scale of development around the project site during public participation. Currently data is not being used for this program activity.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Elevation data will better enhance the public participation process. Allowing the public to better visualize what existing and what is proposed in the development process. The environmental benefits can be derived from view and solar analysis. Taking into consideration of scale and shadowing as the result of any proposed development. None

Minnesota (MN)

The State of Minnesota is known as "The Land of 10,000 Lakes" and enhanced elevation data has been important in managing water and natural resources in the state. Historically, a number of counties acquired LiDAR data to support floodplain mapping requirements. Larger regional projects in northwest and southeast Minnesota obtained LiDAR and elevation data derivatives through cooperative partnerships as a result of flooding impacts. More recently, the Clean Water Fund of the Clean Water, Land and Legacy Amendment has provided base funding to help realize the goal of creating a seamless elevation model for Minnesota. As a result, the Minnesota Elevation Mapping Project has a goal to develop and deliver a seamless high-accuracy digital elevation map of the State of Minnesota, based on data collected using LiDAR technology. The project is managed by the Minnesota Department of Natural Resources and includes multiple State, Federal and local partners. The following information may not fully reflect all of the possible business uses or functional activities in Minnesota, but includes a subset of information from respondents.
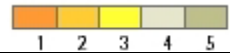
State Functional Activities

Program: Watershed Management	Business Use: 2. Water Supply and Quality
	Watershed Assessment: Watershed Modeling, Identification of Water Quality Stressors, and Identification of Priority Management Areas
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Provides highly detailed picture of landscape features contributing sediment load to streams. This allows for the analysis of large geographic areas quickly in the office, improving operational efficiency in best management practice targeting. Provides elevation data for fine scale watershed modeling. Augments existing data sources for watershed stressor identification.
	Estimated Annual Customer Service Benefits: Don't Know; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate More efficient and accurate analysis and identification of potential sources of nonpoint pollution benefits the public by improving the return on investment of public and private funds in nonpoint source reduction efforts.
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes for watersheds along State boundary	

Program: National Flood Insurance Program	**Business Use:** 14. Flood Risk Management
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes	**Flood Risk Mapping:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported FEMA requires use of LiDAR products for all flood risk mapping. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Customers are better served through improved accuracy and can avoid costs to have survey validated elevations. **Estimated Strategic Benefits:** Major Millions of dollars can be saved and improved delivery of flood mitigation projects.

Program: Program Delivery	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** > 10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Pre-engineering Design - Cut /Fill for Earthwork Balance:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported When the entire state is available the impact could be years in time savings, resulting in the savings of many hundreds of thousands of dollars. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Regional offices will be receiving identical looking and performing data and that is a big plus in terms of training and customer expectations. **Estimated Strategic Benefits:** Moderate There are uses being discovered each day for enhanced elevation data but if we were not using it before then there is little reason to think that we will have uses outside of what we currently use elevation data for.

390

Program: Reinvest in Minnesota Reserve Conservation Easement Program (and partnerships)	**Business Use:** 1. Natural Resources Conservation
Quality Level: [color scale 1-5, yellow at 3] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes	**Wetland Restoration:** **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Faster and more accurate project site screening and priority ranking. Reduced surveying needs. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Faster evaluation of potential project sites (program applications). **Estimated Strategic Benefits:** Minor Don't know.

Program: County Atlas Geologic Mapping Program	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: [color scale 1-5, orange at 1] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Geologic mapping:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported More accuracy in surficial map unit delineation. Reduction in the need for field-checking unit boundaries. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported These data have been used where available and when the county is willing to release it. Commonly, there is a reluctance to share data that they have purchased, even when the product may ultimately benefit them. **Estimated Strategic Benefits:** Major Elevation data of the highest quality level would show geologic hazards more clearly (karst features, landslide scars); better delineate watersheds; allow accurate mapping of near surface sediment and bedrock that control recharge to the groundwater.

Local Functional Activities

County Government -- Clay County	
Program: GIS Mapping	**Business Use:** 24. Real Estate, Banking, Mortgage, Insurance
Functional Activity: Building Permits	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Accurate and current data
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Verify location. Good information.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Accurate information to the land owner.

Mississippi (MS)

The State of Mississippi has undocumented operational requirements for accurate, reliable elevation data that serves the widest utility of all government agencies. Uses for the data include Economic Development, Emergency Planning and Response, Flood Map Modernization, Geologic Mapping, ground-water modeling and management, Highway Planning, and Urban and Suburban Infrastructure Engineering, just to name a few. The collection and maintenance of this data has taken place through individual, un-coordinated actions that often result in duplicated efforts at various levels of government using different standards and specifications. A centrally coordinated collection effort could solve a few key issues that have been seen within the state. It would provide a data set collected with consistent standards, make the data easily accessible for all levels of government and the public, reduce acquisition costs through economy of scale, and could fill gaps in funding at the local and state level.
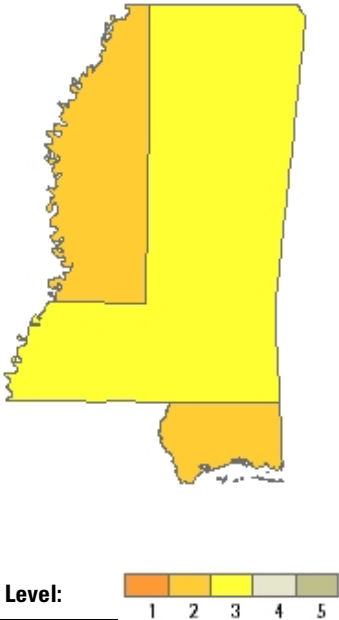
It is also apparent that local officials with intimate knowledge of local conditions are the best stewards of the data layers associated with their jurisdictions. As budgets are being strained at all levels of government, the logical solution is to develop a system of partnerships to share costs and ease the burden of funding. Large collaborations also have the added benefit of reduced costs per square mile of data thereby stretching those dollars further. Acquiring data in this piecemeal fashion has resulted in multiple collections and local LIDAR in some counties – all with varying specifications, age, accuracy, and with a very small percentage of that data in the public domain which means that it cannot be widely used across all levels of government.
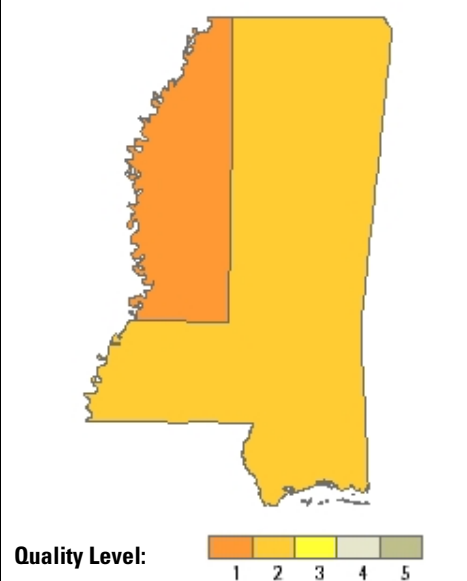
There are many benefits in developing a statewide program to acquire enhanced elevation and LIDAR, with very few disadvantages. In other states and within the State of Mississippi at regional levels, this has repeatedly been proven. One confirmed advantage is the reduction of overall costs. This can be accomplished in several ways including reducing duplication of data, utilizing economies of scale and leveraging costs among participants. Additionally, there are benefits derived from having standard information. These include uniform and generally greater accuracy, better decision making capability and better collaboration capabilities. It then becomes easier to manage resources in business and land development, environmental management and emergency management.

USGS has recently released LIDAR standards in anticipation of increased data acquisitions that will be absorbed into the National Elevation Database. LIDAR data acquired through this project will be collected using the USGS standards as a minimum, with FEMA standards and additional break line collection determined on a project by project basis or as funding permits. The primary intent of this specification is to create consistency across all LIDAR collections, in particular those undertaken in support of the National Elevation Dataset (NED). Unlike most other "LIDAR specs" which focus on the derived bare-earth DEM product, this specification places emphasis on the handling of the source LIDAR point cloud data. This is to assure that the source data collected remains intact and viable to support the wide variety of non-DEM science and mapping applications and derivatives that can benefit from LIDAR technology.

State Functional Activities

Program: Mississippi State University / Geosystems Research Institute - Coastal studies	Business Use: 4. Coastal Zone Management

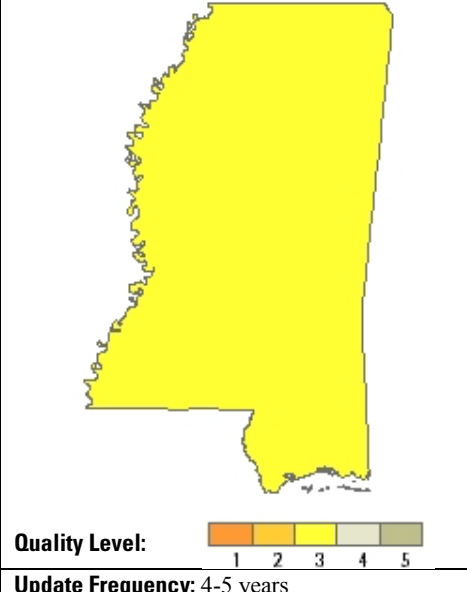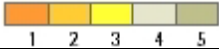|	**Coastal Inundation:** Coastal wetlands provide a line of defense for coastal communities against hurricane impacts. The wetlands can reduce wind, wave, and surge energy which will in-turn reduce the damaging effects of hurricanes on coastal infrastructure and communities. Research has been developed to improve understanding of coastal resiliency from hurricane impacts in regards to wetland areas. This was achieved by using integrated numerical modeling and in-situ observations and remote sensing techniques.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Significantly better spatial resolution and vertical accuracy of LiDAR-derived elevation data provides clear advantages for use in delineating lands subject to a given sea-level rise.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported The increased spatial detail of LiDAR elevation data, as well as its improved vertical accuracy, provides enhanced topographic information that is advantageous to sea-level rise impact studies.
Quality Level: 1 2 3 4 5 **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes, adjoining coastal states.	**Estimated Strategic Benefits:** Major Coastal elevation is such an important parameter in sea level rise impact studies, it must be known precisely, and the data used to model elevations in the analyses must support the accurate delineation of elevation zones that correspond to specific sea-level rise scenarios. Accurate delineations are especially important if the potential inundation area is used as a mask to generate estimates of affected population, land cover types, infrastructure, or economic zones

Program: Mississippi Emergency Management Agency	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response

	Emergency Response to a Disaster: The Operations Section is responsible for coordinating support for state and local response in an all hazards concept. These responsibilities include alert and notification, activation of the State Emergency Operations Center, coordination of emergency support functions, establishing priorities for allocating resources, maintaining operational control of the State Emergency Response Team, the Mobile Operations Center, the Disaster Reconnaissance Team and the communications/state warning point section. The Operations Branch also supports damage assessment after an event and assists with the transition to the recovery phase. All of these functions are directed toward the one goal of minimizing the risk and affect to people, property and the environment.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Pre- and post-event geospatial data, primarily LiDAR data, in a change analysis for monitoring and tracking the type and rate of landscape changes. They concluded that 3D visualizations of the disaster area can improve emergency managers' understanding of the situation, and enable them to make better plans and decisions.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported LiDAR has the capability of quickly assessing the amount of damage that has been sustained by the transport network as the result of a disaster and depending on the technology used, these systems are able to survey large areas quickly and more efficiently than deploying emergency responders to drive over every part of a transportation network to ascertain the locations of debris, damage, and other blockages of the transport network.
Quality Level: [color scale 1 2 3 4 5]	**Estimated Strategic Benefits:** Major LiDAR data immediately after a storm or other disaster events has the potential to increase the number of lives saved by rescuers. LiDAR data enable rescuers to respond in a more expedient manner. In emergency situations, minutes and even seconds can make the difference between life and death for victims of a disaster. Having prior knowledge of which roads to avoid due to blockage serves to shave minutes off the time it takes for rescuers to reach victims.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, adjoining states in case of an event close to a state boundary.	

Program: Mississippi Automated Resource Information Systems	**Business Use:** 25. Education K-12 and Beyond

	GIS Coordination and Outreach: Legislatively created to standardize and disseminate geographic information regarding Natural and Cultural Resources. To fulfill education/research mission would want all available products.
	Estimated Annual Operational Benefits: Moderate; $7,500 Based on a cost of distribution of data.
	Estimated Annual Customer Service Benefits: Major; $7,500 Based on Goodwill and clientele satisfaction
	Estimated Strategic Benefits: Major Fulfilling functional activity description.
Quality Level:	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Limited Hydrography based needs.	

Program: (Mississippi Department of Environmental Quality) Office of Geology - Geospatial Resources Division/Flood Mapping	**Business Use:** 14. Flood Risk Management

	Modernizing and updating FEMA Flood Risk Maps:
	Estimated Annual Operational Benefits: Major; $560,000 The data would allow users to create datasets for analysis with minimal time and effort.
	Estimated Annual Customer Service Benefits: Major; $250,000 Good elevation data statewide would further reduce acquisition costs and the amount of time required to complete certain phases of the project. It would also improve the quality of the data from studies and analysis. Overall this would give the public a better sense that the department is more efficient by reducing the cost and time to take a project to completion.
	Estimated Strategic Benefits: Major Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefits, Strategic/political benefits
Quality Level:	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, Adjoining states where watershed boundaries cross	

Program: Mississippi Department of Transportation - Transportation Information Division	Business Use: 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**The Planning, Investigation, and Preliminary Design of Roadway Projects:** The Planning, Investigation, and Preliminary Design of Roadway Projects to provide a safe, efficient, environmentally sound intermodal transportation system for all users, especially the taxpayers of Mississippi. To also facilitate economic and social development and prosperity through the efficient movement of people and goods and to facilitate intermodal connections within Mississippi.
	Estimated Annual Operational Benefits: Major; $2,500,000 New operational benefits would be reduced costs to acquire data on a project by project basis, quicker evaluation of proposed projects, and the overall improvement in the data resulting from studies and analysis using good data statewide. This will reduce the cost and time to take a project from conception to construction.
	Estimated Annual Customer Service Benefits: Major; $500,000 Good elevation data statewide would further reduce acquisition costs and the amount of time required to complete certain phases of the project. It would also improve the quality of the data from studies and analysis. Overall this would give the public a better sense that the department is more efficient by reducing the cost and time to take a project to construction.
Update Frequency: 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Estimated Strategic Benefits:** Moderate A good statewide LIDAR dataset would provide more data for evaluating existing roadway conditions and identify needs for safety projects. Statewide LIDAR data would benefit environmental efforts by providing more detailed information over larger areas on ALL projects. This would provide a more complete picture of the study area and how the proposed construction would affect those habitats.

Program: Mississippi Forestry Commission	Business Use: 5. Forest Resources Management
Quality Level: 1 2 3 4 5	**Forest Resources management:** The Mississippi Forestry Commission is committed to protecting and sustaining state forest resources using professionally applied stewardship principles and education. Mississippi will ensure their forests contribute to abundant timber and wildlife, clean air and water, and a healthy economy.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Ability to determine vegetated and non-vegetated area for measuring tree canopy coverage and estimate timber volumes for forested areas
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Ability to provide terrain information for analysis with minimal time and effort and could be used across all Departments.
Update Frequency: 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, fires, destructive insects do not stop at state boundaries	**Estimated Strategic Benefits:** Major Integration of imagery and LiDAR produces valuable information for forest management, and also has application for carbon accounting to understand the ecosystem services of forests. LiDAR is a critical component for more accurate measurement of logging practices and emission and carbon sequestration calculations.

Program: Central Mississippi Planning and Development District	Business Use: 22. Urban and Regional Planning

  Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Urban and Regional Planning:** Central Mississippi Planning & Development District (CMPDD) is a sub-state regional planning organization serving the governments of seven adjacent counties in central Mississippi - Copiah, Hinds, Madison, Rankin, Simpson, Warren and Yazoo. Legislatively created CMPDD is a non-profit concerned with meeting the ever-changing needs of its seven member counties and thirty-four municipalities. The District promotes area-wide progress through regional planning and development concepts in such areas as local planning, governmental management, and human resource coordination.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Government will be in a better position to make informed, scientifically sound decisions regarding urban/rural planning.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improved quality of mission and products thus a reduced cost to the taxpayer (customer).
	Estimated Strategic Benefits: Major Policy maker's decisions are strengthened when current and accurate geospatial datasets are available in support of the decision making process.

Local Functional Activities

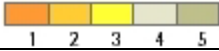| County Government -- Desoto County	
Program: DeSoto County GIS Department	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping For Emergency Services And Urban And Regional Planning	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $25,000 The operational benefits will include the timely assistance in regards to emergency response and critical flood planning in and around the Mississippi River, as well as backwater tributaries. We would be able to assist all facets of DeSoto County Government in planning, exploring, and developing new and current infrastructure.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; $75,000 We are currently providing the same service that would be provided with current data. Customer Service is important in providing citizens with elevation data.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	The latest data that we have for our region is over eleven years old and new data might entice more investors to come into the area. Public safety and planning for future development are very beneficial to citizens and make politicians look good.
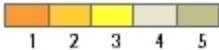
Missouri (MO)

The State of Missouri has a need for improved elevation data to strengthen the state's preparedness for flood events, to protect the health and safety of Missourians, and to mitigate damages from flooding. Elevation data is a multi-purpose resource, however, and benefits will extend beyond flood map modernization to other applications as varied as watershed management, dam safety assessment, transportation modeling, precision agriculture and soil mapping, identification of sinkholes, correction of aerial photography, and regional/urban planning.

Counties and Regional Planning Commissions are responsible for much of the LiDAR collections that have occurred in the state. Local Government uses LiDAR for public safety as flooding is a major hazard. Other uses include highway and culvert design, land use planning, and to update structure databases.
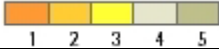
LiDAR technology has a breadth of applications that directly influence and impact local citizens: their quality of life as well as their lives! The potential to save local, county and state governments valuable resources by providing a low cost alternative to traditional land-surveys as well as to have cost avoidance related to better floodplain mapping, risk analysis, and emergency planning and response support is great. For example, on May 10, 2011, Governor Jay Nixon pledged $25 million in state funds to help counties and communities with their costs of responding to the historic flooding. If better elevation could mitigate just 10% of these costs, that saving (or avoidance) would be $2.5 million.

State Functional Activities

Program: Water Resources Center (Quantity) Office of Director	Business Use: 14. Flood Risk Management

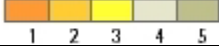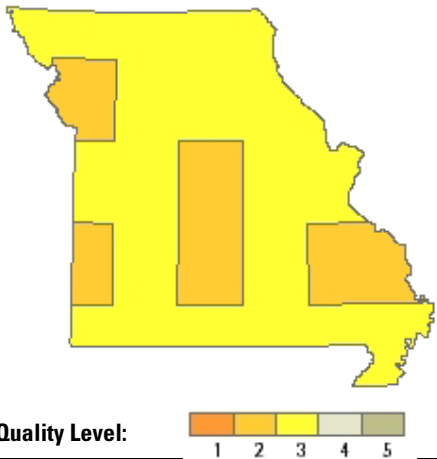|	**Dam breach inundation mapping for EAP development:** Dam breach inundation mapping for EAP development. One of the missions of the Department of Natural Resources Water Resources Center is to ensure that dams in the state are constructed, maintained and operated in a safe manner. This is accomplished by regulation of all non-agricultural, non-federal dams more than 35 feet in height and by providing technical assistance and informational resources to all dam owners. One way to estimate the benefits of LiDAR data would be to estimate land survey cost for all the sectioning used to produce the dam breach inundation mapping, which are thousands of sections per year, versus use of LiDAR data from the desk top. Done in the field, that would be a huge cost and in fact it simply could not be done; however this is a legally mandated deliverable. LiDAR helps make it both possible, more accurate, quicker, and at less cost for staffing office work. The completed deliverable has a direct bearing upon public safety.
	Estimated Annual Operational Benefits: Major; $1,000,000
	Dam Safety Assessment includes: dam hazard rating, site selection, dam flood stage rating and structural analyses, dam breech inundation studies, dam flood prediction, levee analysis-integrity and capacity, and emergency management plans. Annual dollar benefit difficult to determine, but an approach would be to estimate the commercial value of the deliverables and attribute perhaps half of that value to having the LiDAR data just for this specific application. Call it easily 100+ inundation maps per year at assumed value for completed product of ~ $20,000 each = $2,000,000; and half of that would be $1M for a very roughly determined value of the LiDAR data for one year's work.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Benefits Description Not Provided
Quality Level: [color scale 1 2 3 4 5]	**Estimated Strategic Benefits:** Major
	Benefits Description Not Provided
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Highway Design	Business Use: 21. Infrastructure and Construction Management

	Highway Design: High Accuracy ground model for highway design, culvert placement and size
	Estimated Annual Operational Benefits: Moderate; $125,000
	30% of the mapping cost, less than 5% of the total program cost
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported
	Benefits Description Not Provided
Quality Level: [color scale 1 2 3 4 5]	**Estimated Strategic Benefits: Not Reported**
	None
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: WRC, Parks, Soil and Water Conservation, Waste	Business Use: 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** NO	**Park design and maintenance:** Missouri recreation areas are often in flood prone areas. Improved elevation data needed to effectively plan for campgrounds, roads, and structures.
	Estimated Annual Operational Benefits: Major; $10,000 Park and Conservation area planning, infrastrucutre protection. Annual dollar benefit difficult to determine.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Missouri recreation areas subject to frequent flooding.
	Estimated Strategic Benefits: Major Campgrounds often closed during flood events. Potential for flash floods

Program: Management of the state's fish, forest, and wildlife resources	Business Use: 1. Natural Resources Conservation
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes by watershed	**Soil and wetland conservation, wildlife habitat:** The Department of Conservation is responsible for soil and wetland conservation, along with wildlife habitat conditions
	Estimated Annual Operational Benefits: Major; $125,000 Planning use for landscape restoration, annual dollar benefit difficult to determine. Range of 50-200K given, averaged to 125K
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Minor Benefits Description Not Provided

400

Program: Geologic mapping and analysis. Seismic fault analysis. Landslide hazard mapping assessment	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic analysis: Identification of the states geological resources and hazards. The New Madrid seismic zone, rich deposits of heavy metals, and karst topography are all found in Missouri
	Estimated Annual Operational Benefits: Major; $10,000 Early identification of sinkholes and portential landslide areas could save lives and property, annual dollar benefit difficult to determine.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Minor Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Emergency Response and Floodplain Management	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response

	Emergency Response: Missouri is subject to frequent flooding and the potential for a major seismic event. Levee's are not well mapped. New Madrid seismic zone needs improved elevation data. A good structure inventory also needed for the seismic and flood prone areas
	Estimated Annual Operational Benefits: Major; Dollar value not reported Flood risk mitigation, improved flood insurance maps.
	Estimated Annual Customer Service Benefits: Major; $2,500,000 Emergency response uses include: vulnerability assessments of critical infrastructure, spill routing, animal burial siting, public safety tower siting and deadzone identification, hazardous material spill containment, identification of vulnerable populations for response and planning prior to floods, search and rescue in waterways, and line of sight analysis.
	Estimated Strategic Benefits: Major Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: 5 mile buffer	

Program: Economic Development	Business Use: 22. Urban and Regional Planning
Quality Level: 1 2 3 4 5	**Urban and regional planning:** Urban and regional planning includes site plan analysis, accurate building footprints, and conflation
	Estimated Annual Operational Benefits: Moderate; $400,000
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Flood Prediction and Mitigation includes: floodplain delineation: new generation of floodplain and flood insurance maps, flood prone properties, risk determination and insurance assessment, flood flow characterization (e.g., direction, velocity, anddepth), flood preparedness and response planning, evacuation planning, an reverse E-911 proactive notification.
	Estimated Strategic Benefits: Minor Benefits Description Not Provided
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

County Government -- Boone County	
Program: Implementation of our Regional Plan	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Climate Chanage Adaptation Planning	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided More accurate mapping of areas at risk from sea level rise
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Same as #6
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Improved planning for sea level rise

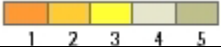| County Government -- Boone County	
Program: Resource Management	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Stormwater Buffer Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Able to accurately and quickly calcuate stormwater buffer. Can also see terrain for parcels taking out permits.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided N/a Providing the public with accurate and current elevation information.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	N/a Public saftey can use the elevation data during flooding events to model affected areas. Environmental benifies by using the data for code enforcement. Political benifits, Commissioners and Elected official used the data capture project during elects to highlight advancements being do at the County to support the citizens (to support the FEMA risk and other mapping efforts).

County Government -- St Louis County	
Program: 911 Addressing	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: 911 Database Maintenance	

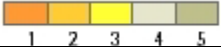|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $100,000 The elevation data is used in conjunction with imagery to derive planimetrics and other infrastructure features for proper placement of address points and road centerlines for 911 addressing. Our existing data set dates from 2005 and only partially covers the county. Annual or biennial updates would greatly enhance the accuracy of the dataset, as well as completing the western regions of the county for which we have incomplete addressing based mostly on centerlines digitized from orthophotography.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Performance will increase linearly with linear increases in address quality. The complete LiDAR project would allow automated extraction of structures and centerline, which would greatly speed the delivery of improved addressing. Customer experience would not only be enhanced by improved 911 addressing, but the addition of enhanced 911 will create an increased need to precisely locate callers relative to structures, roads, and topography. Most of the existing systems has not yet taken full advantage of the available data, as structures and centerlines are hand digitized. Most of the benefit is in improved performance, but customer experience will be better realized with the deployment of enhanced 911.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Public safety benefits would increase, but are already high, by building complete and timely addressing as well as surface and terrain models for enhanced 911 mapping. Strategic and political benefits would accumulate from significantly improve police performance, possibly with reductions in overall costs of patrolling. An enhanced product could also induce participation from fire protection and ambulance services, enhancing regional cooperation in public safety. Improved addressing quality in 911 is a significant public safety benefit. No environmental benefits have been identified within this program, though this same addressing can be employed in geocoding in other programs within the county. Strategic and political benefits stem from improved police response times. First responders do not make use of the data at this time.

County Government -- St Louis County	
Program: Emergency Management	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: Emergency Management	

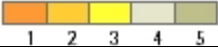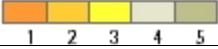|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $250,000 We currently do not have data at the quality level selected, but rather at the next lower quality level and from a much longer refresh cycle. Far more accurate and current projections of flood inundation and flood inundation relative to structures. A bility to derive planimetrics to project bulidings at risk versus earthquake hazards. Rapid damage assessment for tornadoes, manmade hazards, and other threats as they occur against roads, buildings, and other infrastructure data layers from LiDAR derived planimetrics.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Flood modeling is significantly out of date and does not reflect recent changes to the flood plain. Building planimetrics are over 5 years out of date, and only reflect part of the county. This would allow for a significant reduction in time for damage assessment with better knowledge of the location and height of potentially affected structures, as well as better situational awareness and planning products during disaster response. No data at this quality level.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	The primary benefits are in public safety and disaster response, with greatly enhanced response and recovery services due to better knowledge of risks and hazards. There could likely be minor environmental benefits due to better knowledge of disaster effects on environmental inventories (e.g. knowing where environmental features were damaged or destroyed by flooding). Enhanced common operating picture and strategic awareness products in disaster planning and response would have significant political benefits in the form of public awareness of increased effectiveness of planning and response operations (something I call the "CSI effect"). No data at this quality level.

Montana (MT)

The State of Montana encompasses 145,552 square miles of land and approximately 1,490 square miles of water. Its landforms range in elevation from 12,799 feet to 1,800 feet. This vast and differing terrain calls for various requirements for enhanced elevation data. To date, a majority of the enhanced elevation collection in Montana has taken place through local and state efforts coordinated with the assistance of federal grant funding which often results in somewhat standardized data that is based on federal guidelines and specifications. A centrally coordinated collection effort would further this effort by establishing consistent standards and possibly reduce acquisition costs through economy of scale. The priority functional activity that drives current enhanced elevation requirements in Montana is Flood Risk Modeling and Mapping of Riverine Areas. Every year millions of dollars in damage is caused by flooding. New and updated floodplain mapping studies and maps based on enhanced elevation data at Federal Emergency Management Agency (FEMA) quality level #3 would improve the accuracy, reliability, and confidence in these required products at a much greater rate and lower cost. Acquiring the necessary elevation data over Montana's "at risk" flood plain areas is the highest cost associated with this activity. Additional requirements for enhanced elevation data fall under the identified functional activities of Terrain and Hydrologic Modeling and Analysis, Wetland Mapping, Geologic Hazard Mapping & Seismic Analysis, Engineering and Construction of Public Works, and Climate Modeling assessment for multiple economic sectors. Although currently state wide enhanced elevation data may not be an efficient or cost effective program, many areas being mapped and studied under the defined top tier functional activities could benefit from a collection program that would improve the data accuracy and reliability as well as the confidence in the program areas this data supports. For example, a statewide enhanced elevation data set that meets FEMA "Guidelines and Specifications for Flood Hazard Mapping" would increase completion rates for the local Flood Hazard Mapping Program and the associated flood risk studies by some 10 fold (estimate). There are also ancillary products derived from enhanced elevation data that influence the cost benefit summary. The state anticipates an overall increase in productivity of 25% and a cost savings of 20% in most program areas as a direct result of acquiring this data.
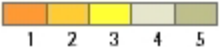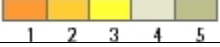
State Functional Activities

Program: State of Montana Floodplain Management Program	Business Use: 14. Flood Risk Management

<table>
<tr>
<td rowspan="6">

Quality Level: [color scale 1-5]

Update Frequency: 6-10 years

Bathymetric Data: Yes

Tide-Coordinated: No

Data Outside State Needed: Buffer zone with border states and Canada
</td>
<td>

Flood risk modeling and mapping of riverine areas, dams, dike, levee safety analysis: Flood Risk Modeling and Mapping. New and updated floodplain mapping studies and risk maps based on enhanced elevation data would improve the accuracy, reliability, and confidence in these required products at a much greater rate and lower cost. Acquiring the necessary elevation data is the highest cost associated with these projects. A statewide elevation data set that meets FEMA Mapping Standards would increase the rate of completing new studies by some 10 fold (estimate).
</td>
</tr>
<tr>
<td>

Estimated Annual Operational Benefits: Major; $150,000

Elevation data provides the foundation for all new floodplain mapping in Montana. Enhanced elevation data can be collected for large areas at a fraction of the cost and level of effort from past practices. The accuracy of the data improves the overall reliance and confidence in the resulting mapping products utilized by communities and the National Flood Insurance Program (NFIP). The State Department of Natural Resources (DNRC) and Federal Emergency Management Agency (FEMA) would be able to complete new flood risk modeling and mapping projects at a much greater rate and lower cost. Acquisition of the necessary elevation data is the highest cost associated with these projects. A complete statewide elevation data set, meeting the "Guidelines and Specifications for Flood Hazard Mapping" would increase the state's rate of completing new studies by 10 fold (estimate).
</td>
</tr>
<tr>
<td>

Estimated Annual Customer Service Benefits: Major; $150,000

New and updated floodplain mapping studies and maps. Accuracy, reliability, and confidence in these products are greatly enhanced.
</td>
</tr>
<tr>
<td>

Estimated Strategic Benefits: Major

Environmental benefits would include data to perform new mapping of derivative products such as channel migration zones, etc.
</td>
</tr>
</table>
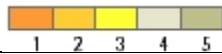
Program: State Water Quality Program	Business Use: 1. Natural Resources Conservation

<table>
<tr>
<td rowspan="5">

Quality Level: [color scale 1-5]

Update Frequency: 2-3 years

Bathymetric Data: Yes

Tide-Coordinated: No

Data Outside State Needed: Buffer area with adjoining states and Canada
</td>
<td>

Terrain and hydrologic modeling and analysis: Protection, sustainment and improvement of the environment utilizing enhanced elevation data for terrain and hydrologic modeling and analysis. There are ancillary products derived from enhanced elevation data that influence the cost benefit summary however the state anticipates a 25% increase in productivity as a direct result of having this data.
</td>
</tr>
<tr>
<td>

Estimated Annual Operational Benefits: Moderate; $40,000

The elevation dataset allows the Montana Bureau of Mines and Geology to understand the terrain and its influence on Montana's environment. This data is used for modeling input for various analysis, compliance and monitoring programs within the state.
</td>
</tr>
<tr>
<td>

Estimated Annual Customer Service Benefits: Moderate; $40,000

Provides consistent data source for analyses and assist in the environmental compliance to protect Montana's citizens.
</td>
</tr>
<tr>
<td>

Estimated Strategic Benefits: Moderate

The elevation dataset allows the Montana Bureau of Mines and Geology to accomplish part of its mission in understanding the terrain and its influence on Montana's environment.
</td>
</tr>
</table>

Program: Wetland Mapping and Riparian Center	**Business Use:** 7. Wildlife and Habitat Management
Quality Level: 1 2 3 4 5 **Update Frequency:** > 10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Buffer area for bordering states and Canada	**Wetland Mapping:** Wetland and Riparian Mapping derived from a visual interpretation of vegetation and water on the earth's surface. There are ancillary products derived from enhanced elevation that influence the cost benefit summary however the state anticipates a 25% increase in productivity as a direct result of having this data.
	Estimated Annual Operational Benefits: Moderate; $100,000 While there would likely be no time or cost savings, the improved accuracy would be extremely valuable. The University of Montana, Natural Heritage Program currently uses visual photointerpretation of 1-meter NAIP to map wetlands and riparian areas. LiDAR would greatly enhance the accuracy of this mapping.
	Estimated Annual Customer Service Benefits: Major; $100,000 Precision and accuracy of products would be enhanced, encouraging users to rely on them more for primary decisions.
	Estimated Strategic Benefits: Not Reported Accurate maps of wetlands and riparian areas would directly benefit conservation planning. Better conservation planning, backed by accurate maps, would be both a strategic/political benefit (conservation plans could not be dismissed as based on bad or outdated maps) and an environmental benefit (the target resources would be better identified, so that the right ones were identified).

Program: STATEMAP & Earthquake Studies	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Buffer area with bordering states and Canada	**Geologic hazard mapping & seismic analysis/risk mapping:** Geologic hazard mapping & seismic analysis/risk mapping through the determination of surface geology and anomalies associated with slopes inherent to landslides, determining fault lines / locations and planning for proper surface use. There are ancillary products derived from enhanced elevation that influence the cost benefit summary however the state anticipates a 20% increase in productivity as a direct result of having this data.
	Estimated Annual Operational Benefits: Major; $150,000 The **Montana Bureau of Mines and Geology** STATEMAP program would benefit from better elevation and anomaly data. Earthquake studies would be able to greatly improve seismic hazards & change analysis relative to faults & fault movement due to seismic activity.
	Estimated Annual Customer Service Benefits: Major; $150,000 The Public would be better informed of areas with landslide activity, active fault lines, and fault location in general.
	Estimated Strategic Benefits: Major Land developers, planners, & politicians could make better informed judgments & decisions regarding land use with the improved data (i.e. where not to locate a subdivision, or mine waste repository, etc).

Program: Department of Environmental Quality (DEQ) Remediation, public works, Department of Transportation Programs , Major Facility Siting Program, Open Cut Program, Coal Program	**Business Use:** 21. Infrastructure and Construction Management

	Water, sewer, and power line planning and analysis. Storm water modeling, cut and fill analysis for earth moving. Site analysis. Road infrastructure; dams, reservoirs and levees; improved delineation, planning and analysis for construction of buildings, water systems, road infrastructure, dams, levees, sewer, and power lines. Storm water modeling, cut and fill analysis for earth moving and site analysis for horizontal construction. There are ancillary products derived from enhanced elevation that influence the cost benefit summary however the state anticipates a 20% increase in productivity as a direct result of having this data.
	Estimated Annual Operational Benefits: Major; $100,000 Improved planning, delineation and construction of buildings and facilities
	Estimated Annual Customer Service Benefits: Moderate; $100,000 Cost savings in tax payer dollars and customer satisfaction.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Major Major benefit to public safety and satisfaction.
Update Frequency: 2-3 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Montana Bureau of Mines and Geology (MBMG) - Ground Water Investigation, Assessment, and Characteristic Programs	**Business Use:** 2. Water Supply and Quality

	Hydrologic and hydraulic modeling of ground water for development: Hydrologic and hydraulic modeling of ground water for development which impacts the availability and quality of both surface and subsurface water. There are ancillary products derived from enhanced elevation that influence the cost benefit summary however the Montana Bureau of Mines and Geology (MBMG) anticipates a 25% increase in productivity as a direct result of having this data.
	Estimated Annual Operational Benefits: Moderate; $20,000 LIDAR data would greatly reduce the MBMG need for surveys, the time required to survey, the time frame the surveys are accomplished and other operational requirements.
	Estimated Annual Customer Service Benefits: Moderate; $20,000 LIDAR data would increase the benefit to the customer as the MBMG could better assess ground and surface water movement.
Quality Level: [1 2 3 4 5]	**Estimated Strategic Benefits:** Moderate Development (agricultural, industrial, residential, etc) are heavily influenced by water here in the arid west. State Ground Water Information Program seeks to directly address issues related to water supply, water quality, aquifer recharge, aquifer depletion, and a myriad of other issues related to water. LIDAR data would enhance the MBMG capability to make scientific determinations on these issues.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

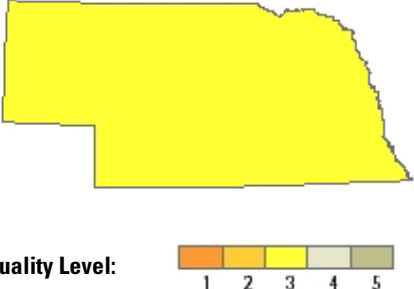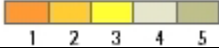| **Program:** Montana Climate Office	**Business Use:** 1. Natural Resources Conservation
	Climate modeling in support of water availability assessment for multiple economic sectors: Climate modeling in support of water availability as well as assessment and forecasting products to support agriculture and water yield monitoring and prediction, disaster services planning, reservoir recharge and conveyance, wildfire suppression planning, ground cover stress assessment, fisheries and wildfowl management planning, animal and plant disease assessment, climate change and natural anomaly research. There are ancillary products derived from enhanced elevation that influence the cost benefit summary however the state anticipates a 25% increase in productivity as a direct result of having this data.
	Estimated Annual Operational Benefits: Moderate; $40,000 The Montana Climate Office would see a considerable reduction in the time spent on data preparation, and more efficiently be able to meet mission objectives of delivery climate services by automating procedures. The availability of elevation data at the quality level specified would bring the state closer to meeting mission objectives. The only way the state could fully meet the objectives and significantly reduce cost is if border data such as adjoining state and Canadian data were included. Analysis units are 4th-code hydrologic units that are coincident with Montana; not the Montana administrative boundary. Montana will still need to face the cost of integrating Canadian data along the border.
	Estimated Annual Customer Service Benefits: Major; $40,000 A consistent authoritative source product at the quality level specified would provide climate services products where now there are none. The ability to automate and customize procedures to meet customer objectives would greatly enhance the array of products as well as the customer experience while holding down costs.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate Climate assessment and forecasting products to support agriculture, water supply and water yield monitoring and prediction, disaster services planning, reservoir recharge and conveyance, wildfire suppression planning, ground cover stress assessment, fisheries and wildfowl management planning, animal and plant disease assessment, climate change and natural anomaly research.
Update Frequency: > 10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: border states and Canada (include all 4th cod HUCs)	

Local Functional Activities

None

Nebraska (NE)

The State of Nebraska has requirements for LIDAR data for the entire state which will provide an accurate, consistent, and useful georeferenced base elevation layer that will benefit a wide range of users. The improvement in information provided in this base layer will allow more accurate identification of point estimates of slope, aspect, and elevation, allowing more accurate identifications of landforms and surface features, stream cross-sections and geomorphology, watershed boundaries, forest heights, floodplains, and much more. This elevation layer will allow improvements in planning efforts while reducing needs and costs for engineering (elevation) surveys for groundwater and surface water modeling and management, watershed planning and management, community planning, emergency management, conservation planning, and public and private construction. For the State of Nebraska, having this data publicly available for the entire state will improve planning efforts and reduce costs for public agencies and private businesses while improving the ability of state agencies to manage public resources they are entrusted with.

LiDAR applications from which Nebraska may realize real benefits in cost savings or improved efficiencies include: Infrastructure Planning, Natural Resources and Environmental Science, Emergency Management and Response Planning, Evaluating Alternative Options for Infrastructure, Permit Process Improvement, Research, Economic Development, development and use of Automated Planning Tools, and Development of New Technologies and approaches to resource challenges.

State Functional Activities

Program: Integrated Management Planning	Business Use: 2. Water Supply and Quality
Quality Level: **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Conservation practices assessment:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported assessment of conservation terraces will allow improved conjunctive management modeling **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Benefits Description Not Provided **Estimated Strategic Benefits: Not Reported** Benefits Description LiDAR can be useful to define field boundaries, identify conservation structures, locate reservoirs and dams, assess the condition of conservation terraces, estimate potential storage in reservoirs and terraces, and evaluate slope for erosion potential. Agricultural application of LiDAR technology can help better target and design watershed practices to improve watershed health and to maintain or enhance productivity.

Program: Floodplain Management & Dam Safety	Business Use: 14. Flood Risk Management

	Flood Risk Mapping:
	Estimated Annual Operational Benefits: Major; $70,000
	More survey savings will be realized from the availability of state-wide LiDAR data. More accurate flood area maps will be available for citizens in the state, and will help local communities to carry out their floodplain management responsibilities.
	Estimated Annual Customer Service Benefits: Major; $600,000
	As more areas with quality topographic data, more areas will have more accurate flood risk maps. More future flood loss can be reduced or eliminated.
Quality Level:	**Estimated Strategic Benefits:** Major
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	If quality topographic data become available statewide, new accurate floodrisk maps can be produced and exiting flood maps can be revised. This more accurate risk information will improve public safety, guide future developments, and make communities more risk-resistant. Public perceptions of government services will be improved. Numerous other benefits will be achieved.
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

None

Nevada (NV)

The State of Nevada has a number of high resolution/high accuracy elevation data needs. Two of these, related to the Business Uses of Geologic Resource Assessment and Hazards Mitigation and Flood Risk Management are high value programs in spite of representing a small portion of the State budget. Public safety will be enhanced through more extensive and accurate seismic hazard assessments. Better elevation data will improve flood risk maps that enhance public safety and have the potential to save Nevada residents money on flood insurance. Geothermal exploration and mineral investigations made using enhanced elevation data will have a significant positive impact on the Nevada economy. Better elevation data will also aid the State in dealing with fire hazards through better data for fuels reduction and fire fighting. Additional applications in the State include improved air quality modeling, forestry, and the mapping of mining activities for regulatory compliance and reclamation.
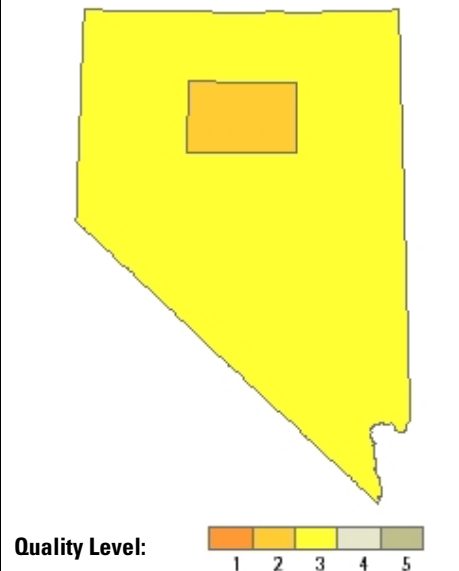
State Functional Activities

Program: Bureau of Air Quality Planning	**Business Use:** 1. Natural Resources Conservation
Quality Level:	**Air Modeling Analyses:** The Bureau of Air Quality Planning uses exiting 1- and 3-meter DEM data extensively to support air modeling analysis. More accurate and current elevation data would improve modeling and enhance the reliability of analysis.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Current elevation data would allow the Bureau to account for the major elevation changes occurring in mining areas while modeling air quality.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Better modeling will improve customer service because more accurate information will be available.
Update Frequency: 4-5 years	**Estimated Strategic Benefits:** Major Better information will be available to the public.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Forest Resource Management and Fires	**Business Use:** 5. Forest Resources Management

Forest Resource Management Planning and Mapping: LiDAR would assist the Division of Forestry by improving their ability to identify species types and locations, manage wildfire (fire fighting, fuels reduction, etc.), and better work with landowners on site development plans.

Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported
Improve elevation data would allow Forestry to do better analysis

Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
Better elevation data would assist Land Managers and planners.

Estimated Strategic Benefits: Minor
Public safety will be improved through access to better information during wildfires.

Quality Level: 1 2 3 4 5

Update Frequency: 2-3 years
Bathymetric Data: No
Tide-Coordinated: No
Data Outside State Needed: Not Provided

Program: Geologic Mapping Program	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

Geologic Mapping: The overall quality and cost effectiveness of several kinds of geologic mapping projects would be greatly enhanced if LiDAR data existed in Nevada. Geothermal exploration, seismic hazard investigations, site characterization studies, and mineral investigations and development usually begin with geologic mapping that would benefit from having LiDAR bases and topographic enhancements as tools.

Estimated Annual Operational Benefits: Major; $200,000
If LiDAR data existed in Nevada, it could be used as the base topography in setting up 3D virtual geologic mapping models, and could be used in coloring elevations for correlation and shading landforms which are tools that aid in mapping, and for topographic profiles used in geologic cross sections.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
The overall quality and cost effectiveness of several kinds of geologic mapping projects would be greatly enhanced if LiDAR data existed in Nevada. Geothermal exploration, seismic hazard investigations, site characterization studies, and mineral investigations and development usually begin with geologic mapping that would benefit from having LiDAR bases and topographic enhancements as tools.

Estimated Strategic Benefits: Major
A high-quality LiDAR database for Nevada would allow all communities to have their natural hazards be mapped and characterized cost effectively. For example, LiDAR could be used to locate and map late Quaternary faults that could rupture during earthquakes so urban development can be planned to avoid building over them. Other natural hazards such as landsliding, flooding, and even earthquake shaking susceptibility can also be mapped using LiDAR. Earthquake research would greatly benefit from LiDAR in Nevada because it would allow future earthquake surface ruptures to be mapped in great detail, aiding scientific studies by creating a more complete documentation of an earthquake event.

Quality Level: 1 2 3 4 5

Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program
Bathymetric Data: Yes
Tide-Coordinated: No
Data Outside State Needed: Not Provided

Program: Bureau of Mining Regulation and Reclamation	**Business Use:** 10. Resource Mining

	Mine Facility Maps: The Bureau of Mining Regulation and Reclamation uses elevation data as a source for mapping mine facilities. Existing elevation data does not show many of the areas that have been mined in Nevada. Good quality elevation data that is updated regularly will result in maps that are more current and accurate.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	The Bureau will have access to better source information for mapping efforts
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Customer service will be enhanced through access to more accurate and higher quality maps
	Estimated Strategic Benefits: Major
	More timely and accurate information will be available to the public
Quality Level: (1 2 3 4 5)	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Flood risk modeling and mapping of riverine areas and alluvial fans . Also dam/levee safety analysis	**Business Use:** 14. Flood Risk Management

	Flood insurance rate map and Coordinated Needs Management Strategy activities: The mapping of flood hazards would be significantly improved if quality level 2 and 3 LiDAR was available statewide. The improvement would enhance public safety and potentially save Nevada residents money on flood insurance.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	The National Flood Insurance Program is in the process of completing conversion to digital flood maps and is mapping special flood hazard areas (SFHAs). Some of these SFHAs have been re-delineated to show additional homes in the "required Insurance" zones while the FIS reports state "no new detailed study" was done. Many of these studies were based on the National Elevation Data Set at 10 meter resolution. Improvement in topographic information could save many residents of Nevada money because of the potential for better data to show their residences as being in locations with reduced flood risks.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	This data type can be used for many different users. The LiDAR data may also bring new communities/ tribal areas into the National Flood Insurance Program due to improved data accuracy.
	Estimated Strategic Benefits: Major
	All of the above answers can be included here. Also, the entire hazard mitigation process can be based on better data, which can be used to prioritize the greatest needs.
Quality Level: (1 2 3 4 5)	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities
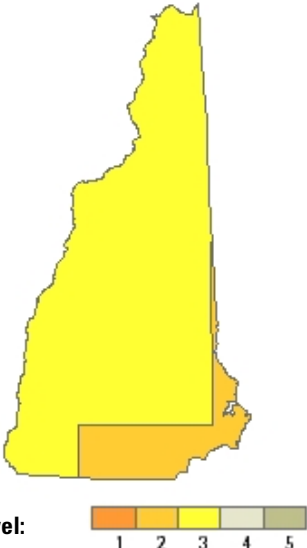
Regional Government -- Southern Nevada Water Authority	
Program: In-State Water Resources Project	**Business Use:** 2. Water Supply And Quality
Functional Activity: Watershed Assessment	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Combined with other technology like remote weather gauging instruments, the elevation data would greatly assist ongoing monitoring of hydrology in the region.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided We would be able to provide much better elevation & contour data for the area of interest. Also, having the LiDAR data available to customers will open up additional applications for the data and enhance its value.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Would be able to track changes in hydrologic patterns, when combined with imagery snapshots, over time, and which could show impacts to the environment.
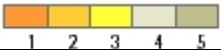
Regional Government -- Southern Nevada Water Authority	
Program: Water Smart Landscape Program	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Biological Modeling And Change Detection	

Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Having LiDAR data returns that included vegetation and other above-ground features would be beneficial to identify various plant types and vegetation in the Las Vegas Valley metropolitan area.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided A major benefit would be the ability to perform change-detection, not only with imagery but with elevation data. Also, having the LiDAR data available to customers will open up additional applications for the data and enhance its value.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Possible environmental benefits would be tracking growth patterns and changes in an urban environment, and their impact on the microclimate and water usage for the Las Vegas Valley.

New Hampshire (NH)

The State of New Hampshire has many agencies that know the value of LiDAR to their programs. Those programs include flood risk mapping, sea level rise, forest and soil mangement. The issue is a lack of funding to complete statewide coverage.

State Functional Activities

Program: flood hazard mapping	**Business Use:** 14. Flood Risk Management
	Flood risk mapping: Both users are using LiDAR for flood plain management. One user is identifying areas of flood risk to use zoning to prevent development in danger zones. The other agency is using LiDAR to do mapping to identify developed areas that require flood insurance.
	Estimated Annual Operational Benefits: Major; $650,000 Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Major Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes	

Program: Fluvial erosion hazard assessment	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic mapping: Mapping fluvial erosion is a high priority in New Hampshire. Streams and rivers continue to erode and flood in significant urban areas. LiDAR is used to identify these areas before the erosion occurs.
	Estimated Annual Operational Benefits: Major; $50,000 Accurate delineation of valley walls is critical in mapping fluvial erosion hazard zones. Data at the specified Quality Level will enable breaklines defining the valley wall to valley flat transition to be identified remotely, limiting the amount of staff time and travel required for field verification. Data will also identify subtle topographic features, such as meander scrolls and other evidence of former channel positions that are critical in mapping present and past floodplains. In many cases these features are not visible to an observer on the ground and cannot be seen in the high resolution digital orthophotography that is available.
Quality Level:	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported More accurate fluvial erosion hazard (FEH) zone delineations that can be incorporated into local hazard mitigation plans and local FEH zoning ordinances. Accuracy is imperative to obtain landowner acceptance of the FEH maps at the parcel scale. Lower costs of mapping due to a reduction in the labor required to field verify valley walls.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Strategic Benefits:** Major Greater public confidence in the accuracy and reliability of FEH maps will translate into increased adoption of local FEH zoning ordinances and ultimately increase public safety. Lowered costs of mapping will translated into an increase of river miles that can be mapped with available program resources.
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, watersheds	

Local Functional Activities

Regional Government -- Rockingham Planning Commission	
Program: Adaptation change study	**Business Use:** 15. Sea Level Rise And Subsidence
Functional Activity: Sea Level Rise Hazard Analysis For Communities	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $20,000 With limited LiDAR we have completed a pilot study. We could study all New Hampshire coastal communities.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided We would be able to offer this study to all coastal communities. Our pilot study using limited existing data has been very well received.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Further study will increase outreach and also understanding of the need for coastal adaptation planning. The pilot study has been well received and has enhanced the educational outreach.

Regional Government -- Rockingham Planning Commission	
Program: Regional Planning	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Natural Resource Conservation, Planning.	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Currently we run a GIS and data distribution hub with very poor elevation data. This hampers the activities. We would have a fundamental base mapping layer that has been lacking.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided We would be able to fulfill elevation data request with relevant data. We respond to customer requests for elevation data, but with poor data.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Agency would have relevant elevation data for regional planning support and also for distribution to consultants. Currently when there is a request for elevation data, people are taken aback to realize the lack of quality data.

New Jersey (NJ)

The State of New Jersey has some sort of LiDAR coverage for the entire state. FEMA Region II, the New Jesey Dept. of Environmental Protection (NJ-DEP), and USGS have played the largest roles in acquisition and coordination of LiDAR data. Coastal Flood loss and drinking water supply are the two largest issues to which LiDAR data are applied in New Jersey. Both these functions are are administered in NJ-DEP. The most immediate needs for New Jersey elevation data are to have the western Warren and Sussex LiDAR reprocessed, as it was rejected by USGS QA for use in the NED due to excessive processing artifacts and a systematic horizontal control error. Also mapping of the shoreline using NGS vertical Datum software and LiDAR is being discussed with Rutgers University, Richard Stockton College, NOAA Coastal Services Center, FEMA Region II, and NJ-DEP. The state will compare methodology of the NGS Vertical Datum shoreline derivation to a method that USGS Coastal marine Geology is using. The USGS Geospatial Liaison has encouraged NJ-DEP to consider developing policy guidance on how to revise open water features (LiDAR and/or orthoimagery). NJ-DEP is the USGS NHD/WBD state steward, so developing a strategic plan to reconcile orthoimagery and LiDAR shoreline in tidal areas is an issue. FEMA has began LiDAR maintenance in NJ with the re-acquisition of Burlington and Camden counties this past leaf-off season. NJ-DEP also has contracted for the production of a state-wide DEM at 3 meters. This will support many small watershed uses and future orthoimagery acquisition. Discussions with the Delaware River basin Commission are underway to create a basin-wide DEM in conjunction with StreamStats as part of the Northeast Area Watersmart initiative.

State Functional Activities

Program: Land Use Management	Business Use: 2. Water Supply and Quality
	Watershed Management: NJ-DEP is charged with maintaining an adequate supply of safe drinking water from both surface water in the northern part of the state, and ground water in the southern part of the state. Comprehensive reviews of land use change are needed to protect surface water, surface water filtering buffer areas, ground-water recharge areas, and well sites. Impervious surface location also become important to maintain drinking water supply for the most densely populated state in the nation.
	Estimated Annual Operational Benefits: Major; $10,000,000 Used to facilitate watershed land use change analysis in order to protect surface and groundwater drinking water supply and recharge areas. Institution of best-management practices to maintain or improve water quality can be modeled.
	Estimated Annual Customer Service Benefits: Major; $5,000,000 Improves forecast for water supply and consumption
Quality Level:	**Estimated Strategic Benefits:** Major Improved decisions based on data, science, and changes in supply can be made to protect surface and ground water resources, and water quality.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes	

Program: NJ State-wide Beach-Dune Susceptibility Assessment. Funded by NOAA CSC	**Business Use:** 4. Coastal Zone Management
	Monitor & model beach-dune system. Map-predict susceptibility to coastal storm events: Map and model areas of coastal vulnerability, shoreline change and predict what areas may be subject to shoreline recession, and inundation.
	Estimated Annual Operational Benefits: Major; $100,000 LiDAR combined with the 105 dune-to-15' water depth profiles allow a much more accurate assessment of coastline change, and improved prediction of coastal vulnerability and change.
	Estimated Annual Customer Service Benefits: Major; $50,000 More accurate elevation data will provide coastal residents and businesses. Improved recommendations for shoreline BMP and costs. Improved modeling to predict coastal change and vulnerability of infrastructure and living and natural resources.
	Estimated Strategic Benefits: Major A more informed comprehensive management of coastal resources can be made at both the local and regional level. Long term trends and data can be better represented and assessed.
Quality Level: 1 2 3 4 5	
Update Frequency: Annually	
Bathymetric Data: No	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

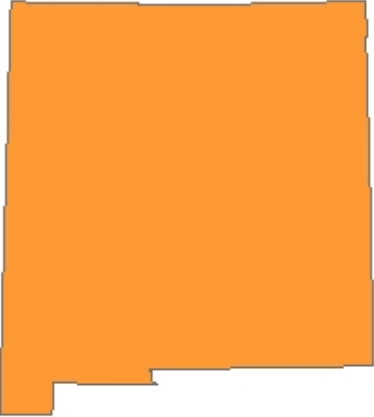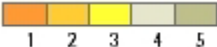| **Program:** Critical Infrastructure Protection	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
	Flood Risk Analysis at Critical Infrastructure Sites in NJ: The most probable disaster is flooding in New Jersey. LiDAR data will help predict vulnerable areas, and assist in generate planning for a more coordinated response and mitigation and recovery of effected areas.
	Estimated Annual Operational Benefits: Moderate; $10,000 A state-wide DEM to create critical infrastructure site topographic analysis will enable planned emergency responses to be implemented in an expeditious and organized manner. This is currently in production by NJ-DEP.
	Estimated Annual Customer Service Benefits: Moderate; $10,000 Improved and maintained elevation data is an essential part of data needed for Informed partners which enable a coordinated action plan to be formulated. They benefit from a site-specific plan that allows them to protect infrastructure investment and function. Infrastructure change can be monitored at local scale.
	Estimated Strategic Benefits: Major Faster coordinated response means less loss, and easier financial recovery, faster return to full functional capability. Environmental considerations can be better prepared for and mitigated at less cost.
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes	

Local Functional Activities

None

New Mexico (NM)

The State of New Mexico has two major business uses for enhanced elevation that would require the need for quality level 1 LiDAR to be provided statewide. The New Mexico Department of Transportation has the business use requirement for Infrastructure and Construction Management to provide statewide transportation planning, design and maintenance, and construction for its roads, rail and air systems. This Infrastructure and Construction Management Business Use is also requested to meet the elevation requirements of three (3) county and local agencies in the state. The second major business use for New Mexico County, Local and Tribal agencies is for Flood Risk Management. New Mexico has Flood Risk Management requirements from four (4) County, Local and Tribal agencies. These non-state agencies have a Flood Risk Management Business Use to provide Hydrologic and Hydraulic Modeling, Retention and Reservoir design, Flood Risk Mapping, and Water Resource Planning. Flood Risk Management was a priority use for survey respondents, although no New Mexico State agency respondent identified elevation requirements in this major business use.

State Functional Activities

Program: Statewide transportation planning, design, construction, and maintenance (to include roads, rail, and air)	**Business Use:** 21. Infrastructure and Construction Management
	Road Infrastructure: New Mexico has a functional activity need for enhanced elevation to support statewide road Infrastructure design and engineering, new infrastructure design and infrastructure management, (i.e., roads, water, waste water, drainage, electricity), stormwater modeling, capital improvement, floodplain administration, and infrastructure planning.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported All functional groups would have access to the same current elevation data.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported All customers would use the same elevation data. Other elevation data sources could be used to supplement the existing elevation data.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major New statewide coordination would take place in relation to the elevation data.
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

City Government -- City Of Farmington	
Program: Public Works - Flood Control	**Business Use:** 14. Flood Risk Management
Functional Activity: Retention Resevoir Design, Hydrologic And Hydraulic Modeling	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided LiDAR data provides the basis for hydrologic modeling and retention dam design. Traditionally, the surface model for this was created with photogrammetry, which would take 3-12 months and cost more than LiDAR for the entire City. In an arid environment like we have here, regularly updated LiDAR data helps us monitor changes in drainages due to localized flood events, and provides data for updating FEMA maps when retention structures are added or drainages are modified.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided On going LiDAR acquisition will ensure that these benefits will continue to be realized as the surface changes over time. We have full coverage for the City to use on projects as needed. The long wait and greater cost associated with ordering photogrammetric based surface data for idividual projects is completely avoided.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Again, flying new LiDAR data will allow us to continue to deliver timely and cost effective services as the City develops and expands. The LiDAR data was purchased for less that the cost of photogrammetric data covering a single project. It has reduced the cost and improved turn around time on projects. In turn public safety from flooding is improved faster and at a lower cost to the citizens, streaching limited tax dollars.

City Government -- City Of Farmington	
Program: Public Works Department	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: New Infrastructure Design And Infrastructure Management (Roads, Water, Waste Water, Dainage, And Electricity)	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $200,000 Traditionally Photogrammetric data was aquired for project areas only, leaving much of the City without updated elevation data. We can aquire LiDAR for the entire City for the same cost as a small photogrammetry project, this have enabled us to use the data on a wide variety of projects, and reduce the design costs of new projects that weren't even planned when the data was aquired. To keep up with the changes to the landscape, new data is needed continually needed to properly model the current ground surface. This would enable us to continue on with the efficiencies and cost savings already realized with the LiDAR data we currently have.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Again, to enjoy the same benefits we are currently enjoying, we need to keep the LiDAR data up to date. The LiDAR data enables us to meet the needs of the City internally, and provide better, more efficient services to the citizens of Farmington. One of the greatest benefits is the greatly reduced cost and turn around time for new project designs.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Continued LiDAR data aquisition would simply continue the benefits we currently enjoy Improved response times for projects and queries from both City Leaders and the general public. The ability to generate surface data quickly on an as needed basis has greatly improved both service delivery and public perception.

City Government -- City Of Farmington	
Program: Zoning/Development permitting	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Impervious Surface Water Runoff	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $10,000 We don't have any data to realize existing operational benefits for controlling storm water runoff. Elevation data would allow the County to accurately assess developer plans for controlling storm water runoff in new residential and commerical developments.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; $2,000 If allowed to license the data, we see a major impact and improvement in the plans the County requires and receives for new development construction and the mitigation of storm water runoff. We don't have elevation data to provide customer service benefits.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	We will be able to better assess plans for storm water runoff and mitigation strategies as development proceeds to protect the waterways, streams and creeks of St. Clair County. We don't have elevation data to realize public, social or political benefits.

County Government -- Bernalillo County	
Program: GIS Program	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Infrastructure Planning And Capital Improvement	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Less field work, inspections, etc., including cost savings for transportation, fuel. Alternative to topographic surveys, incorporate aerial surveys for site development to assess elevation, slope, aspect, and drainage, pertaining to new construction/re-construction for tranportation corridors, facilities, and drainage structures. Currently, LIDAR surface data are acquired biennially for anticiapted high development areas (based on development/permitting activity) of the County. Extending these data regionally would moderately extend benefits, improving mission compliance, countywide.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Currently, LIDAR surface data are acquired biennially for anticiapted high development areas (based on development/permitting activity) of the County. Extending these data regionally would moderately extend benefits, improving mission compliance, countywide. High availability of these data through the County's enterprise GIS for planners, engineers, customer service staff, etc. dealing directly w/ the public pertaning to development in the County assures improved performance, timeliness, and customer service.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Currently, LIDAR surface data are acquired biennially for anticiapted high development areas (based on development/permitting activity) of the County. Extending these data regionally would moderately extend benefit,improving mission compliance, countywide. Improvements to infrastructure control drainage in the Rio Grande valley. Digital elevation data applied to the FEMA's Map Modernization initiative revised DFIRMS translates to cost svaing benefits to the public for those porperties removed from floodplain.

County Government -- Bernalillo County	
Program: Not Provided	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Capital Improvement, Floodplain Adminstration	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- Bernalillo County	
Program: Not Provided	**Business Use:** 2. Water Supply And Quality
Functional Activity: Water Resource Planning Activity	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- Doña Ana	
Program: Innundation mapping	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Innundation mapping and analysis has not been done for Doña Ana County. We are in the beginning stages of performing these analyses using hydrologic & hydraulic modelling methods. Using LiDAR in conjuction with The USACE Hydrologic Engineering Center & ESRI products allows us to develop better practices and to streamline the process to cover all flood control structures. The operational benefits are developing as the project gains momentum. Time/cost savings are noticed in reduced field time and in predictive locations for in-depth study. Having Q2 data available to cover watersheds beyond the County boundaries would allow much better modelling of all flood structures in the County. The same procedures would be applied to each structure, allowing for better analysis. Eventually, this will permit more accurate information, which will benefit Emergency Operations in the event of flooding.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided If the data were available annually, there would be increased benefit to internal customers and to the university/research entities in the area 1. Availablity of LiDAR data (DTM in particular) at affordable cost to public & private firms in the area 2. Availability of data in 3 year increments for historic analysis of topographic changes and human impacts
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	1. Public safety is now coming to understand uses of elevation data. Increased understanding should lead to better application to water supply, hazmat, and evacuation issues 2. Environmentally, water storage and water movement processes could be better understood and managed. Education and public safety are not as interested in elevation data at the moment. We are currently using each opportunity to foster these relationships. Environmental and political concerns are limited to (and addressed by) aerial photography

Regional Government -- Albuquerque Metropolitan Arroyo Flood Control Authority	
Program: Stormwater Facility Design	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Stormwater Modeling	

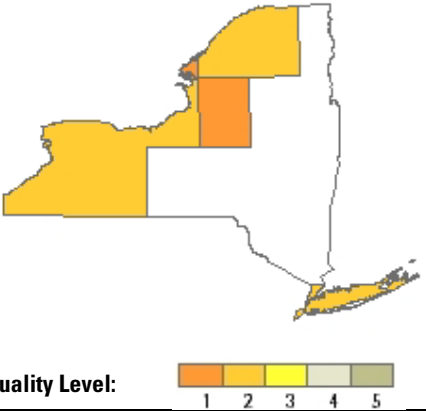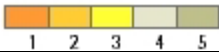|	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $15,000
	Elevation data at Quality Level 1 allows us to take our design to around 65% before we need to get field survey. Elevation data at this level is available to us via a partnership of regional and Federal organizations. If our area was covered by a national program at Quality Level 1, we would be able to reduce the staff time required to identify areas of deficient elevation data and the staff time required to provide that data to consulting engineers during each project.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided
	If our area was covered by a national program at Quality Level 1, we would be able to reduce the staff time required to identify areas of deficient elevation data and the staff time required to provide that data to consulting engineers during each project. The availability of 1ft contour equivalent elevation data has reduced the design time for our projects. Previously, several ground surveys were required before development could start. Right now, digital elevation data is usually used up to the 65% plans.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: Not Provided	If our area was covered by a national program at Quality Level 1, we would be able to reduce the staff time required to identify areas of deficient elevation data and the staff time required to provide that data to consulting engineers during each analysis. Existing high resolution data is used for certain types of H&H modeling that can determine evacuation zones in a dam failure scenario.

Tribal Functional Activities

Pueblo Of Sandia	
Program: GIS Program	**Business Use:** 14. Flood Risk Management
Functional Activity: Hydrologic And Hydraulic Modeling	

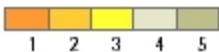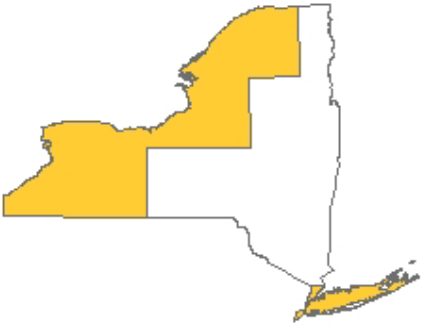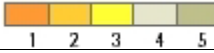|	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $20,000
	The Pueblo of Sandia currently uses a LIDAR derived topographic surface at specified quality level 1 accuracy that covers a small portion of the reservation. This surface has been used for modeling of river overflow for identification of areas suitable for endangered species habitat enhancement. With accurate topographic mapping covering the entire reservation and tribally-owned lands, the Pueblo of Sandia would be capable of accurately characterizing flood potential and risk to life and property.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Provided
	With accurate topographic mapping covering the entire reservation and tribally-owned lands, the Pueblo could also more accurately characterize and manage its agricultural resources and cultural resources including traditional cultural properties. The existing LIDAR derived topographic surface had been used in several applications; for example with cursory examination of a significant river levee bordering the Rio Grande.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Protection of life and property would be the most significant benefit. Accurate characterization of natural resources, agricultural resources and environmental and ecological habitat is another significant benefit. The public, social, and political benefits of using the exiting LIDAR topographic surface are limited by its small size relative to the reservation.

New York (NY)

The State of New York has requirements for updated and higher resolution elevation data over most of the state. A high priority is LiDAR coverage for coastal zone management purposes, as well as inland freshwater resources and flood hazard mitigation. A repeat cycle of between 6 to 10 years would be generally acceptable, with more frequent collections for certain activities. The LiDAR collections should be at least quality level 3 with coastal and other areas (urbanized areas, critical facilities) requiring quality level 2. In general, NY encourages LiDAR collection to cover gaps in areas where no acceptable LiDAR exists presently, before recollecting widespread updates to replace existing acceptable LiDAR datasets. While NY has significant history with coordinating data collection efforts across and within levels of government, a coordinated national-level enhanced elevation program must have well publicized specifications and planned acquisition schedules available well before collection in order to leverage the existing partnership opportunities. Sufficient time must be allowed for stakeholder planning, and to appreciate local/state budget cycles for funding requests considered.
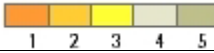
State Functional Activities
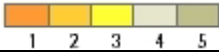
Program: Coastal zone management (Various state agencies)	Business Use: 4. Coastal Zone Management
  Quality Level: **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Yes, for contiguous watersheds	**Coastal Erosion Hazard Area Mapping:** Coastal zone management, hazards and flood risk management. Coastal zone mapping is required by state statute every year; acquisition schedule should be tied to statute and statute revised as needed to include LiDAR acquisition as part of the mapping.
	Estimated Annual Operational Benefits: Major; $1,875,000 Coastal erosion and flood inundation management; loss prevention to property and coastal resources
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Major Benefits Description Not Provided

Program: Capital transportation programs	**Business Use:** 21. Infrastructure and Construction Management
	Transportation infrastructure:
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Provide more current and accurate baseline data for improved risk analysis, disaster response and preparing environmental impact statements for projects.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
Quality Level:	**Estimated Strategic Benefits:** Moderate Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, adjoining counties	

Program: New York State Department of Environmental Conservation Bureau of Habitat Freshwater wetlands program	**Business Use:** 1. Natural Resources Conservation
	Freshwater wetlands mapping: Freshwater wetlands mapping
	Estimated Annual Operational Benefits: Major; $900,000 Meet regulatory requirements of the NYS Freshwater Wetlands Act; reduce costs by avoiding mapping of unnecessary areas.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided
Quality Level:	**Estimated Strategic Benefits:** Major Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: Not Reported	
Data Outside State Needed: Yes adjoining watersheds	

Program: Ocean and Great Lakes Program	**Business Use:** 4. Coastal Zone Management
Quality Level:	**Analysis of Wind Energy Potential:**
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
	Improved analysis of wind generating potential and siting analysis; mitigate risk due to potential flooding and shoreline erosion.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Strategic Benefits: Major
	Benefits Description Not Provided
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Program: Div. of Homeland Security and Emergency Service - OCS - Hazard Mitigation	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
Quality Level:	**Hazard Modeling:** Hazards Monitoring (primarily flood related)
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported
	Improved inundation and flood inundation modeling; better input into hazard mitigation plans.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate
	Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes contiguous watersheds and or counties.	

Program: Div. of Homeland Security and Emergency Service - OCS - Critical Infrastructure Mapping	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response

	Critical Infrastructure Protection: Critical Infrastructure protection Statewide
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Roads and other critical infrastructure in adjoining counties.	

Program: New York State Department of Environmental Conservation Bureau of Flood Protection and Dam Safety, Dam Safety Section	Business Use: 4. Coastal Zone Management

	Dam safety analysis: Improvements to dam safety analysis, permitting and monitoring
	Estimated Annual Operational Benefits: Major; $2,000,000 Dam owners are required to submit dam failure / inundation analysis to support dam hazard classifications and emergency action plans (EAPs) in the case of higher hazard dams. Statewide availability and consistent standards for high-accuracy elevation data would improve the ability of the Dam Safety Section to check/verify these analyses and to perform their own analysis to evaluate requests for hazard classification changes. The primary potential benefits are improved productivity of existing staff and improved protection of the affected public.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Dam owners are required to submit dam failure / inundation analysis to support dam hazard classifications and emergency action plans (EAPs) in the case of higher hazard dams. When available, analysis methods using high accuracy elevation data have significant cost benefits for dam owners, as well as improved outcomes. Statewide availability and consistent standards for high-accuracy elevation data would maximize these savings / benefits. Estimated savings to dam owners are included in above dollar benefit, assuming 25 dam owners per year (low estimate) would otherwise need to employ traditional (field survey) methods.
Quality Level: 1 2 3 4 5	Estimated Strategic Benefits: Major When high accuracy elevation data is available for dam failure / inundation analysis, outcomes are improved and costs are reduced. This increases the safety of the affected public and helps to mitigate any potential environmental damage. It also significantly reduces the cost of complying with state regulations for dam owners. Statewide availability and consistent standards for high-accuracy elevation data would maximize these savings / benefits.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Only those watersheds that have dammed streams that enter into the state	

Local Functional Activities

None

North Carolina (NC)

North Carolina began collection of statewide LIDAR data in 2001 to support the Federal Emergency Management Agency (FEMA) Map Modernization Program (MapMod).   LIDAR-based elevation has led to a suite of programs that support local and state government, universities, private business, and the public. A few of these efforts by the state are noted below.

NC OneMap is the state program that embodies the building of a spatial data infrastructure for the state and is North Carolina's contribution to the National Spatial Data Infrastructure (NSDI).   The thirty-seven (37) data themes of NC OneMap, including elevation, are public domain data and information available to any customer. The business uses for these data are not limited. Thus, while natural resources conservation was chosen in the enhanced-elevation survey response, NC OneMap data is appropriate for many of the twenty-seven (27) business uses that were listed in the survey.
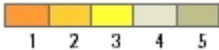
North Carolina was the first Cooperating Technical State (CTS) for MapMod and statewide LIDAR was flown starting in 2001. The NC Floodplain Mapping Program (FMP) was established and used LIDAR to create accurate elevation products that support the accuracy and content requirements for Digital Flood Insurance Rate Maps (DFIRMS). DFIRM products have been completed statewide and scheduled update/maintenance for these products is underway. Learning from the use of LIDAR-based elevation for MapMod, the Office of Risk Information and Analysis is addressing a much wider range of hazard issues across the state. Significant research and development is taking place to create additional data, information and products on all hazards statewide to aid in developing plans for response to and mitigation of these hazards. High quality elevation data has led to significant cost savings and risk avoidance for North Carolina residents and businesses.
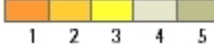
The Multi-Hazard Threat Database (MHTD), a non-public facing state database, is used primarily for disaster response when an event impacts or originates from animals and plants in the state. Data in the MHTD largely comes from businesses that donate business sensitive locational information and other data to the MHTD. Elevation data is used in emergency response to rapidly visualize the best location for response personnel and materials to be deployed when involved in a disaster that effects plants and animals, whether it be flooding or an infectious animal disease or some other issue. Effective location is crucial to a timely emergency response.
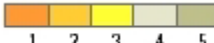
At the NC Department of Transportation (DOT), final design basemap production is a process of mapping the mid-level details of an overall road project for road placement, design, construction, expansion, and maintenance. The elevation data from the statewide LIDAR supports this level of detail. The basemap is then used as one of the products that supports the field survey and final design processes of transportation planning, saving time and money in the beginning stages of road design and construction.
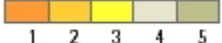
The NC Geodetic Survey (NCGS) uses LIDAR-based elevation data to support research activities by state government, universities, and the private sector in land subsidence and sea level rise. These research efforts in North Carolina would benefit significantly by having a regular update of the elevation data so that temporal change, both degree and speed, could be accurately determined on a yearly basis.
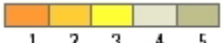
State Functional Activities

Program: NC OneMap	Business Use: 1. Natural Resources Conservation
      Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** NO	**Geospatial Information Clearinghouse:** North Carolina (NC) OneMap is the state program that embodies the building of a spatial data infrastructure for the state, one that feeds the National Spatial Data Infrastructure as it develops. Building a spatial data infrastructure for the state was defined as the longterm goal for GIS in NC by the NC Geographic Information Coordinating Council. NC OneMap provides public domain data and information to any user for any business use. Thus, while Business Use #1, natural resources conservation, was chosen in the survey response, NC OneMap is appropriate for many of the business uses that were part of the survey. **Estimated Annual Operational Benefits:** Moderate; $1,000,000 This is the benefit of having current, accurate elevation data to serve out as part of the NC OneMap data resource. The benefit is $1 million per year based on the value of this data to the user community balanced against the cost of maintaining the data on an annual basis, particularly for those areas of NC where the landscape is significantly changing due to development or natural processes. **Estimated Annual Customer Service Benefits:** Major; $625,000 The 2010 NC OneMap Refresh Planning Project looked at overall benefits being derived from NC OneMap and the data layers contained therein. The benefit is defined as cost savings to users who do not need to develop the data themselves or seek other sources for the data. Considering all of the critical data layers in NC OneMap, the overall value/benefit to the user was estimated at $2.5 million. Since elevation is a framework data layer that has more and varied users, it is weighted more than many of the other layers. Therefore, a weighted value of 25 percent of the total benefit was assigned to elevation data and its customer service benefit. This yields a dollar benefit of $625,000. **Estimated Strategic Benefits:** Moderate Benefits Description Not Provided

Program: Office of Risk Information and Analysis	**Business Use:** 14. Flood Risk Management
	Floodplain Mapping and Hazard Risk Assessment: Digital Flood Insurance Rate Maps (DFIRMS) for all counties in the state have been produced and are now in the process of having map maintenance performed on them. DFIRMs are publically accessible on the Internet. Additionally, significant amounts of research and development is taking place in the state to provide the public and government leaders with additional information and data on all hazards and to develop plans for the mitigation or adaptation to these hazards. LiDAR based elevation data is critical, including bathymetric LiDAR needs for ocean front and sound front areas.
	Estimated Annual Operational Benefits: Major; $75,000,000 Efficiencies are maximized in NC Emergency Management due to more accurate horizontal and vertical flood determination to support the assessment of potential losses from flooding, and to assess the hazards of first floor flooding of every building in the state both inside and outside the 100 and 500 year floodplain.
	Estimated Annual Customer Service Benefits: Major; $170,000,000 Creating quality, statewide base level elevation data to provide accurate information for flooding of first floor elevations in commercial and residential structures throughout the state provides significant loss avoidance for residents and businesses in NC in terms of property damage and loss.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major The establishment of a statewide flood warning system and increased business development in the state.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, extension by watershed into neighboring states to support common operations across state boundaries during emergency situations.	

Program: Transportation Planning, Design, Construction, and Maintenance	**Business Use:** 21. Infrastructure and Construction Management
	Final Design Basemap Production: Final design basemap production is a process of mapping the mid-level details of a transportation project for road placement, design, construction, expansion, and maintenance. The elevation data from LiDAR supports this level of detail. The basemap is then used as one of the products that supports the field survey and final design stage of transportation planning where the tolereances for elevation are much finer than the LiDAR data at any of the quality levels defined in the survey could support accurately. One inch elevation errors in the final road design and placement are significant to the overall project success.
	Estimated Annual Operational Benefits: Major; $75,000 Time savings in the development of final survey basemaps for transportation construction and maintenance.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Improved earthwork estimates, due to more dense point spacing, and the ability to immediately provide dense & accurate bare earth LiDAR elevation points to final design.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits: Not Reported** None
Update Frequency: Annually	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: NO	

Program: NC Geodetic Survey	**Business Use:** 15. Sea Level Rise and Subsidence
Quality Level: 1 2 3 4 5 **Update Frequency:** Annually **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Subsidence and Sea Level Rise Research and Monitoring:** This functional activity involves supplying state government, universities, and the private sector with high quality, high resolution elevation data and information which these organizations use to do their work or their research into land subsidence and sea level rise in North Carolina. An annual update to the elevation data would provide a temporal view of these issues, with degree and rate of change evaluated annually. **Estimated Annual Operational Benefits:** Moderate; $60,000 A regular replacement or update of the enhanced elevation data provides researchers and others a temporal perspective on both subsidence and sea level rise rates and impacts in the state. **Estimated Annual Customer Service Benefits:** Major; $100,000 State government departments involved in surface and ground water issues and research organizations involved in sea level rise research can save both time and money by having continued high-resolution elevation data updates that form a temporal view of subsidence and sea level rise in the state. **Estimated Strategic Benefits:** Major Improved quality of data and information that becomes available to the public and the political leadership to help deal with adverse conditions caused by subsidence and sea level rise.

Program: Multi-Hazard Threat Database	**Business Use:** 17. Homeland Security, Law Enforcement, and Disaster Response
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Visualization of Disaster Response Requirements:** The Multi-Hazard Threat Database (MHTD), a non-public facing database, is largely used for disaster response when the source of the disaster is linked to or impacts animals and plants in the state. While a disaster might be flooding, the MHTD is largely used to mitigate the impacts caused by the disaster on animal and plant populations. The goal is to deal with these impacts so that human populations are not endangered by the effects of animal and plant issues. Additionally, the MHTD is used in cases where animal and/or plant diseases surface in NC and could harm the full animal or plant industry in the state, and possibly bring harm to the human population. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improved citing of response personnel and equipment following an event that endangers human life due to animal or plant issues or impacts. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported The effected human population is provided the best and most rapid response to animal and plant issues that could impact human health. **Estimated Strategic Benefits:** Major Either creates or enhances the value of the MHTD to the public, law enforcement, and elected officials at all levels of government.

Local Functional Activities

County Government -- Mecklenburg County		
Program: Floodplain Management		**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Plain Management And Remapping For FEMA Initiatives		
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $850,000	
	The benefits are valued in the Floodplain Mapping and Safety Programs. The biggest benefit is to achieve accurate and timely data more efficiently and faster for usage.	
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $1,300,000	
	Data and information is more current and accurate and available to users at a point where the current data is becoming out-of-date. The benefits are that it is valuable information for re-mapping, analysis and study's.	
Bathymetric Data: No	**Estimated Strategic Benefits:** Major	
Tide-Coordinated: No	A new and current enhanced elevation data set will benefit the public safety and social aspects the greatest, with the political benefits being the planning and preparation for major events like the upcoming 2012 Democratic National Convention in Charlotte, NC. Benefits are valued in re-mapping of DFIRM maps, and in the public safety sector. These benefits are viewed not by dollar amounts, but by accurate information being utilized for safety.	

County Government -- Mecklenburg County		
Program: Framework Base Mapping		**Business Use:** 22. Urban And Regional Planning
Functional Activity: Base Mapping		
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $50,000	
	The elevation data set is currently used for base mapping efforts and supplying the engineering community with accurate contour information for land development purposes. Having more timely and accurate information will greatly improve the efforts of both communities.	
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $50,000	
	Having new and accurate elevation data will benefit the customer by bringing a greater accuracy level to the base mapping resources. Because the current elevation data set is becoming aged and dated, the data are becoming less valuable to the customers.	
Bathymetric Data: No	**Estimated Strategic Benefits:** Major	
Tide-Coordinated: No	The benefits will be largely in planning and development of accurate base layers. Currently, the existing benefits are for land development and planning purposes. These data sets are used to better prepare areas for residential and commercial construction and development.	

County Government -- Pasquotank County		
Program: Flood Plain Mapping		**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping		
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $100,000	
	Higher resolution elevation data would give us the ability to more finely determine and adjust the flood areas of the county and having the LiDAR data on a regular update and maintenance cycle would help us keep up with changing conditions such as sea level rise.	
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided	
	We are better able to serve our citizens by having accurate flooding information.	
Bathymetric Data: No	**Estimated Strategic Benefits:** Major	
Tide-Coordinated: No	Because we have the data currently, I don't know what better services we could provide. We aren't just guessing people are in flood zones but using great accurate data that allows us to make the best policy decisions.	

County Government -- Pasquotank County	
Program: Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Subdivision Runoff	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $100,000 We are limited by our analysis of our ditches and streams in the county. High resolution LiDAR data would improve our ability to predict runoff by helping to calculate the load carrying capacity of ditches and streams in the county.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $200,000 Builders and owners of new buildings and/or subdivisions/shopping areas would be better able to understand how their construction will effect flooding issues downstream from their construction site, thus saving significant investments later on to fix issues that develop.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Yes	Our citizens are happy that we look at runoff before allowing a subdivision. Finer detail and bathymetric LiDAR would do much to help in this regard.

Tribal Functional Activities
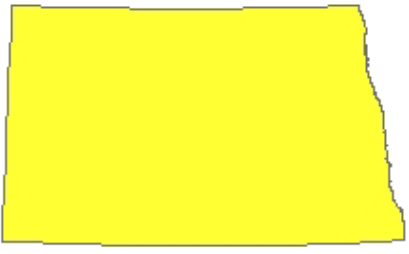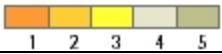
Eastern Band Of Cherokee Indians	
Program: Tribal GIS System	**Business Use:** 13. Cultural Resources Preservation And Management
Functional Activity: Site Protection Preservation And Analysis	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $500,000 Elevation data plays a key role in the location and protection of Indian heritage sites in NC and elsewhere. The elevation data is used to help locate those heritage sites and provide bounding area information for preservation of the sites. The Tribal GIS System services sites in NC and nine other states in the eastern US.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $300,000 Site suitability determinations for the siting of construction will be easier to achieve with enhanced elevation data available for the process. Significant field work can be avoided if site is not suitable for development.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Educadtion of the public on tribal history and presence in NC and the protection of the sites.

North Dakota (ND)

The State of North Dakota has requirements for Quality-Level-1, 2, and 3 data covering the entire state and including a buffer area across both state and international borders. Approximately 18% of the state is covered by existing Quality-Level-3 or higher resolution elevation data. Large areas of the state are currently covered only by very old elevation data that do not meet Quality-Level-5. Experience in the use of LiDAR data is rather limited in most state agencies due to the lack of data over areas of interest. Primary uses for enhanced elevation data by the state government are identified as emergency response, flood and drainage modeling, water quality monitoring, invasive species control, and transportation infrastructure design. There is a need for a broad range of data products that vary by user.   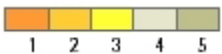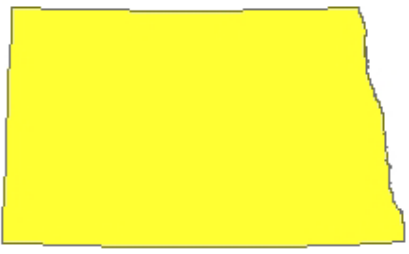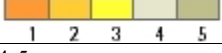Benefits of enhanced data include more accurate hydrologic and hydraulic modeling, refinement of the Watershed Boundary Dataset, more accurate and efficient orthophoto production, and reduced need for field surveys which will reduce labor costs, provide more reliable flood inundation predictions and enable more educated management decision making. Property damage and lives lost in emergency events could be reduced. North Dakota would be very supportive of a national program for LiDAR acquisition.
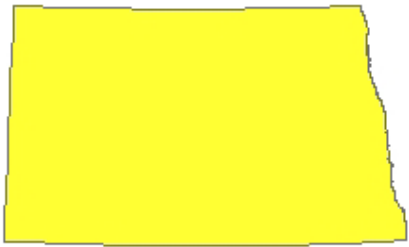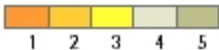
State Functional Activities

Program: National Watershed Boundary Dataset Stewardship, Total Maximum Daily Load determinations, Non-Point Source Pollution Prevention programs	Business Use: 2. Water Supply and Quality

	Watershed Delineations and Water Quality Monitoring:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Refinement of Watershed Boundary Dataset delineation with high resolution elevation data; determination of TMDL's using established computer models that need elevation as an input.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Improved performance of models. Larger data files sizes will be challenging to handle. No data exists at quality level desired, so exact impact is unknown.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major Refinement of elevation data for watersheds wouldimprove flood control planning, refinement of watershed delineations, and elevation of hospitals for flood response efforts.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Data to complete watersheds that cross state and international boundaries would improve models.	

Program: Orthophotos	Business Use: 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**Road Infrastructure:**
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Improve ability to produce orthophotos at the accuracy that is required. Reduced time by utilizing existing data instead of creating digital surface model. Reduced field survey time.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Broader coverage. Creation time for data would be reduced.
	Estimated Strategic Benefits: Major Reduced design time for public transportation. Effcient use of public funds.
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: GPS Data Logging	Business Use: 8. Agriculture and Precision Farming
Quality Level: 1 2 3 4 5	**Noxious Weed and Invasive Species Infestation Reporting and Control:** Respondent could not be reached for follow up interview due to ongoing flood emergencies in the state.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported More accurate and up to date data.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Faster delivery of more current, higher quality point location infestation data to the counties.
	Estimated Strategic Benefits: Not Reported Benefits Description Not Provided
Update Frequency: 2-3 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Need for data in surrounding states may develop as the emerald ash borer infestation spreads towards North Dakota.	

Program: Emergency Response	Business Use: 14. Flood Risk Management
Quality Level: 1 2 3 4 5	**Predictive Flood Inundation Mapping:**
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported Benefits Description Not Provided
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes - toxic plumes, floods, and other hazards cross state boundaries.	

Program: Hydraulics	Business Use: 21. Infrastructure and Construction Management

	Hydrologic and Hydraulic Modeling:
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Using enhanced elevation data reduces field surveys and improves accuracy over existing data.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More accurate modeling. Delivery of products on a more timely basis.
Quality Level:	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Local Functional Activities

City Government -- City Of Fargo	
Program: Storm Sewer Utility encompasses floodplain and storm water management activities within the civil experience.	**Business Use:** 14. Flood Risk Management
Functional Activity: Floodplain & Stormwater Management	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Better data would provide for better management decisions.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Our current process would not be changed but it may well provide a positive timing element. This data offers up a higher level of service both for consulting engineers and off the street customers.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Up to date quality data reduces labor costs, provides for better assumptions and enables better planning information. A larger data set would aid us in planning for extra-territorial expansion and merging with adjacent jurisdictions. Up to date data reduces labor and hopefully provides a better product to our users.

City Government -- City Of Minot	
Program: District III Planning and Development	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Flood Risk Mapping, Hydrologic and Hydraulic Modeling to Help Identify Zoning and Planning for Rural Communities	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Currently we do not use any LiDAR data, so its hard to put a "value" on it. We would be able to educate public on certain problems in the region. Flood, sediment, fire and other potential disaster related issues along with environmental issues (septic tanks).
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; Not Provided Information would be an asset for poor counties when trying to protect the environment and property.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Would use bathymetry for sediment issues along the Missouri River. Also, this data can assist in planning for sewer systems, along with flood plain issues. We have utilized LiDAR for a new flood plain, which was valuable in protecting a community. This community is now able to develop accurate zoning and other planning documents to "grow" the community.

Regional Government -- Bismarck-Mandan Mpo	
Program: Not Provided	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Transportation And Land Use Planning	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided It helps the Metropolitan Planning Organization. We don't know the benefits requested here.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided We are unaware of the new customer benefits. Local jurisdictions can use data for local planning, engineering and design efforts.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate We are unaware of these benefits. This data aids emergency management addressing natural and man made disasters.
Tide-Coordinated: No	

County Government -- Cass	
Program: Not Provided	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Modelling	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Time savings for County engineering staff when preparing for spring flooding. Having elevation data available in-house enables staff to prepare in advance and mitigate as much as possible the impacts of spring flooding. Staff has the ability to produce maps and provide information to County residents in a timely manner. County has been able to perform 80+ buyouts of flood prone properties to mitigate the risk of flooding. We would have the ability to produce more detailed models of other rivers in Cass County i.e. Maple, Sheyenne that would enable us to assess the impacts on a wider population.
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided We would have the ability to produce more detailed models of other rivers in Cass County i.e. Maple, Sheyenne that would enable us to assess the impacts on a wider population which in turn can be shared with our customers i.e. County residents The County has provided an interactive flood risk reduction site that allows residents to estimate the river stage at which their property is at risk from spring flooding. Maps & data are readily available to answer customer questions immediately instead of involving an extensive search of data on the web (which was often out-dated and inaccurate)
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	With discussion of a major diversion project in process for the Red River basin the availability of more accurate data will assist in educating the public and politicians. The public are much better educated at how the river flooding is going to affect their property and environment. From a public safety stand point resources can be prepared and deployed in advance to protect areas where flooding is most likely to occur.

County Government -- Mckenzie County	
Program: Not Provided	**Business Use:** 12. Oil And Gas Resources
Functional Activity: Pipeline Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Unknown
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Information would be easier to obtain.
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Unknown

County Government -- Ward County	
Program: Ward County Highway Department is charged with the responsibility to construct, maintain, and operate the county road system	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Road Infrastructure	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided There is some relief due to the savings of on the ground surveying, but what it really brings is better accuracy to the design, and a better end product for the public, and helps to eliminate unforeseen errors.
Update Frequency: > 10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided There is some relief due to the savings of on the ground surveying, but what it really brings is better accuracy, to the design, and a better end product for the public, and helps to eliminate unforeseen errors.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	There is some relief due to the savings of on the ground surveying, but what it really brings is better accuracy, to the design, and a better end product for the public, and helps to eliminate unforeseen errors.

Ohio (OH)

The State of Ohio has had statewide, high-resolution LiDAR-based digital elevation (DEM) data and LiDAR point cloud data for the past several years thanks to the coordinated efforts of the Ohio Geographically Referenced Information Program (OGRIP), Ohio Office of Information Technology (OIT), Ohio Department of Transportation (ODOT), Ohio Department of Natural Resources (ODNR), and other state agencies and stakeholder groups, with additional financial support from the National Geospatial-Intelligence Agency (NGA), U.S. Department of Homeland Security (DHS), and U.S. Geological Survey (USGS).
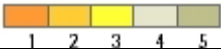
The basic horizontal resolution for the Ohio statewide LiDAR is two meters, corresponding to quality level three (Q3). A number of counties and cities are taking advantage of the Ohio Statewide Imagery Program (OSIP) buy-up options to acquire even higher-resolution LiDAR and corresponding elevation data that is better than Q3. The contractor also flew original OSIP LiDAR in two directions in several of the Ohio major urban areas to support accuracy within taller structures.
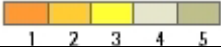
The requirements and benefits documented through this survey are related to water quality, flooding, geology, coastal issues, transportation infrastructure planning, and forest management. Additional requirements and more precise and authoritative quantitative benefit information were not yet documented through this survey due to limited available resources during this period by key stakeholder groups for the complex survey and the current lack of a full-time USGS Geospatial Liaison dedicated to Ohio.

The original driving requirement for statewide high-resolution elevation data for Ohio was to support the accurate ortho rectification of new statewide high-resolution color aerial photo imagery through OSIP. Statewide LiDAR data was not an original requirement to support OSIP, but was found to be the most efficient method to meet the elevation requirement. The OSIP LiDAR data has shown itself to be valuable beyond the original air photo ortho rectification requirement, but it may still be important to note the value of enhanced elevation to support accurate development of other themes of spatial data, such as imagery, which have their own requirements.

During subsequent meetings, a few additional functional activities for Ohio LiDAR and elevation data were noted that did not come out during the survey period. These included archaeology, history, more detailed stream mapping, and recreation.

State Functional Activities

Program: Biological and Water Quality Monitoring and Assessment / Coastal Zone Management: Non-point Program / Planning for watershed conservancy districts	Business Use: 2. Water Supply and Quality

	Water quality: Water quality monitoring and assessment Impervious surface info (from LiDAR and related sources) also related to water quality.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Enhanced elevation data would allow for the accurate, automated delineation of catchments associated with individual stream monitoring sites. Accurate delineation allows for a more extensive characterization of sites, which benefits study planning and result assessment.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported The primary product of the Biological and Water Quality Monitoring and Assessment Program are Biological and Water Quality Reports. Enhanced elevation data could increase the efficiency of monitoring efforts as well as the quality of the data and analysis produced, which could improve report timeliness and utility to readers.
	Estimated Strategic Benefits: Moderate Enhanced elevation data could result in environmental benefit, because it could improve the quality and timeliness of stream and watershed assessments. Improved assessment supports better decision-making, that would hopefully results in real environmental improvement in streams, rivers and lakes.
Quality Level: ▮▮▮▮▮ 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes	

Program: Flood risk modeling and mapping / Dam and levee safety	Business Use: 14. Flood Risk Management

	Flooding: Flooding, flood risk modeling and mapping, dam and levee safety analysis Impervious surface info (from LiDAR and related sources) also related to runoff and flooding.
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported Benefits Description Not Provided
Quality Level: ▮▮▮▮▮ 1 2 3 4 5	
Update Frequency: Not Reported	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes	

Program: Geologic mapping, geologic assessment, mine mapping, hazard mitigation, glacial mapping, surficial geomorphology	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	Geology: Geology / geologic assessment, hazard mitigation, geologic mapping, mine mapping, glacial mapping
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Elevation data helps with geomorphology mapping of glacial deposits and karst sinkholes. The use of high quality elevation data mostly helps with higher detail of data capture...less generalization. It is especially important for pinpointing karst sinkholes as accuracy is more important.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Customers can expect better accuracy and more thorough mapping.
	Estimated Strategic Benefits: Major Higher accuracy of surficial geomorphological mapping provides excellent opportunities to inform the public of the importance of geologic mapping for the purpose of protecting sensitive areas. Mapping detailed areas allows for coordination between the state and local government agencies due to better quality.

Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Coastal Zone Management: CEA, SSP and SLL regulatory Programs / bluff recession, viewshed analysis, off-shore wind facility planning, shore structure inventory	**Business Use:** 4. Coastal Zone Management

	Coastal issues: Coastal issues / coastal zone management / bluff recession, viewshed analysis, off-shore wind facility planning, shore structure inventory
	Estimated Annual Operational Benefits: Not Reported; $300,000 Updating of coastal erosion area mapping under Ohio Revised Code 1506.06. Identify unauthorized coastal structures using digital surface model, full point cloud and hydroflattened LiDAR data for reporting to NOAA. Assistance to littoral property owners.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Since the general public do not have the analysis software, any benefits derived will be indirectly received through consultants. Provide datasets to consultants for benefit of public projects, usually in a LAS format.
	Estimated Strategic Benefits: Minor Collaborative efforts to leverage public funds and bring a more fiscally responsible use would be accepted by the constituents. Education outreach efforts for bluff erosion and recession, vegetative slopes BMPs have been received as a regulatory component although it was not intended as such.

Quality Level: 1 2 3 4 5	
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Transportation infrastructure planning, preliminary engineering, mapping, and construction management	**Business Use:** 21. Infrastructure and Construction Management

	Transportation planning: Transportation infrastructure preliminary design, planning, and construction management Better elevation data helps in culvert replacement efforts and in determining cut and fill in the preparation of the road bed.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported The benefits are estimated to be moderate due primarily to the vertical accuracy which limits the use of the data. Would need to compare the existing LiDAR data to the proposed in order to make a determination. Savings for ODOT may be up to $2,000 per project.
	Estimated Annual Customer Service Benefits: None; Dollar Value Not Reported None
	Estimated Strategic Benefits: Moderate An increased point density may have a slight environmental impact due to the higher resolution of the terrain for analysis purposes. Public and private entities may also benefit for these reasons stated above.
Quality Level:	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Comprehensive sustainable forest management on state forest lands in Ohio	**Business Use:** 5. Forest Resources Management

	Forest management: Forest management / Forest structure, volume, and composition biometrics Lessons learned from current Ohio OSIP statewide high-res imagery, elevation, and LiDAR is need for more returns in LiDAR point cloud and more classification values to support forest management.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported QL1 data would provide the opportunity to quantify and project current forest stands, cover types, development, volume, biomass, etc. through automated means. This is critical with decreasing staff available to conduct detailed forest inventory on the ground. This data will facilitate maintaining Forest Stewardship Council and Sustainable Forestry Initiative sustainable management certification.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported QL1 data will facilitate quantification of forest inventory relating to timber harvest location and layout. This will result in more efficient harvesting at a sustainable level, providing benefits to Ohio's timber industry as well as local governments.
	Estimated Strategic Benefits: Major QL1 data may provide information necessary to maintain certification by FSC and SFI sustainable certification for Ohio's state forests. This data will allow for analyses of completed, current, and planned silvicultural and forest management activities on state forest lands.
Quality Level:	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities
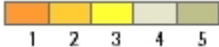
County Government -- Clinton County	
Program: Regional Planning Commission	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Suitable Land For Business Growth	

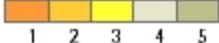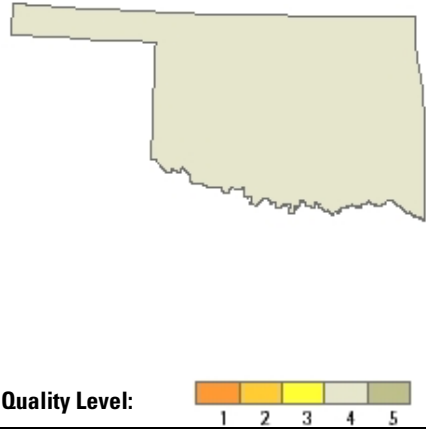|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided We could minimize the amount of money spent on performing basic functions such as creation of contour data, structure outline datasets, in the early phase of enticing a major business to choose to build in Clinton County, if we already possessed the data. Being able to answer questions early is always a benefit. We already possess elevation data.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Wew already possess elevation data. With the elevation data we currently have, we are imediatley able to answer questions on land suitablility that businesses / corporations might have. This is a benefit we have that other counties might not have, which puts us in a better position of enticing business here.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	We already possess elevation data. Our elevation data was used for the creation of new, accurate flood zones, which benefits property owners, i.e., helping them to answer the question "...am I in or out". Accurate floodzones have a direct impact on public safety in relation to roads, bridges, ciulverts, etc. that might be affected in a flooding situation.

Oklahoma (OK)

The surface terrain varies significantly throughout the State of Oklahoma with flat and arid regions, vast moderately hilly topography, and mountainous areas located in different regions of the State. Responses from the variety of state agencies expressing their requirements for enhanced high accuracy elevation data only reinforce what geospatial data users in the State already know; there is an overwhelming critical need for high accuracy elevation data coverage for the State of Oklahoma. Of course, one of the most economical means for capturing this type of data is through the use of LiDAR technology. At a minimum for the urban areas, the level of accuracy needs to be such that a one-foot contour interval can be generated from a 0.5 - 1.0 meter spaced ground sample. This level of accuracy is necessary to meet the vast majority of needs for hydrologic studies, natural resource planning and assessments, environmental monitoring, and construction planning activities. The State of Oklahoma agencies are working with various partners at multiple levels of government to build and maintain the Oklahoma Spatial Data Infrastructure (OSDI). Enhanced elevation data is a key component of the OSDI which will be leveraged with national level datasets. All levels of government within the State need access to more highly accurate elevation data which is especially important for solving terrain related applications in Oklahoma's expanding metropolitan areas, conversion of rural terrain areas to built up more populated terrain areas, large and small cities' applications, as well as the many tribal governments requirements across Oklahoma.
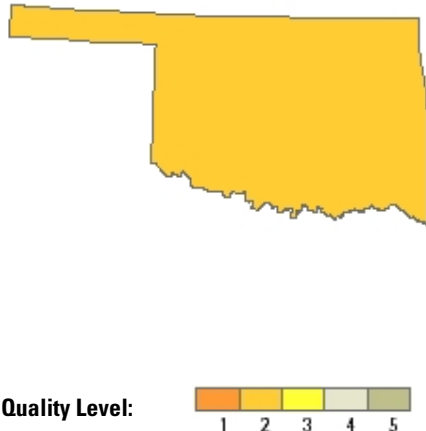
State Functional Activities

Program: Dam Safety Program	Business Use: 14. Flood Risk Management
Quality Level: (1 2 3 4 5) **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No.	**Dam Breach Analysis:** Analyzing and modeling the potential breach of dams in high hazard zone areas and non- high hazard areas. The analysis includes potential damage assessment to structures, loss of life, property, and natural resources. Using enhanced digital elevation data allows rapid, remote analysis of dam breach areas and associated potential damage locations. The level of accuracy gives a much clearer picture of a breach event than even ground survey cross sections because of the sheer volume of accurate elevations. Even with surveyed cross sections you still have to interpolate between them, and the enhanced elevation data does that for you on a more consistent and accurate basis.
	Estimated Annual Operational Benefits: Major; $3,762,500 Significant Benefits are derived from not having to use survey crews to collect detailed elevation data for each dam site. Having enhanced elevation data statewide will expand the breach analysis program to include additional high hazard and non-high hazard dams being converted to high hazard status due to population growth in rural areas.
	Estimated Annual Customer Service Benefits: Major; $1,254,000 The State would be able to produce more and higher quality dam breach analyses for the same amount of money.
	Estimated Strategic Benefits: Major Statewide expansion of the program gives all state residents a greater level of protection through emergency action plans and not limiting the better high accuracy information to only high priority areas.

Program: Floodplain Management Programs	**Business Use:** 14. Flood Risk Management
Quality Level: 1 2 3 4 5	**Flood Risk Mapping:** Development of highly accurate floodplain maps to aid officials at various state agencies to conduct risk analysis for flooding events. There may be a need for some upstream elevation data that exist outside the state but is needed to develop accurate floodplain maps for areas downstream within the State of Oklahoma.
	Estimated Annual Operational Benefits: Major; $1,400,000 Enhanced elevation data would greatly improve state agencies' flood risk analysis results and reduce the amount of time required to create the analysis models. The availability of enhanced elevation data would also decrease the costs for counties and rural communities to update and improve floodplain mapping.
	Estimated Annual Customer Service Benefits: Major; $1,050,000 Analysts would be able to produce more high quality flood risk models leading to higher quality flood risk maps. Available enhanced elevations data would likely reduce the time to produce floodplain maps making them more accessible sooner to the public and professionals in the field.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Strategic Benefits:** Major The State could provide higher quality flood risk maps for low hazard dams to cities, counties, developers, lenders, and insurance companies to discourage future development in these potential flood areas and allow for better decision-making where the public is concerned.
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes. There may be a need for some upstream elevation data outside the state that is needed for developing floodplain maps downstream within Oklahoma.	

Program: Location Survey	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**Location Surveying and Highway Design:** Location Surveying for preliminary engineering for the design of highways and bridges.
	Estimated Annual Operational Benefits: Moderate; $15,000,000 Available enhanced elevation data will provide quality elevation data in areas where conventional survey access is limited or very expensive to acquire.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More accurate elevation, structures, and landcover data provide better drainage information and allow service agencies to better serve the public with higher quality data and improved or better decision-making. The existence of high accuracy elevation data also provides for the generation of new datasets, which provides the ability to generate surface data in less time in areas where access is limited, and data acquisition costs are nearly prohibitive.
Update Frequency: 2-3 years	**Estimated Strategic Benefits:** Moderate Geospatial data users can graphically represent a newer and more accurate representation of the earth's surface and what's on it utilizing the high accuracy elevation data. The availability of this quality level of elevation will significantly benefit users from all parts of society.
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes. Oklahoma Department of Transportation has done some cooperative work with departments of transportation from some of Oklahoma's border States; Texas, Kansas, Arkansas, etc.	

Program: Watershed Planning and Total Maximum Daily Load Development	**Business Use:** 2. Water Supply and Quality

	Water Quality Modeling: Collect and interpret water quality data to determine the total daily maximum load for streams in Oklahoma. This activity is performed to meet regulatory requirements by the United States Environmental Protection Agency.
	Estimated Annual Operational Benefits: Minor; Dollar Value Not Reported Most of the agency's watershed modeling was done with 30 meter digital elevation model data. Enhanced elevation data would significantly improve the models' outputs. Using this type of enhanced data also improves the quality of graphs in reports created for projects.
	Estimated Annual Customer Service Benefits: Don't Know; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Don't Know Benefits Description Not Provided
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No.	

Program: Oklahoma Natural Heritage Program	**Business Use:** 7. Wildlife and Habitat Management

	Species Distribution Modeling: Prediction of species distribution based on measured environmental variables. Accurate species distribution models are necessary for conservation planning, especially for endangered species protection and mitigation efforts.
	Estimated Annual Operational Benefits: Moderate; $500,000 State specialists would potentially be able to model currently unknown breeding grounds for Lesser Prairie Chickens with new enhanced elevation data due to the higher data resolution. State agency personnel may also be able to identify certain vegetation types not currently distinguishable with existing lesser quality elevation data.
	Estimated Annual Customer Service Benefits: Moderate; $500,000 Being able to produce basically enhanced species distribution models using the higher accuracy elevation data would allow resource planners better information on what to expect and how to manage the limited resources.
	Estimated Strategic Benefits: Moderate Better base elevation data means the state can make more accurate models and therefore give more precise recommendations to the public and private sector for natural resource management.
Quality Level: 1 2 3 4 5	
Update Frequency: 2-3 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No.	

Local Functional Activities

City Government -- City Of Ardmore	
Program: Several programs within our jurisdiction directly utilize this data as part of their core functionality.	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response

Functional Activity: Municipal Mapping	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $40,000 Our existing elevation data is utilized in all aspects of maintenance, construction, & development for all municipal projects where elevation data has a role. We do not currently have complete bathymetrics of all of the city owned lakes or elevation data or the waterlines coming from the lakes. This additional data would be invaluable in assessing current resources & planning for future growth in the region.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Moderate; $4,000 New customer service benefits from newly acquired elevation data would probably not be as critical as the data we currently utilize because the bulk of the enhanced elevation data for the city and surrounding area has already been acquired. That being said, the new elevation data could easily point out issues that need to be addressed that we currently do not know about. By having our current elevation data in house we do not have to acquire elevation data every time a project needs to access elevation data. The ability of having a good elevation data set on hand is invaluable to our daily operations.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	The additional data would definitely help in planning for future growth & hazard mitigation. Having one standard elevation data set has helped the City of Ardmore tie all of the projects together with all the elevation data matching on a citywide basis rather than on a project specific area.

Regional Government -- City Of Oklahoma City And The Association Of Central Oklahoma Governments	
Program: Comprehensive planning	**Business Use:** 22. Urban And Regional Planning

Functional Activity: Municipal Government Operations	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $400,000 Acquiring and possessing high accurate elevation data saves staff time by reducing field work, increases our ability to peform analyses, and increases the quality of program outputs. It also provides the ability to perform region-wide analyses that significantly reduces staff time acquiring and processing the data.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; $200,000 If all the enhanced data can be made avialble from one location it can improve efficiency, lowers customer/partner cost, and promote ecnomic development. There is a much increased capability to provide customers and partners alike the data they require, through improves accuracy, broad coverage and regular consistant acquisition of elevation data across the geographic region.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Greater accuracy in the data provides for better modelling, and higher resolution allows for better visualization for engineering and planning applications. Enhanced elevation data can be used for engineering and other high accuracy tasks/projects which would not be possible with lower accuracy levels of elevation data. Enhanced elevation data is often used for flood rate map production, hydrologic modelling for disaster preparedness, visualisation for engineering and planning, while also improves business efficiency and promotes development

Regional Government -- City Of Oklahoma City And The Association Of Central Oklahoma Governments	
Program: Storm water quality management	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Storm Water Quality Management And Regulatory Compliance	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $400,000 Improves ability to manage stormwater quality region-wide by providing consistent elevation data. Higher resolution and consistent elevation data improves the city's ability to do stormwater quality management throughout the system.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; $200,000 Wider coverage, higher resolution data can provides better accuracy, centralized storage location for the data, time savings through better decisionmaking. Storm water quality permitting, and pollution control studies are produced from this data for customers.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major Having all of the data in one location makes it easier to share with customers saving them time and money and promotes business. Pollution control protects environmental quality. Having enhanced elevation data for a larger area provides consistency that makes benefits possible region wide.
Tide-Coordinated: No	

Regional Government -- City Of Oklahoma City And The Association Of Central Oklahoma Governments	
Program: Transportation and utility infrastructure management	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Transportration And Utility Infrastructure Management	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $1,000,000 Accurate elevation data allows much better infrastructure project planning, and modelling of existing assets. Having more accurate data for a wider area would allow new tasks to be performed using the enhanced elevation data. It would increase our ability to collaborate, and make it easier to provide required data to partner organizations.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $1,000,000 Having the new data avialable would eliminate acquisition time, and allow better validation of engineering work, as well as give us the ability to build better models for visualization and analysis. More accurate data for a larger area would improve the engineering and planning work associated with building and maintaining our infrastructure.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major With enhanced data available in a consistent format that is acquired on a regular basis significantly reduces lag and startup times. Not having to dedicate city resources to the acquisition of high accuracy elevation this typep of data allows us to focus on the main planning and engineering goals. Highly accurate data expedites major construction projects leading to cost savings, project efficiencies, better decisionmaking and overall better quality of life.
Tide-Coordinated: Not Provided	

Tribal Functional Activities

Kickapoo Tribe Of Oklahoma	
Program: The Kickapoo Tribe of Oklahoma Clean Water Act (CWA) § 106 program	**Business Use:** 2. Water Supply And Quality
Functional Activity: Non-Point Source Assessment	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $19,000 Any improvement to enhanced elevation data to show water quality results while comparing to the natural features would provide a better model and better results.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; $38,000 The customer benefits would be to the tribal community and its members regarding their water quality.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major Benefits would demonstrate areas of concern with respect to non-point sources and aid in development for the future.
Tide-Coordinated: No	

Choctaw Nation Of Oklahoma	
Program: Section 106 of the Clean Water Act. Intended to assist Indian Tribes in carrying out effective water pollution control programs.	**Business Use:** 2. Water Supply And Quality

Functional Activity: Selection Of Water Quality Monitoring Sites	
Quality Level: QL 4 Elevation Data from Imagery	**Estimated Annual Operational Benefits:** Moderate; $10,000 Allows staff to visually see geography of drainage basins. Allows staff to select better sites for water quality monitors
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; $10,000 Allow staff to select monitor sites that are accessible and assess same for how well they would meet data collection criteria for turbidity, flow rate etc. Makes maps convey three dimensional terrain of region.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Would show in more detail the terrain of the monitor sites and allow for better visualization and evaluation of same. Only used as map background to display three dimensional quality of terrain.

Choctaw Nation Of Oklahoma	
Program: Agriculture	**Business Use:** 8. Agriculture And Precision Farming

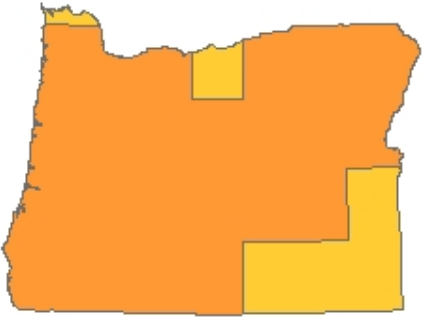| **Functional Activity:** Lease Agreements For Tribal Members	
Quality Level: QL 4 Elevation Data from Imagery	**Estimated Annual Operational Benefits:** Major; $15,000 Allows preliminary assessments of tracts of land for suitability for leasing as pasture or recreational use. Allows detailed in office assessments of tracts of land for suitability for leasing as pasture or recreational use and identification of fencing and other features used in determining lease value, such as pasture terrain/slopes...soil suitability...available water & type (stream, pond etc.)
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; $15,000 Improved detailed data would allow for much more accurate in office assessments of potential Income producing uses for tracts of Individually owned Native American land, therefore increasing the income of these individuals and possibly improving the quality of the land by inclusion of stipulations for same in the lease agreement. As an example would be additional fencing, weed control soil improvements, erosion control measures, addition of stock ponds and other value enhancing features. Currently available ortho photos with elevation and contours allows staff to calculate a preliminary acreage for suitability of pasture or recreational use only.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Would allow staff to show potential lessor/lessee, tribal leaders and Administrators how the tract of land up for lease "looks" now and what used are proposed for same. Should increase income potential for Tribal Members by allowing more cost effective evaluation of available land and better determination of best uses for same. Allows staff to locate land to evaluate in the field.

Oregon (OR)

Oregon has a robust and active LiDAR community with a wide variety of disciplines utilizing the data for a broad spectrum of management, analysis, and research. The extensive use of LiDAR in Oregon is directly due to the high resolution of the data that has been acquired. Major uses include Infrastructure Planning and Management, Ecosystem and Resource Management, and Public Safety.

Infrastructure Planning and Management uses of LiDAR include analyzing sites for solar development, mapping road centerlines and designing public works projects. Ecosystem and Resource Management uses of LiDAR include forest inventory, evaluating farming practices, and watershed assessment. Public Safety uses of LiDAR include mapping landslides, updating the tsunami inundation line, and analyzing flood risk.

Approximately 20,000 square miles in Oregon have high resolution Quality Level 1 (8 pts per square meter) LiDAR available. There have been 18 major projects since 2008 with 60 different government agencies, tribes, and private firms providing over $9.8 million dollars in funding. This funding level and diverse participation illustrates the broad based support in Oregon for Quality Level 1 LiDAR as it allows for many different uses and derivative products.

While Oregon has been very successful in creating partnerships to acquire LiDAR, nearly 80 percent of the state is still in need of this data to support the many uses described above. Oregon strongly supports a national program for LiDAR acquisition.
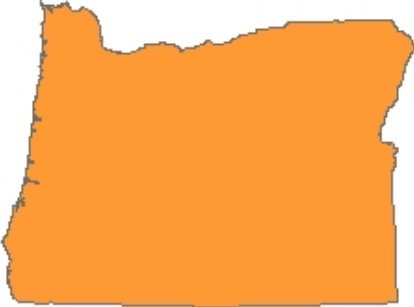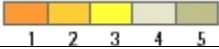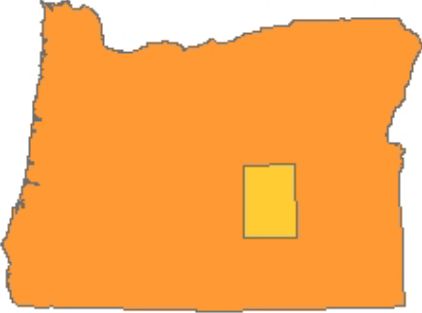
State Functional Activities

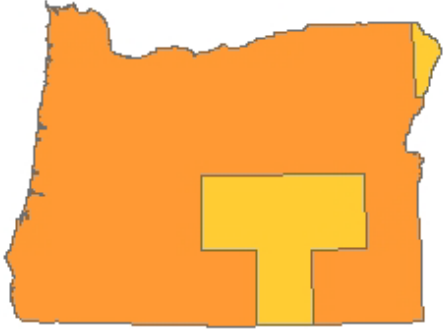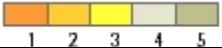| Program: Forest Management	Business Use: 5. Forest Resources Management
	Forest Management: Forest management involves collecting and sharing information about the conditions of Oregon's forests, protecting forestlands and conserving forest resources. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $6,500,000 The single biggest impact of LiDAR technology on the science of forestry is that of forest inventory. Traditionally forest-wide inventories have been based upon samples taken within different vegetation strata across the landscape. Now forest managers are closer to being able to have a true inventory of the trees in any given area or ownership. Another benefit is that the design of new road layout is constrained by control points that the constructed road should avoid and areas of optimal grade and alignment. By using the bare earth hillshade it is possible to conduct preliminary engineering before making a field visit.
	Estimated Annual Customer Service Benefits: Major; $6,500,000 The engineering uses of LiDAR data are impressive. In the past land managers used the best available topographic information available which was typically the 1:24,000 USGS topographic quadrangles. The contour lines on these maps were developed using photogrammetric methods, and due to the forest cover in western Oregon, the USGS was not able to certify that these maps met the National Map Accuracy Standard of plus or minus ½ a contour interval (typically 40 feet). The LiDAR bare earth model is an accurate representation of the ground surface under the vegetation and can be used in many ways.
Quality Level: **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No	**Estimated Strategic Benefits:** Major; 1. Landslide and unstable slope identification to avoid issues resulting from improper road location. 2. Steep slope and operable lands identification. 3. Determining tractor ground versus cable ground and optimal landing locations. 4. Road design and layout including mass calculations for fills and cuts.

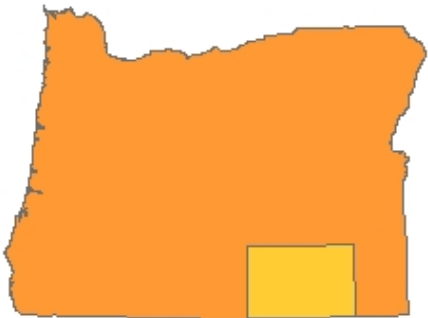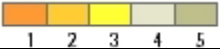|	5. Determine yarding profiles and blind leads for cable systems. 6. Determination of landing placement. 7. The canopy layer is an efficient tool to help Oregon Department of Forestry biologists quickly identify potential Marbled Murrelet habitat and candidate trees. 8. The LiDAR derived hillshade is an extremely valuable tool for the identification of potential cultural resource areas, and specific historical activity locations.
Data Outside State Needed: No	

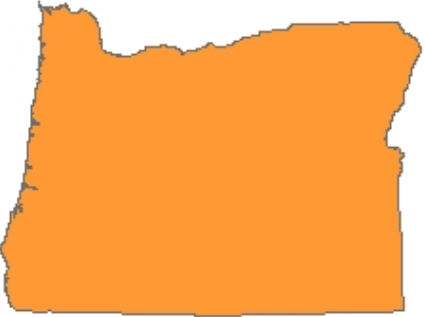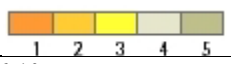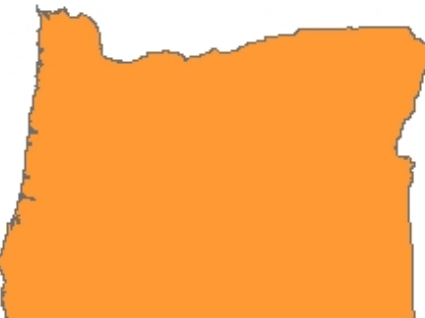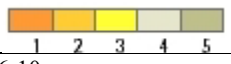| **Program:** Oregon Parks Recreation Department/Oregon Department of Transportation Engineering and Design	**Business Use:** 21. Infrastructure and Construction Management
	Infrastructure Siting and Design: Infrastructure siting and design involves developing and managing Oregon's system of highways, roads, and bridges and state park facilities. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $200,000 Reduced fieldwork is required and improved data accuracy results in better compliance with building and environmental regulations. The LiDAR data makes it possible to analyze hundreds of potential sites with a sufficient amount of detail. Without the LiDAR each site would have to be surveyed. This improves mission compliance by greatly increasing the efficiency of site selection. Having detailed elevation data for the entire highway system would allow the Oregon Department of Transportation to analyze thousands of sites with sufficient detail for 9,000 miles of highway. If the detailed data is not available, then gaps are analyzed with inferior methods.
	Estimated Annual Customer Service Benefits: Major; $10,600,000 Other quality levels or photogrammetrically derived data do not have the canopy penetration or accuracy required. Since specifying the Quality Level 1 level data there has been an increase in the accuracy/performance of products as well as a faster production rate. Surface analysis is a common task and the LiDAR greatly improves the results. Projects that have a need for detailed elevation data can rely on the LiDAR in certain situations rather than putting a crew on the ground which is much slower and more expensive.
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Estimated Strategic Benefits:** Major; Higher quality level data allows the state to do a better job of avoiding environmentally sensitive areas because those locations are more accurately located. With Quality Level 1 LiDAR, a better job planning for runoff as well as locating inground effluent treatment sites is possible. Protecting the natural environment is part of the agency mission. The Oregon Solar Highways program has used LiDAR to inform the public about line of sight to solar installations and viewshed analysis. LiDAR is also used to analyze vegetation cover for potential solar installations.

Program: Watershed Enhancement Grant Program and Watershed Council Support	**Business Use:** 3. River and Stream Resource Management

	Assessment of Watershed and Upland Restoration Project Sites: Assessment of watershed and upland restoration project sites involves historic channel mapping, vegetation analysis, cultural resource identification, farmland terrace installation, and ecosystem services assessments. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $18,400,000 LiDAR provides high quality data for assessment, modeling and project planning. The higher quality the data (accurate and precise) the better outcomes implemented restoration projects have. Post-implementation monitoring is required of most restoration grants; the more accurate the data to plan projects the more likely restoration projects will be successful. LiDAR data decreases the amount of time needed to plan projects and improves the reporting on projects.
	Estimated Annual Customer Service Benefits: Moderate; $18,400,000 Oregon Watershed Enhancement Board (OWEB) not only funds projects during its regular grant cycle but also has targeted investments for whole watershed type approaches. Strong partnerships are built to manage these projects. OWEB sees positive gains from having LiDAR data available for partners as well as an assessment and planning tool. The time/cost savings to watershed council staff includes less site fields, less in-field data collection, less need for contractors such as surveyors. Improved compliance means councils can do more projects if their overhead and time spent on each project is reduced by increased use of technology and available data. In addition, councils can do their work better and more accurately with good data. For example, the Calapooia Watershed Council identified Indian burial sites on a proposed restoration site that needed further exploration before the project could begin.
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, for all watershed that enter Oregon.	**Estimated Strategic Benefits:** Major; The social benefits include an increased need for employees who have skills and experience with LiDAR data, for OWEB this means more contracting or staffing opportunities available with Lottery dollars granted to councils. The environmental benefits include better designed restoration projects. The strategic/political benefits include OWEB's ability to strategically plan for large investments (for example, property acquisition for conservation) based on better quality data.

Program: Agricultural Water Quality, Nonpoint Source Pollution, Total Maximum Daily Load Drinking Water Protection	Business Use: 2. Water Supply and Quality

Water Quality: Water quality involves protecting Oregon's rivers, lakes, streams and groundwater to keeps these waters safe for a multitude of beneficial uses such as drinking water, fish habitat, recreation, and irrigation. Intensity Image is also a required product.

Estimated Annual Operational Benefits: Major; $5,670,000

From the existing data the Oregon Department of Agriculture (ODA) has been able to run an erosion model to identify areas in agricultural land that has a higher potential of erosion or of sedimentation and runoff to reach the waters of state. With this information ODA can work with the farmers to help them develop a plan to stop the erosion/runoff.   LiDAR assist in being able to work with farmers to improve farming practices and identify where on their farm there could be potential problems before there is a compliance issue. This allows a proactive instead of reactive approach and results in improved planning capacity and prioritization of non-point source pollution control projects. For example with statewide LiDAR, the evaluation of the annual Confined Animal Feeding Operation plans could be done state wide with comments and/or concerns without having to be on the ground which would save travel time and money.

Estimated Annual Customer Service Benefits: Major; $5,400,000

LiDAR would assist in being able to locate areas that have a high potential to cause erosion or sediment reaching the waters of the state and do educational/outreach in those areas with local farmers/ranchers to avoid future problems. It would be especially useful for reaching the ranchers on the east side of the state with improved plan reviews. The Soil and Water Conservation Districts on the east side would be in a stronger position to reach out to their customers with the erosion/sediment analysis information.

Estimated Strategic Benefits: Major;

Statewide LiDAR would allow for a consistent, statewide approach to erosion and sedimentation water quality issues. Having this data would make it easier to work more effectively with the agricultural community during plan review and offer them ideas to increase environmental benefits.

Quality Level:

1 2 3 4 5

Update Frequency: 6-10 years

Bathymetric Data: No

Tide-Coordinated: No

Data Outside State Needed: Yes, for watersheds that enter Oregon.

Program: Park and Recreation Planning	Business Use: 22. Urban and Regional Planning
<table><tr><td></td></tr></table>	**Landscape Planning:** Landscape planning involves designing various aspects of state parks including vegetation establishment and maintenance, trail development, facilities location, and campground layout. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $100,000 Airborne LiDAR surveys produce data much faster and cost significantly less than comparable field based efforts. LiDAR data is significantly more accurate than photogrammetrically derived data in canopied areas in the Pacific NorthWest. There would be direct savings from a national program in not having to acquire additional data Areas of Interest (AOI) and additional time savings in not having to contract for ad hoc acquisition.
	Estimated Annual Customer Service Benefits: Major; $250,000 With a national program, the state budget could be directed towards additional planning efforts as opposed to data acquisition which would increase speed of delivery. Having data available over entire AOI would enable a wider use of the higher quality data thereby improving customer's experience. Better quality data results in more accurate planning therefore reducing future costs and better customer satisfaction. Fewer field visits are required to verify plans or designs when high quality data is used.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major; Increasing productivity would provide the public more recreational opportunities and reflect positively on the state. Using higher quality data has produced better decisions which provides a direct social benefit.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Geologic Survey and Services, Natural Hazards Mapping and Support of State Land Use Goals, and Dam Safety	**Business Use:** 14. Flood Risk Management

	Flood, Channel Migration And Tsunami Inundation Mapping, Flood Risk Mapping and Analysis, and Dam Safety Inundation Analysis: Flood risk mapping involves producing data, reports and maps for dam safety, flood risk, channel migration and tsunami inundation. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $335,000 High resolution topographic data is used to delineate elevation sensitive areas of modeled flood and tsunami inundation. This high resolution topography is used to anchor and rectify serial photography to track and model channel migration zones, and the LiDAR digital elevation model allows the Oregon Department of Geology and Mineral Industries to locate abandoned channels and potential avulsion zones instead of extensive field work. For all these hazards LiDAR is used to locate and digitize structures for risk management, and to create easy to use base maps for web applications to display hazard information. Statewide LiDAR would make it possible to expand the flood hazard mapping to additional areas with LiDAR coverage. Redefined public reviews have dramatically reduced challenges to the current flood mapping products. LiDAR has also made possible more precise configuration of embankment dams for seismic analysis. The real savings isn't tangible in dollars per budget saved, but rather in the derived products produced and how they cascade through the system for the communities and other users.
	Estimated Annual Customer Service Benefits: Major; $775,000 The real winner is the public where, if LiDAR-derived elevation data existed, a surveyor might not have to be employed to determine the structure relationship to the flood zone. In Oregon that could easily relate to several tens of thousands of dollars a year for the public. This may be vastly underrated as it is not known how much effort private citizens and businesses have to put in to create their own studies in approximate A zones that don't have good elevation data. The associated products and services, such as the ability to extract building footprints, identify meandering channels, and locate potential landslide areas will also assist in hazards risk analysis.
Quality Level: [color scale 1 2 3 4 5]	**Estimated Strategic Benefits:** Major; Being able to provide really accurate and useful information to local governments helps to build strong positive relations and partnerships for hazard mitigation. LiDAR brings hazards mitigation and mitigation planning to the forefront with much better analysis capability and outreach materials. The additional data, tools and strategies allow for addressing additional concerns such as the Endangered Species Act.
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes, for watersheds that enter Oregon.	

Program: Geologic Survey and Services	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Hazard Mapping: Hazard mapping involves producing maps and reports that can be used by the public and by government to reduce the loss of life and property due to geologic hazards and to manage geologic resources. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Major; $325,000 High resolution digital elevation models allow the Oregon Department of Geology and Mineral Resources to make landslide inventory maps that are far more accurate and complete than any other method, and at a cost savings of 75-85 percent over other methods.
	Estimated Annual Customer Service Benefits: Major; $325,000 Statewide LiDAR would make it possible to be able to rapidly provide easy to use, accurate landslide inventory maps to any part of the state. Landslide inventory maps made with high resolution digital elevation models are three to four times as complete as is possible with other methods and are four to five times as accurate. Greater completeness and accuracy gives customers more confidence in the product. Cycle times for map production are drastically reduced, from one plus years per quad to six weeks. Presentation of landslide inventory data on extremely detailed and accurate LiDAR basemaps improves the ability of user to interpret the data.
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Estimated Strategic Benefits:** Major; Statewide LiDAR would increase the geographic scope of the current efforts. Communities and individuals are far more likely to mitigate landslide hazards if the hazard is clearly and reliably defined. Good LiDAR based inventory maps make most landslides readily apparent even to a lay audience. Having well-defined areas of hazard allows local governments to craft ordinances that maximize hazard mitigation while minimizing cost and impact on the community. Landslide inventory in forest lands is a crucial element in modeling and mitigating sediment input into streams with sediment related total maximum daily load limitations.

Program: Fire Protection	Business Use: 16. Wildfire Management, Planning, and Response

	Wildland Fire Prevention and Management: Wildland fire prevention and management involves protecting 15.8 million acres (246,875 square miles) of private and public forestland from fire. Intensity Image is also a required product.
	Estimated Annual Operational Benefits: Moderate; $2,460,000 The ability to prevent fires through effective vegetation management will be enhanced with statewide forest canopy data derived from LiDAR.
	Estimated Annual Customer Service Benefits: Moderate; $2,460,000 With statewide quality topographic data derived from LiDAR, fire management activities will be more efficient. Fire managers are able to better respond to fires in areas where high quality topographic data exists.
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Estimated Strategic Benefits:** Moderate; The goal is to have smaller fires that burn less frequently and LiDAR topography enables this goal. Better fire management is achieved through the use of quality elevation data.

Local Functional Activities

City Government -- City Of Springfield	
Program: New Shelby County DFIRMS	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $125,000 Contours, orthophotos and change detection
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $25,000 N/A Contours, Orthophoto's and change detection on demand
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	N/A Accurate Elevation data is a benefit across the Enterprise GIS User Community including Social Benefits, Environmental benefitts, Strategic/political benefits and other etc...

City Government -- City Of Springfield	
Program: Public Works: Engineering, Transportation, Environmental Services, Technical Service(GIS/Survey)	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Wastewater & Stormwater Infrastructure Design.	

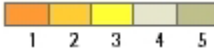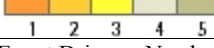|	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $2,610,000 The QL1 LiDAR data set the City took deliverable of in August 2009 has proved to be extremely beneficial and has been integrated into the City's current operations seamlessly. All branches of the City's Public Works department have directly or indirectly benefited from this data . Engineers have successfully used the data in preliminary design, environmental services has used it to calculate shade potential, and GIS has used it to update aging/outdated elevation datasets. It is the City's intention to begin using QL1 LiDAR data to assist in the update, and continued maintenance of the City wide planimetic data sets. It is our hope that the regional partners can come to a cooperative agreement to have LiDAR data acquired every 3rd year. The reliability of routine updates would allow the City to rely on the LiDAR data sets to replace many of our existing business process. Currently without a reliable update schedule we are confined to the "snap Shot in time scenario", and can only depend on the data we have to inform our existing data sets for a limited duration.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; $1,740,000 New QL1 LiDAR data has provided the city with the means to update aging elevation models such as Slope, aspect, viewshed, and hillshade. The higher resolution data sets have been a major success. Customers are continually delighted with the detail these data sets provide.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	With a regular schedule for LiDAR acquisition, we can justify implementing systems to provide elevation data in support of public requests, facilities management, city wide slope analysis and FIRM support. Without regularly scheduled LiDAR acquisitions we will need to rely on other sources to update City wide inventories (Planimetric, field surveys, etc.) Most other options have a much higher price tag, thus leading to a potential reduction in services the City can provide to the public. With the anticipated budget reductions both locally, statewide, and nationally - it is imperative that agencies begin working together to share the cost of data acquisition and development. QL1 LiDAR has provided ESD with a valuable tool set to measure environmental variable such as shade, and slope. It has also allowed ESD team members to locate potential depresional wetlands. The QL1 data sets the City currently possess have resulted in staff having to make fewer trips to the field. allowed for more prompt response to requests from council, timely meet requests form the private sector for topography, support city wide build-able lands analysis, and support ongoing facility design. In summary the QL1 data has resulted in more timely public service, better design of public facilities, and a better understanding of environmental hazards and constraints.

Tribal Functional Activities

Confederated Tribes Of Grand Ronde	
Program: Natural Resources	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Stream Channel Mapping	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $184,000 Stream buffers derived from LIDAR data are more accurate. Difficult and time consuming GPS surveys of streams are converted to simple inception point surveys. Road layer more accurate - for reporting purposes to BIA Road inventory
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; $184,000 Lidar data is used on many of the maps supplied to logging contractors, clearly identified stream-buffers, cable corridor analysis for cable logging operations, hill-shade and conotur-lines help in general map making.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Lidar data will be used for educational purposes and cultural resource mapping. New stream layer derived from LIDAR data will be used for fish habitat protection and improvement. We are aslo planning to use LIDAR data for forest inventory purposes

Pennsylvania (PA)

The Commonwealth of Pennsylvania has recent statewide LiDAR with breaklines, contours, DEMs, point clouds, and other derivative products, with aggressive work being performed in a variety of applications. The need is for a program that will ensure continuing coverage on at most a 10-year cycle, with a view toward emerging technologies that may yield even more precise, refined and varied elevation datasets.

State Functional Activities

Program: Forestry	Business Use: 5. Forest Resources Management
Quality Level: **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, because of watershed definitions	**Mapping of forest vegetation:** **Estimated Annual Operational Benefits:** Not Reported; Dollar Value Not Reported Current data are inadequate to needs, particularly in Marcellus shale region **Estimated Annual Customer Service Benefits:** Not Reported; Dollar Value Not Reported Responds to known and frequently repeated constituent demands. **Estimated Strategic Benefits:** Not Reported Data are now inadequate or nonexistent.

Program: GIS	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response
Quality Level: **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** Not Reported **Tide-Coordinated:** Not Reported **Data Outside State Needed:** Not Provided	**Flood risk assessment, response and mitigation:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported More exact flood modeling. Provide recent data or areas where data does not currently exist. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported More accurate modeling will lead to better customer service. **Estimated Strategic Benefits:** Major More exact flood modeling allows for better disaster planning, recovery and mitigation.

Local Functional Activities

County Government -- City And County Of Philadelphia	
Program: Not Provided	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: 3d Modeling	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Too many uses to enumerate here, but the data needs are for continually refined and current information
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

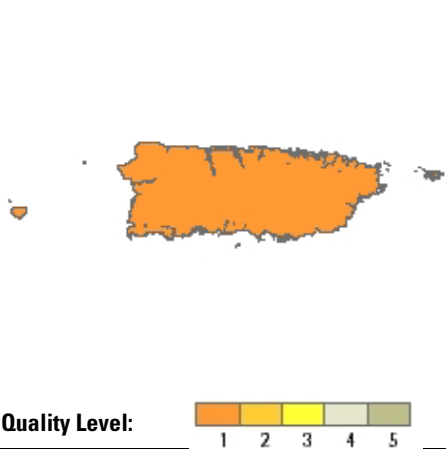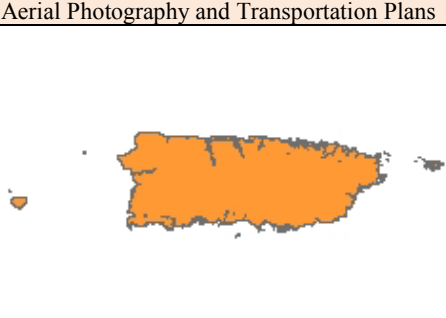| Regional Government -- County Commissioners Association Of Pennsylvania	
Program: Not Provided	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Counties Use It For A Variety Of Reasons	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided The counties have a huge variety of applications for this dataset.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: No	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

Puerto Rico (PR)

The Commonwealth of Puerto Rico, which is among the most densely populated islands in the world, has requirements for high-resolution, accurate, and current LiDAR-derived elevation products to support numerous missions to include public safety (especially tsunami response and mitigation), transportation planning and construction, sea level rise, and urban/rural planning. With limited budgets and mounting requirements, it's critical that these and other important programs are executed in the most cost-efficient and effective manner.
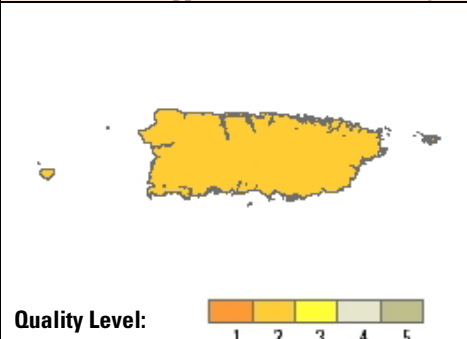
The Caribbean region has a critical requirement for a revised and accurate regional vertical reference datum to replace the one that is currently in place (NGVD29 was never valid for Puerto Rico, NAVD 88 is not and will not be valid for PR). Lacking this fundamental reference system it is impossible to fully leverage the benefits typically associated with LiDAR datasets such as highly accurate bare earth elevation measurements. Critical programs such as topographic map revision in support of flood mapping and modeling continue to be compromised in the region of the U.S. Caribbean Territories due to the absence of a reliable vertical datum.
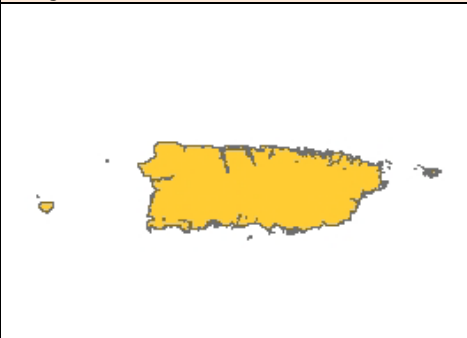
Territorial Functional Activities

Program: Geographic Information System Bureau and Land Use Bureau	Business Use: 22. Urban and Regional Planning
  Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Not Provided	**Zoning:** Urban and rural zoning, natural resources conservation area delineation, and potential impact of development analysis programs would benefit from availability of high-accuracy LiDAR elevation datasets
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The availability of LiDAR-derived elevation products would result in cost savings through automation of land use/cover interpretation, classification and analysis activities which include enabling "virtual visits" to urban and rural project areas.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported The customer (policy makers, program managers, and public at large) will get more detailed and accurate descriptive information of environment. Public safety programs will benefit through improved planning and modeling capabilities. Property loss due to natural hazards will be minimized through implementation of more effective urban and rural development strategies.
	Estimated Strategic Benefits: Major Improved ability to design, develop, and protect critical infrastructure which directly impact all citizens of the Commonwealth.

Program: Coastal Management Program	Business Use: 4. Coastal Zone Management
Quality Level: (1 2 3 4 5) **Update Frequency:** 6-10 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** no	**Coastal Resources Management:** This includes planning and modeling activities associated with existing and planned coastal development to establish sustainable best-use guidelines.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported With the availability of high-accuracy LiDAR derived elevation datasets exposure to coastal hazards would be minimized as the result of improved coastal inundation models and map products. Enhanced elevation datasets would also support climate change studies and seal level rise vulnerability assessments along with associated adaptation strategy development.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported High accuracy LiDAR coverage would result in improved decision making tools that enable Federal and Commonwealth agencies to implement improved public policies to protect life, property and biodiversity within the region.
	Estimated Strategic Benefits: Major Outreach strategies targeting policy makers and program managers are strengthened when current and accurate geospatial datasets are available to support informed decision making.

Program: Linear Referencing System (LRS), Network Modeling, Aerial Photography and Transportation Plans	Business Use: 18. Land Navigation and Safety
Quality Level: (1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** no	**Transportation Infrastructure Planning**: This includes the use of LiDAR point cloud as well as derived Digital Surface Models and Digital Terrain Models for planning and construction of roads, overpasses, bridges and other transportation features.
	Estimated Annual Operational Benefits: Major; $66,000 Improved planning capability and management of resources. With the availability of LiDAR-derived elevation datasets field survey requirements are significantly reduced resulting in operational cost savings.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improved quality of mission and products. Reduced cost to taxpayer (customer).
	Estimated Strategic Benefits: Major Public safety enhanced as the result of timely transportation project completion and efficient use of available funds.

Program: GIS support to Commonwealth agencies	**Business Use:** 22. Urban and Regional Planning
	Land Use/Land Cover Analysis
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The availability of LiDAR data would result in improved hazard preparedness and planning programs especially in the context of tsunami mapping/modeling and flood map revision as it pertains to zoning, infrastructure development, and land use.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported With reliable elevation datasets readily available Commonwealth agencies will be in a better position to make informed, scientifically sound decisions regarding urban/rural planning and emergency response.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major Public safety enhanced with current and accurate depiction of topography.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: no	

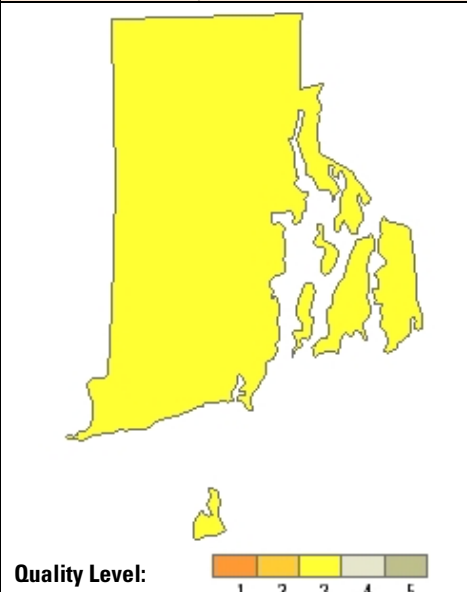| **Program:** GIS Database Centralization of PR Government Agencies	**Business Use:** 15. Sea Level Rise and Subsidence
	Modeling the Impact of Sea Level Rise: As an island Territory extremely vulnerable to impacts of natural disasters a top priority for scientific research is to develop improved models for predicting potential effects of sea level rise.
	Estimated Annual Operational Benefits: Major; $20,000 It is of critical importance for Commonwealth planning agencies to have a thorough understanding of the global warming effects on sea level rise and subsidence. Local geologist and marine scientists have been monitoring coastal changes since the 1930's. Elevation data derived from LiDAR will be used in efforts to continue to monitor these changes.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Better informed public as the result of published of scientific investigations and revised cartographic products.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major Sea Level rise and subsidence is related to coastal floods, storm surge, and coastal erosion issues. Availability of LiDAR datasets will enhance response and mitigation efforts.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: near shore bathy to support modeling of importance to program	

Local Functional Activities
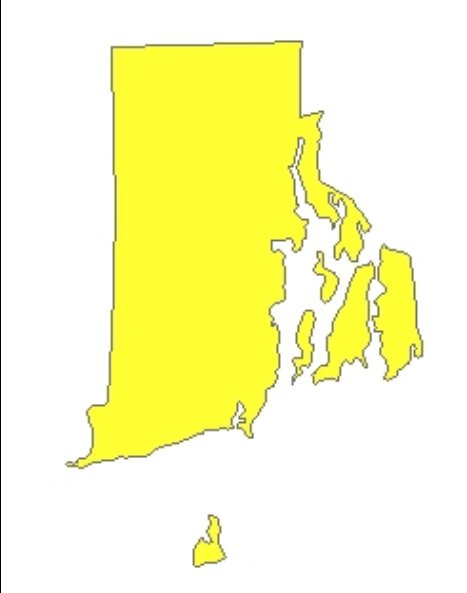
None

Rhode Island (RI)

The State of Rhode Island has requirements for sea level rise analysis. LiDAR data has been compiled from various sources at various quality levels, with at least 2/3 of the State unavailable. The gaps were filled in with orthophotographic DEM data. This compilation has proven insufficient for coastal needs. Bathymetric data was also compiled from a variety of sources. Although this data was helpful in the short term, the availablity of new, consistent LiDAR data along the coast would be an invaluable improvement. The other immediate need for detailed LiDAR data is to support flood plain mapping updates in conjunction with FEMA and map modernization program.

State Functional Activities

Program: Surface Water Quality & Non-Point Source Pollution, RI Department of Environmental Management	Business Use: 2. Water Supply and Quality
	Stormwater management: Phase I: The National Pollutant Discharge Elimination System (NPDES) Phase I storm water program, initiated in 1990, required discharges from large construction sites, certain industrial activities and operators of "medium" or "large" Municipal Separate Storm Sewer Systems (that serve a population of 100,000 or greater) to obtain permits and implement a storm water management program as a means to control polluted discharges from these activities. Since 1984, the Rhode Island Department of Environmental Management (RIDEM) has been the delegated authority to implement the NPDES program in Rhode Island (referred to as RIPDES). Phase II: The Environmental Protection Agency (EPA) finalized on December 8, 1999, the Storm Water Phase II Rule, that requires Municipal Separate Storm Sewer Systems (MS4s) to obtain permits and establish a storm water management program. It is intended to improve waterbodies by reducing the quantity of pollutants that can enter storm sewer systems during storm events. The Storm Water Phase II Rule extends the coverage of the NPDES storm water program to include "small" MS4s. The Phase II Rule automatically covers, on a nationwide basis, all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census. Small MS4s located outside of UAs may be subject to future designation on a case-by-case basis. The RIPDES Program amended the RIPDES Regulations and has included Phase II storm water requirements (amended February 5, 2003).
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Delineation of small stormwater catchments would provide the ability to target specific properties and improve water quality at each outfall while enabling better use of staff resources through targeted regulatory compliance
	Estimated Annual Customer Service Benefits: None; Dollar Value Not Reported not applicable.
Quality Level:	**Estimated Strategic Benefits:** Major environmental benefit is improved water quality from targeted regulatory compliance, strategic benefit of fine tuned regulatory compliance
Update Frequency: > 10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Coastal Resources Management Program, RI Coastal Resources Management Council	**Business Use:** 4. Coastal Zone Management

Planning for climate change: The RI Coastal Resources Management Program needs LiDAR data to enhance resiliency to coastal hazards and to plan adaptation strategies to climate change. High resolution elevation data are critical for assessing risks to properties and natural resources within the coastal zone, and for developing sound coastal policies for future conditions. Some specific applications include identifying and quantifying assets in coastal communities that are vulnerable to storm surge and sea level rise; examining future flood hazards under various tidal conditions; prioritizing resource allocation for maintaining and enhancing critical transportation routes and other infrastructure that will be flooded more and more frequently as sea levels rise; determining cumulative effects of shoreline protection; habitat assessment and management; targeting lands to be preserved for wetlands migration; shoreline change analyses; stormwater management; and effectiveness of coastal buffer zones. Although QL3 data is the very minimum resolution needed to reasonably plan for future conditions, QL2 data is preferable. To analyze shoreline changes, a five year schedule with event driven acquisition is a reasonable schedule. Benefits to coastal zone management are major. This program office does not have the resources to do analysis on the raw data; derivative products are needed. The University of Rhode Island is a state partner and since they would have more need for the raw data products, it is included the point cloud requirements.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
Statewide data would enable us to create higher resolution planning tools for all coastal areas. The quality level chosen is the minimum required to use for planning for climate change. The QL2 level data would be preferred, but if costs are much greater, the QL3 can be used given the uncertainty of all aspects of the mapping (SLR, tide and surge levels, elevation).

Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported
Products will be improved with better data

Estimated Strategic Benefits: Major
Will expand to the entire coastal area. Better elevation data will be very helpful in developing standards for sea level rise considerations in the regulatory process.

Quality Level:

1	2	3	4	5

Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program

Bathymetric Data: Yes

Tide-Coordinated: Not Reported

Data Outside State Needed: Not Provided

Program: University of Rhode Island Environmental Data Center	Business Use: 11. Renewable Energy Resources

Terrestrial Wind Energy Potential: The University of Rhode Island Environmental Data Center will assist state researchers with the development of a suite of first-tier screening tools for evaluating terrestrial wind power proposals throughout the state. Map and data products identifying preferred land-based development locations will be generated and distributed on-line through Rhode Island's State Geographic Information System, along with products describing project methodologies and procedures. In addition, a web-based decision support and analysis system will be built to allow users to evaluate locations of their choice based on parameters specific to their power needs and development objectives.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
Data from the North East LiDAR Project already cover the entire study area.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
Unable to quantify in the short-term. Future data collection would allow areas to be reevaluated for energy potential.

Estimated Strategic Benefits: Major
Unable to quantify in the short-term. Future data collection would allow areas to be reevaluated for energy potential.

Quality Level: 1 2 3 4 5

Update Frequency: 6-10 years

Bathymetric Data: No

Tide-Coordinated: No

Data Outside State Needed: Not Provided

Program: Community Assistance Program & Risk MAP, RI Emergency Management Agency	Business Use: 14. Flood Risk Management

Floodplain Management: The Community Assistance Program-State Supporting Services Element (CAP-SSSE) is a product-oriented financial assistance program directly related to the flood loss reduction objectives of the National Flood Insurance Program (NFIP). States and communities that are participating in the NFIP are eligible for this assistance. The CAP-SSSE is intended to identify, prevent, and resolve floodplain management issues in participating communities before they develop into problems requiring enforcement action. CAP-SSSE falls under the purview of the National Flood Insurance Program (NFIP) which was established under the National Flood Insurance Act of 1968, and subsequent amendments and revisions. Currently all of the 39 RI cities and towns participate in the NFIP. The State floodplain management program provides the following services: Technical assistance and training to all NFIP communities, state agencies, non profit organizations and the private sector; Resources for flood maps and related technical data; Oversight of community compliance with the NFIP; Information related to mandatory purchase requirements for flood insurance; Review proposed floodplain development and provide technical assistance to State, Federal and community officials in the aftermath of a Governor-declared disaster.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
Benefits Description Not Provided

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
Benefits Description Not Provided

Estimated Strategic Benefits: Major
Benefits Description Not Provided

Quality Level: 1 2 3 4 5

Update Frequency: As provided by FEMA

Bathymetric Data: No

Tide-Coordinated: No

Data Outside State Needed: Yes, at any watersheds that cross state lines.
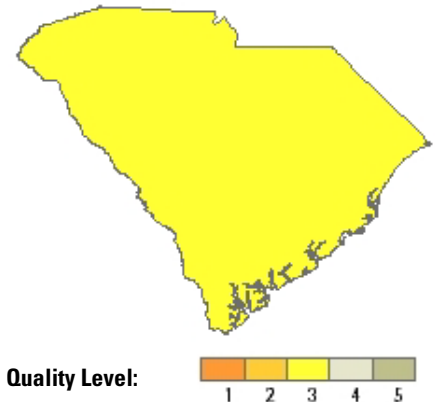
Local Functional Activities

City Government -- Town Of South Kingstown	
Program: GIS Services	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Stormwater Alanysis	

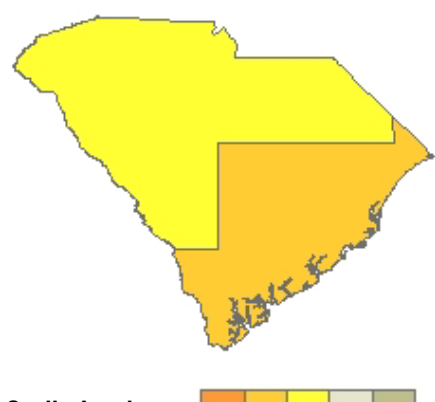|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided We experience major cost savings by eliminating extensive field work by depending on the LiDAR data and DTM products. This allows us to be in compliance with our stormwater mission and goals. We are currently expanding our use of GIS throughout our organization. The accuracy of the surface model allows better mapping throughout our organization as related to contours, breaklines, and imagery rectification.
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Major; Not Provided Better response to our stormwater response based on analysis of the complete watershed would greatly benefit the public. Availability of accurate imagery, better parcel mapping, improved planimetric data all improve the customer experience. Quality data also enables a quicker turn-around on the delivery of our data acquisitions.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	As LiDAR is the base product that all of our data is constructed on, we see great benefits across the board. From Public Safety disaster response to Election Commission Redistricting. All of our layers have our LiDAR derived DTM as their foundation.

South Carolina (SC)

The South Carolina Departments of Natural Resources (SC DNR) and the Department of Health and Environmental Control (SC DHEC) have numerous activities and programs that currently use elevation data and that can benefit from statewide high resolution elevation data. The SC DNR is comprised of a variety of programs from Geographic Information Systems (GIS), Geological Survey and Flood Mitigation Programs, fisheries and game management, to Law Enforcement to a variety of scientific disciplines including climatology, hydrology, geology, marine science, archaeology and geography. The SC DHEC/Bureau of Water is comprised of a variety of programs that also require enhanced elevation data to achieve their mission and to ensure high quality drinkable, fishable, and swimming waters throughout South Carolina. Bureau of Water activities include modeling stream restoration for Total Maximum Daily Load (TMDL) calculations, modeling stream migration and erosion, the redelineation of watersheds for TMDL, water quality monitoring, drinking water protection, storm water assessments, and sea-level rise. Each has specific programs that currently use elevation data and that can benefit from statewide high resolution elevation data.

South Carolina is working with a consortium of federal, state and local government agencies to develop LiDAR-derived elevation data for the state. SC DNR and SC DHEC continue to serve as an active contributor and participant for the completion of statewide LiDAR. Currently, approximately 80% of LiDAR for the state has been completed or is in progress. The South Carolina requirements for enhanced elevation data will support the state's objective to provide more accurate, high-resolution elevation data for improved modeling and data processing capabilities and analysis results with regard to flood risk mapping, wetlands and habitat management, modeling stream restoration for TMDL calculations, stream migration and erosion, the redelineation of watersheds for TMDL, water quality monitoring, drinking water protection, storm water assessments, sea-level rise and climate change projections, ecological modeling, geologic mapping, and other natural resource and environmental applications.

State Functional Activities

Program: Total Maximum Daily Load (TMDL) Development	**Business Use:** 2. Water Supply and Quality
	Stream Restoration Efforts: Stream Restoration and Water Quality
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported When holding outside entities responsible for compliance to TMDL requirements, agency is providing the most current elevation data to clients.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Not applicable.
	Estimated Strategic Benefits: Major Not applicable.
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Not Reported	
Data Outside State Needed: Yes. SC DNR has a need for full hydrographic basins that extend into North Carolina, Georgia, and Tennessee.	

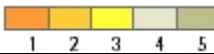| **Program:** Information Technology and GIS support	**Business Use:** 14. Flood Risk Management
	Flood Mitigation Program: Flood Mitigation and Risk Mapping
	Estimated Annual Operational Benefits: Moderate; $240,000 Completion of statewide LiDAR would not provide additional operation benefits other than providing standard data across the entire state of South Carolina. Currently, approximately 80% is complete or in progress.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Currently the agency uses 7.5 minute DEM data of inconsistent quality and accuracy where no LiDAR data are available. Having statewide LiDAR-derived elevation data would provide more accurate products for the agency's mission critical programs that are supported by these data.
	Estimated Strategic Benefits: Major Improved public safety related to risk mapping, scientific data analysis (sea-level rise impact projections), and habitat and ecological modeling as these programs can be extended statewide.
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes. SC DNR has a need for full hydrographic basins that extend into North Carolina, Georgia, and Tennessee.	

Local Functional Activities

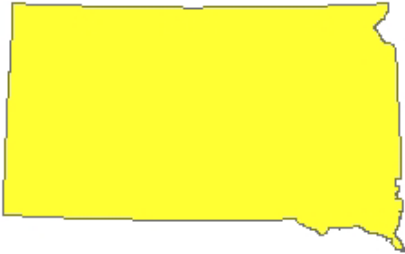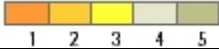| **County Government** -- Florence County	
Program: Stormwater Modeling	**Business Use:** 14. Flood Risk Management
Functional Activity: Stormwater / Flood Risk Modeling	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $96,000 Quality of LiDAR data has reduced staff time and resources previously used in field checking Improved and expanded use of LiDAR data
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Same. Countywide LiDAR data available in Florence Contours, hillshades, flow direction, hydrology and elevation, etc
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Economic development, public works, transportation and long-range planning benefits could be realized. Stormwater and FEMA Flood modeling capabilities improve hazard mitigation efforts.

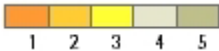| **County Government** -- York County	
Program: Engineering	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: County Engineering/Planning/Economic Development/Taxation Assessment	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; $132,000 Ability to better assess changes in earths surface and ability to review site plans using modern topography
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Can offer this product online in reference to other map data & 3d product. can use updated topography to make better decisions on hydrography
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Can offer the product to citizens in support of internal/external activities, savings by buying in bulk.

South Dakota (SD)

The State of South Dakota has requirements for Quality-Level-3 data covering the entire state and including a buffer area across the borders. Approximately 12% of the state is covered by existing Quality-Level-3 or higher resolution elevation data. Much of this data is in production and has not been delivered or utilized. Large areas of the state are currently covered only by very old elevation data that do not meet Quality-Level-5. Primary uses for enhanced elevation data by the state government are identified as HAZMAT and other emergency response, flood and drainage modeling, habitat assessment, pine beetle damage mapping, and transportation infrastructure design. There is a uniform need for contours and some form of digital elevation models.   Benefits of enhanced data, while not well understood due to lack of experience with the data, include more accurate hydrologic modeling and reduced need for field surveys which will reduce labor costs, provide more reliable flood inundation predictions and enable more educated management decision making. Property damage and lives lost in emergency events could be reduced South Dakota would be very supportive of a national program for LiDAR acquisition.

State Functional Activities

Program: National Flood Insurance Program and Emergency Response	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response
	HAZMAT and Flooding Emergency Response:
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Up to date and more accurate data will yield improved model results.
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Improved data access will speed delivery of products.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Not Reported Improved products can save lives.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes - toxic plumes, floods, and other hazards cross state boundaries.	

Program: Habitat Assessment and Damage Mapping	**Business Use:** 1. Natural Resources Conservation
Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Data adjacent to the state border would be used in assessments.	**Habitat Assessment and Damage Mapping:** **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Would provide a more accurate elevation model for registering & rectifying digital imagery at the 1 foot resoultion level. More accurate DEMs for creating hillshade, slope, and aspect maps. Point cloud used to indentify tree types. Imporved delinaetion of habitats better defines state ownership. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Do not know, cannot describe. **Estimated Strategic Benefits:** Minor Improved management decision making for state lands.

Program: Road and Bridge Design	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: [color scale 1 2 3 4 5] **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** A 4 to 5 mile buffer along state lines would be used in hydrologic modeling to determine possible stream flows and corresponding culvert sizes required to accommodate them.	**Road and Bridge Design and Drainage Analysis:** **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Not currently using 2 ft contour LiDAR. Enhanced elevation data may reduce (but not eliminate) the need for manual drainage survey methods and save time/manpower. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Improved highway drainage feature design and plans with expedited delivery time. **Estimated Strategic Benefits:** Moderate Improved road safety due to better hydrologic modeling.

Local Functional Activities

County Government -- Brown County	
Program: Brown County Water Management Plan	**Business Use:** 14. Flood Risk Management
Functional Activity: County-Wide Water Management Plan	
Quality Level: QL 3 LiDAR Data	**Estimated Annual Operational Benefits:** Major; $10,000,000 Better understanding of water movement throughout the very flat county and along James river.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; Not Provided Better advisement to township and county officials as to how to handle drainage situations.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major Better advisement of where new development should take place and how to hold or drain water appropriately in flood-prone areas.
Tide-Coordinated: No	

County Government -- Pennington County - Rapid City GIS	
Program: Pennington County - Rapid City GIS	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 2 LiDAR Data	**Estimated Annual Operational Benefits:** Moderate; Not Provided We don't have data of sufficient quality to support flood mapping outside of the City area. Better data would support flood mapping in the small communities in the county, along with developed areas near streams.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided. We would be able to support flood mapping in the entire county with better data. We are able to support flood mapping in the City area without the need for additional survey work.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate More accurate flood models in the entire county would enhace public saftey. In the City area, more accurate flood models add to public safety through regulation of flood areas.
Tide-Coordinated: No	

Regional Government -- Planning And Development District III	
Program: District III Planning and Development	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Erosion And Sediment Issues Along Major Rivers	
Quality Level: QL 3 LiDAR Data	**Estimated Annual Operational Benefits:** Don't know; Not Provided Unknown
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Unknown
Bathymetric Data: No	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Yes	Unknown

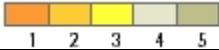| Regional Government -- Planning And Development District III	
Program: District III Planning and Development	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Flood Risk Mapping, Hydrologic And Hydraulic Modeling To Help Identify Zoning And Planning For Rural Communities	
Quality Level: QL 3 LiDAR Data	**Estimated Annual Operational Benefits:** Major; Not Provided Currently we do not use any LiDAR data, so its hard to put a "value" on it. We would be able to educate public on certian problems in the region. Flood, sediment, fire and other potential disaster related issues along with environmental issues (septic tanks).
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Major; Not Provided Information would be an asset for poor counties when trying to protect the environment and property.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major Would use bathymetry for sediment issues along the Missouri River. Also, this data can assist in planning for sewer systems, along with flood plain issues. We have utilized LiDAR for a new flood plain, which was valuable in protecting a community. This community is now able to develop accurate zoning and other planning documents to "grow" the community.
Tide-Coordinated: No	

Tennessee (TN)

The State of Tennessee is pursuing, through a parallel effort of the NEEA, development of a statewide business plan for LiDAR/enhanced elevation data. Through a FGDC "50 States" initiative grant, Tennessee and its partner, Applied Geographics will be conducting stakeholder interviews and regional meetings in 2011 to identify the business needs and associated benefits of developing a statewide LiDAR/elevation program.
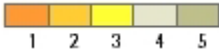
Tennessee has a rich history of developing framework GIS data. Through the original efforts of the Tennessee Base Mapping Program (2000-2007), the state has developed large scale (1:1,200 and 1;4,800) GIS data layers (ortho imagery, parcels, transportation, admin boundaries, hydrography, and elevation). The existing Tennessee Base Mapping Program elevation data however, does not support all of the elevation business functions across all levels of government in Tennessee.
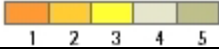
Through the NEEA online survey and stakeholder workshop held on June 14, the state was able to begin to identify the functional areas in Tennessee that require enhanced elevation data through LiDAR technology. This process will expand through the State led effort to include additional state agency stakeholders, floodplain management professionals, federal agencies (USDA, USACE, TVA, DOI), local governments and other industries (surveyors, engineers, utility districts, etc.) that rely on accurate elevation data to support their business function.

When complete, the goal for the Tennessee LiDAR/elevation business plan is to have the state well positioned, in terms of both GIS practitioner and political support, relative to the national effort and to work with USGS on potential funding/cost sharing scenarios and build out statewide LiDAR/elevation data in Tennessee.

State Functional Activities

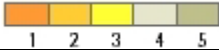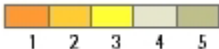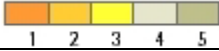| Program: TN Dept. of Agriculture, USDA Forest Service Forest Stewardship Program	Business Use: 5. Forest Resources Management
	Development of private forest management plans: Tree canopy, forest volume, individual tree counts, habitat modeling and assessment
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Present funding is based on past performance, if the number of clients and acres could be increased, this would allow the program to be expanded by targeting landowners that might receive the greatest benefit, those with the largest acreage and timber volumes. Program allocations would then also be increased.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported In some areas of the State where forest inventory estimates have not been provided, this service would be expanded due to the cost reduction in developing inventory estimates.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Moderate None
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	
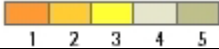
Program: **State of TN** Finance and Administration	Business Use: 14. Flood Risk Management
	Floodplain mapping:
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Not Reported Benefits Description Not Provided 2010 TN Flood event: $612.5 million federal disaster assistance $225 million in claims paid through NFIP 24 people died 10,000 displaced
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: State Hazard Mitigation Program	Business Use: 17. Homeland Security, Law Enforcement, and Disaster Response

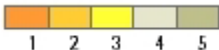|	Flood Risk Mapping:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported For the Mitigation program, better elevation data would improve the estimates for dollar exposure for flood risk, and improve the allocation of funds to mitigate these risks. Improved elevation could be used in emergency response and planning beyond mitigation activities to better determine the State's response to flood events. Examples include predicting areas for evacuation based on projected flood crest and discharge values. Planning for protective measures such as sandbagging, etc.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Enhanced elevation data statewide would help standardize some of the processes and allow for documenting best practices and standards.
Quality Level: [1 2 3 4 5] **Update Frequency:** > 10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Estimated Strategic Benefits:** Major Social: Enhanced elevation data would allow for production of better Flood Insurance Rate Maps, storm water drainage efforts, and better data for public safety and other personnel responding to flood events. Environmental: Better hydro modeling for water catchment systems for reducing sedimentation, pollution and other impacts. Improved assessment of Hazardous Materials sites at risk of flooding. Strategic/political: Better allocation of funding for flood hazard mitigation activities and understanding of populations at risk for flooding.
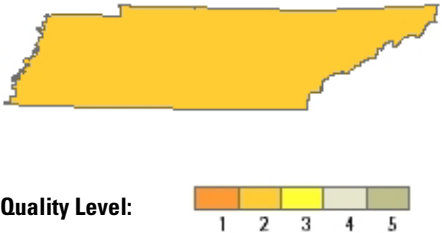
Program: Communication (Radio) Towers	Business Use: 27. Telecommunications

	Line of sight analysis:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Locating proper locations for towers is critical. Statewide coverage for dispatch, automated vehicle location, and reporting will be drastically improved.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported The new communication tower system will be digital and include automated vehicle location capability that does not presently exist. The value of this cannot be realized with the current system which does not have complete state coverage.
Quality Level: [1 2 3 4 5] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Estimated Strategic Benefits:** Major Elevaton data use is anticipated, but that project is not yet underway. It is anticipated that elevation data will greatly assist in determining new tower locations

Program: Transportation Design, Construction and Maintenance	Business Use: 21. Infrastructure and Construction Management

	Planning, design and constructions of transportation infrastructure with consideration of all impacted cultural and environmental factors.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Improved and more efficient engineering design. Improved runoff modeling for bridge design and stormwater management. Viewshed analysis of design alternatives (not possible now). Reduced time and cost for design and construction.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Landform modeling and visualization that are not practical now. Faster production of more accurate statewide digital orthophotography for state base mapping program.
Quality Level: [1 2 3 4 5] **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Estimated Strategic Benefits:** Major Improved road planning and design based on very accurate and consistent elevation data. Vastly improved stormwater management and mitigation. Improved flood modeling and mitigation. More accurate base mapping.

Program: Not Reported	Business Use: 22. Urban and Regional Planning
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**General planning:**
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided

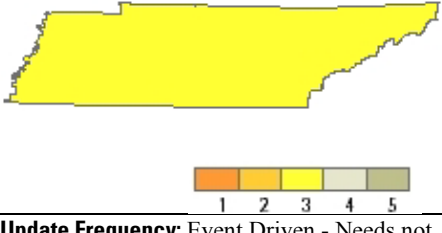| Program: Not Reported	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**hazards mitigation:** Identification of land-slide hazards for predictive modeling
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Not Reported Benefits Description Not Provided

Program: Not Reported	Business Use: 26. Recreation
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Resource management:**
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided

Program: Not Reported	Business Use: 13. Cultural Resources Preservation and Management
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Historic site analysis and preservation:** Mapping and identification of archeological sites, battlefields, structures for historic preservation.
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided

Program: TN Solar Institute, Univ. of TN & Oak Ridge National Laboratory	Business Use: 11. Renewable energy resources
1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Provided	**Solar power suitability analysis**
	Estimated Annual Operational Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Not Reported; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Moderate Benefits Description Not Provided $23 million dollars was made availabale for a solar opportunity fund, to look at suitability for solar energy. Elevation data has been used for solar suitabiity analysis.

Local Functional Activities

County Government -- Hamilton	
Program: Not Provided	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping, Hydrologic Modeling	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- Knox County	
Program: Annual Landbase Mainenance	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Landbase Maintenance	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Not Provided; $320,000 Cost savings by aerial surveys instead of field surveys; improved confidence in approving subdivision development plans. Regional coverage would better support utility flow models; building/infrastructure value-added data will provide better situational awareness in high-veg/rural areas.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided None; extend to regional audience the same benefits as above. Digital and hard copy map sales. Digital data sales. Confidence by engineering/development community in elevation data products.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	Regional coverage would aid multi-jurisdictional projects, especially in mutual aid support for emergency response and land use planning FEMA flood mapping, stormwater runoff, field survey cost savings

County Government -- Knox County	
Program: Landbase	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Utility And Stormwater	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Cost savings by aerial surveys instead of field surveys.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided None Digital and hard copy map sales. Digital data sales.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	None FEMA flood mapping, stormwater runoff, field survey cost savings.

County Government -- Knox County	
Program: Not Provided	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Site And Road Construction	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- Rutherford	
Program: Not Provided	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- Rutherford County	
Program: GIS Services	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Stormwater Alanysis	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided We experience major cost savings by eliminating extensive field work by depending on the LiDAR data and DTM products. This allows us to be in compliance with our stormwater mission and goals. We are currently expanding our use of GIS throughout our organization. The accuracy of the surface model allows better mapping throughout our organization as related to contours, breaklines, and imagery rectification.
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Major; Not Provided Better response to our stormwater response based on analysis of the complete watershed would greatly benefit the public. Availability of accurate imagery, better parcel mapping, improved planimetric data all improve the customer experience. Quality data also enables a quicker turn-around on the delivery of our data acquisitions.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	As LiDAR is the base product that all of our data is constructed on, we see great benefits across the board. From Public Safety disaster response to Election Commission Redistricting. All of our layers have our LiDAR derived DTM as their foundation.

County Government -- Tipton	
Program: Tipton County GIS	**Business Use:** 14. Flood Risk Management
Functional Activity: Drainage Basin Managment And Flood Risk Mapping	

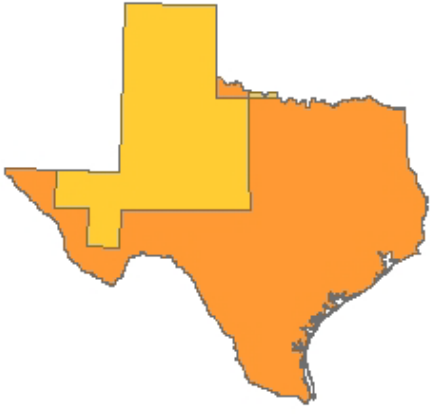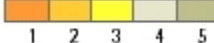|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Determining Flood Stages for rivers or major streams. Determining adequate drainage basins for new subdivisions. Creating proposed site layout plans for review. Higher accuracy data would provide better results. Better planning for flood events and development.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided All aspects would be improved relative to new surface data. Better confidence. Existing data is somewhat dated and inaccurate causing customers to question quality.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Perception would be improved with data representing what's in the field. Mainly for subdividing of property customers can see lay of land.

Texas (TX)

Enhanced elevation data are classified as a high priority data set by the State of Texas. The role of these data in developing accurate floodplain maps led to capital funding for their acquisition by the Texas Legislature in 2007, as well as the adoption of a statewide purchasing contract to promote cooperative data acquisition projects.
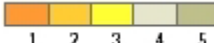
Enhanced elevation data are essential for developing accurate maps that guide decision making for planning, economic development and natural disaster response in Texas. State, federal and local governments actively collaborate to develop new data and make it accessible in the public domain. The NEEA survey has identified five major uses for enhanced elevation in Texas: floodplain mapping, transportation planning, resource management, forestry, and emergency management.

Between 1960 and 2008, Texas ranked first in casualties related to flooding. Within the last six years Texas has experienced multiple hurricanes, tropical storms, wildfires and is now in a period of exceptional drought. The capacity to prepare for and manage responses to these events is significantly increased when accurate enhanced elevation data are available. Texas' population is projected to double in the next fifty years and the need to plan for future water and energy resources is an ongoing process. Elevation data are a fundamental input to understanding where and how to plan and develop these critical resources.

Over the past four years, more than $7 million has been invested in developing enhanced elevation data for floodplain mapping and other needs. In total, Texas has developed 35,000 square miles of priority enhanced elevation data - approximately 15 percent of its total land area. Recently, Texas has had to suspend capital allocation for enhanced elevation data due to state budget constraints. If these data were supported by a national strategy and state coordination, the benefits of these data could be realized along with significant cost savings.

State Functional Activities

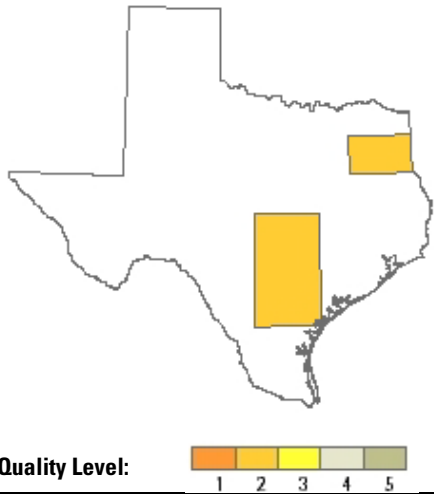| **Program:** Floodplain Mapping; The Dam Safety Program	**Business Use:** 14. Flood Risk Management
	Flood Risk Assessment: Flood risk assessment, analysis, and floodplain mapping.
	Estimated Annual Operational Benefits: Major; $2,300,000 Ability to provide Hydrologic and Hydraulic models and more accurate flood zones from elevation data. By reducing the need for field survey and inspection, the agency costs would decrease resulting in government savings.
	Estimated Annual Customer Service Benefits: Major; $3,600,000 With more accurate and complete elevation data, Texas could more accurately (and more rapidly) determine flood risk to the population and implement remedial measures to improve the safety of dams.
	Estimated Strategic Benefits: Major The public and social benefits are that of reducing the risk of loss of life as well as expenses associated with property damage. Equal opportunity for risk management for all levels of socio-economic development. Between 1960 and 2008, Texas ranked first in casualties, second in flood damage claims, and fourth in the U.S. in property damage. The state of Texas enacted legislation to support floodplain mapping in 2007. Many areas of Texas will not be able to address their floodplain needs due to lack of elevation data coverage.
Quality Level: 1 2 3 4 5	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes. Adjacent states with common hydrologic units (HUC)	

Program: Rural Runway Design and Flight Path Obstructions; Outfall Tracking System	**Business Use:** 21. Infrastructure and Construction Management
	Infrastructure Management and Support: Management and support of infrastructure including transportation facilities and utilities for planning and design, placement of infrastructure using a minimal amount of field survey work.
	Estimated Annual Operational Benefits: Major; $120,000 Accurate and updated elevation data would allow a desktop inspection of the topography of the area prior to field inspection. Also provides the potential for eliminating trips to the field which would result in program savings.
	Estimated Annual Customer Service Benefits: Major; $60,000 Increase the efficiency of the process and reduce the time spent on gathering topographic data for project areas. The enhanced elevation data could allow manual extraction and classification of obstructions with a decrease in time and cost of field surveys.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major This dataset would provide relevant, time-sensitive elevation information that would support the state Aviation Capital Improvements Program and Routine Airport Maintenance Grants initiative, which focus on the safety and maintenance of the areas around the state's approximately 300 rural runways and airports. It would provide for enhanced safety for the general aviation system / community. It would help the Department of Transportation and local governments to preserve and maintain existing facilities and respond to present needs for repairs and improvements. Most importantly, it would allow for more timely and precise assessments of the anticipated needs in and around these facilities.
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: No	

Program: Ecological Systems Database Project; Forest Resource Development	**Business Use:** 1. Natural Resources Conservation

	Ecological Systems Modeling; Forest Inventory and Analysis / Urban Tree Canopy Analysis: Forest and natural resource management and planning including ecological systems modeling, urban tree canopy analysis, and forest inventory/analysis.
	Estimated Annual Operational Benefits: Major; $3,000,000 Statewide LiDAR would assist with: timber management and forest inventory, urban tree canopy analysis, terrestrial and aquatic vegetation mapping, natural resource conservation, park planning, riparian studies, fish habitat studies, geologic studies, utility corridor mitigation studies, wetland mitigation studies, and species habitat delineation.
	Estimated Annual Customer Service Benefits: Major; $30,000,000 Providing reliable information regarding forest resources is extremely important considering that the forest sector in Texas is the third most important agriculture commodity. The forest sector produces $22 billion in industry outputs and employs 80,000 workers. It will also provide key information for carbon stock trading and renewable energy resources across the state.
Quality Level: (1 2 3 4 5) **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** No	**Estimated Strategic Benefits:** Major Elevation data allows for better response to natural disasters such as wildfires, floods, or hurricanes. Urban tree canopy provides many benefits to communities including improving water quality, conserving energy, lowering city temperatures, reducing air pollution, enhancing property values, providing wildlife habitat, facilitating social and educational opportunities, and providing aesthetic benefits. Elevation data helps with park planning which benefits the numerous visitors to state and federal parks and preserves.

Program: Texas Coastal Zone Management Program; Texas Coastal Ocean Observation Network Program	**Business Use:** 4. Coastal Zone Management

Coastal Flooding Due To Storms, Subsidence, And Sea-Level Rise: Coastal Zone Management includes:
• Tropical storm hazard mitigation
• Oil spill hazard mitigation
• Sea level rise and subsidence
• Disaster response
• Marine navigation and safety
• Coastal infrastructure and construction mgt.
• Coastal urban and regional planning
• Real estate, insurance (flood and wind storm)
• Coastal recreational use and management

Energy and water policy and disaster response are major components in the national and state governments' missions. All three components converge at the coastal zone. America's coastal zone is experiencing increasing development (especially in critical infrastructure and energy facilities), increasing risk from natural and man-made disasters, increasing demand on limited water resources, and increasing pressure on fragile ecosystems. As the nation and individual states strive to develop comprehensive coastal management programs to meet these challenges, airborne topographic LiDAR will be the key remote sensing system for commercial and research applications. Bathymetric LiDAR should be included, to the extent that water clarity allows, in order to help stitch conventional bathymetric data and LiDAR topographic data together. Example: Real-time water level elevation data provided to the Houston/Galveston Physical Oceanographic Real Time System for use by pilots to safely navigate ships in and out of the port offers an $18 million benefit annually.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
High resolution 4-D (time) LiDAR data is critical for assessing short and long term shoreline trends, managing coastal development, and assessing the potential impacts of climate change and sea level rise. An annual to semiannual, national program of LiDAR coastal mapping would provide a uniform LiDAR dataset to support federal and state coastal management requirements.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
A national, high resolution 4-demensional coastal mapping program can provide fundamental data for high resolution hurricane and tsunami models that can be used to save properties and lives.

Estimated Strategic Benefits: Major
Storm surge preparedness would greatly reduce property damage and save lives during hurricane storm surge events. Due to the frequency and magnitude of recent storms it is anticipated that future economic development, investment, and mitigation can be better served by utilizing current and more accurate elevation data. This will also provide a better basis for decisions relating to planning, engineering, and construction. The benefits will be better understanding of risk to lives and property, more precise risk mitigation strategies, and more efficient evacuation and response plans. In addition, 4-D LiDAR datasets are excellent tools for education and training.

Quality Level:

1	2	3	4	5

Update Frequency: 2-3 years

Bathymetric Data: Yes

Tide-Coordinated: Yes

Data Outside State Needed: No

Program: Texas Abandoned Mine Land Program	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Earthwork Volume Calculation:** Abandoned mine site studies for health and safety hazards analysis.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The elevation data provide the information necessary to design reclamation/calculate earthwork volumes associated with abandoned open pit surface mines - directly related to the program's goal to mitigate health and safety hazards posed by the mine sites. More accurate elevation data will enable improved reclamation design. Several internal activities such as assembling work specifications, public solicitation of bids for photogrammetric work, establishing ground control points, and assessing photogrammetric data are costly and time-consuming. Access to LiDAR could make design reclamation and volumetric work less costly and more efficient for the program.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Topographic maps with 1-foot contour accuracy and elevation data should provide a better digital terrain model, since all of the mine sites have varying levels of vegetation cover.
	Estimated Strategic Benefits: Moderate Same benefits (elimination of health and safety hazards posed by open pit surface mines) but the more accurate elevation data will allow the State to better estimate earthwork volumes.

Program: Forest Resource Protection	**Business Use:** 16. Wildfire Management, Planning, Response
Quality Level: **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Statewide Wildfire Risk Assessment / Planning and Decision Support for Wildfire Operations:** Statewide wildfire risk analysis and support for wildfire operations for better management and grant funding based on need.
	Estimated Annual Operational Benefits: Major; $3,000,000 The main areas for significant operational improvement include the mapping of wildland fuels, wildland-urban interface areas, and aerial hazards. Using Digital Surface Model (DSM) data derived from LiDAR would provide the vegetation profile and structure information needed to accurately map wildland fuels – 1) fire behavior fuel models, 2) canopy cover, 3) canopy ceiling height/ stand height, 4) canopy base height, and 5) canopy bulk density. These datasets are essential for determining the wildland fire behavior potential for an area. In addition, DSM data would give the ability to map structures to provide a better definition of the wildland-urban interface as well as monitor future urban sprawl. Knowing where potential impacts to structures will occur is critical in the planning process and currently there is not a reliable source for this information statewide. Finally, the DSM data could be used to identify aerial hazards in support of air operations.
	Estimated Annual Customer Service Benefits: Major; $50,000,000 Information derived from the data, would provide more accurate and reliable information than current sources. This will raise the confidence level in state products and provide better information to wildfire managers and public officials when making critical decisions.
	Estimated Strategic Benefits: Major The Texas Wildfire Risk Assessment is used to help prioritize areas in the state where tactical analyses, community interaction and education, or mitigation treatments might be necessary to reduce risk from wildfires. It also serves as the basis for allocating $25 million in grant funds annually to local fire departments for equipment, training, and protective gear. Therefore, it is critical to have the best available information to support this process.

Local Functional Activities

City Government -- City Of Austin	
Program: Flood Hazard Mitigation (Floodplain Mgmt, Creek Flood Hazard Mit., Local Flood Hazard Mit., Flood Early Warning System, Storm Water Pond Safety)	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided The higher resolution LiDAR data will provide more detailed topographic information in key areas such as stream channels and allow for the identification of curbs that define localized flows. This will allow for more detailed flood models and improved floodplain mapping. It will also provide more accurate data for preliminary engineering studies, master planning studies and detention pond volume analysis. This will reduce the need for survey prior to final design and allow engineers to move more quickly into conceptual design and better estimate quantities and costs at the planning stage of projects.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The higher resolution data will allow City staff to more accurately evaluate flood risks (depths of inundation, properties/structures at risk, etc.) and more quickly and accurately evaluate flood or drainage related issues that are influenced by topography. The topographic data and associated contours also will provide a better base data set for the engineering and development community. This should result in development submittals that generate fewer City comments based on issues of topography and drainage.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Benefits Description Not Provided

City Government -- City Of Austin	
Program: Pulaski Area Georaphic Information System Consortium	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Land Development Preliminary Design	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Eliminated field work for preliminary design data collection. Allows users to quality control GPS elevation values from their desktop. Allows for vertical profiles to be run for line of sight analysis. Allows for material estimates to be done for laying new pipe, or road survaces to use the z value of the terrain. Allows for more accurate water pressure calculations from points of service. In addition to the answers in #4 it will allow for better ortho photo rectification, better hydraulic modleing, line of sight can take into account buildings and other surface features. Allows for high resolution visualization of small drainage features when mapping storm water assets. Allows for more precise excavation volumne calculations when locating new tanks, etc.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Give more accurate information Give more accurate information
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	More accurate information More accurate information

Regional Government -- North Central Texas Council Of Governments	
Program: Vision North Texas	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Suitability Analysis	

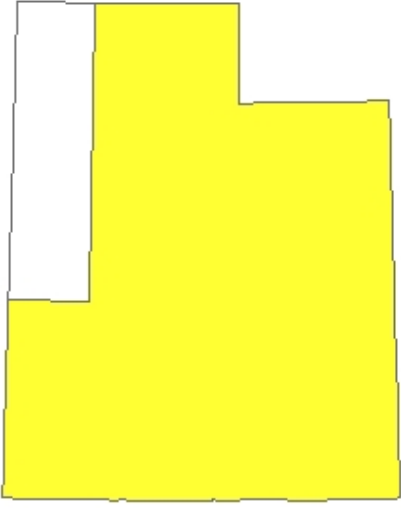|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Enhanced elevation data will be used for transportation infrastructure planning, such as for rail, HOV, freeways, and tollways. Such data will also be utilized in planning tools such as the following: Regional Ecosystem Framework, Integrated Storm Water Management, and Greenprinting.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The public and private stakeholders in the region will use enhanced elevation data to assist with the decision-making processes regarding planning and development.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Vision North Texas is a private-public partnership headed by the Urban land Institute, the North Central Texas Council of Governments, and the University of Texas at Arlington. This partnership is making an important contribution to the future quality of life, economic desirability and long-term sustainability of the 16-county North Central Texas region. Vision North Texas is increasing public awareness about important regional land use issues that affect mobility, air quality, water supply and other economic and environmental resources. The area's population is projected to nearly double by 2050, to approximately 10 million residents. Expected growth challenges include those of transportation, energy, water supply, water quality, open space, and tree cover. Enhanced elevation data will assist with addressing these issues, by providing baseline data to evaluate current conditions, and to enable planning that will successfully accommodate the expected population growth.

Utah (UT)

A statewide comprehensive high-resolution elevation dataset is the most important need for the State of Utah. Because of Utah's varied landscape; mountains, desert, valley floors, and canyonlands, a 'one size' high-resolution dataset is neither practical nor cost effective. However, as noted in the survey reports from the Utah Geological Survey and the academic community, the quality level 2 LiDAR high-resolution elevation data source is the most identified need. Acquiring this dataset over the mountains, desert, and valley floors would provide this agency and the academic community with a dataset sufficient to meet their needs. This would also more than meet the needs, as identified in the survey, of the Utah Department of Natural Resources, Division of Water Resources, and the Department of Public Safety, Division of Emergency Management. These agency requirements are also primarily in the mountains, desert, and valley floor areas. Additionally, this would also meet the needs of geospatial, GIS, and other users of this data type in Utah. A lower-resolution elevation dataset, able to portray an accurate dataset in the canyonlands areas, would complete the statewide coverage. However the acquisition of datasets in the canyonland areas would have to meet the Utah Geological Survey's needs for geologic and geologic hazards mapping.
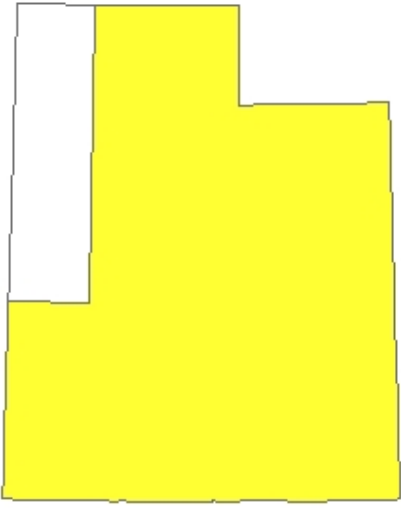
State Functional Activities

Program: Geological Hazards Mapping	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation
 Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, natural hazards do not stop at state boundaries.	**Geologic hazards mapping and assessment:** Geologic hazards mapping and assessment for use in developing geologic hazard maps and in emergency response to natural hazards. Also use for resource mapping, education, and other uses.
	Estimated Annual Operational Benefits: Major; $100,000 There is currently very limited LiDAR data available over areas of interest, i.e. potential natural hazards. A comprehensive statewide high-resolution elevation coverage is critically important to have an 'on-hand' database available for responses to natural hazards. Additionally, high-resolution elevation coverage of new geologic map areas would improve the mapping of surficial geologic features and in some cases, poorly exposed bedrock features. This would also improve the mapping of landslide boundaries and features, especially in highly vegetated areas.
	Estimated Annual Customer Service Benefits: Major; $100,000 Having a comprehensive high-resolution elevation dataset, more work can be done in the office that will increase turnaround time for completing mapping projects. Because the elevation data that the map is created on will be of higher quality, so will the geologic map products that are produced, i.e. a higher level of detail is possible. Thus, customer experience will be improved through the more accurate location of geologic features.
	Estimated Strategic Benefits: Major The geologic maps produced by the Utah Geological Survey are the foundation tool for nearly all geology-related activities. For example, geologists and geotechnical engineers usually start with geologic and geologic hazard maps when they perfrom site investigations for schools, roads, housing developments, and most other new projects. These users are constantly pleading for better accuracy and more detail in the geologic maps. Having a statewide high-resolution elevation data will allow the Utah Geological Survey (UGS) to provide this. This would lead to better decisions by planners, the public, and politicians in regards to land management and development decisions. Additionally, the UGS collaborates with the on responses to natural hazards emergencies. Having statewide high-resolution elevation coverage would provide the UGS with initial 'on hand' information for any area in the State where a natural hazard may occur.

Program: University of Utah Dept. of Geography	**Business Use:** 25. Education K-12 and Beyond
	Higher education GIS and remote sensing education and research. Used in all aspects of academic research and training.: Higher education GIS and remote sensing education and research. Used in all aspects of academic research and training.
	Estimated Annual Operational Benefits: Minor; Dollar Value Not Reported Having a comprehensive statewide high-resolution elevation dataset allows more research to be conducted in Utah instead of other places. Particularly, Utah college and university campuses would be able to use the data in their academic labs and in support of research.
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported There is just an improvement in the level of research that can be performed. All uses are academic and research in nature so there is not a monetary benefit from existing elevation data.
	Estimated Strategic Benefits: Major The Utah academic community, through their GIS and remote sensing departments, are using LiDAR and other elevation datasets for research and other academic applications. However the research applications utilizing these datasets, particularly LiDAR data, is limited to the current coverage in Utah; the Wasatch Front and other small areas. An expansion of the high-resolution elevation coverage would enable the academic community to conduct more research in the State.
Quality Level: 1 2 3 4 5	
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Natural resource management	**Business Use:** 1. Natural Resources Conservation
	Natural resource monitoring and assessment: Natural resource monitoring and assessment for use by the academic community for modeling landcover and landscape rehabilitation projects. This involves the ability to research and monitor soils and vegetation growth, visualize landscapes and land cover structures, and wildlife habitat studies.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Without accurate digital elevation data Utah's academic community cannot adequately model landcover with remotely sensed imagery. The ability to monitor soils, vegetation growth, and structural diversity is a key component that allows the community to better monitor landscape rehabilitation projects.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Academic students, research, and State and federal land management agencies are the primary customers. The ability to teach natural resource management is greatly improved by the use of quality high-resolution elevation data. Students are better able to understand landscape dynamics by visualizing landscape and land cover structure. In addition, having accurate digital elevation data will improve the academic community's ability to target types of wildlife habitat needed in certain areas of the State. Further, land management agencies who do not have the budget to monitor the vast landscapes in the Intermountain West at the finest level, can use these data to help monitor landscape health using a holistic approach.
Quality Level: 1 2 3 4 5	**Estimated Strategic Benefits:** Major Educational benefits include a better understanding of landscape and land cover structure. Also improved understanding of existing wildlife habitats. Strategic and political benefits include the ability to better inform stake holders on the status and trend of the landscapes from which they rely for water, grazing, recreation, etc.
Update Frequency: 2-3 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: No	
Data Outside State Needed: Yes, natural landscapes and wildlife habitats do not stop at state boundaries.	

Program: Hydrology and Dam Safety Applications	Business Use: 2. Water Supply and Quality
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Water supply analysis and planning for the State of Utah:** Improved hydrologic analysis for water supply studies, dam safety data analysis, precise cost estimates for hydrologic related project planning and preventing project cost over-runs.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Improved hydrologic analysis for water supply studies. Better dam safety data analysis. More precise cost estimates for projects to prevent cost over-runs.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported With better elevation data the Utah Department of Natural Resources, Division of Water Resources could provide more detailed and precise data analysis for water supply studies, dam safety analysis, and other related hydrologic applications and project planning for the State of Utah.
	Estimated Strategic Benefits: Major The availability of an improved high-resolution elevation Dataset that provides more accurate and reliable hydrologic analysis – particularly dam safety data analysis – the Utah Department of Natural Resources, Division of Water Resources is better able meet the agency's mission and goals in providing critical data to their users.

Program: FEMA Risk Map Program	Business Use: 14. Flood Risk Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** No	**Flood risk mapping:** FEMA Risk Map Program. The Utah Division of Emergency Management cooperates with FEMA to acquire LiDAR coverage of watersheds where potential flood risks have been identified.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The Utah Division of Emergency Management cooperates with FEMA to acquire LiDAR coverage of watersheds where potential flood risks have been identified. These datasets are provided to the county and local governments. A comprehensive coverage of areas where potential flood risks are identified is critical to meeting the needs of the counties and local governments for flood risk planning, prevention, and emergency response.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported The availability of high-resolution elevation data can increase production efficiency and overall accuracy of current geologic map products relating to flood risks. Wider availability of this data could also result in the production of new map products and/or datasets.
	Estimated Strategic Benefits: Major More efficient and accurate geologic map products used in identifying flood risks have direct application in making informed decisions about environmental issues.

Local Functional Activities

City Government -- Salt Lake City	
Program: Comprehensive Environmental Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Regional Land Use And Transportation Planning	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Data would be helpful in supporting several of our general regional planning projects involving regional land use planning and rural transportation planning.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.

City Government -- Sandy City	
Program: Police and Information services	**Business Use:** 27. Telecommunications
Functional Activity: Telecom Line Of Sight	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Police are building a "MESH" Network of pole-mounted antennas that allow officers in vehicles to tie into cameras mounted at intersections, parks, etc. so they can observe sites "live" without having to be on-site. The LiDAR lets us to place the antennas and cameras accurately so they have good line-of-sight connectivity, avoiding trees and structures. Information Services maintains a whole series of point-to-point antennas for LAN and WAN connections between buildings. In both cases, when they need to modify or add new links, the LiDAR is used in GIS viewshed analysis to predict clear paths. Would bring the existing data up to date, for same purposes.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided See comment above for uses by the city police department.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Enhanced police and IT effectiveness.

City Government -- Sandy City	
Program: Urban Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Building Footprint And Tree Crown Extraction For Planning And Parks Uses	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Building footprint extraction for planning and tree crown extraction for parks each allow specific uses. Planning uses this for analysis of density, viewsheds, and for general cartography. Parks uses this data to estimate tree density, counts, locations, and total tree canopy along streets.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Wouldn't be any NEW ones, just improved ones. Building footprint extraction for planning and tree crown extraction for parks each allow specific uses. Planning uses this for analysis of density, viewsheds, and for general cartography. Parks uses this data to estimate tree density, counts, locations, and total tree canopy along streets. Other city departments also use the data.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Our citizens can see and appreciate the city's efforts to improve their lives. Also would help improve accuracy in these areas. Our citizens can see and appreciate the city's efforts to improve their lives.

County Government -- Carbon County	
Program: Predisaster Mitigation Planning	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: Multiple Risk Analysis And Feature Extraction	

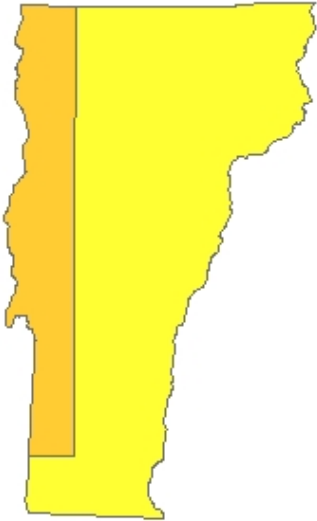|	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided A LIDAR dataset flown over a small area of the county is being used for updated FEMA maps in the detailed study area for the county. This data which has recently been approved, will be shipped shortly, and will help us with insurance needs within the county, will make developments possible that were not previously feasible due to inaccurate elevations, and will allow more realistic Pre-Disaster Mitigation (PDM) plans. We also expect to be able to extract building footprints for the area covered by the LIDAR flight in a more accurate and expedited way.
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided The improvements we plan to create in the future from the same dataset include datasets that we do not currently have available. They include building footprints, urban forest canopy, and engineering quality elevation datasets for planning new projects just to name a few. The updated FEMA maps will make the need for contesting the poor data of existing maps unnecessary. The data is now digital and so will be easier to disseminate and the data is much more accurate so it will present a more realistic picture of what may happen in and actual flood event and thus allow for better plans.
Bathymetric Data: No	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Better elevation data will instruct those who are currently at flood risk to obtain the needed insurance. Additionally, with the expected additional datasets we planned to be derived from the data, we will be able to serve the public in ways we have not been able to in the past. And better models of our environment will allow for better plans with regards to environmental benefits as well as political benefits. The two are inextricably linked. There is no question that the updated FEMA maps will benefit both public safety and the environment as we will be able to better plan for those within the update area. But what may not be as apparent is that the local officials will not be badgered by developers who's projects are held up or hampered by the poor existing data and folks who know they will not need flood insurance based on verifiably faulty elevation data will be able to stop their crusades.

County Government -- Washington County	
Program: Water ways (river and streams) resource management	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Mitigation	

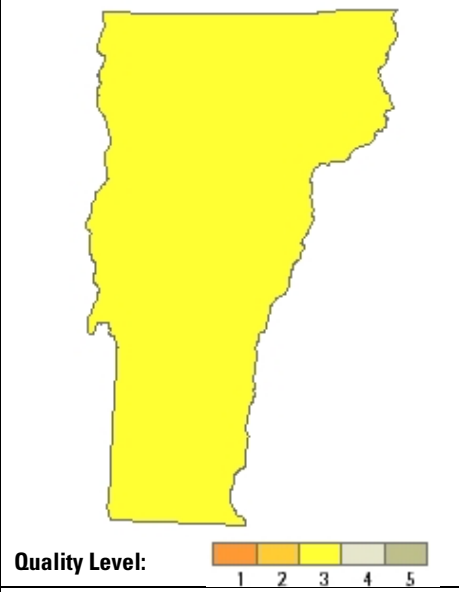|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Recent flooding in Washington County resulted in the courses of several major waterways being changed. Additionally, some bridges were washed out along with some road damage.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: No	Benefits Description Not Provided

Vermont (VT)

The State of Vermont has LiDAR coverage over about 20 percent of the state. Most agencies that have used the LiDAR realize the value of the data. Programs are being developed with the assumption that full coverage will someday be there. Funding continues to be the biggest issue for Vermont.
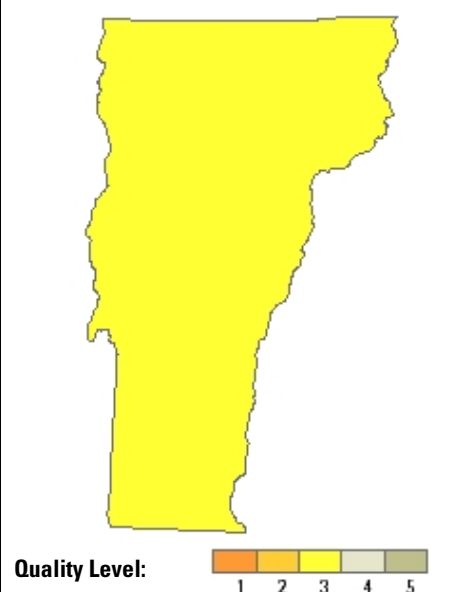
Myriad benefits to individuals, businesses and non-profits using enhanced elevation data for efforts such as preparing a town building permit application, wetland alteration permit application, the Renewable Energy Atlas of Vermont effort (www.vtenergyatlas.com) or Vermont Public Interest Research Group's Solar advocacy program seem to be underestimated at the regional and statewide scales of the NEEA effort. Another example is the Renewable Energy Atlas of Vermont effort (www.vtenergyatlas.com) where an enhanced surface model and its related characteristics like slope would have benefited many components of the analytical results. The total impact and cost savings of these individual applications should be considered in aggregate where the sum of the parts rises well above the value of each use and should be considered in the survey.

State Functional Activities

Program: River Corridor Management Program	Business Use: 14. Flood Risk Management
Quality Level:	**Supporting Community Planning for River Corridors:** The river corridor management includes environmental management but mostly refers to flood plain mapping in this case
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported The state could establish baseline data from which to determine erosion and sedimentation processes and address eutrophication problems.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported With consistent new elevation data the state would have a baseline snap shot of conditions from which to study fluvial geomorphic changes, identify channels that are not in reference condition, flag sites that are causing increased erosion and phosphorus discharges.
Update Frequency: 4-5 years	**Estimated Strategic Benefits:** Major The data would be the critical baseline for comparison of change over time - but may not immediately have information on fluvial processes and sedimentation.
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes, by watershed	

493

Program: tree canopy assessment	**Business Use:** 1. Natural Resources Conservation
Quality Level: 1 2 3 4 5	**Land cover mapping:** The land cover mapping program is identifying areas of urban tree canopy. This program depends on the point cloud almost exclusively.
	Estimated Annual Operational Benefits: Not Reported; $25,000 Benefits Description Not Provided
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Ability to see features more clearly
	Estimated Strategic Benefits: Major Benefits Description Not Provided
Update Frequency: 4-5 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: No	
Data Outside State Needed: Yes, with special emphasis into Canada	

Program: Project development and construction - highway, rail, air, transit	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: 1 2 3 4 5	**highway and bridge planning and design:** Transportation planning includes activities for roads, rail, air and waterways. LiDAR is most useful in events such as landslides for prliminary planning.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported Better elevation data for hydrologic modelling will improve culvert sizing, a digital surface model would allow for airport obstruction assessments, and construction projects could focus survey crews to collect in specific area and utilize LiDAR data for areas where less accurate elevation is needed.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported More oppuaturnities to do visualization in a 3-D environment using better elevation data. Improved accuracy of hydrological modeling and project terrain models.
	Estimated Strategic Benefits: Moderate Projects could be advanced if high quality eleveation data was available. Wider swaths of elevation models could be provided to designers for highway, rail and bridge projects, allowing for better stormwater and run-off design, better volume calculations, and improved scoping and visualization.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Program: Mapping, earth resources, hazards, energy	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic resource assessment and hazard mitigation are built on geologic mapping, geo-science research, and hazard identification. The outcome is protecting public safety and obtaining as well as protecting resources that contribute to the well-being of:
	Estimated Annual Operational Benefits: Major; $350,000 Vermont Geological Survey is working to identify areas of potential landslides-LiDAR coverage would be significant.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Benefits Description Not Provided
	Estimated Strategic Benefits: Major Benefits Description Not Provided
Quality Level:	
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Yes	

Program: Landslide inventory work for Vermont Geological Survey	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

	Landslide inventory: The geological mapping is identifying hazards such as landslide areas and flood areas.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Vermont has seen that LiDAR at this level of detail is extremely useful for landslide identification and other geologic mapping efforts that the state has undertake in cooperation with the Vermont Geological Survey.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Vermont would be able to produce new map products that are much more user-friendly. This would include slope and shaded relief maps and detailed topographic maps. The state would be able to identify landslides, rock outcrops, and many other features more efficiently than for areas where Vermont only has conventional topographic maps and orthophotos. It would reduce the need for expensive field work.
	Estimated Strategic Benefits: Major Widespread LiDAR coverage in the state will enable Vermont to map natural hazards far more effectively and present the results to the public in a more precise and timely manner.
Quality Level:	
Update Frequency: 6-10 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Provided	

Local Functional Activities

Regional Government -- Central Vermont Regional Planning Commission	
Program: Transporation Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Regional Planning	

Quality Level: QL 4 Elevation Data from Imagery	**Estimated Annual Operational Benefits:** Moderate; Not Provided Data helps use to determin the elevations of the sites we are working on. Data will allow us to determin better site plan elevations.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided More accurate elevation data can be provided Basic elevation data is being provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: Not Provided	Does not apply does not apply

Regional Government -- Chittenden County Regional Planning Commission	
Program: GIS Data Development	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Zoning	

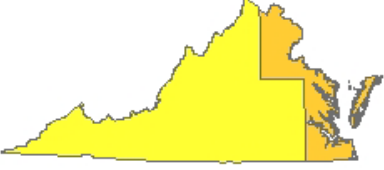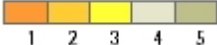|	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Minor; Not Provided We currently do not have enhanced elevation for the entire county only a part, so the benefit is not countywide. Once data is developed, it will be useful in many capacities from lakeshore zoning to building footprint development.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Can use data to develop a county-wide building footprint dataset. This would be useful in stormwater runoff analysis. Having enhanced elevation data for the entire county will benefit all member municipalities, not just a portion of the county. Zoning data can be developed at a more precise level, elevation data can be utilized for better land use planning analysis - buildouts, for example.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Not sure at this time what new benefits, but I'm sure there are many. Where we have the data it is useful for fire and rescue as well as for natural resource planning.

Virginia (VA)

State Agencies within the Commonwealth of Virginia have identified an array of potential uses of LiDAR and LiDAR derived products that could significantly enhance and improve the services they provide to the businesses and citizens of Virginia. These uses include applications in coastal zone management, flood risk management, urban and regional planning, the development and protection of transportation (infrastructure planning, evacuation routes, emergency response routes), geologic and mineral resource mapping, mining impacts, enforcement of mine regulations and reclamation, forest management (timber harvesting, fire protection, land conservation), and wildlife and habitat mapping. Enhanced elevation supports the creation of a suite of products that serve a diverse user base.
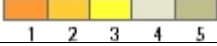
The Virginia Information Technologies Agency, Virginia Geographic Information Network (VITA / VGIN) Elevation Framework Initiative Action Team (FIAT) has determined that existing elevation data for Virginia are not of sufficient resolution, accuracy or currency to satisfy the business needs of all stakeholders. Shortcomings in the current data holdings make many of the Commonwealth's tasks difficult or impossible to complete. The FIAT supports national efforts that will help the Commonwealth resolve these shortcomings.

In all cases the Commonwealth believes that an enhanced elevation program should include the delivery of the raw point cloud. The raw point cloud currently supports a number of applications of importance to Virginia stakeholders. In addition, maintenance of the point cloud would provide the flexibility for the future creation of additional derivative products and applications as the knowledge of and the technologies that support the use of this data increase.
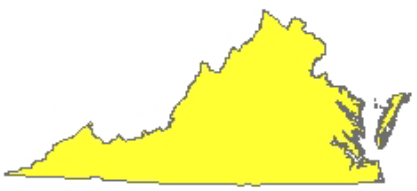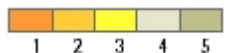
The Commonwealth believes that an enhanced elevation data program will complement and leverage existing state efforts to provide geospatial framework data in the areas of orthoimagery and road centerlines. Effective coordination of these framework data programs will increase the utility of each.
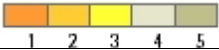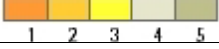
State Functional Activities

Program: Transportation, Public Safety	Business Use: 14. Flood Risk Management

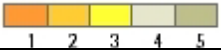|	**Inundation Mapping (drainage areas, flooding, dam breaks):**
	Inundation mapping is designed to minimize the potential impact of large quanities of water. The maps / models are used for planning purposes when designing transportation infrastructure and are used to map closures / danger zones during flood events. Essential for public safety.
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported
	Access to large extents of high resolution consistent data would save time and increase overall data quality. Large area consistent data sets provide uniformity in mapping, modeling and predictions.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	Consistent maps, models and predictions of drainage areas (both standard and catastrophic) are essential tools for both urban and rural planners and engineers.
Quality Level: (1 2 3 4 5)	**Estimated Strategic Benefits:** Moderate
	Better maps, models, predictions of public, private lands and associated infrastructure within drainage (including potential drainage areas such as a dam break may cause) areas can save lives and property.
Update Frequency: 4-5 years	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Regional watershed mapping allows for mapping of and the prediction of flood waters across an entire watershed. Although the State only has the responsibility for the monitoring and public safety within Virginia, regional flood models are required to predict the timing and volume of water that will enter the State.	

Program: Enforcement of Mining Regulations and Reclamation	Business Use: 10. Resource Mining

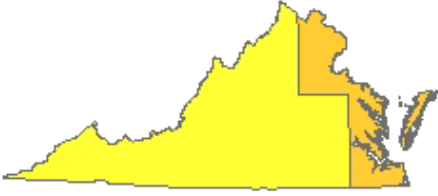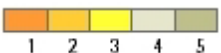|	**Assessment of Mining Impacts; Enforcement of Mine Regulations and Reclamation:**
	Estimated Annual Operational Benefits: Major; $1,500,000
	Improved identification of areas that have been modified by surface mining. Improved enforcement of mining regulations; accelerated permit review.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	Improved turnaround time on mine permit applications would benefit mineral extraction operators. Development of mining and reclamation plans (cuts, fills, spoil disposal) could proceed without costly ground surveys.
Quality Level: (1 2 3 4 5)	**Estimated Strategic Benefits:** Major
	Increased profits to mineral extraction operators would benefit the economy, especially in the economically challenged coalfield area of southwestern Virginia. The public would also benefit from increased protection from risks related to active and abandoned mines. Hydrologic models of the impacts of coal mining could be assessed with greater accuracy.
Update Frequency: 4-5 years	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Not Needed	

Program: Issuance of permits for encroachment over State-owned subaqueous bottomlands and leasing of bottomlands for shellfish propagation	Business Use: 4. Coastal Zone Management
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** Annually **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Not Needed	**Shellfish Leasing and Environmental Permit Activities:** **Estimated Annual Operational Benefits:** Major; $50,000 Better information for both the public and for the State agency when evaluating permit and lease applications. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported With better depth data, the state can better serve potential applicants by front loading a selection of areas available for lease; this will help reduce conflicts with other uses. **Estimated Strategic Benefits:** Moderate Better site selection will provide the public with a better selection of potential lease areas. Environmental impacts can be better assessed. The conflict resolution process between competing uses will be better served with accurate depth information.

Program: Geologic and Mineral Resource Mapping	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation
Quality Level: (scale 1 2 3 4 5) **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Although there are some regional geologic features/hazards that stretch beyond the State boundary, the assessment and management of these resources would be the responsibility of neighboring States or Federal agencies. That being said, individual features are more accurately mapped and understood when viewed as part of the overall regional structure or pattern.	**Geologic Mapping:** Geologic Mapping includes geologic structures, geological hazards (including landslide risks), delineation of abandoned mines, and the mapping of mineral resources. **Estimated Annual Operational Benefits:** Major; $400,000 Improved efficiency in mapping geologic and mineral resources resulting in ability to analyze larger areas in given time period; increased accuracy of mapping geologic structure and geologic hazards; improved ability to find and delineate abandoned mines. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Greatly improved ability to provide site assessments without making a site visit; more rapid response to customer requests; greater accuracy in published geologic and mineral resource maps; greater accuracy and feature identification in mapping landslide risks. **Estimated Strategic Benefits:** Major Improved assessment of risks related to geologic hazards; improved assessment of risks related to abandoned mines; improved assessment of remaining mineral resources; improved enforcement of mine reclamation laws.

Program: Support of Coastal Zone Management and Sea Level Rise Adaptation Planning	**Business Use:** 4. Coastal Zone Management
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** Yes **Tide-Coordinated:** Yes **Data Outside State Needed:** Data for entire Chesapeake Bay coastline would be useful	**Local Sea Level Rise Adaptation; Coastal Zone Resource Assessment:** The Virginia Coastal Zone Program coordinates the identification and mapping of the best remaining blue and green natural resources within Virginia's Coastal Zone Blue or green infrastructure comprises those natural features on the land (e.g. forests, wildlife habitat, wetlands, etc.) or in the water (e.g. anadromous fish use areas, oyster reefs, underwater grass beds, etc.) that are critical to maintaining ecosystem and human health and survival. The multiple applications of LiDAR data can assist in this multi-faceted mapping effort. Once identified and mapped, multiple levels of government can work together to develop policy and promote adoption of local plans and ordinances that will better protect and manage important coastal resources **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Coastal Zone localities currently have varying accuracies of elevation data available to them. Regional LiDAR would provide a common baseline for discussions, predictions and assessments. Higher resolution elevation data from LiDAR would greatly enhance regional sea level rise planning efforts by more accurately predicting areas likely to be affected by inundation or storm surge. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Coastal Zone localities currently have varying accuracies of elevation data available to them. Regional LiDAR would provide a common baseline for discussions, predictions and assessments. Higher resolution elevation data from LiDAR would greatly enhance sea level rise planning efforts by more accurately predicting areas likely to be affected by inundation or storm surge. **Estimated Strategic Benefits:** Major Coastal Zone localities currently have varying accuracies of elevation data available to them. Regional LiDAR would provide a common baseline for discussions, predictions and assessments. Higher resolution elevation data from LiDAR would greatly enhance sea level rise planning efforts by more accurately predicting areas likely to be affected by inundation or storm surge.

Program: Virginia Base Map Program	**Business Use:** 22. Urban and Regional Planning
Quality Level: 1 2 3 4 5 **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** Yes **Data Outside State Needed:** Not Needed	**Virginia Base Map Program: Framework Geospatial Data:** Virginia Base Map Program (VBMP) framework data is shared by State Agencies as well as all localities within the Commonwealth. This wide distribution allows for a ROI beyond the annual program budget. **Estimated Annual Operational Benefits:** Major; $3,000,000 More precise flood risk mapping at the local level. Accurate analysis of coastal flooding and storm surge. Better analysis for sea level rise and mitigation. Better geologic mapping and better assessment of natural resources and coastal ecosystems. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Improved support for flood risk mapping. Improved support for storm surge and sea level rise analysis. Improved support for local land use planning. Improved support for geologic mapping. Better assessment of natural resources and coastal ecosystems. Improved support for infrastructure projects in transportation and utilities, including renewable energy such as wind and solar. **Estimated Strategic Benefits:** Major Flood insurance cost savings by matching coverage closer to actual risks. Public safety increased by more accurate modeling of storm surge hazards. Improved knowledge about needs for mitigation of sea level rise. Costs savings for infrastructure projects in transportation and utilities. Better conservation and management of natural resources.

Program: Games and Inland Fisheries	Business Use: 7. Wildlife and Habitat Management
Quality Level: (scale 1-5) **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not Needed	**Species' habitat modeling:** Update frequency driven by change in landscape. Grossly altered landscapes (manmade or natural) require new data **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Increased accuracy of elevation data along with the raw point cloud data will allow the creation of models for an increased number of habitats / species. Ability to map forest structure and create habitat models from such maps / data. **Estimated Annual Customer Service Benefits:** Minor; Dollar Value Not Reported Current customers are internal State agency personnel, however a new line of products (maps. models, research) could be of value to localities, academia and NGOs. **Estimated Strategic Benefits:** Moderate Decisions (conservation priorities, development, mitigation, land acquisition) made based on habitat will benefit from increased accuracy of elevation data. Protection of Biodiversity and Ecosystem Services; Land Conservation.

Program: Department of Forestry	Business Use: 5. Forest Resources Management
Quality Level: (scale 1-5) **Update Frequency:** 6-10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Regional need for Riparian Buffer Studies (Chesapeake Bay)	**Forest Management:** Forest Management includes but is not limited to timber harvesting, forest health, fire protection, forest stewardship, water quality, land conservation and protection of infrastructure on forest lands. The State notes the potential for tremendous benefit, however actual benefits can only be assessed through the use of the data coupled with additional research within the forest management community. Utility also limited by age of data. **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Improved efficiency through better harvest planning, less field work, better direction of resources; monitor forest health; stream stabilization **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Decrease response time to customer request (permits) if LiDAR derivatives allow analysis of forest cover, health from office environment **Estimated Strategic Benefits:** Moderate Recreation and Safety; Fire-wise community plans; Urban and Community Forest Initiatives, Improved water quality, Protection of Ecosystem Services; Land Conservation; Climate Change Mitigation.

Local Functional Activities

County Government -- Accomack County	
Program: Planning	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Innundation Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Will provide more accurate data for flood prediction and models. Will provide data for the development of higher resolution contours.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Will provide the ability to provide enhanced data and analysis that will assist in meeting business and citizen needs.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Yes	Help to assess changes in the landscape due to Natural hazards (hurricanes / floods).

County Government -- Loudoun County	
Program: FEMA RiskMAP	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Will facilitate new task of automated hydrology and hydraulics and conversion of DFIRM to RiskMAP products. Will offer additional non-regulatory derivative products such as depth grids
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Potentially alleviate project specific field surveys required for floodplain waivers Applications for development will be based upon improved map quality and will be consistent with new base map data. This will facilitate the review process.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Well calculated flood risk assessments for both residential and commercial property owners is a right of property owners. Decisions should be made on the best available data.

County Government -- Montgomery County	
Program: GIS SERVICES	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Proposed Cellular Structure Viewshed	

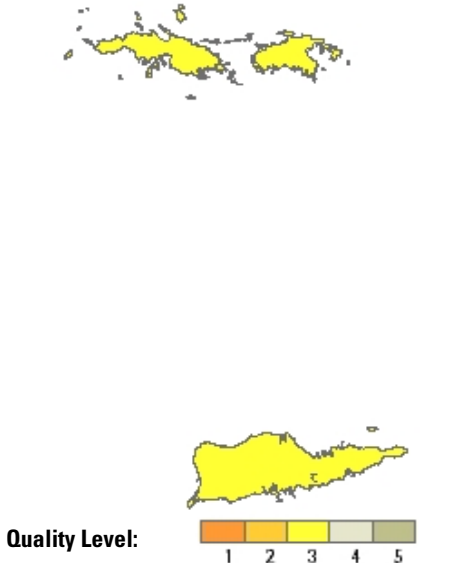|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Benefits come from the re-use of our LiDAR data. The data was originally acquired for floodplain re-mapping, but is now used internally as well as by the local development community. Our dem was used most recently to enable a better pictometry oblique aerial mapping product. Without its use, the vendor would use the publicly available U.s.g.s. dem which has substantially less accuracY.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided New uses for the LiDAR keep evolving as wider knowledge of its existence is known. We recently used the LiDAR for wind turbine viewshed analysis. We acquired our LiDAR in 2005 and began soon after completing the fema floodmapping project to find other uses such as utility and school construction design, erosion and sediment control and cellular structure siting. Most recently we used it for radio propagation coverage analysis as the county considered a new system.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	To be determined, but the key is flexibility to meet any needs and timely delivery of the data. We have used the "acquire it once, but use many times over" approach. We have also recouped approximately 25% of the cost of the LiDAR through licensing to our local developers, engineers, surveyors, and citizens. This has created a positive view by all of responsible spending of limited tax dollars.

Regional Government -- Hampton Roads Planning District Commission	
Program: Comprehensive Environmental Planning	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Regional Land Use And Transportation Planning	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Data would be helpful in supporting several of our general regional planning projects involving regional land use planning and rural transportation planning.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.

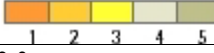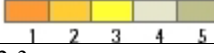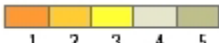| Regional Government -- Hampton Roads Planning District Commission	
Program: Hazard Mitigation Planning	**Business Use:** 14. Flood Risk Management
Functional Activity: Regional Emergency Management Planning	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Higher resolution elevation data would greatly enhance the ability to determine if critical facilities are vulnerable to flooding and storm surge
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Minor; Not Provided Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Monetary value unknown but the improved quality of the information we are able to generate would be beneficial.

Virgin Islands (VI)

The U.S. Virgin Islands spatial data infrastructure plan identifies high-resolution, accurate, and current elevation data as a critical geospatial framework layer needed to support environmental protection and infrastructure planning/development programs. In addition, the Territory is exceedingly vulnerable to the impacts of natural disasters such as earthquakes, tsunamis, landslides, and hurricanes given its Caribbean subtopical location. Emergency response and mitigation programs require enhanced elevation data to better protect public safety and minimize damages resulting from occurrence of natural disasters. The Caribbean region has a critical requirement for an upgraded vertical reference datum to replace the one that is currently in place (NGVD29 was never valid for U.S. Virgin Islands, NAVD 88 is not and will not be valid for US-VI). Without the development of such a high accuracy reference system it is impossible to fully leverage the benefits typically associated with LiDAR datasets.

Territorial Functional Activities

Program: Flood Risk Mapping, Hazards Data Development	Business Use: 14. Flood Risk Management
Quality Level: **Update Frequency:** 2-3 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** no	**Coastal Flood Risk Mapping and Modeling:** With the availability of current and accurate LiDAR-derived elevation data the Territory can continue to contribute to the revision of regional flood maps. **Estimated Annual Operational Benefits:** Major; $140,000 Consistent, reliable, and accessible LiDAR-derived elevation datasets significantly speeds the process of flood mapping and modeling and lowers associated costs associated with traditional field survey measurements. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported Accurate surface data facilitates effective post-event recovery operations. Newly acquired LiDAR datasets will facilitate the Territory in ongoing efforts to complete HAZUS data inventory. **Estimated Strategic Benefits:** Major Accurate and current ground surface data will facilitate appropriate application of flood insurance coverages to residents of Territory.

Program: tsunami planning	Business Use: 9. Geologic Resource Assessment and Hazard Mitigation

Tsunami Hazard Mitigation: There have been 91 reported tsunamis in the Caribbean basin since Europeans moved to the area, of which 27 events are very well documented and caused extensive damage and casualties. Accurate and current topographic and bathymetric LiDAR-derived elevation datasets will better enable the Territory model tsunami behavior and improve response operations.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
Improved bathymetry/topography will allow development of tsunami inundation models that in turn will enable tsunami hazard planning with identified escape routes and safe areas.   Enhanced elevation data will minimize response time to tsunami threat. Emergency managers will have a reliable data framework to support the decision-making process.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
Reliable and timely tsunami inundation models benefit emergency response managers and the public at large

Estimated Strategic Benefits: Major
Improved public safety by incorporating enhanced elevation datasets into emergency response, mitigation, and planning operations.

Quality Level:
1 2 3 4 5

Update Frequency: 2-3 years
Bathymetric Data: Yes
Tide-Coordinated: Yes
Data Outside State Needed: no

Program: Public Access	Business Use: 4. Coastal Zone Management

Coastal Development Mapping: This includes planning and modeling activities associated with existing and planned coastal development to establish sustainable best-use guidelines.

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported
LiDAR-derived elevation data has been proven effective in support of crucial shoreline monitoring (lost/gain) activities as they pertain to coastal use planning and development of public recreational use and access policies.

Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
Current and accurate enhanced elevation datasets support natural resources managers in their effort to establish effective policies which protect sensitive coastal areas and better serve the general public regarding development, use, and access.

Estimated Strategic Benefits: Major
High accuracy coastal elevation data will be critical to natural resource managers and researchers work to identify and model   the effects of sea level rise and other climatic changes that directly impact coastal zones

Quality Level:
1 2 3 4 5

Update Frequency: 2-3 years
Bathymetric Data: Yes
Tide-Coordinated: No
Data Outside State Needed: no

Program: Caribbean Intercoastal Ocean Observing System	Business Use: 19. Marine Navigation and Safety

	Developing Ocean Observing Capabilities
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Bathymetric LiDAR will enhance accuracy of, as well as extend, computer ocean circulation models in support of intercoastal marine navigation requirements.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improved ocean circulation models using LiDAR bathymetric elevations will improve procedures currently used for identifying and navigation variables for regional ferries and cruise ships in transit.
	Estimated Strategic Benefits: Major Improved real-time observations and computer modeling capabilities enhanced by LiDAR-derived elevation data will enhance the understanding of regional currents, waves, and tide action to the benefit of marine navigators, environmental managers, and search and rescue teams..
Quality Level:	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: offshore and intercoastal coverage required to support marine navigation requirements.	

Local Functional Activities

None

Washington (WA)

The State of Washington has requirements for Quality Level 1 LiDAR acquisitions, including the collection of bathymetric data along the near-shore zone of Puget Sound. LiDAR derived enhanced elevation and bathymetric data will support geologic resource assessment, hazard planning and mitigation, FEMA Flood mapping, water quality assessments, and ecosystem study and restoration efforts. The only State participants in this survey were the State Champion, who is also the State Geologist in Washington's Department of Natural Resources (DNR) and the Chief Hazards Geologist for DNR. They combined their response into one survey that was submitted by the State Champion. Other State-level participants were sought out to complete the survey but either did not respond to the survey request or did not complete the survey.

State Functional Activities

Program: DNR- Geology	Business Use: 9. Geologic resource assessment and hazard mitigation
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program	**Geology in the Public Interest:**
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Could improve tsunami inundation modeling, forest practice landslide identification. Low tide LiDAR allows for habitat indentification in the near shore environment.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported More accurate landslide recognition to improve forestry regulation. More confidence in landuse planning
	Estimated Strategic Benefits: Major Better geological hazard maps, better forestry regulation, better aquatic near shore habitat mapping,
Bathymetric Data: Yes	
Tide-Coordinated: Yes	
Data Outside State Needed: Not Provided	

Local Functional Activities

City Government -- City Of Olympia	
Program: Not Provided	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Capital Improvement, Floodplain Adminstration	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't know; Not Provided Benefits Description Not Provided
Update Frequency: 2-3 years	**Estimated Annual Customer Service Benefits:** Don't know; Not Provided Benefits Description Not Provided
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Don't know
Tide-Coordinated: Not Provided	Benefits Description Not Provided

County Government -- King County	
Program: Rivers Mgmt	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Less need to acquire supplemental data to high-grade areas. Accurate flood planning and FEMA coordination
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Reduction in errors in existing database, improved orthorectification products Less field work/visits required
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Yes	With improvements in technology for using LiDAR, we anticipate a wider range of applications from any future acquistions Public was pleased when we first acquired LiDAR; however it is becoming extremely dated in areas

County Government -- Pierce County	
Program: River Improvement Program	**Business Use:** 3. River And Stream Resource Management
Functional Activity: River Improvement Program	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Preliminary Engineering, Planning, Real Estate purchases. Improved compliance and cost savings in rural areas.
Update Frequency: Annually	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Extended areas of high quality LiDAR allows us to provide better service to rural areas within county. Reduces preliminary engineering costs, enhances site and infrastructure planning, identifies properties that lie in flood zones.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Same as #13 but for a broader area. Allows better visualization of projects to the public, improves accuracy of models and engineering designs, helps reduce impacts by better knowledge of riverine environments, allow strategic planning for property purchases.

County Government -- Pierce County	
Program: Water Quality Program	**Business Use:** 2. Water Supply And Quality
Functional Activity: Water Quality Monitoring	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Minor; Not Provided Trace non point source water quality issues to probable source. No need for higher quality data, just more current.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Minor; Not Provided Increased coverage would improve Accuracy and tracking times in rural areas of county Accuracy and tracking time improvement
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Since we currently use this quality of data, no new benefits will be obtained. Minor improvements in water quality will improve public safety and salmon habitat. Also improved accuracy in tracking water quality issues will provide strategic and political benefits.

Regional Government -- Puget Sound Regional Council	
Program: Travel Demand Model Development-GIS	**Business Use:** 22. Urban And Regional Planning
Functional Activity: Provide Elevation Gain For Travel Modeling	

Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Don't Know; $40,000
	Time and cost savings are unknown at this time because the addition of high accuracy elevation information to the travel demand model network is done on a first time, experimental basis. Mission improvement occurs in two ways: Elevation gain over distance applied to travel demand model links enables vehicle speed adjustments, especially for trucks. Elevation gain over distance applied to travel demand model links that allows highly accurate speed and effort adjustments to non-motorized modes. Time and cost savings anticipated from delineation of steep (undevelopable) slopes compared to current lower-resolution DEM used. Mission improvements include enabling seasonal adjustment of transportation network attributes by accurate slope, and sharper 3D graphic presentations of travel demand model results.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Minor; Not Provided
	Additional minor public viewing/display from improved 3D detail and horizontal accuracy, through browser and web mapping services. Minor public viewing/display from improved 3D detail, through browser
Bathymetric Data: No	**Estimated Strategic Benefits:** Minor
Tide-Coordinated: No	Potential benefits are tied to high accuracy elevation coverage used to discriminate building rooftops for primitive extraction in an image classification process. Results from a successful classification could yield better impervious surface, vegetation (tree) and urban growth measurements. Strategic benefits include 3D viewing and display enhancements to travel demand model results making the results more understandable to public

Tribal Functional Activities

Lower Elwha Klallam Tribe	
Program: Natural Resources, Habitat Restoration, etc.	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Salmon Habitat Preservation	

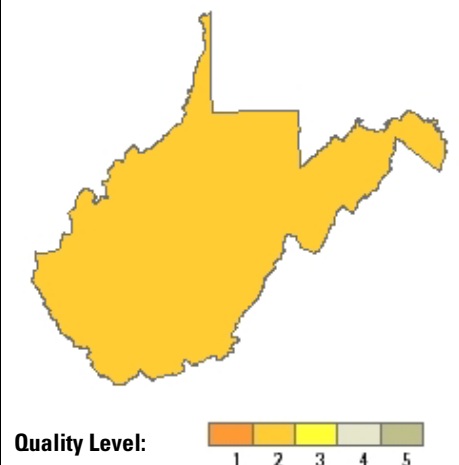|	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $2,500,000
	Able to map hydrologic channels and fish rearing habitat more accurately in order to prioritize culvert replacement of undersized/perched/impassable/etc. culverts. We'd be able to apply existing operational benefits to our entire area of interest.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Provided
	Full LiDAR coverage at 2m resolution with bathymetric data would greatly enhance our ability to perform various habitat related analysis of our area of interest. We currently have LiDAR data for critical sections of our area of interest but lack some resolution, full watershed coverage and bathymetric data.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	We'd be able to perform more accurate and complete analysis and restoration for our entire area of interest. We are able to perform and complete analysis that demonstrate needs for habitat restoration for all benfit categories (e.g., social, environmental, strategic and political/etc.).

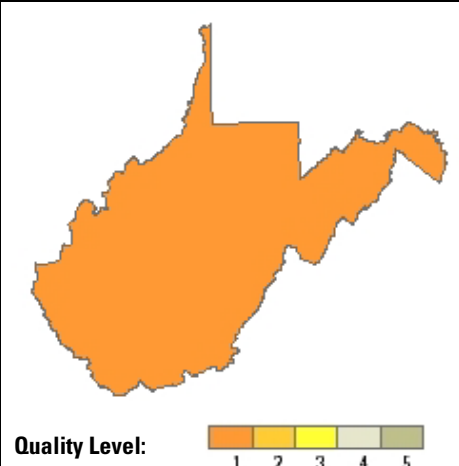| Lower Elwha Klallam Tribe	
Program: Natural Resources, Planning, Bureau of Indian Affairs Tahola Agency	**Business Use:** 3. River And Stream Resource Management
Functional Activity: Stream Mapping	
Quality Level: QL 1 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Dollar Value Not Provided Supply planners, Natural Resource staff and BIA with critical information on stream and forest health
Update Frequency: > 10 years	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Provided LiDAR coverage at 1m resolution with bathymetric data would greatly enhance our ability to perform various habitat related analysis of our area of interest.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Yes	Provide information to Natural Resource Council, Friends of the Upper Quinault, and other non-profit groups

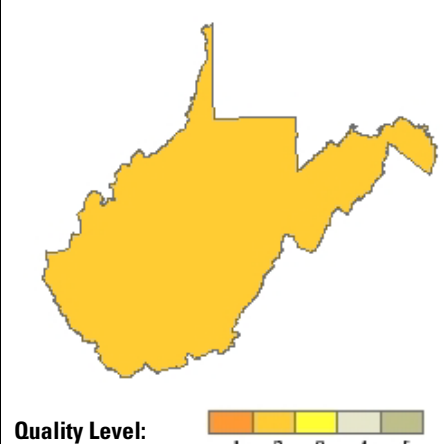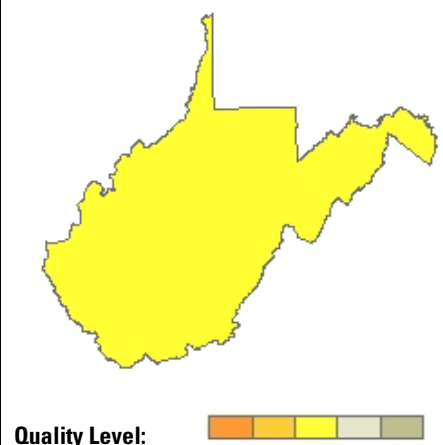| Quinault Indian Nation	
Program: EPA	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; $100,000 Able to model and illustrate flood risks. Able to more accurately model and illustrate flood risks.
Update Frequency: 4-5 years	**Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Provided More accurate, more recent data sharing. Able to share data with prospective and existing contractors/agencies.
Bathymetric Data: Yes	**Estimated Strategic Benefits:** Major
Tide-Coordinated: No	Ability to illustrate and demonstrate more accurate and recent locations of hazard risks. Ability to illustrate and demonstrate where various risks and hazards are.

West Virginia (WV)

In 2004, West Virginia was the first state in the nation to have a complete 1/9th Arc Second Digital Elevation Model (DEM) incorporated into the National Elevation Dataset (NED). However, the elevation data were photogrammetrically compiled and not sufficient to meet accuracy requirements for application such as floodplain mapping to Federal Emergency Management Agency (FEMA) specifications. LiDAR technology has advanced significantly in the last 8 years to the point where it can be used to build upon the NED base in many areas of the state requiring better data. How much of the state requires enhanced elevation data beyond the NED remains to be determined, but there is great interest and excitement in the possibilities LiDAR technology has to offer. West Virginia (WV) has identified enhanced elevation needs for a variety of purposes ranging from statewide coverages for flood risk management and hazards, broadband and wireless development, and transportation infrastructure development. LiDAR data for certain areas of the state and specific applications have been identified for water and sewer infrastructure development, especially in rural areas, and environmental regulation pertaining to surface coal mining and Marcellus gas development. There is also strong interest in the state from the academic community for applied research applications, educational outreach, and LiDAR data development related to implementation of LiDAR data across the state. Local interest from counties and regions focuses on flood risk management and interactions with FEMA, flood insurance and property assessment, and state and county emergency operations. The LiDAR quality level update frequency varies by functional area and business need. As part of the WV State Geographic Information Systems Strategic Plan approved in 2010, an Enhanced Elevation Business Plan will be developed in the near future, and will incorporate the findings of the Northwest Energy Efficiency Alliance (NEEA) study as appropriate. Although not specifically mentioned in the current NEEA survey, other functional areas of importance to West Virginia include land cover/land use change, forestry, water resources, and geological uses of LiDAR data. In general, WV encourages LiDAR collection to cover gaps in areas where no acceptable LiDAR exists presently, before recollecting widespread updates to replace existing acceptable LiDAR datasets. While has a significant history of coordinating data collection efforts across and within levels of government, a coordinated national-level enhanced elevation program must have well publicized specifications and planned acquisition schedules available well before collection in order to leverage the existing partnership opportunities. Sufficient time must be allowed for stakeholders, and an appreciation of local/state budget cycles for funding requests.
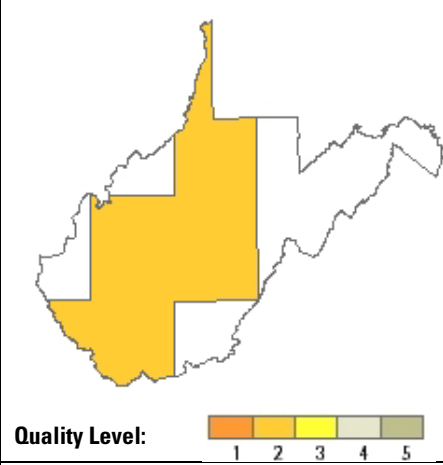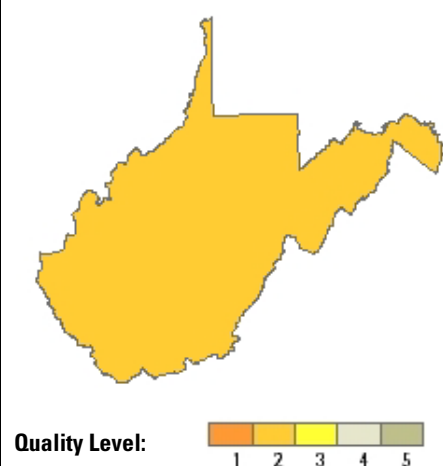
State Functional Activities

Program: Emergency Management		**Business Use:** 14. Flood Risk Management
	Flood Risk Mapping: Flood Risk Mapping	
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported More accurate floodplain models and maps; improved Hazards in the U.S. multi-hazards software model results; standardization and consistency of analysis and modeling of flood hazards; integration with other data (stream gages, National Weather Service forecasts, etc.).	
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Better assessment of flood risks and improved information to public, including flood warnings.	
	Estimated Strategic Benefits: Major; Improved government services, better information to public, reduced flood insurance premiums.	
Quality Level:		
Update Frequency: 2-3 years		
Bathymetric Data: No		
Tide-Coordinated: No		
Data Outside State Needed: Yes, contiguous watersheds where major streams enter/exit the state.		

Program: West Virginia Department of Transportation and West Virginia Department of Highways Transportation Operations		**Business Use:** 21. Infrastructure and Construction Management
	Transportation Infrastructure: Transportation infrastructure planning, design, construction, and maintenance including roads and rail.	
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Increase efficiency and accuracy of mapping projects; reduce survey field time and enhance personnel safety; better integration with other data such as geology, engineering, and environmental to speed up project review and reduce costs.	
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Better data consistency with project contractors and decreased costs through data standardization for analysis such as cut-and-fill volumetrics, ROW analysis, etc.	
	Estimated Strategic Benefits: Moderate; Improved maps and project information for public and government officials.	
Quality Level:		
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program.		
Bathymetric Data: No		
Tide-Coordinated: No		
Data Outside State Needed: Yes, adjoining road networks from other states.		

Program: West Virginia GIS Technical Center - Applied Research and Data Development	Business Use: 25. Education K-12 and Beyond
Quality Level: 1 2 3 4 5 **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, to the extent that research or data development activities overlap the state boundary for specific purposes, such as landscape analysis, hydrology or natural resources.	**GIS Data Development, Research, Analysis and Publication:** Geographic information systems (GIS) data development, research, analysis and publication supports research, applied research, and GIS technical assistance to state agencies. Quality level is determined by specific application requirements. **Estimated Annual Operational Benefits:** Moderate; Dollar Value Not Reported Improve standardization of government operations for mapping; and reduce costs "create once, use many times." **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Improved accuracy, quality, consistency, and currency of data for various government services. **Estimated Strategic Benefits:** Moderate High quality elevation data supports a wide variety of programs that directly benefit the public, private and government sector operations.

Program: Telecommunications Utility Regulation	Business Use: 27. Telecommunications
Quality Level: 1 2 3 4 5 **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Yes, contiguous terrain data one county deep for line-of-sight, signal strength and other analysis.	**Broadband Mapping and Wireless Communications:** Broadband mapping and wireless communications. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improved data and maps to support decision making for providing services to under and non-served areas of the state. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported More accurate, timely, and detailed data for all sectors to use. **Estimated Strategic Benefits:** Moderate; Improved public service commission decision making on provider rate requests and public information; public safety.

Program: Surface Mining Regulation and Permitting; Natural Gas (Marcellus)	**Business Use:** 1. Natural Resources Conservation
Quality Level: [1 2 3 4 5] **Update Frequency:** 2-3 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No, unless coordinated through common national or regional program with EPA, Office of Surface Mining Reclamation and Enforcement, US Army Corps of Engineers, or other Federal agencies.	**Environmental Regulation:** Environmental Regulation **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improved currency, accuracy and detail of mapping to improve regulatory compliance and speed up permitting process, and compare results and impacts through time; integration with other data sources such as geology, hydrology, land cover, etc., that could also be derived from LiDAR or fused multispectral data. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Standardization of permitting process and compliance requirements with companies. **Estimated Strategic Benefits:** Major; Improved information for public, regulators, and elected officials.

Program: Water and Sewer Infrastructure Development	**Business Use:** 21. Infrastructure and Construction Management
Quality Level: [1 2 3 4 5] **Update Frequency:** Event Driven - Needs not met by a cyclic data acquisition program. **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** No	**Water and Sewer Infrastructure Development:** Water and sewer infrastructure development Update frequency for data acquisition indicated for specific development projects but could be coordinated with statewide efforts. **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported Improved data to support planning, design, construction and maintenance of water and sewer projects, and potentially reduce project costs; better integration with other data sources such as geology, soils, land cover, hydrology, etc. to promote more sustainable development. **Estimated Annual Customer Service Benefits:** Moderate; Dollar Value Not Reported Improved public awareness. **Estimated Strategic Benefits:** Moderate; Improved information for public, government regulators, and elected officials.

Local Functional Activities

County Government -- Raleigh County	
Program: Metro Gis	**Business Use:** 17. Homeland Security, Law Enforcement, And Disaster Response
Functional Activity: 911 Center	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Sharing data between several agencies. Having more mapping layers available
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided More accuracy none
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	n/a

Regional Government -- Hagerstown/Eastern Panhandle Metropolitan Planning Organization	
Program: GIS	**Business Use:** 21. Infrastructure And Construction Management
Functional Activity: Transportation Planning	
Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided Topographic information effects planning and study efforts, and decision-making process. With better data, greater confidence in analytical, decision-making and planning efforts.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided Information products and analysis would be enhanced with higher quality data Production of mapping information products and analysis
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Major
Tide-Coordinated: Not Provided	With enhanced elevation data, the number of aerial surveys needed would be greatly diminshed which would shorten the amount of time needed to complete projects and studies...this is a major issue in our area which is high growth and proposed alignments are affected due to timeliness all aspects of transportation planning

Wisconsin (WI)

The State of Wisconsin has requirements for high resolution elevation data that support multiple programs among several agencies. Given the importance of agriculture to Wisconsin's economy, key business uses include programs related to agricultural resource management and environmental quality. Additional business uses include geological and floodplain mapping to support more informed decision-making about environmental issues and risks. In terms of infrastructure development, high resolution elevation data plays a role in highway planning and design, and airport development and obstruction assessment. Business uses in higher education include educational and research activities in a variety of fields.

These survey results are not a comprehensive list of elevation requirements within the State, but a subset of program activities provided at this point in time. There are likely additional requirements that could be documented in the future with further inquiry and investigation.
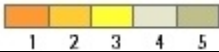
At present the majority of LiDAR acquisition projects in Wisconsin occur at the local level, and there is no current statewide product. This means that availability of high resolution data is inconsistent across the State with varying levels of access to the data. All levels of government in the State could benefit from access to current, high resolution elevation data.
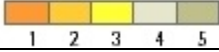
State Functional Activities

Program: Drainage Program	Business Use: 3. River and Stream Resource Management
	Hydrologic and Hydraulic Analysis for Drainage Districts:
	Estimated Annual Operational Benefits: Major; $50,000 Ability to quickly and accurately model hydrologic characteristics of small catchments.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improved working relationships between State and county land conservation staff. Improved efficacy in working with county surveyor and land conservation staff. Better information for hydraulic modeling projects.
	Estimated Strategic Benefits: Moderate Improved quality, accuracy and timeliness of hydrologic and hydraulic modeling.
Quality Level: 1 2 3 4 5	
Update Frequency: 2-3 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: Yes. Interest in drainage areas that extend into Illinois.	

Program: Land and Water Resources Management	**Business Use:** 8. Agriculture and Precision Farming

	Soil and Nutrient Runoff Management:
	Estimated Annual Operational Benefits: Major; $5,000,000
	Users (farmers, consultants, resource professionals) would not have to determine slope, aspect and flow direction on site. These measurements are critical in soil and water resource management, and field determinations are very expensive.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported
	More accurate, cost-effective, consistent, accessible, and current determinations of critical geomorphic factors that allow the assessment of natural resource vulnerabilities and allow for better management and control of soil erosion and polluted runoff.
	Estimated Strategic Benefits: Major
	This data set will help mitigate political and social conflicts over resource management and environmental quality.

Quality Level: 1 2 3 4 5

Update Frequency: 4-5 years
Bathymetric Data: No
Tide-Coordinated: No
Data Outside State Needed: Not Provided

Program: Geologic Mapping (surficial and bedrock)	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	Geologic Mapping: The preparation of maps, models, and databases to characterize geologic and hydrogeologic settings and processes, including surficial and bedrock geologic maps, groundwater flow models, and water table maps.
	Estimated Annual Operational Benefits: Moderate; $45,000
	Having high-resolution terrain data available would enable new mapping techniques, such as closed-depression modeling, to help better characterize those regions underlain by karst.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported
	The availability of high-resolution elevation data could increase production efficiency and overall accuracy of current geologic map products. Broader availability of these data could also spur the production of new map products/datasets.
	Estimated Strategic Benefits: Major
	More efficient and accurate geologic map products have direct application in making informed decisions about environmental issues.

Quality Level: 1 2 3 4 5

Update Frequency: > 10 years
Bathymetric Data: No
Tide-Coordinated: No
Data Outside State Needed: No

Program: Floodplain Mapping Project within the Floodplain Management Program	**Business Use:** 14. Flood Risk Management

	Flood Risk Mapping:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Having access to these data statewide would allow development of new flood hazard maps anywhere in the State. This would serve more community partners and protect more high risk flood zones from development. There will not be monetary savings as a result of these data being available, but rather the ability to cover more ground in the same amount of time and cost.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported This would result in accurate flood hazard maps throughout the whole state, which would add to the level of buy-in with community partners and property owners.
	Estimated Strategic Benefits: Major This would result in accurate flood hazard maps throughout the whole state, which would add to the level of buy-in with community partners and property owners.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: State Highway Improvement	**Business Use:** 21. Infrastructure and Construction Management

	Highway Planning and Preliminary Design: Highway planning and preliminary design requires moderately accurate elevation data to plan for alternative routes, horizontal and vertical alignments, drainage, balancing cut and fills, determination of terrain type (level or rolling), and slope analysis. Final design requires a high degree of accuracy normally provided by site-specific field surveys, photogrammetry, and/or LiDAR.
	Estimated Annual Operational Benefits: Minor; $250,000 Agencies such as WisDOT would expand on the existing operational benefits if elevation data was available for the entire state. Most planning studies do not cover large enough area to realize cost-savings from collecting aerial LiDAR data.
	Estimated Annual Customer Service Benefits: Minor; Dollar Value Not Reported Agencies such as WisDOT would expand on the existing customer service benefit.
	Estimated Strategic Benefits: Minor Statewide coverage would decrease the cost of providing the social and environmental benefits.
Quality Level: 1 2 3 4 5	
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: No	
Tide-Coordinated: No	
Data Outside State Needed: Yes, need a small buffer in adjacent states.	

Program: Research and education	Business Use: 25. Education K-12 and Beyond

University-Level Education and Research in Geography:

Estimated Annual Operational Benefits: Major; Dollar Value Not Reported

Increased detail of high resolution elevation data would support identification of smaller features, such as gullies. Potential impact on environmental programs and precision agriculture.

Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported

Use of enhanced elevation data and derivatives to support university research and teaching efforts in geography, including subfields such as geomorphology, hydrology, and biogeography.

Estimated Strategic Benefits: Major

More local examples to teach from, more detailed analyses - vegetation structure, solar calculations from rooftops, etc.

Quality Level:

1 2 3 4 5

Update Frequency: 2-3 years

Bathymetric Data: No

Tide-Coordinated: No

Data Outside State Needed: Yes

Program: Airport improvement and maintenance	Business Use: 20. Aviation Navigation and Safety

Airport Development and Obstruction Evaluation: Airport development requires both bare earth and multiple pulse data to determine the best alternative for expansion and real estate acquisition. Detailed topographic and obstruction surveys in support of instrument approaches are required by the Federal Aviation Administration (FAA). FAA does not allow the use of LiDAR, but some planning activities would benefit from the use of a full point cloud.

Estimated Annual Operational Benefits: Minor; Dollar Value Not Reported

Use of elevation data assists with land acquisition.

Estimated Annual Customer Service Benefits: Don't Know; Dollar Value Not Reported

Benefits Description Not Provided

Estimated Strategic Benefits: Minor

Benefits Description Not Provided

Quality Level:

1 2 3 4 5

Update Frequency: Annually

Bathymetric Data: No

Tide-Coordinated: No

Data Outside State Needed: Not Provided

Local Functional Activities

County Government -- Outagamie	
Program: Land and Water Resources Plan	**Business Use:** 1. Natural Resources Conservation
Functional Activity: Conservation Practice Engineering	

Quality Level: QL 3 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Moderate; Not Provided LiDAR is usually used in all designs at a minimum, the planning stages and maximum of engineering for conservation engineering. LiDAR is also used for watershed delineation using archydro, slope maps, etc. LiDAR Data have been used for 4 years.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Moderate; Not Provided The only new perceived benefit will be a Terrain to Points python script to best get LiDAR Data to the general public. Hillshades now used for countywide mapping across multiple departments. Detailed contour mapping provided to customers.
Bathymetric Data: No	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: No	Would like to create floodplain mapping for emergency management that relates river stage an innundated lands. LiDAR is used in some facet of all conservation practice planning and design.

Wyoming (WY)

Of the programs surveyed in the State of Wyoming, the existence of high resolution elevation data would benefit the following programmatic elements: Mineral and Energy Production, Water Management, and Wildlife Management, and Infrastructure Planning.
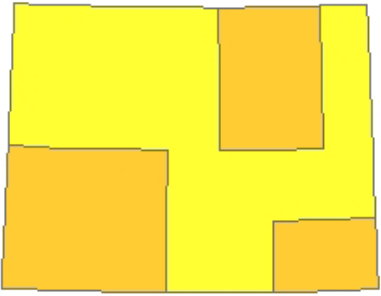
Wyoming supplies the nation with vast quantities of coal and various forms of renewable and non-renewable energy. High resolution elevation data would assist in the intelligent discovery and management of these precious resources, helping to more sustainably meet the increasing demand for energy in the United States.
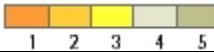
Snow and rain that falls in Wyoming feeds into three different major watersheds in the United States; The Columbia River, the Colorado River, and the Mississippi River. High snowmelt during the spring and summer of 2011 contributed to the replenishment of Lake Mead, but the high runoff also contributed to flooding scenarios in the Mississippi River Drainage. Having access to high resolution elevation data would allow water managers to more effectively predict snowpack and runoff, and more effectively model and manage our nation's freshwater supply.
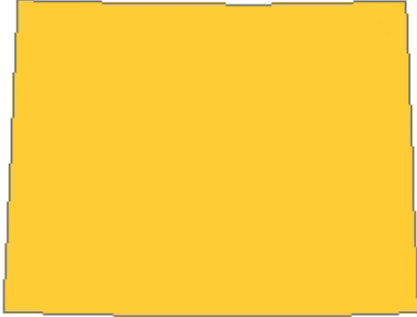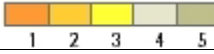
The low population density in Wyoming makes it a haven for wildlife; and the State sustains large populations of many different species. Access to high resolution elevation data would enhance the ability of wildlife management agencies to more effectively model habitat impacts with changes in the regional environment.
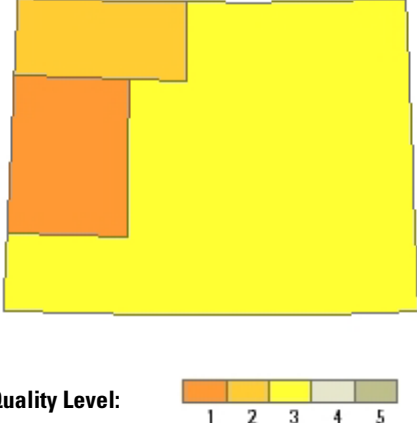
The State of Wyoming has more rural highway miles per Capita than any other state in the nation. This means that the development and maintenance of the highway infrastructure frequently involves travelling long distances away from urban centers, which is expensive and time consuming. Having access to high resolution elevation data would decrease the number and length of these trips during planning and design phases, and would more efficiently utilize the State's resources.
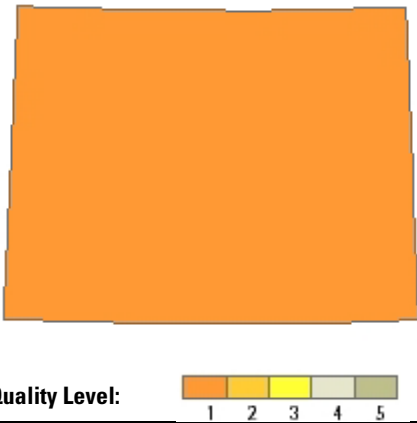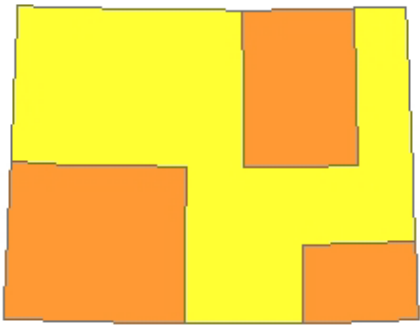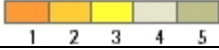
State Functional Activities

Program: Watersheds Program	Business Use: 2. Water Supply and Quality
Quality Level: (color scale 1 2 3 4 5) **Update Frequency:** > 10 years **Bathymetric Data:** Yes **Tide-Coordinated:** No **Data Outside State Needed:** Yes, for overlap to make project data seamless.	**Water Safety Modeling:** **Estimated Annual Operational Benefits:** Major; Dollar Value Not Reported — These data would give more accurate values for storage in reservoirs, more accurate stream miles, and accurate values for runoff modeling. **Estimated Annual Customer Service Benefits:** Major; Dollar Value Not Reported — These data would save the agency valuable time spent in the field collecting much of the data for the monitoring group, such as collecting cross section data of the stream monitoring site. Data could be collected from LiDAR at a quality that is sufficient for the needs of the program. **Estimated Strategic Benefits:** Major — Near real time modeling of water quality related events, more accurately place protective measures to alleviate events, and more quickly answer questions raised by the public and government.

Program: Support Services	**Business Use:** 2. Water Supply and Quality
 Quality Level: (scale 1 2 3 4 5) **Update Frequency:** > 10 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** NO	**Water supply:** Although the program in general would find only a moderate impact with the availability of LiDAR data, specific projects within the program have benefited greatly from LiDAR data that has been collected and made available from federal programs. For example: dam safety and water irrigation usage
	Estimated Annual Operational Benefits: Moderate; $500,000 If our agency had this data we may be able to do projects and analysis in-house rather than contracting the work outside our office.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported Our agency would be able to use this data to answer questions about hydrologic modeling which in turn could speed up requests for the use of water in the state. The data might also be used to mitigate disasters such as dam breaking etc.
	Estimated Strategic Benefits: Moderate Public benefits would be a better Dam Safety program throughout the state. Also, more efficient irrigation water usage as well and oil and gas drilling.

Program: Sage-Grouse	**Business Use:** 7. Wildlife and Habitat Management
 Quality Level: (scale 1 2 3 4 5) **Update Frequency:** 4-5 years **Bathymetric Data:** No **Tide-Coordinated:** No **Data Outside State Needed:** Not at this time, but can see the benefit for future project areas that may go over the state line	**Determination of sage-grouse habitat based on winter/snow conditions:**
	Estimated Annual Operational Benefits: Moderate; Dollar Value Not Reported To model what the snow pack and drift would be in heavy snow years would not only be beneficial for sage-grouse but for big game species, as well.
	Estimated Annual Customer Service Benefits: Moderate; Dollar Value Not Reported The biologists would be the customers and they would be able to predict how the snow would affect the birds and lek (breeding ground) checking season
	Estimated Strategic Benefits: Moderate Socially and politically it would be best to present an accurate depiction of what effects the conditions were having on animal populations.

Program: STATEMAP Geologic Mapping Program	**Business Use:** 9. Geologic Resource Assessment and Hazard Mitigation

	State Geologic Mapping: Bare Earth LiDAR imagery will be used to enhance the STATEMAP geologic mapping program (bedrock and surficial), quaternary fault mapping, energy development planning and resource inventory purposes, throughout the state of Wyoming.
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Enhanced remote sensing imagery will provide higher quality base maps and data for field mapping purposes, reducing the need for smaller scale air photo inspection. Combining digital imagery with field mapping hardware will reduce the amount of time spent on digitizing data for final map and report products.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported With an enhanced elevation data set, time spent in the office, prior to field mapping, will be reduced and production timeliness will increase due to reduced time spent digitizing data collected in the field. Mapping will benefit from more accurate base maps that can be integrated into modern field mapping devices.
Quality Level:	**Estimated Strategic Benefits:** Major Expanded high resolution imagery will allow for enhanced mapping capabilities throughout the State of Wyoming and will provide improved geologic data for mapped and unmapped areas. Improved imagery will allow for more accurate hazards mapping of landslides, quaternary fault data, and field support for geologic mapping.
Update Frequency: 6-10 years	
Bathymetric Data: Yes	
Tide-Coordinated: No	
Data Outside State Needed: No	

Program: Geographic information Systems and Intelligent Transportation Systems	**Business Use:** 18. Land Navigation and Safety

	Road Design:
	Estimated Annual Operational Benefits: Major; $250,000 Being able to plan and design roads without having to send people into the field would save the Department a considerable amount of time and money.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Having that information available to everyone in the Department would allow everyone to do their job more efficiently and in a more timely manner.
Quality Level:	**Estimated Strategic Benefits:** Major Having that information readily available to the public when related to a road construction project would help eliminate confusion about the why we are building a road in a particular location.
Update Frequency: Event Driven - Needs not met by a cyclic data acquisition program	
Bathymetric Data: Not Reported	
Tide-Coordinated: No	
Data Outside State Needed: Yes, for continuity of data over stateline.	

Program: Land Quality Division Permitting	Business Use: 10. Resource Mining

	Mine Permitting:
	Estimated Annual Operational Benefits: Major; Dollar Value Not Reported Accurate premine and postmine contours for inspections and bond release. Accurate contours for reclamation efforts for modeling purposes of bond release.
	Estimated Annual Customer Service Benefits: Major; Dollar Value Not Reported Improve the time needed to inspect the features on the ground and shortened time and increased customer satisfaction as a result.
	Estimated Strategic Benefits: Major More accurate data for use in mine wall modeling, and quicker turn around time for permits and amendments.
Quality Level: 1 2 3 4 5	
Update Frequency: > 10 years	
Bathymetric Data: Not Reported	
Tide-Coordinated: No	
Data Outside State Needed: Yes, just for overlap to make project data seamless	

Local Functional Activities

County Government -- Laramie County, City Of Cheyenne	
Program: Drainage Planning	**Business Use:** 14. Flood Risk Management
Functional Activity: Flood Risk Mapping	
Quality Level: QL 2 Elevation Data from LiDAR	**Estimated Annual Operational Benefits:** Major; Not Provided Elevation data at the Quality Level selected are unavailable. Use of aerial surveys greatly reduces the time and cost in obtaining the necessary elevation data. Ability to use GIS technology we have acquired instead of outsourcing hydrologic and hydraulic engineering modeling.
Update Frequency: 6-10 years	**Estimated Annual Customer Service Benefits:** Major; Not Provided Improved reliability of DFIRMs and perhaps more frequent updates for entire area of interest rather than a few localized drainages. Higher accuracy in identifying property owners that will need flood insurance. Elevation data at the Quality Level selected are unavailable.
Bathymetric Data: Not Provided	**Estimated Strategic Benefits:** Moderate
Tide-Coordinated: Not Provided	Perhaps a higher rating in the FEMA CRS program will be achievable thereby lower the cost of flood insurance. Elevation data at the Quality Level selected are unavailable.