

# The 3D Elevation Program—Summary for Georgia

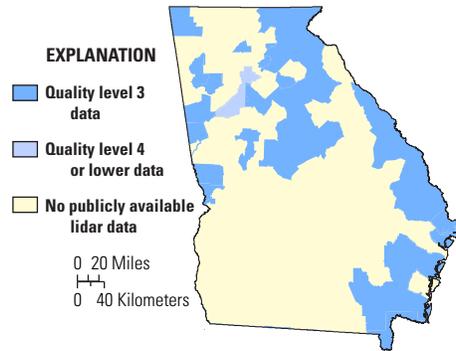
## Introduction

Elevation data are essential to a broad range of applications, including forest resources management, wildlife and habitat management, national security, recreation, and many others. For the State of Georgia, elevation data are critical for infrastructure and construction management, natural resources conservation, flood risk management, agriculture and precision farming, forest resources management, water supply and quality, and other business uses. Today, high-density light detection and ranging (lidar) data are the primary sources for deriving elevation models and other datasets. Federal, State, and local agencies work in partnership to (1) replace data that are older and of lower quality and (2) provide coverage where publicly accessible data do not exist. A joint goal of State and Federal partners is to acquire consistent, statewide coverage to support existing and emerging applications enabled by lidar data.

The National Enhanced Elevation Assessment (NEEA; Dewberry, 2011) evaluated multiple elevation data acquisition options to determine the optimal data quality and data replacement cycle relative to cost to meet the identified requirements of the user community. The evaluation demonstrated that lidar acquisition at quality level 2 (table 1) for the conterminous United States and quality level 5 interferometric synthetic aperture radar (ifsar) data (table 1) for Alaska with a 6- to 10-year acquisition cycle provided the highest benefit/cost ratios. The 3D Elevation Program (3DEP) initiative (Snyder, 2012a,b) selected an 8-year acquisition cycle for the respective quality levels. 3DEP, managed by the U.S. Geological Survey (USGS), the Office of Management and Budget Circular A-16 lead agency for terrestrial elevation data, responds to the growing need for high-quality topographic data and a wide range of other 3D representations of the Nation's natural and constructed features.

### 3DEP in Georgia by the Numbers

Expected annual benefits	\$8.56 million
Estimated total cost	\$19.69 million
Payback	2.3 years
Quality level 1 buy-up estimate	\$12.53 million



**Figure 1.** Map of Georgia showing the extent of existing and planned publicly available lidar data. Information source: United States Interagency Elevation Inventory, June 2014, updated annually. No data that meet 3DEP requirements for quality level 2 or better are publicly available for Georgia. See table 1 for quality level information.

## 3D Elevation Program Benefits for Georgia

The top 10 Georgia business uses for 3D elevation data, which are based on the estimated annual conservative benefits of the 3DEP initiative, are shown in table 2. The NEEA survey respondents in the State of Georgia estimated that the national 3DEP initiative would result in at least \$8.56 million in new benefits annually to the State. The cost for such a program in Georgia is approximately \$19.6 million, resulting in a payback period of 2.3 years and a benefit/cost ratio of 3.5 to 1 over an 8-year period. Because monetary estimates were not provided for all reported benefits, the total benefits of the 3DEP to Georgia are likely much higher. On the basis of the NEEA survey results, all levels of government and many organizations in Georgia could benefit from access to statewide high-resolution elevation data.

For Georgia, approximately 72 percent of the identified business use requirements will be met in infrastructure and construction management, natural resources conservation, and flood risk management uses, as shown in table 2. The status of publicly available lidar data in Georgia is shown in figure 1. By enhancing coordination between 3DEP and various government and private organizations in Georgia, it may be possible to realize more than the cited conservative benefits and

## 3D Elevation Program

3DEP is a national program managed by the USGS to acquire high-resolution elevation data. The initiative is backed by a comprehensive assessment of requirements (Dewberry, 2011) and is in the early stages of implementation. 3DEP will improve data accuracy and provide more current data than is available in the National Elevation Dataset (NED). The goal of this high-priority cooperative program is to be operational by January 2015, and to have complete coverage of the United States by the end of 2022, depending on funding and partnerships. 3DEP can conservatively provide new benefits of \$1.2 billion/year and has the potential to generate \$13 billion/year in new benefits through improved government services, reductions in crop and homeowner losses resulting from floods, more efficient routing of vehicles, and a host of other government, corporate, and citizen activities (Dewberry, 2011). A shared, common elevation dataset would foster cooperation and improve decision-making among all levels of government and other stakeholders.

### Benefits of a Funded National Program

- Economy of scale—Acquisition of data covering larger areas reduces costs by 25 percent.
- A systematic plan—Acquisition of data at a higher quality level reduces the cost of “buying up” to the highest levels needed by State and local governments.
- Higher quality data and national coverage—Ensure consistency for applications that span State and watershed boundaries and meet more needs, which results in increased benefits to citizens.
- Increase in Federal agency contributions—Reduces State and local partner contributions.
- Acquisition assistance—Provided through readily available contracts and published acquisition specifications.

attain the higher potential benefits for many business uses.

The following examples highlight how 3DEP data can support business uses in Georgia: (1) Enhanced elevation data are a key component of Georgia's Flood Mapping, Assessment and Planning program (<http://www.georgiadfirm.com/default.htm>) and the Federal Emergency Management Agency's Risk MAP program. These coordinated programs deliver quality data that increase public awareness and lead to mitigation actions that reduce risk to life and property and address gaps in flood hazard data used for risk assessment and floodplain management. (2) Stormwater runoff carries pollutants such as oil and grease, lawn fertilizers, chemicals, pet waste, litter, and other contaminants into the State's waterways. Enhanced elevation data can be used to improve water quality by modeling soil erosion and runoff into streams and initiating actions to decrease the amount of sediment and nutrients delivered to lakes and rivers (fig. 2). Hydrologic modeling can identify specific locations within a watershed that can be used to temporarily store runoff to decrease peak flows and the amount of sediment and nutrient runoff. In urban environments, the higher quality elevation



data support preservation and restoration activities along wetlands and other protected waterways, the determination of impervious surface area for stormwater master planning, and surface-water accumulation models for systems rehabilitation.

## References Cited

- Dewberry, 2011, Final report of the National Enhanced Elevation Assessment (revised 2012): Fairfax, Va., Dewberry, 84 p. plus appendixes, <http://www.dewberry.com/Consultants/GeospatialMapping/FinalReport-NationalEnhancedElevationAssessment>.
- Snyder, G.I., 2012a, National Enhanced Elevation Assessment at a glance: U.S. Geological Survey Fact Sheet 2012-3088, 2 p., <http://pubs.usgs.gov/fs/2012/3088/>.
- Snyder, G.I., 2012b, The 3D Elevation Program—Summary of program direction: U.S. Geological Survey Fact Sheet 2012-3089, 2 p., <http://pubs.usgs.gov/fs/2012/3089/>.

**Figure 2.** Thousands of stream miles throughout Georgia are impacted by stormwater runoff, which can carry harmful pollutants into waterways. Enhanced elevation data support hydrologic models that can be used to identify specific locations within the watershed that can temporarily store runoff to decrease peak flows and the amount of sediment and nutrient runoff. The tributary shown in the photograph is contributing sediment and nutrient runoff to a much clearer, large river, the Chattahoochee River in Atlanta, Georgia. U.S. Geological Survey photograph.

**Table 2.** Conservative benefits estimates for the top 10 business uses of the proposed 3DEP data identified in the National Enhanced Elevation Assessment for Georgia (Dewberry, 2011).

Rank	Business use	Annual benefits (millions)
1	Infrastructure and construction management	\$2.23
2	Natural resources conservation	2.08
3	Flood risk management	1.84
4	Agriculture and precision farming	1.20
5	Forest resources management	0.46
6	Water supply and quality	0.29
7	Aviation navigation and safety	0.15
8	Geologic resource assessment and hazard mitigation	0.11
9	Coastal zone management	0.08
10	Sea level rise and subsidence	0.06
	Other	0.06
	Total	8.56

## 3D Elevation Program—Continued

The USGS and its partners will acquire quality level 2 or better (table 1) 3D lidar data over the conterminous United States, Hawaii, and the U.S. territories. Interferometric synthetic aperture radar (ifsar) data are being collected at quality level 5 (table 1) in Alaska. The data will be acquired over an 8-year period and will be made available to the public. By using this acquisition scenario, a number of high-quality elevation-data products can be created to serve a wide range of business uses in government and the private sector.

**Table 1.** Data quality levels and related accuracies for the 3D Elevation Program (3DEP) initiative. These data quality parameters for the 3DEP initiative approximate those used in the National Enhanced Elevation Assessment (Dewberry, 2011).

[RMSE<sub>(z)</sub>, root mean square error in the z (elevation) dimension; n/a, not applicable]

Quality level	Nominal pulse spacing (meters)	Vertical error as RMSE <sub>(z)</sub> (centimeters)
1	0.35	10
2	0.7	10
3	2.0	20
4	n/a	139
5	n/a	185

## Next Steps for Implementing 3DEP

Accomplishing the 3DEP initiative's goal of national coverage in 8 years depends on the following factors:

- Increased partnerships among Federal, State, Tribal, and local governments.
- Partnerships that acquire elevation data to the program's specifications across larger project areas.
- Increased communication about and awareness of the program's benefits and goals.
- Support for the program from government and other stakeholders.

## For Further Information:

Director,  
USGS National Geospatial Program  
12201 Sunrise Valley Drive, MS 511  
Reston, VA 20192  
Email: [3DEP@usgs.gov](mailto:3DEP@usgs.gov)

Gary L. Merrill,  
USGS Geospatial Liaison  
Stephenson Center, Suite 129  
720 Gracern Road  
Columbia, SC 29210  
Email: [glmerrill@usgs.gov](mailto:glmerrill@usgs.gov)

<http://nationalmap.gov/3DEP/>

By William J. Carswell, Jr.

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