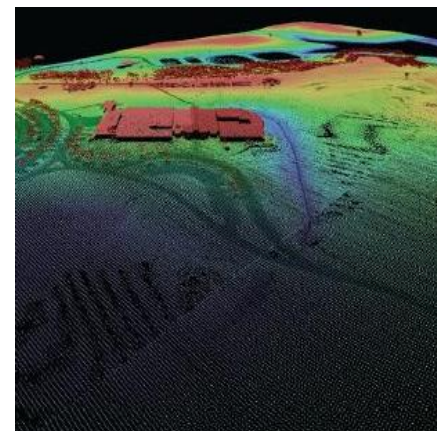
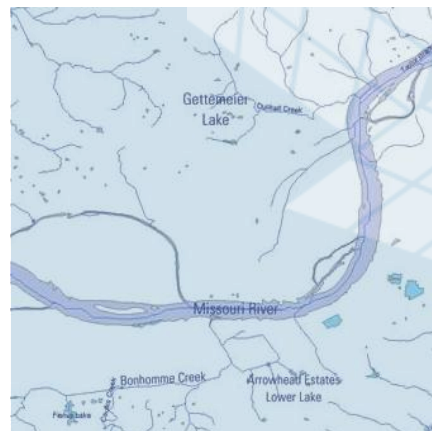
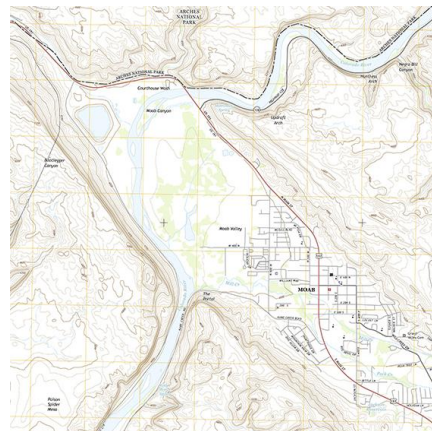




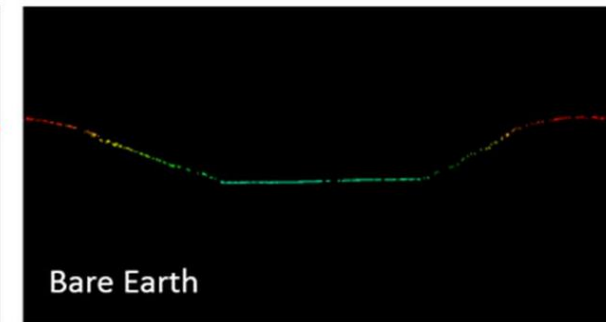
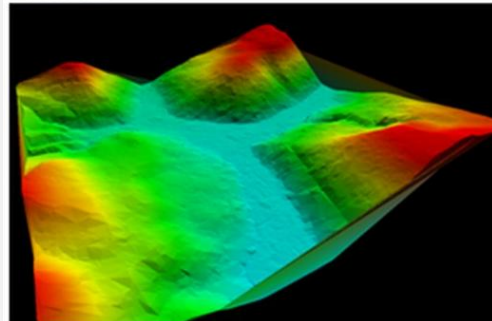
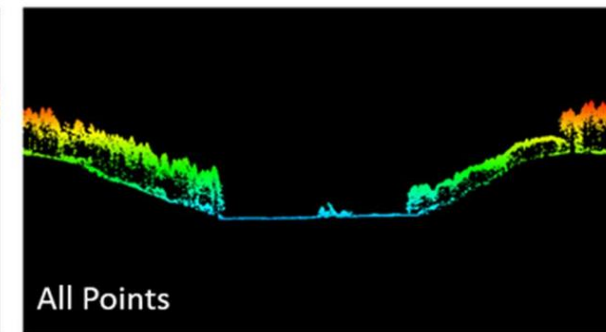
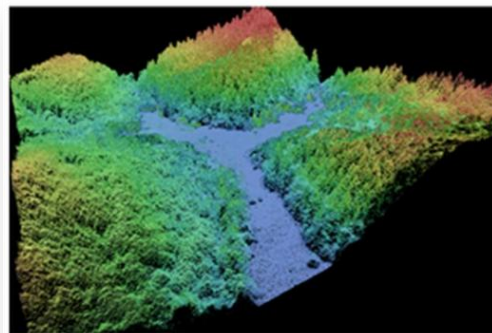
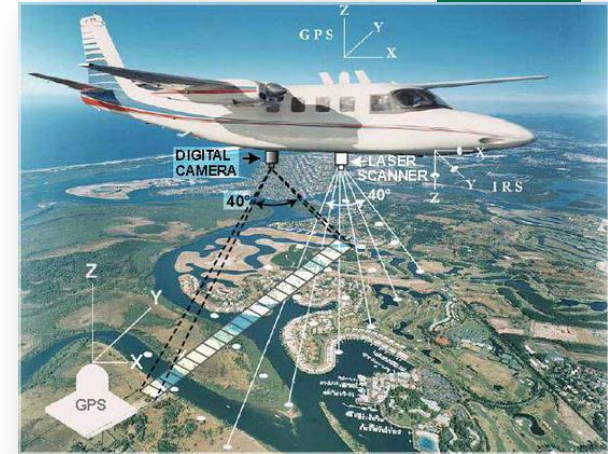
3D Elevation Program (3DEP) Status and Plans



Kevin T. Gallagher
Associate Director, Core Science Systems
June 26, 2017

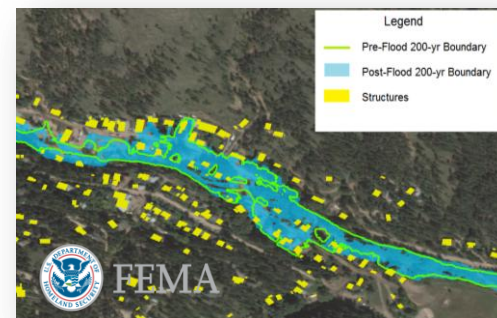
3D Elevation Program (3DEP)

- Apply lidar technology to map bare earth and 3D data of natural and constructed features to enable more accurate understanding, modeling, and prediction
- Goal to complete acquisition of national lidar coverage with IfSAR in Alaska in 8 years
- Address the mission-critical requirements of 34 Federal agencies, 50 states, and other organizations documented in the National Enhanced Elevation Assessment
- ROI 5:1, conservative benefits of \$690 million/year with potential to generate \$13 billion/year
- Leverage the capability and capacity of private industry mapping firms
- Achieve a 25% cost efficiency gain by collecting data in larger projects
- Completely refresh national elevation data holdings with new products and services

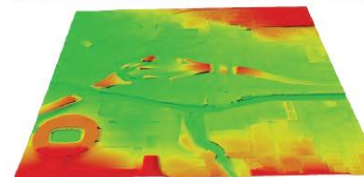
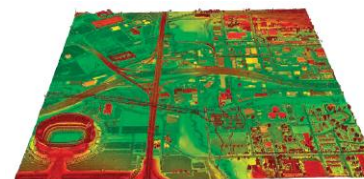


+ National Enhanced Elevation Assessment (NEEA) of 2012

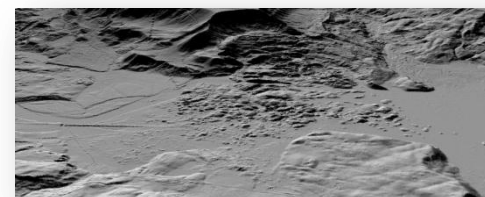
Rank	Business Use	Annual Benefits	
		Conservative	Potential
1	Flood Risk Management	\$295M	\$502M
2	Infrastructure and Construction Management	\$206M	\$942M
3	Natural Resources Conservation	\$159M	\$335M
4	Agriculture and Precision Farming	\$122M	\$2,011M
5	Water Supply and Quality	\$85M	\$156M
6	Wildfire Management, Planning and Response	\$76M	\$159M
7	Geologic Resource Assessment and Hazard Mitigation	\$52M	\$1,067M
8	Forest Resources Management	\$44M	\$62M
9	River and Stream Resource Management	\$38M	\$87M
10	Aviation Navigation and Safety	\$35M	\$56M
:			
20	Land Navigation and Safety	\$0.2M	\$7,125M
Total for all Business Uses (1 – 27)		\$1.2B	\$13B



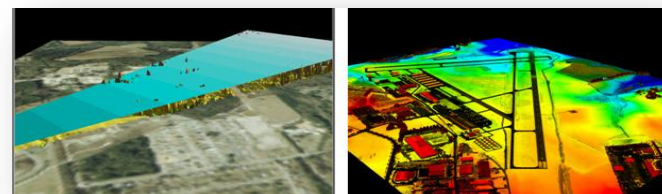
Flood Risk Management



Infrastructure



Geologic Hazards



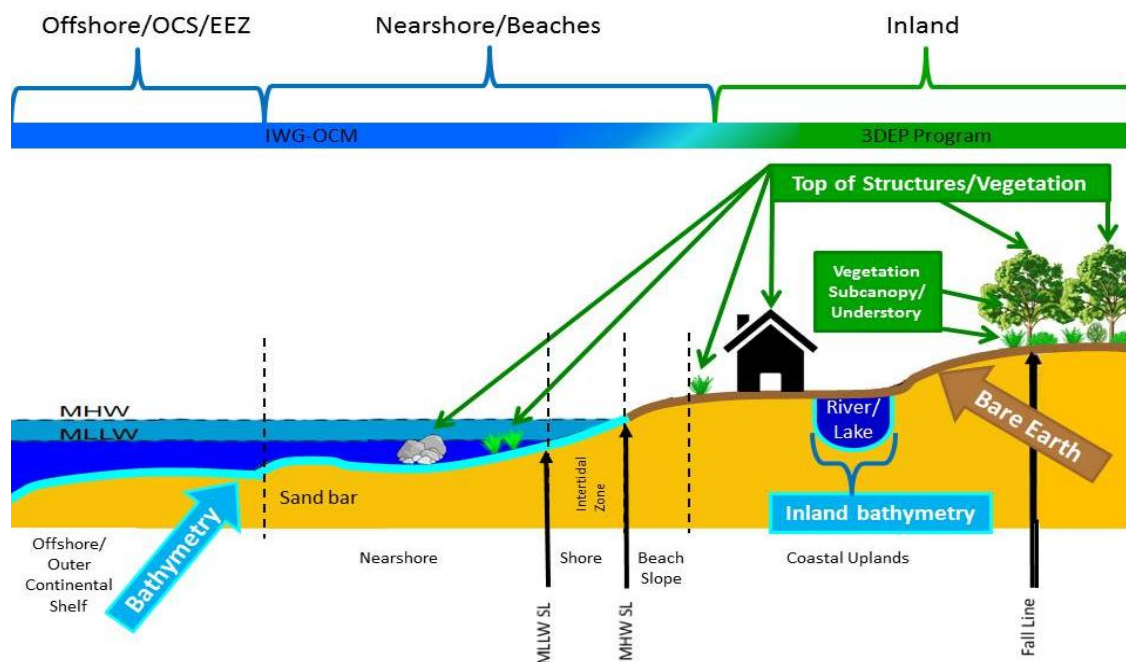
Aviation Safety

+ 3D Nation Elevation

4

Requirements and Benefits Study - Goals

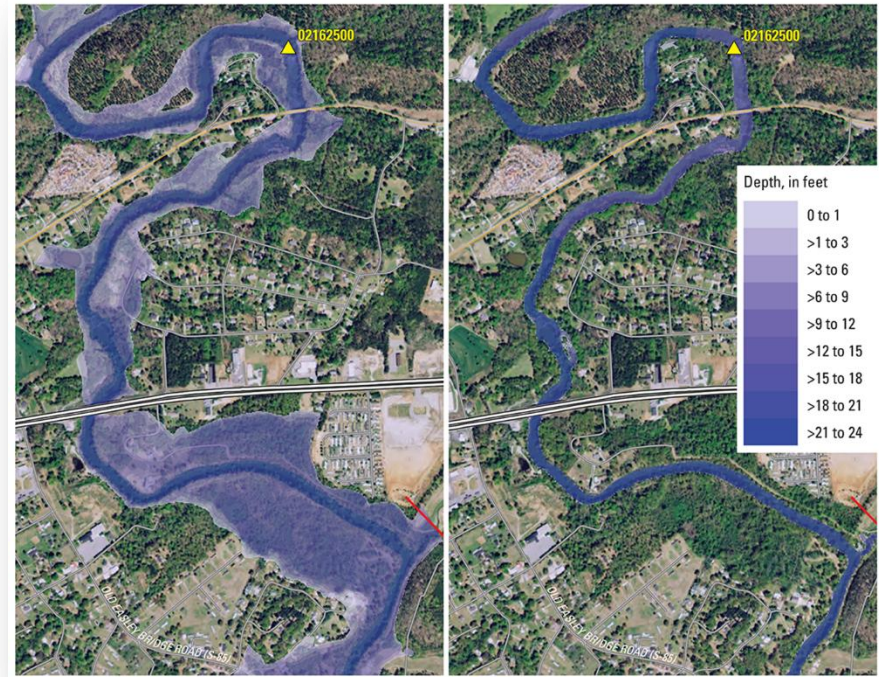
- Understand inland, nearshore and offshore bathymetric data requirements and benefits
- Understand how requirements and benefits dovetail in the nearshore coastal zone
- Plan for the next round of 3DEP after completion of nationwide coverage
- Gather technology-agnostic user information to be able to assess new technologies against requirements and identify the tradeoffs between different approaches
- Improve our understanding of needs to guide development of the next generation of 3DEP products and services



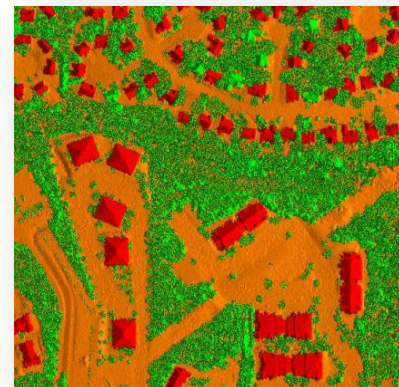
3DEP for Flood Risk Management

Conservative annual benefits estimated at \$502M

- Producing much higher quality flood maps, including Flood Insurance Rate Maps
- Managing dam and levee safety programs reducing flood risks
- Improving hydrologic modeling and flood forecasting
- Improving State and local government flood risk management and response
- Improving storm water facilities and dam design
- Extracting building footprints and identifying the finished floor elevation in order to quantify potential damages based on flooding depths



Lidar aids hydraulic modeling to determine flood-inundation on the Saluda River, near Greenville, SC



Building footprints extracted from lidar in red

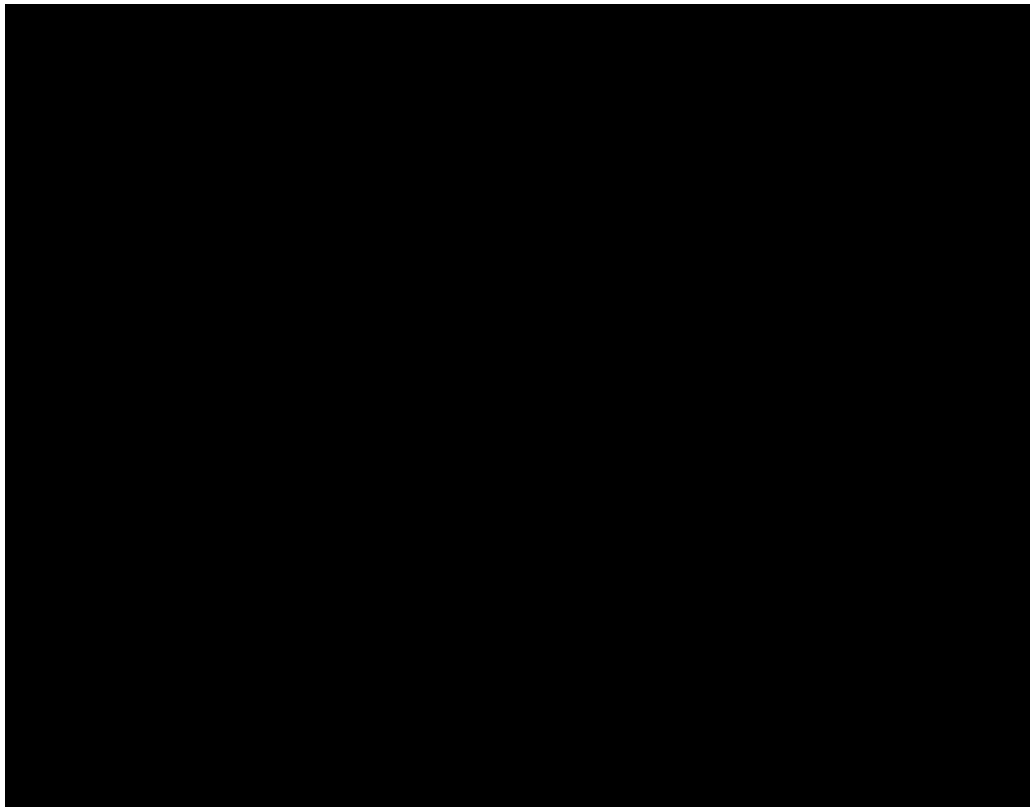
*Courtesy of J. Dorman,
NC Department of Public
Safety, Floodplain
Mapping Program*



3DEP For America's Infrastructure

The significant challenge of improving the Nation's infrastructure depends on high-quality elevation data

Conservative annual benefits estimated at \$170M



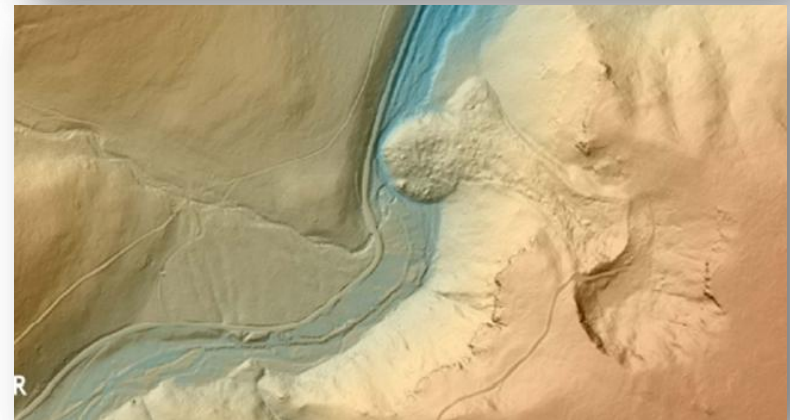
- Route, grade, line-of-sight, and utility surveys and corridor mapping
- Terrain and other obstruction identification for aviation
- Dam, levee, and coastal-structure failure modeling and mitigation
- Hydraulic and hydrologic modeling
- Permit application and construction plan development and evaluation
- Drainage issues and cut-and-fill estimate requirements
- Vegetation, topographic, and geomorphologic feature analysis
- As-built model development
- Preliminary engineering, estimate development, and quantity estimation activities
- Base-map and elevation model creation



3DEP for Landslides Recognition, Hazard Assessment, and Mitigation Support

Conservative annual benefits estimated at \$20.2 M

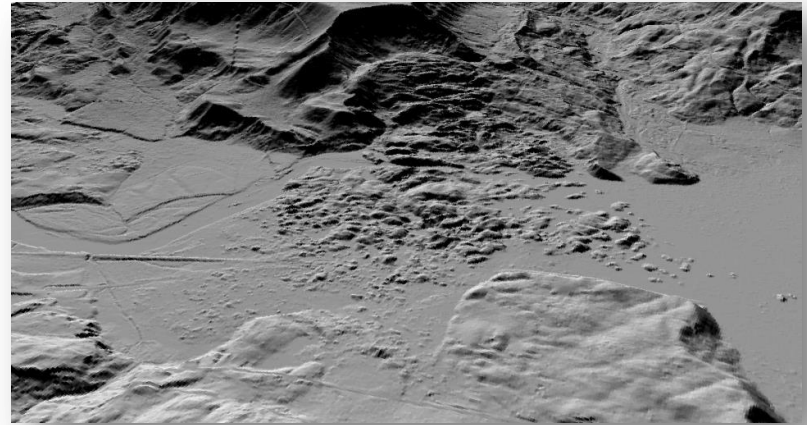
- Input to slope-stability models used to identify where shallow landslides may mobilize into fast-moving, potentially damaging and deadly debris flows
- Determine fundamental and highly detailed descriptions of boundary and conditions for landslide initiation
- Plan for evacuations and staging areas
- Create accurate landslide inventory and deposits maps and estimate the shape and activity of landslides
- Provide baseline information for change-detection comparisons, such as estimating sediment transport rates
- Develop novel approaches for estimating landslide thickness and ages of landslide deposits



National Landslide Preparedness Act

115TH CONGRESS S. 698

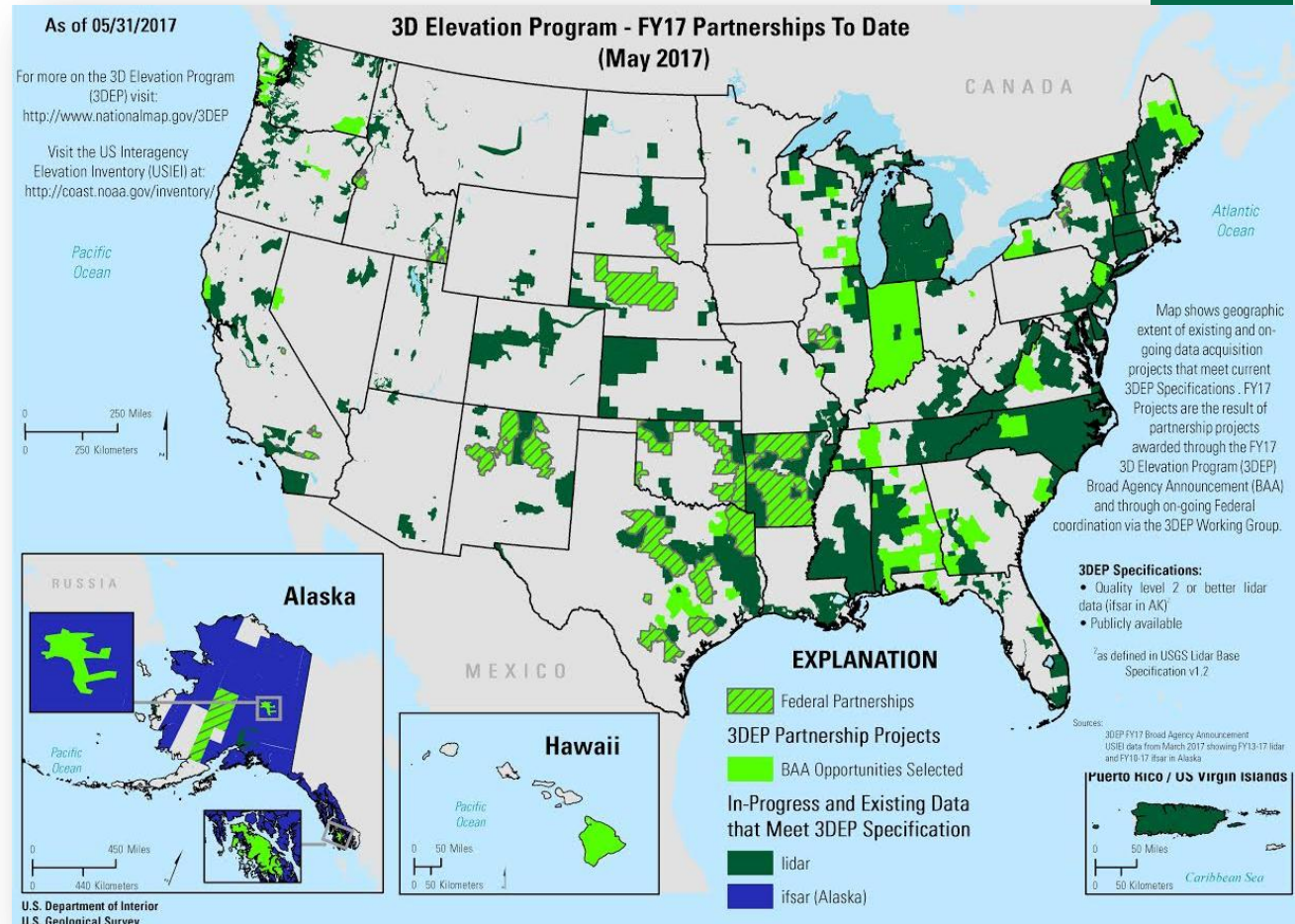
- Bipartisan legislation - To establish a national program to identify and reduce losses from landslide hazards, to establish a national 3D Elevation Program
- Establish an interagency coordinating committee composed of the following members
 - The Secretary of Interior, who shall serve as 24 Chairperson of the Committee
 - The Secretary of Agriculture
 - The Secretary of Commerce
 - The Secretary of Homeland Security
 - The Director of the National Science Foundation
 - The Director of the Office of Science and Technology Policy
 - The Director of the Office of Management and Budget
 - The head of any other Federal department or agency, at the request of the Secretary
- The Secretary shall establish, within the National Geospatial Advisory Committee, a subcommittee
 - Representatives from research and academic institutions; industry standards development organizations; units of State and local government; and the private sector
 - Conduct an assessment of trends and developments in the collection, dissemination, and use of 3D elevation data; and science and technology relating to 3D elevation data; the effectiveness of the program, the need to revise or reorganize the 3DEP; and the management, coordination, implementation, and activities of the 3DEP
 - Not later than 1 year after enactment, and every 2 years thereafter, submit to the Committee a report that includes the findings of the assessment and recommendations



+ 3DEP Status

Goal to complete acquisition of national lidar coverage with IfSAR in Alaska in 8 years

- Nearly 35% of the Nation is acquired
 - Both in work and available data
 - Includes Alaska IfSAR
- FY17 Status - As of May, 9.4%* of the lower 49 and territories has been contracted * Does not include all projects under development

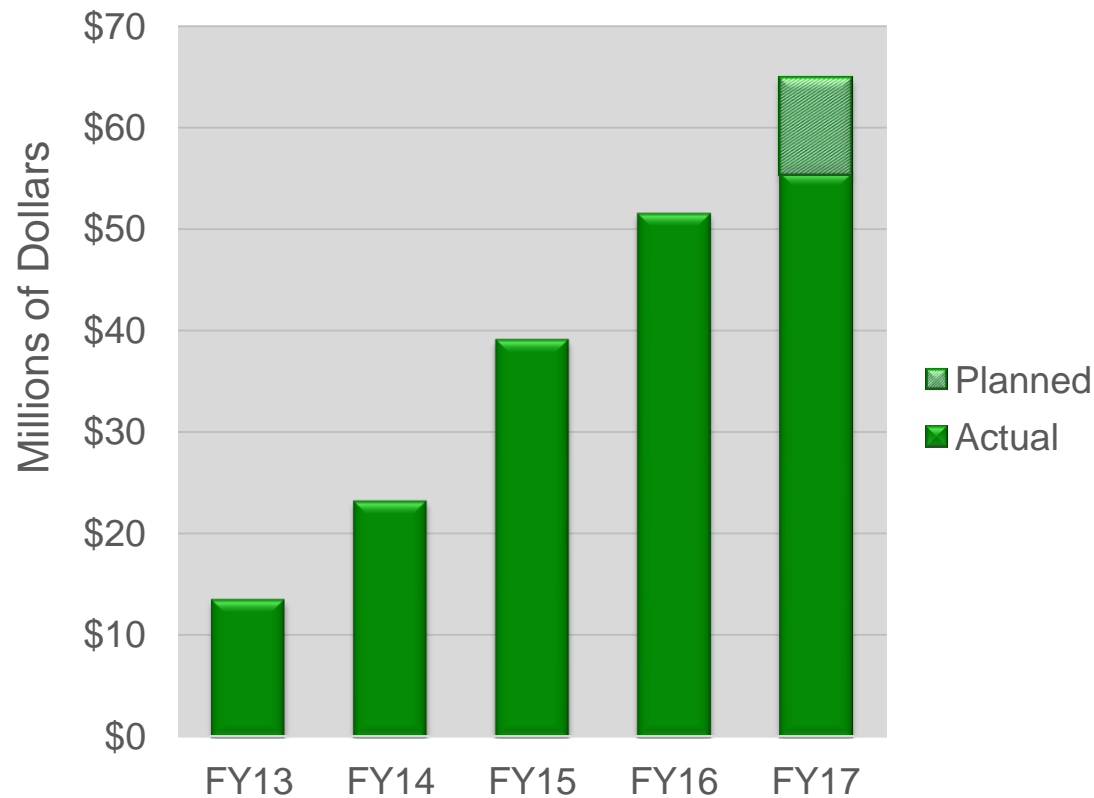


Map shows lidar acquired from FY13 – FY16

+ 3DEP FY17 Partnerships

Trend of Growing Lidar Investment

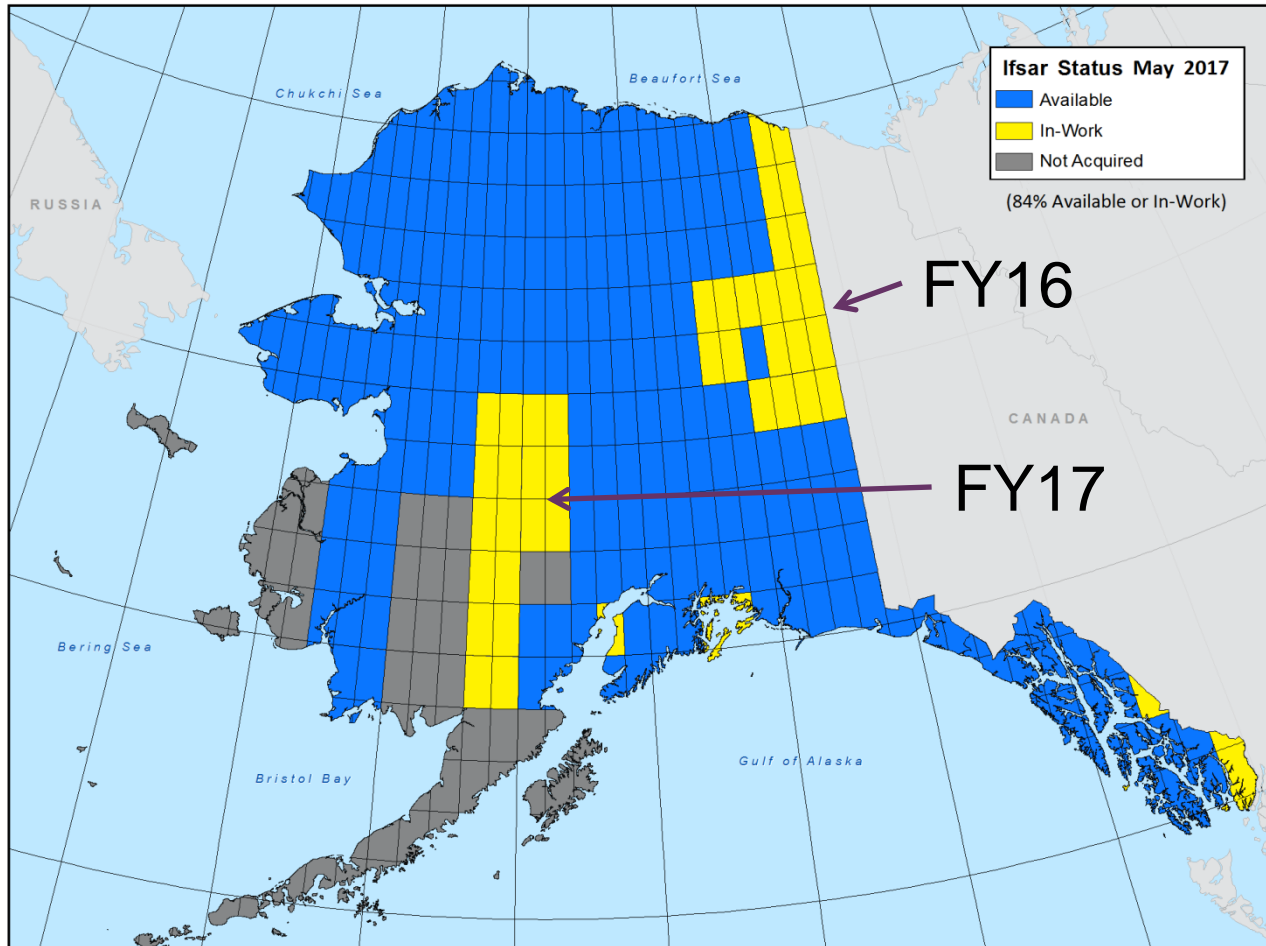
10





Data Contracted in FY17

Alaska IfSAR – 84% Available or In Work

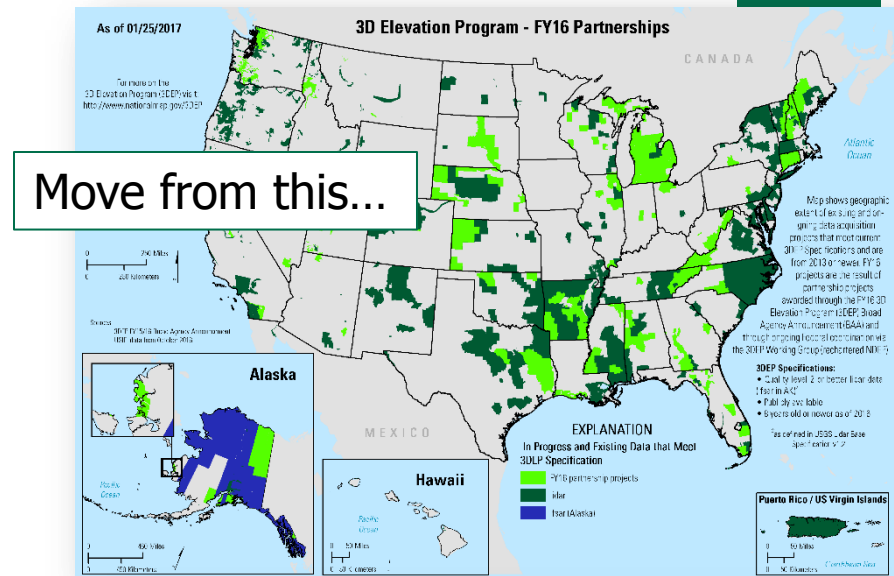




3DEP National Multiyear Plan

Background

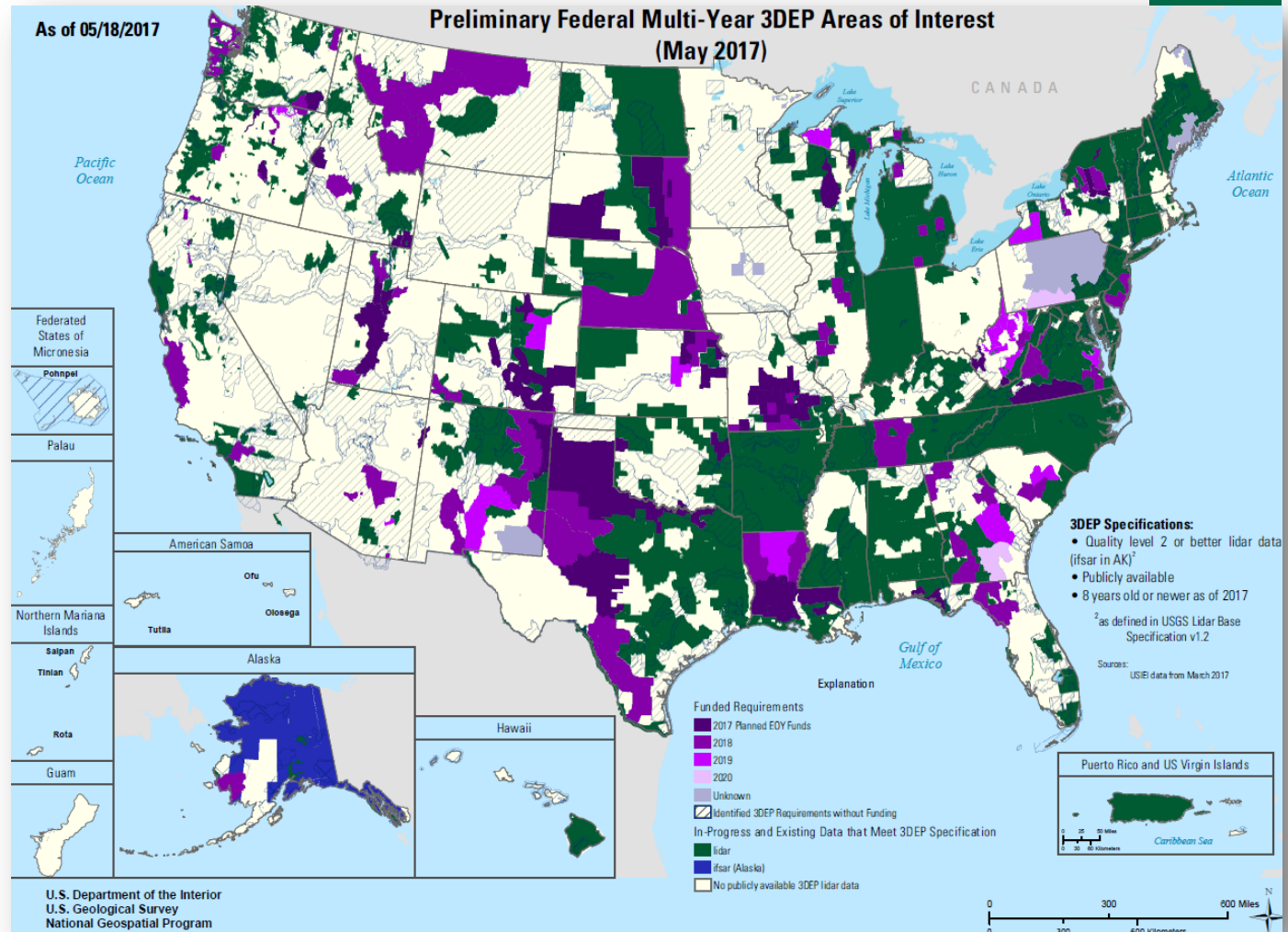
- 3DEP Executive Forum tasked the 3DEP Working Group to develop plan to:
 - Move from an annual, opportunistic process to a unified multi-year plan
 - Move from patchwork irregular acquisition footprints to a defined planning and delivery unit (tiling scheme)
 - Implement a phased approach beginning in FY18
- Benefits
 - Facilitate greater investments and leveraging through longer planning lead times
 - Defined units facilitate planning and understanding costs, allow for improved reporting and justification of investments
 - Presents a plan for nationwide coverage



+ 3DEP Multi-Year Planning (FY18 – FY20)

PRELIMINARY Federal Plan

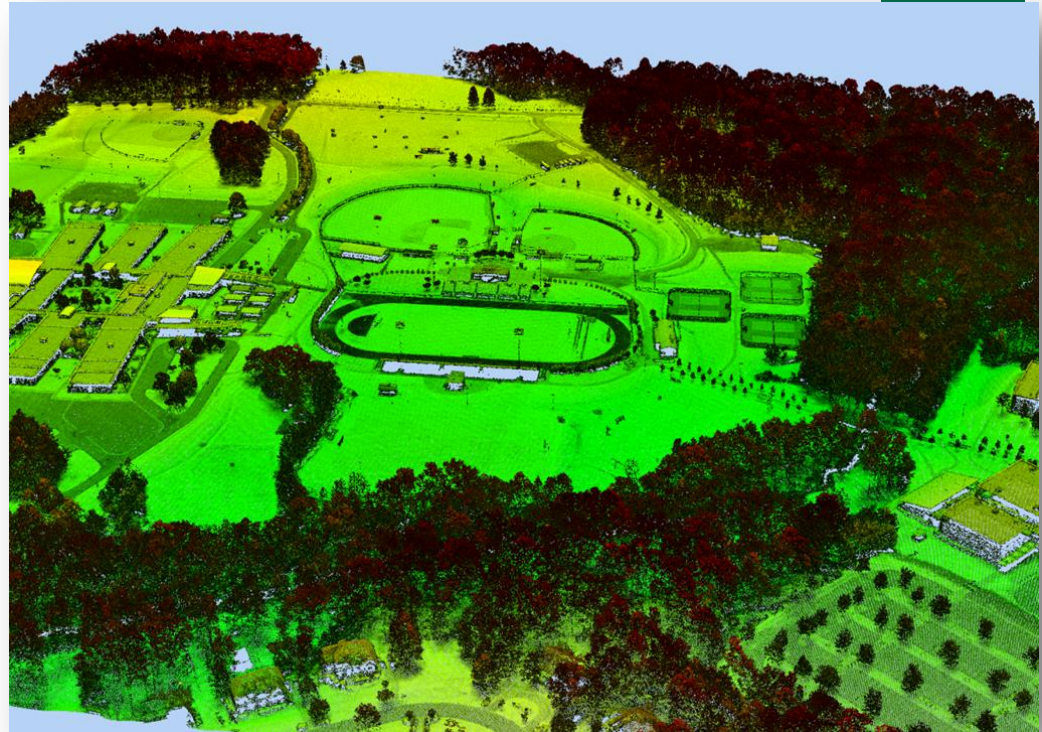
- Based on input from Federal agencies
- Assumes a level budget
- Identifies projects with a minimum/ partial planned funding
- Will be adjusted annually and based on funding



+ Emerging Technology

14

- Geiger mode and single photon lidar
 - Potential to increase quality and/or bring down costs
 - Pilots in 3 states (IL, NC, SD)
- Inland bathymetry
 - Technology proven in coastal areas
 - Commercial sensors becoming available
 - Pilot assessment of commercial capabilities (ID)
- Ongoing/additional review and testing to better understand:
 - The characteristics of the data
 - How the data will be processed through project lifecycle from acquisition to delivery
 - Costs associated with storage and hosting of higher density collections



Geiger mode pilot data, North Carolina

+ 3D Elevation Program (3DEP)

Budget

- FY17 Omnibus increases - \$4.5M total
 - \$1.5M for National Enhancement (3DEP data acquisition)
 - \$2.5M for Alaska Mapping and Map Modernization
 - \$0.5M for Landscape Level Assessments - Chesapeake Bay (3DEP data acquisition)
- FY18 President's budget decreases - \$12.6M total
 - The President's budget uses the annualized CR level as the base budget, which eliminates the FY17 \$4.5M increase in addition to the proposed \$8.1M decrease
 - The reduction decreases lidar data acquisition to the FY15 level (about 50% less square miles of data acquisition than projected for FY17, assuming level partner funding), defers completion of national lidar coverage to the year 2033, and defers Alaska Mapping progress

+ Thank you!

16

