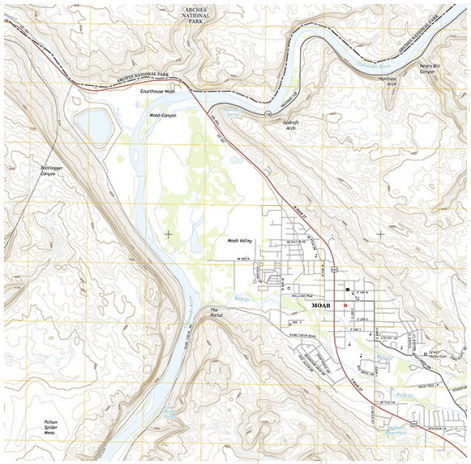
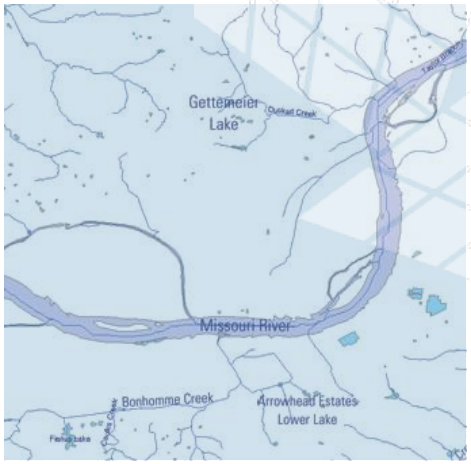
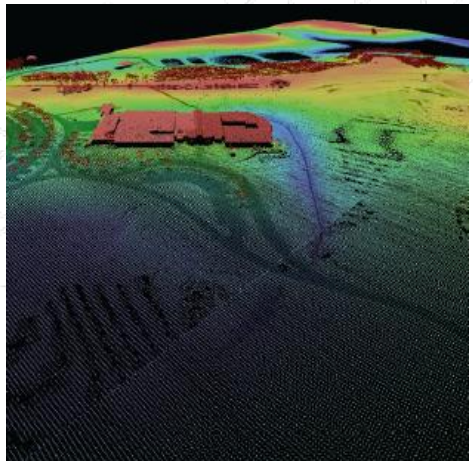
3D Elevation Program (3DEP)







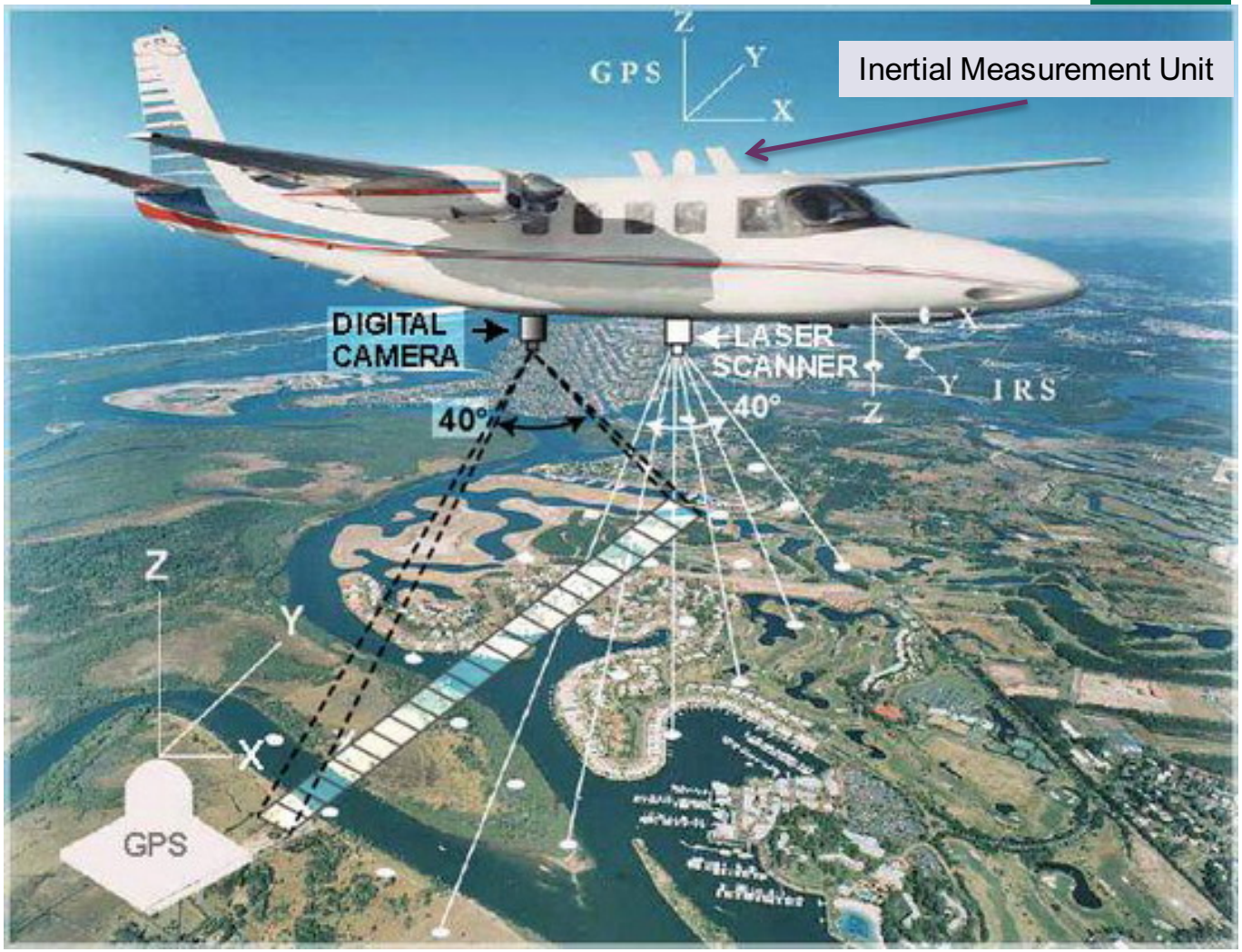
Vicki Lukas
Chief, Topographic Data Services
National Geospatial Program

USGS science for a changing world

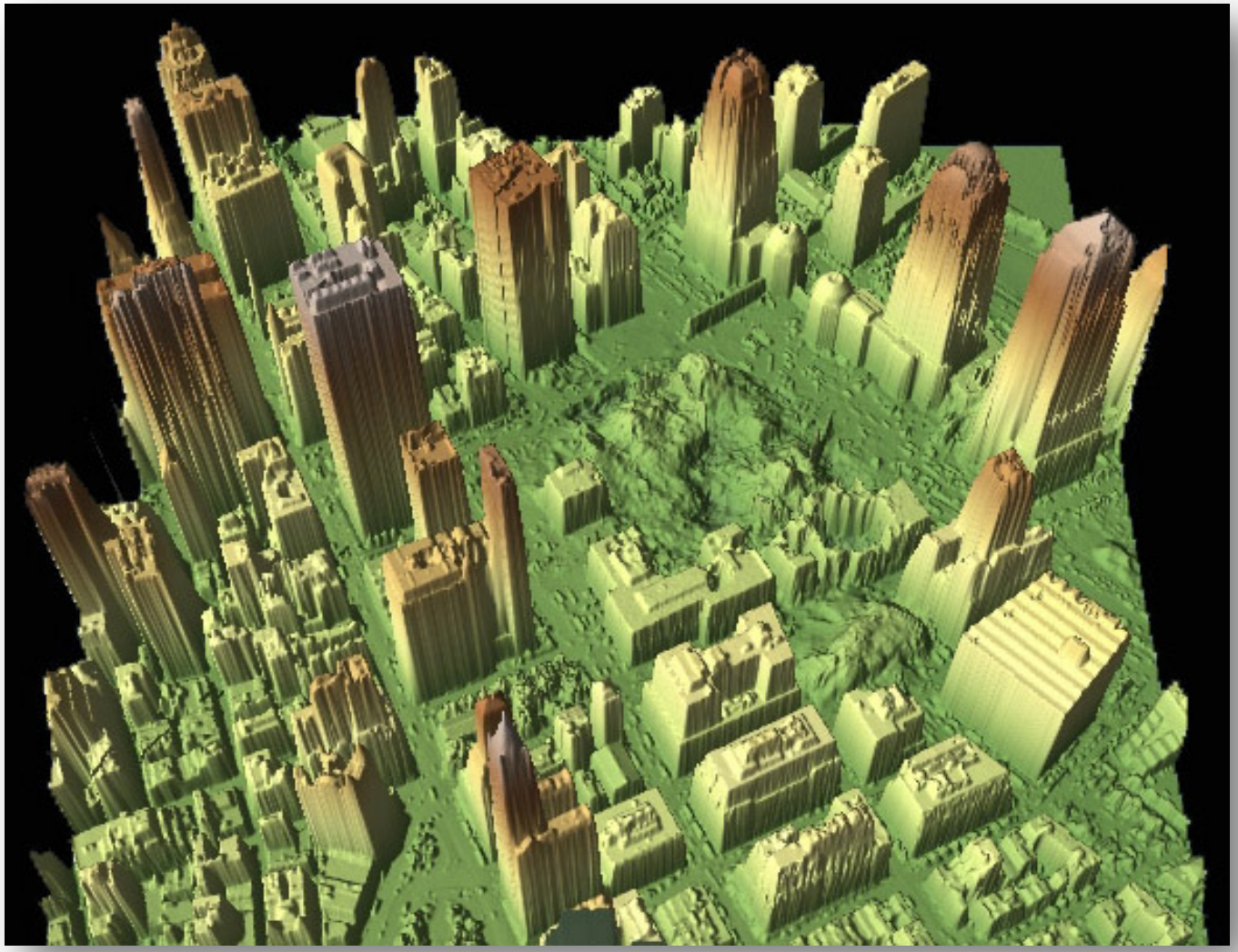
The National Map
Your Source for Topographic Information

Light Detection and Ranging (Lidar)

- System with a laser and detector (range), scanning mirror (laser direction), GPS (location), and IMU (orientation)
- 300,000+ laser pulses per second
- Billions of recorded points create 3D representation of bare earth, vegetation and structures at centimeter-level accuracy



Light Detection and Ranging



Flood Risk Management

Centimeters Matter!

- Red River, MN lidar shows changing river morphology
- 10 cm of additional accuracy is critical to flood risk management, particularly in areas of low relief

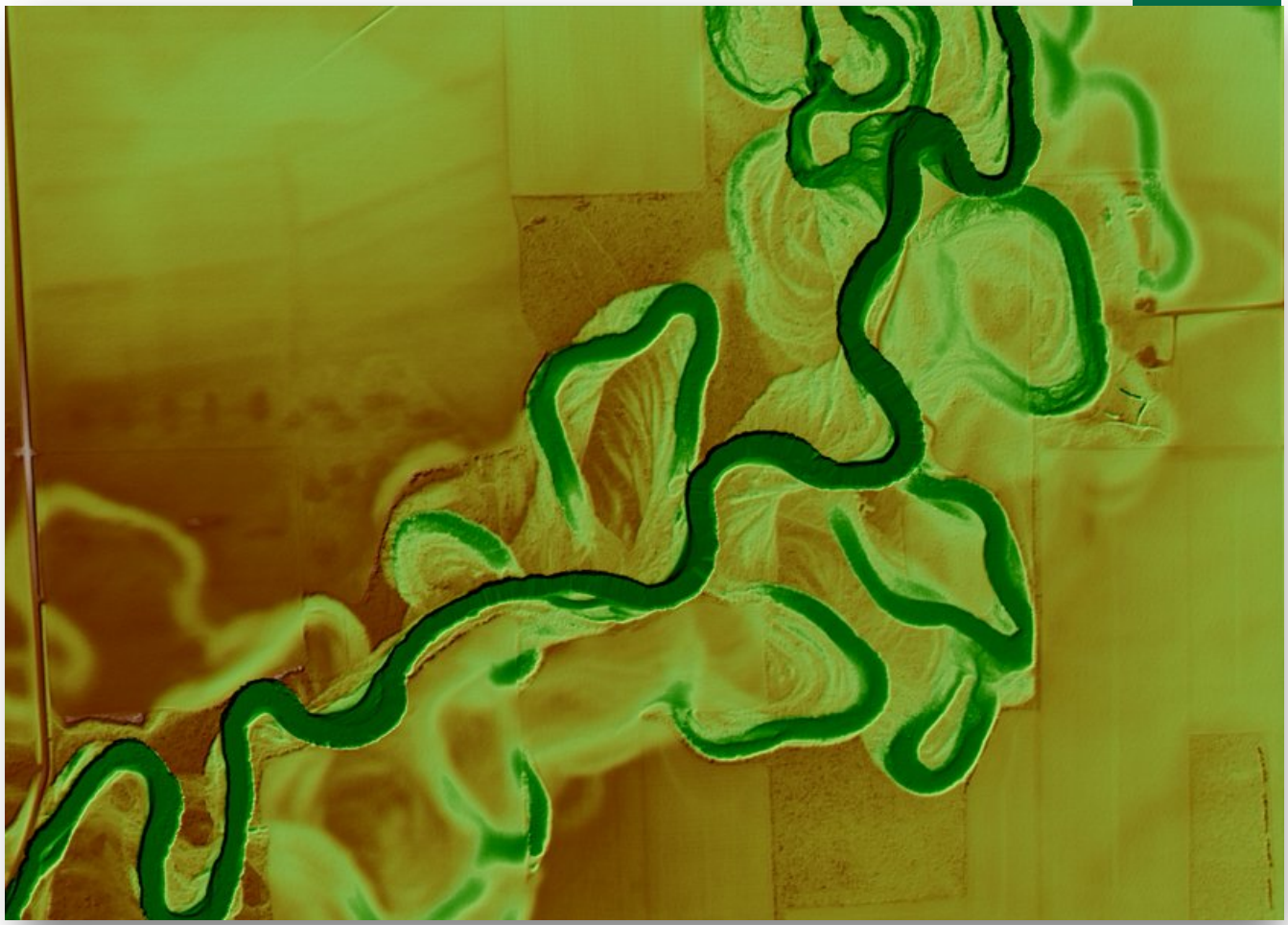


Image from Fugro Geospatial

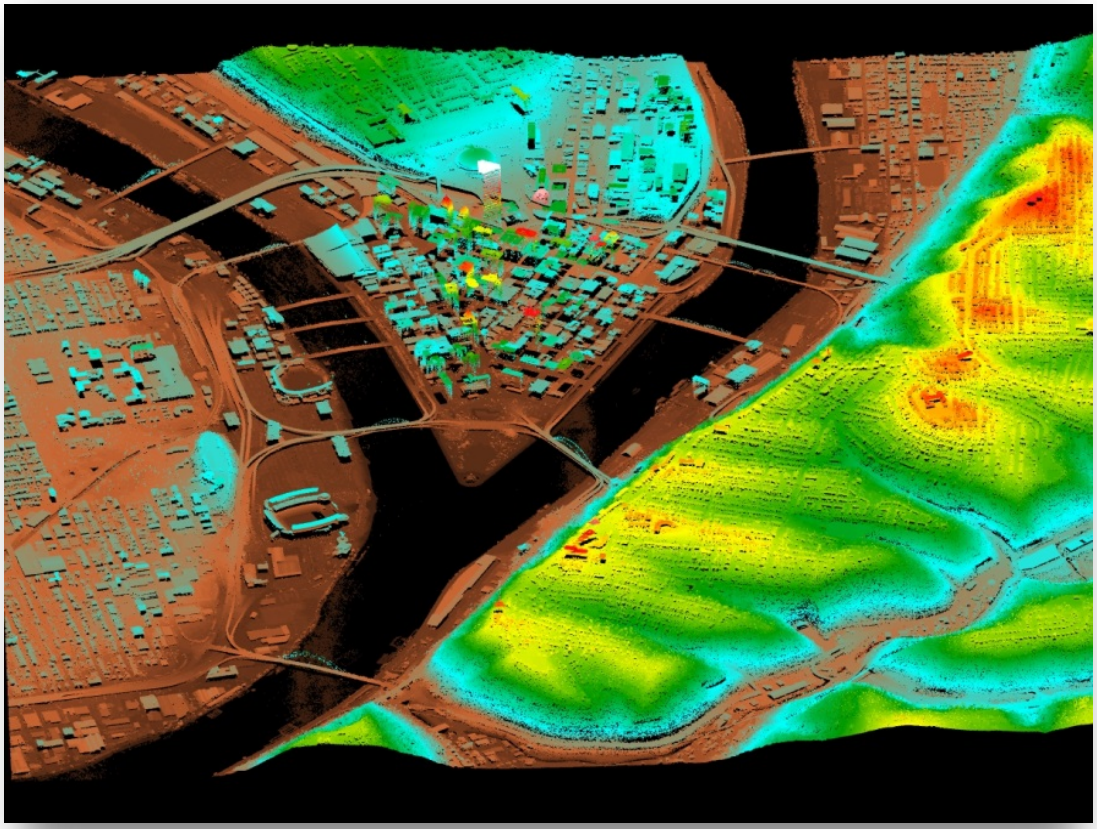
USGS science for a changing world

The National Map
Your Source for Topographic Information

Infrastructure

Construction and Management Lidar Applications

- Route, grade, line-of-sight, and utility surveys and corridor mapping
- Terrain and other obstruction identification
- Dam, levee, and coastal structure failure modeling and mitigation
- Hydraulic and hydrologic modeling
- Geotechnical evaluations
- Permit application and construction plan development and evaluation
- As-built model development
- Preliminary engineering, estimate development, and quantity estimation activities



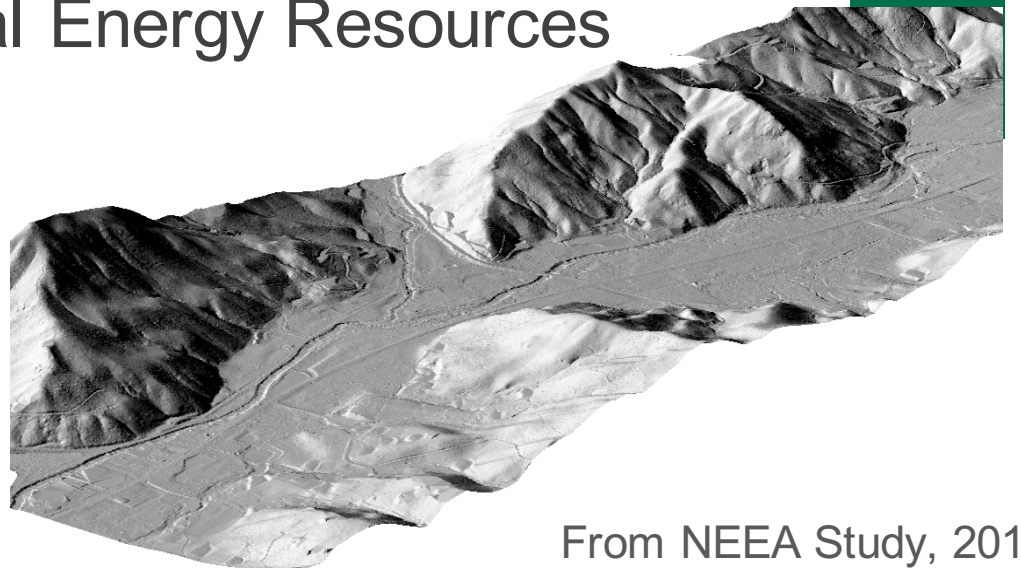
Pittsburgh, PA

Powering Our Future

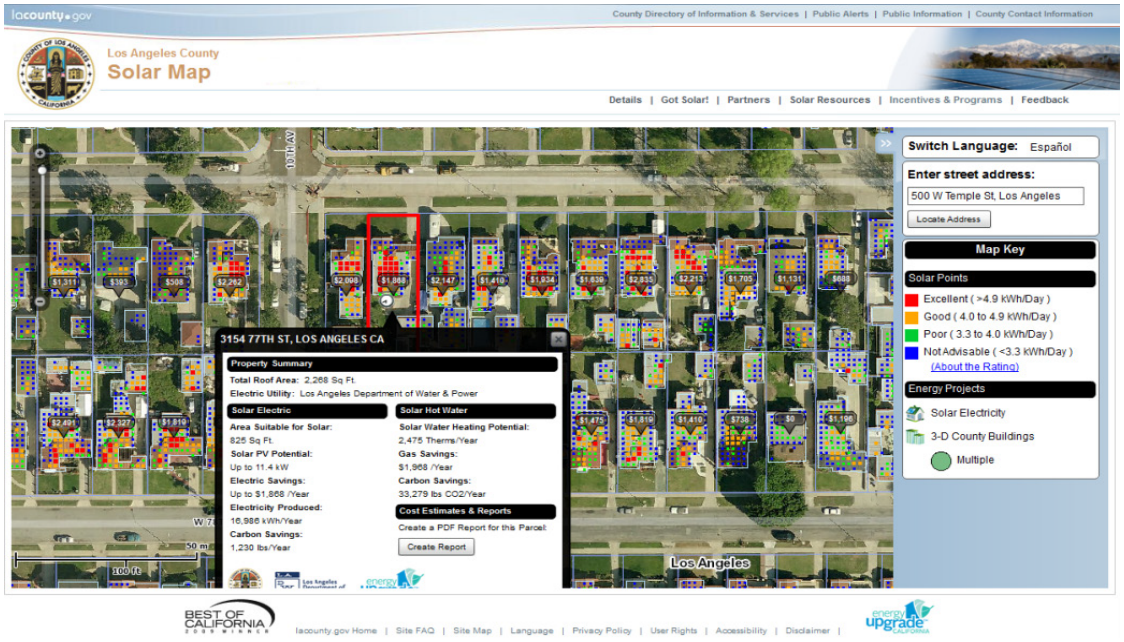
Alternative and Conventional Energy Resources

Lidar are essential for:

- Calculating wind potential
- Planning, construction and operation of hydro power
- Routing transmission lines and pipelines, construction planning, encroachment control, and asset inventories
- Determining solar potential - lidar provides roof pitch/aspect, etc.



From NEEA Study, 2011

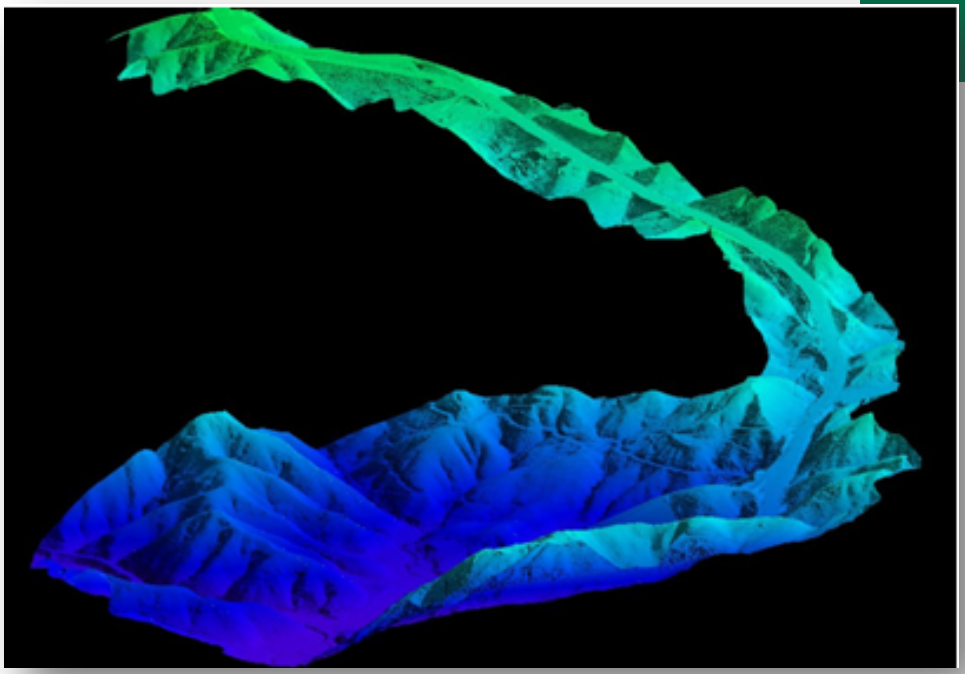


USGS science for a changing world

The National Map
Your Source for Topographic Information

Land Navigation and Safety

Combined use of lidar and imagery for road surveys reduces costs for state and county DOTs



- New cars and trucks will use lidar for transmission control to reduce fuel usage and emissions and provide driver fatigue warnings
- Manufacturers estimate 4 -12% savings in fuel usage are possible
- A 1% reduction in fuel consumption saves $6B per year

Images from Tuck Mapping Solutions

USGS science for a changing world

The National Map Your Source for Topographic Information

Building a Landscape-Level Understanding of our Resources

Landslide hazards John Day, OR area

- Aerial photo image (top)
- Lidar image (bottom) of same area provides visible evidence of landslide activity

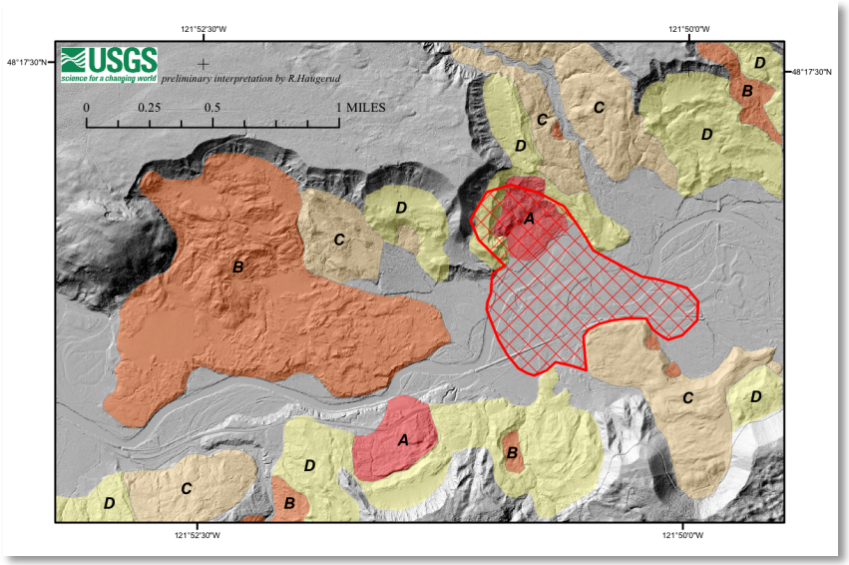
OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES 1937

USGS science for a changing world

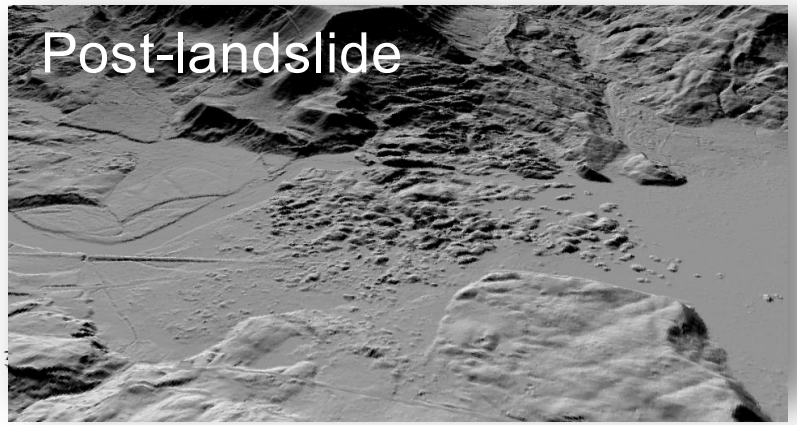
The National Map Your Source for Topographic Information

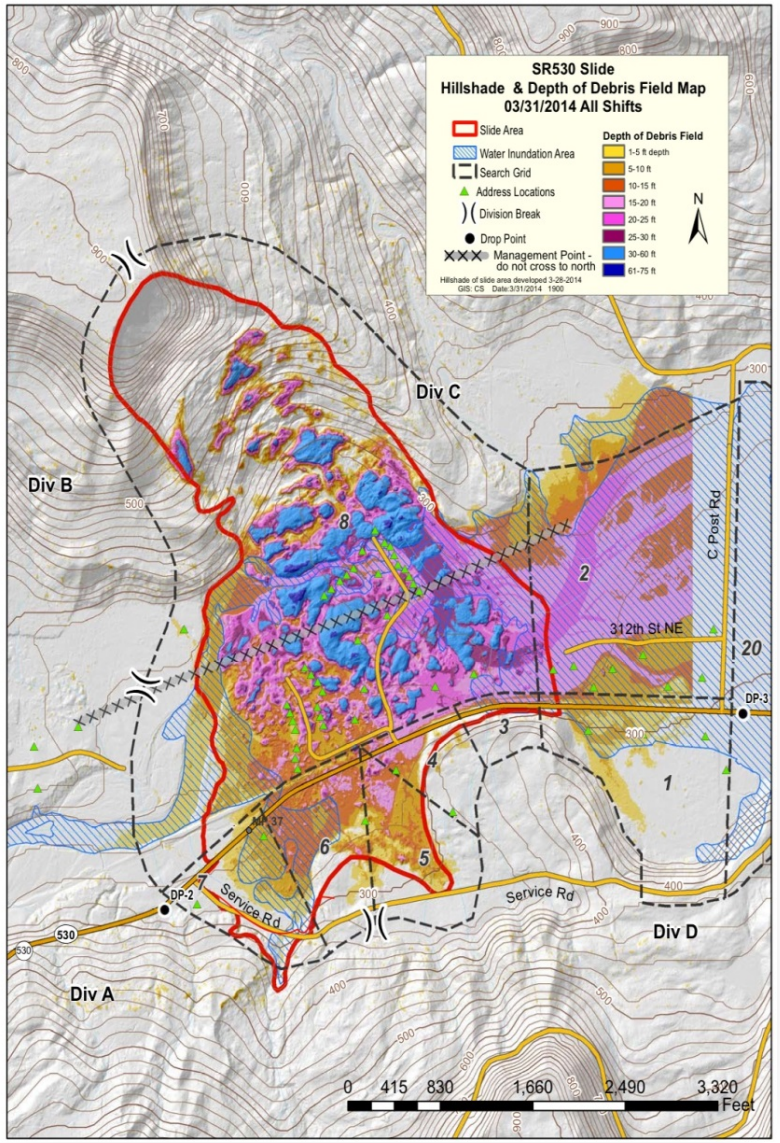
Building a Landscape-Level Understanding of our Resources

Oso, WA Landslide March 22, 2014



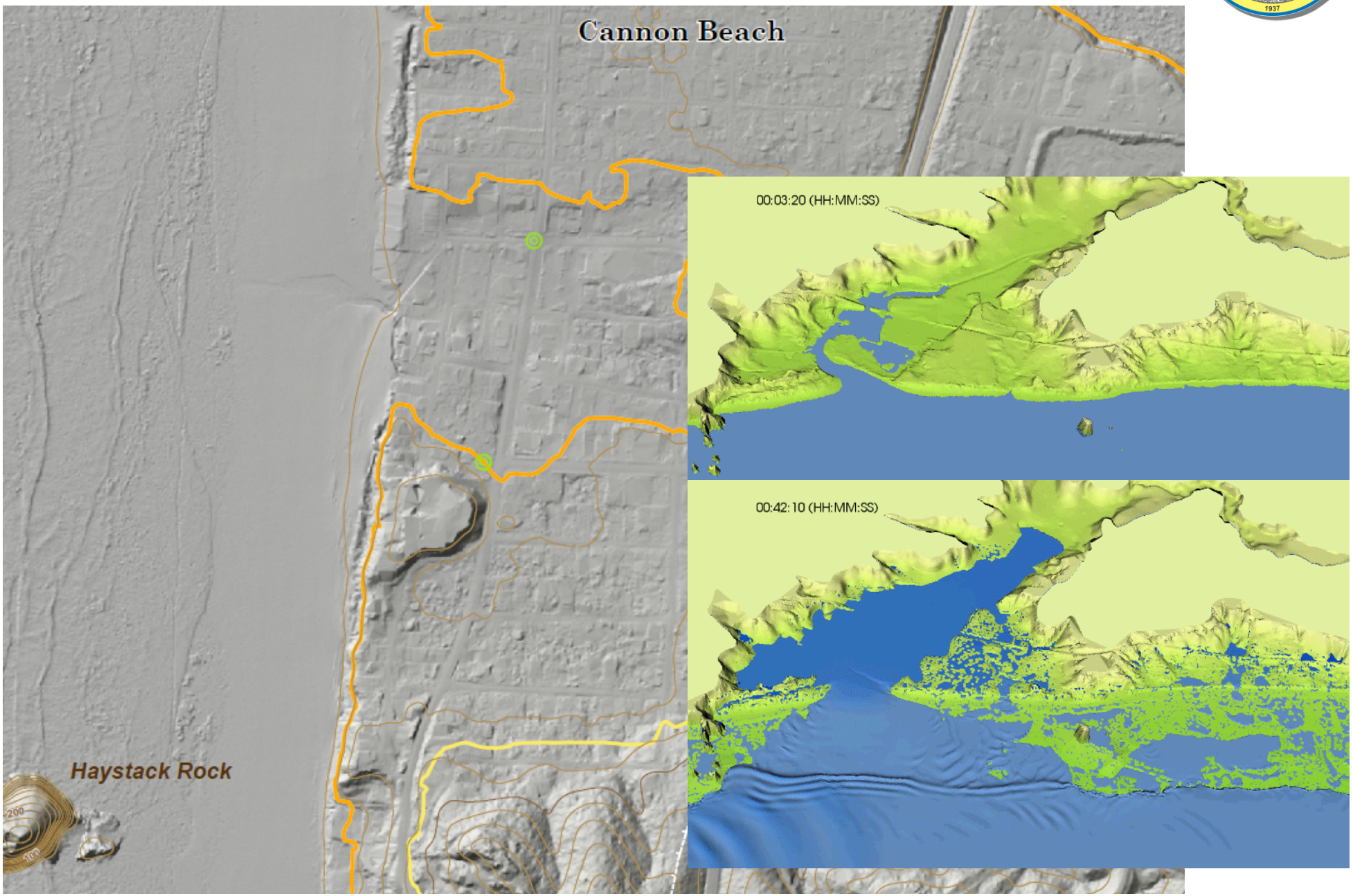
Lidar reveals historic and potential slides





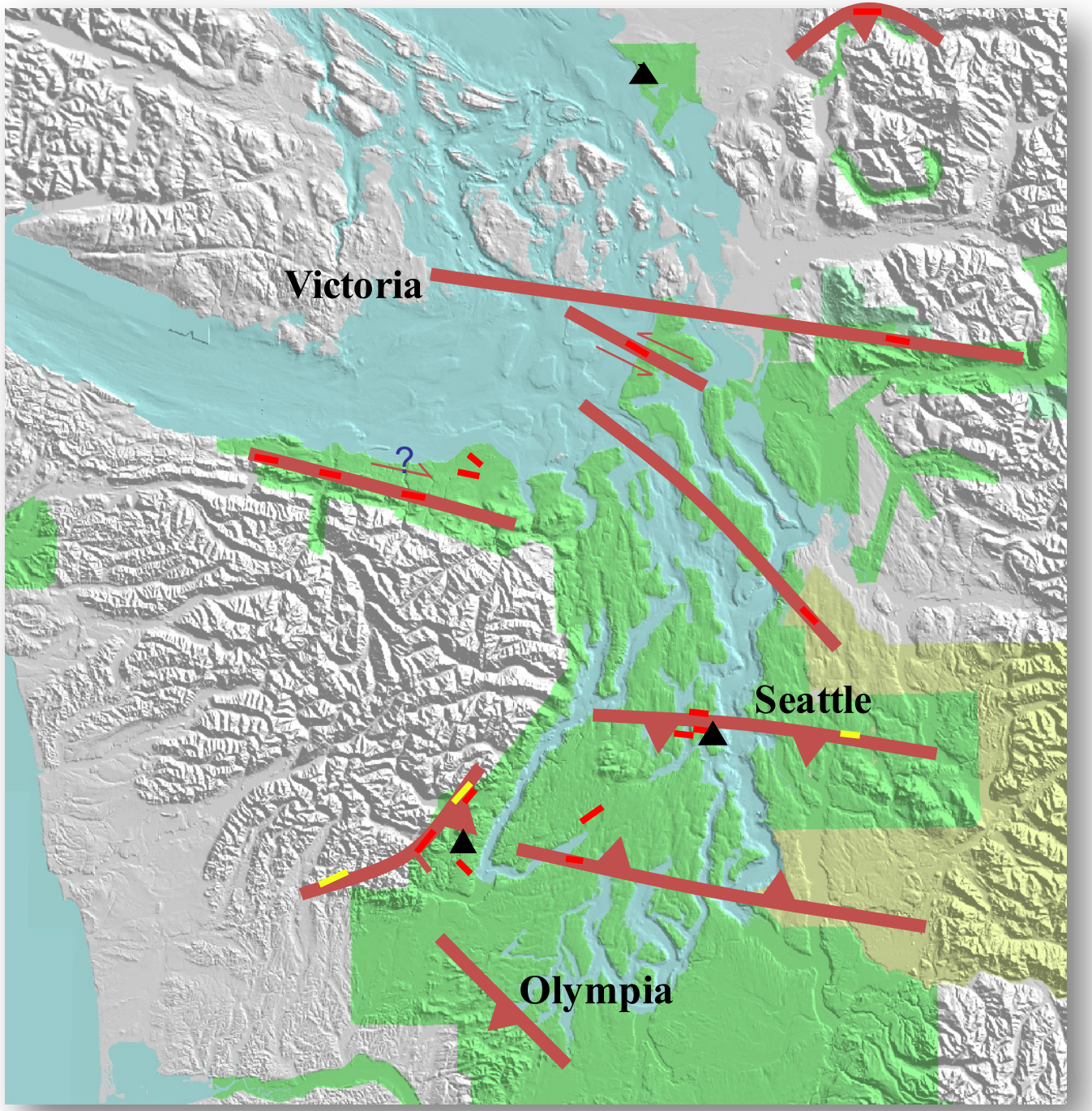
USGS science for a changing world

Tsunami Inundation



Hazards

Detecting Faults



Scarp found with lidar

Scarp found other means

Geomorphic evidence of shoreline uplift

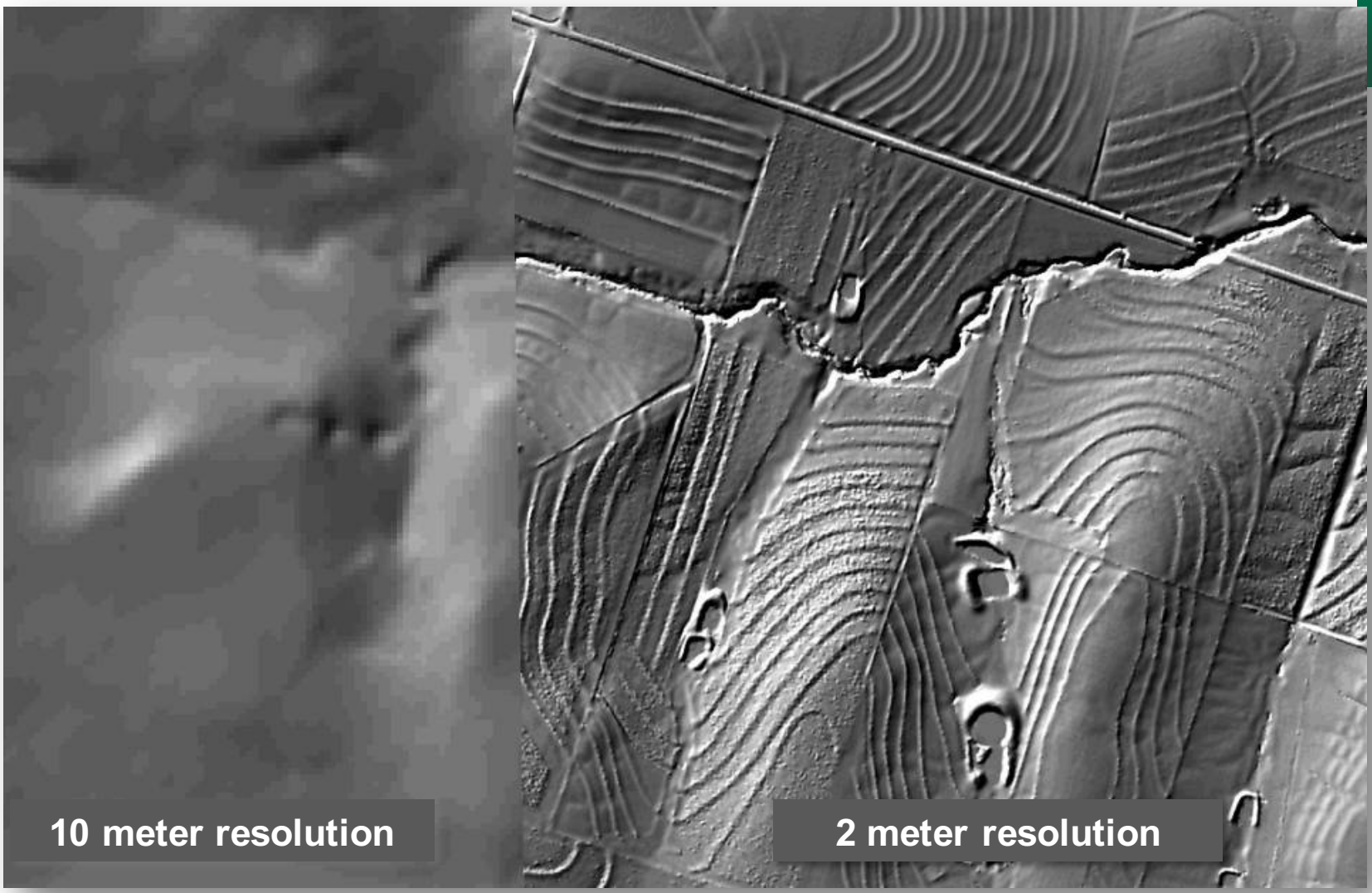
USGS science for a changing world

The National Map Your Source for Topographic Information

Holocene Tectonism PI: Ralph Haugerud, USGS

Enabling Precision Agriculture

Improved Data Quality



USGS science for a changing world

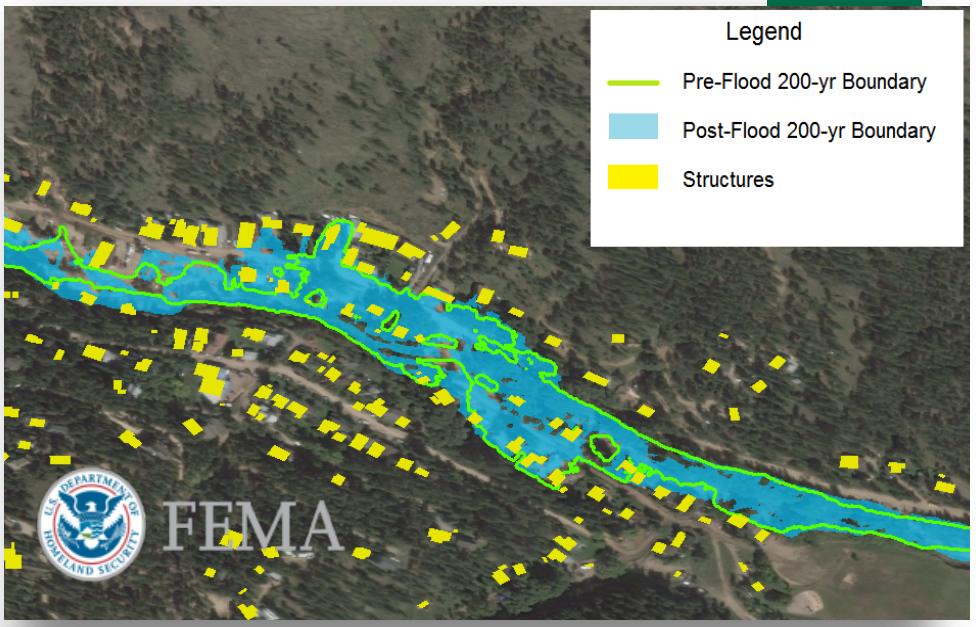
The National Map
Your Source for Topographic Information

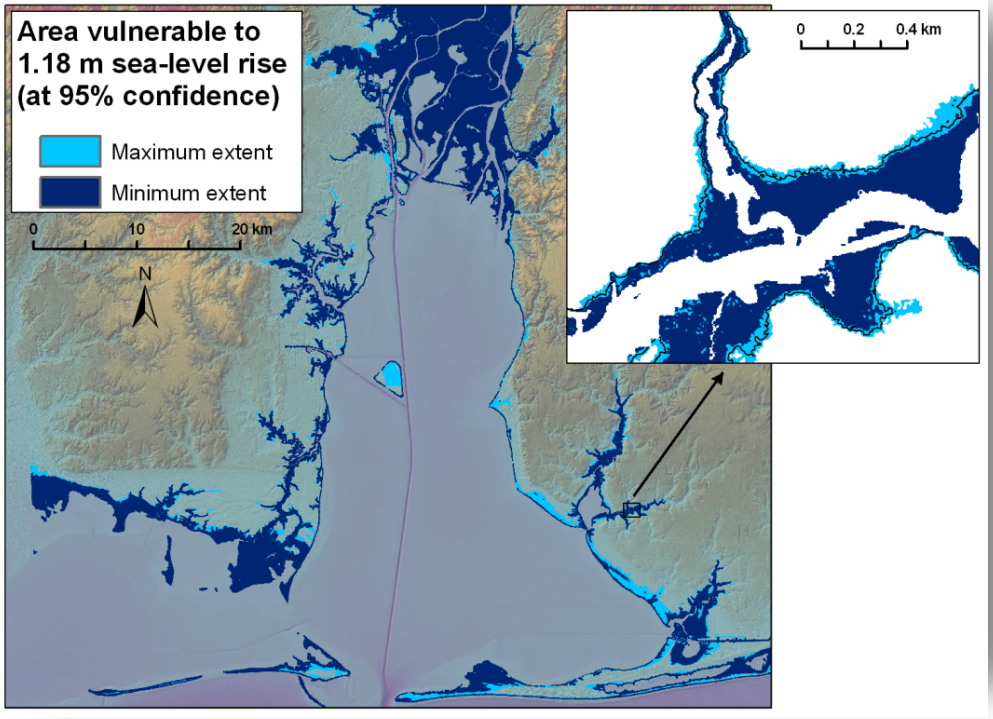
Courtesy of NRCS

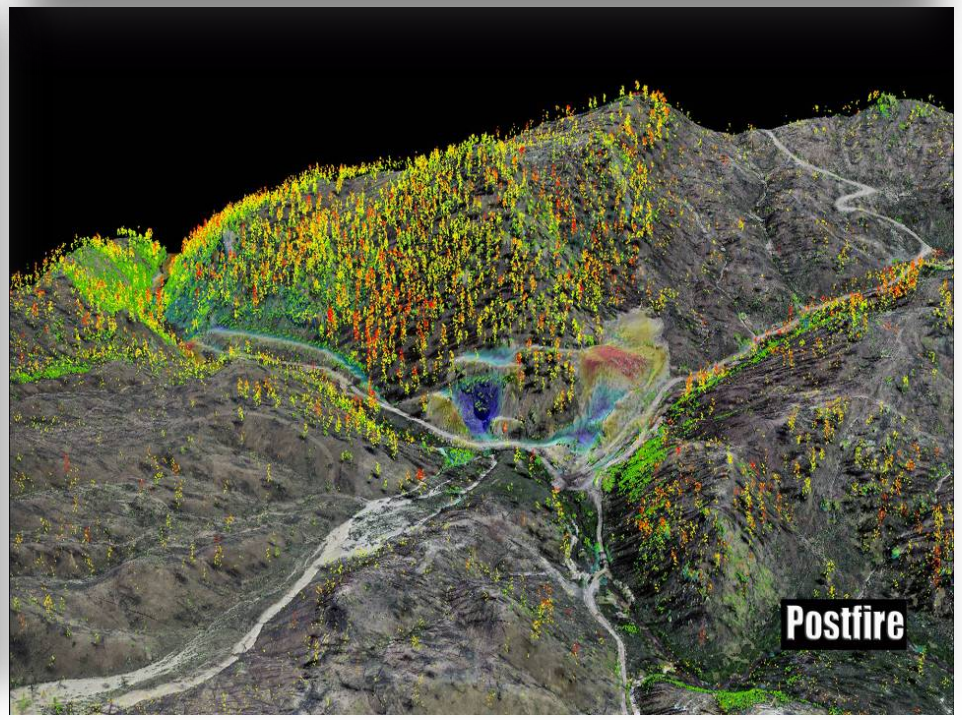
Climate Resilience

Cross-Cutting Priority

- Subsidence
- Flood Risk Mapping
- Wildfire Preparedness and Response







3DEP is a Partnership Program

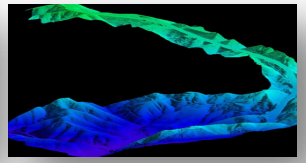
- National lidar coverage with ifsar in Alaska in 8 years
- Address the mission-critical requirements of 34 Federal agencies, 50 states, and other organizations documented in the National Enhanced Elevation Assessment
- Return on investment 5:1, designed to conservatively provide new benefits of $690 million/year with the potential to generate $13 billion/year in new benefits through applications that span the economy
- 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 lidar and ifsar elevation data products and services


Natural Resource Conservation


Infrastructure Management


Flood Risk Mitigation


Precision Farming


Land Navigation and Safety


Geologic Resources and Hazards Mitigation

USGS science for a changing world

The National Map Your Source for Topographic Information

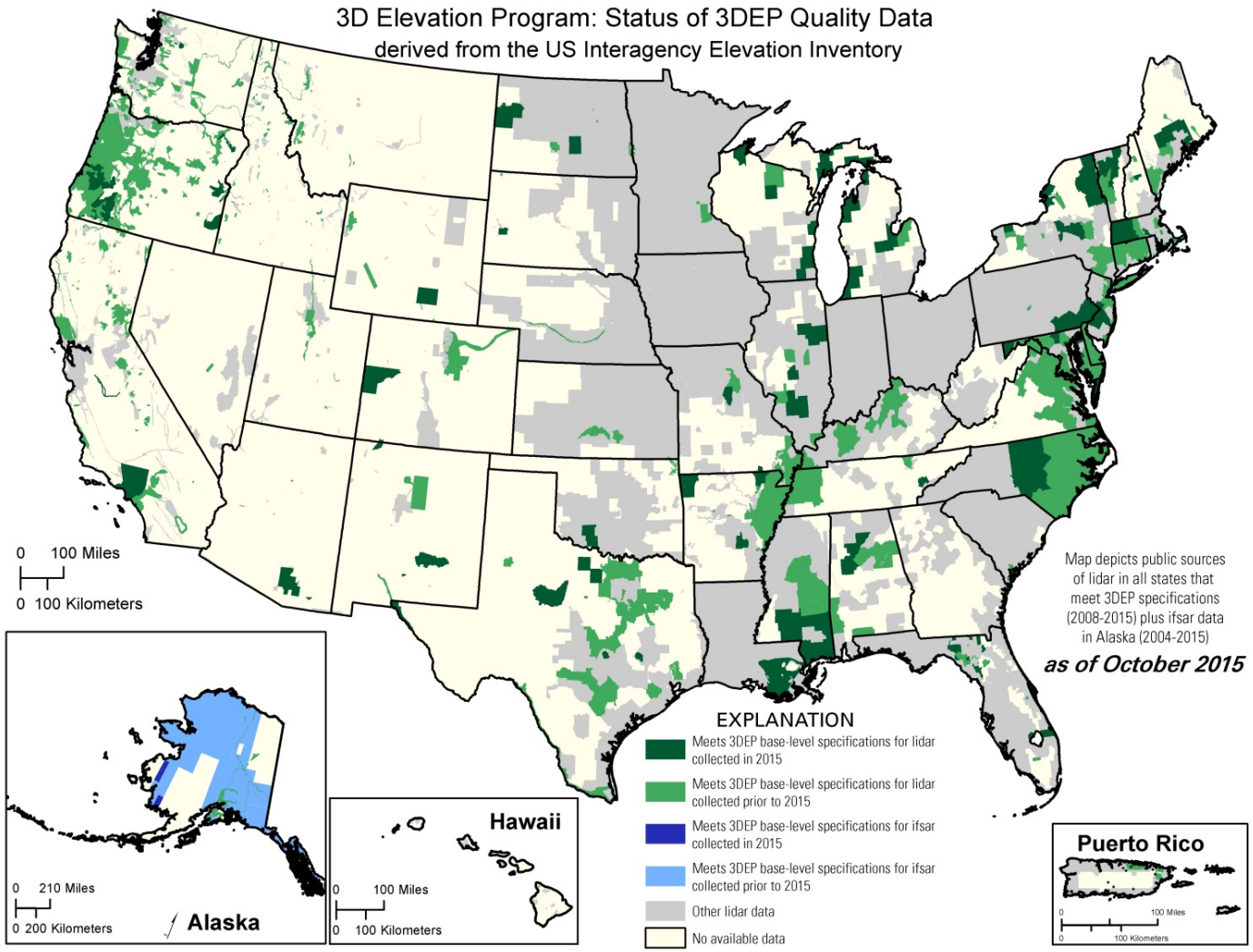
National Enhanced Elevation Assessment

Summary of Benefits for Top Business Uses

Rank		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**

U.S. Interagency Elevation Inventory

Data Acquired through FY 2015



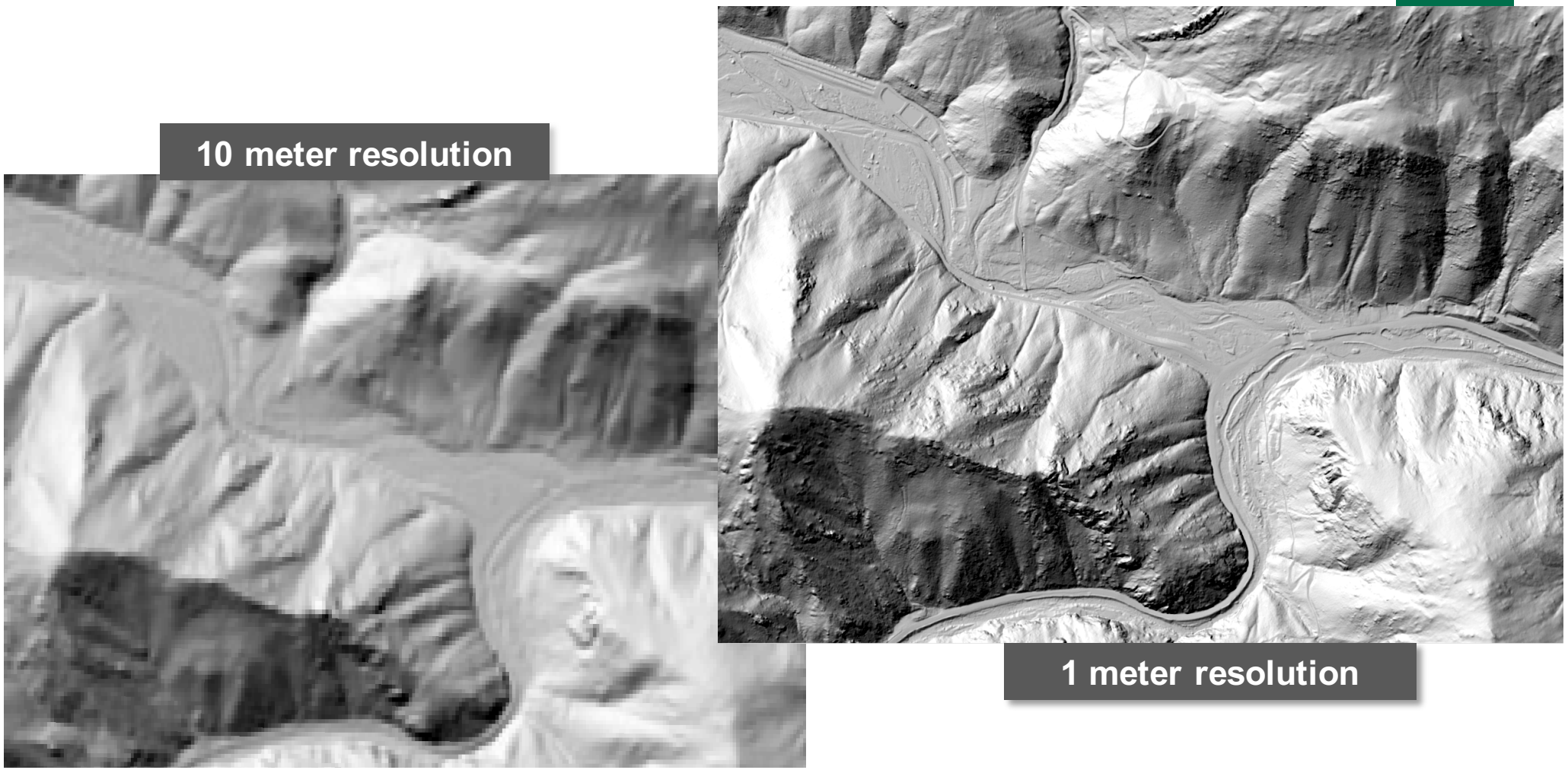
- **3.4% of entire US was acquired to 3DEP quality in FY15 -** includes complete, in progress, and planned/funded
- **13.9% of Lower 49 Meets 3DEP quality** (2008-2015 only)
- **63.6% of AK Meets 3DEP quality (QL5 – ifsar)**

USGS science for a changing world

The National Map
Your Source for Topographic Information

3DEP Data Quality

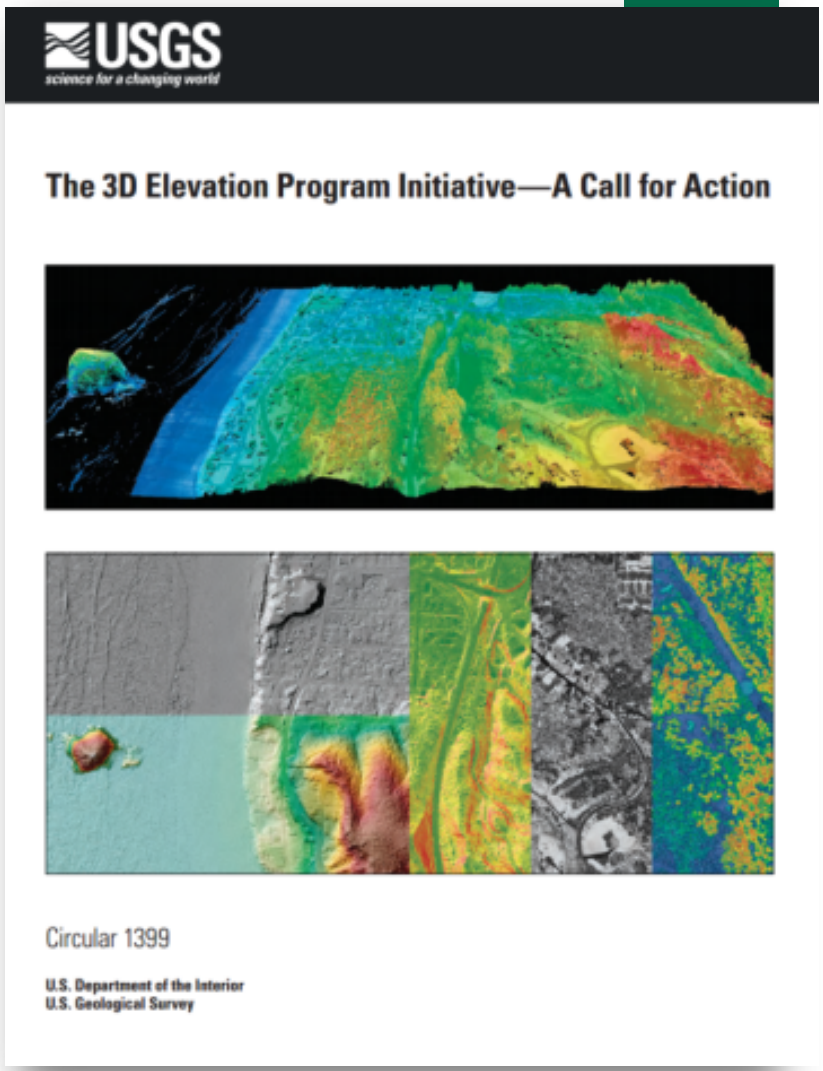
Improves and Enables Applications



3DEP 2012-2015

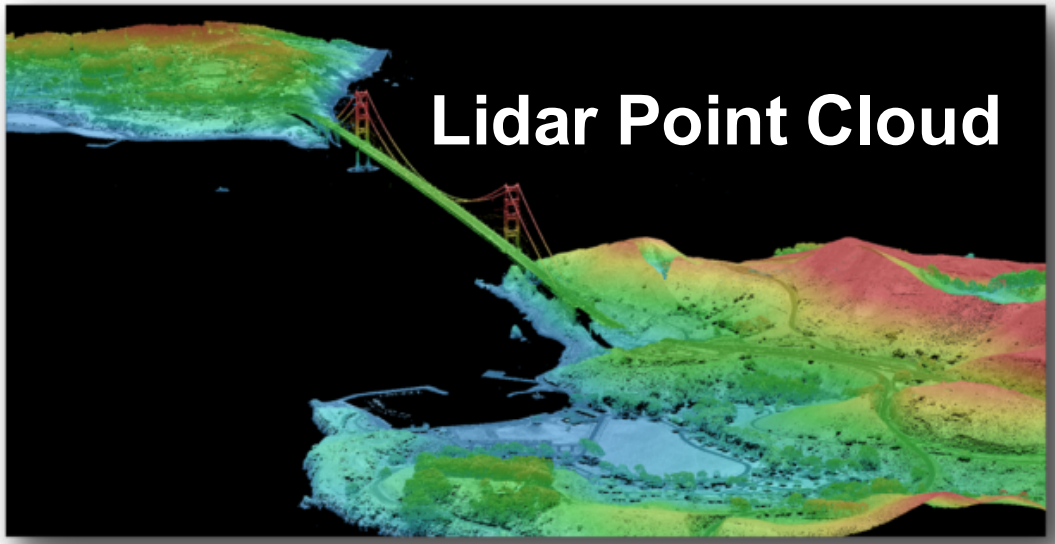
READY for a national, 8-year program

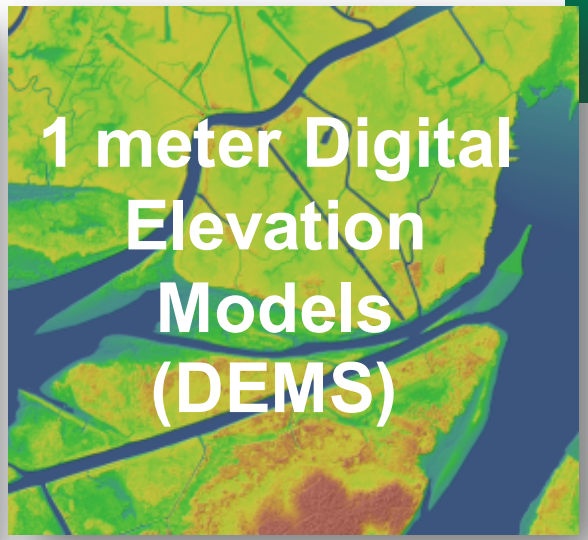
- Published plan for action based on extensive stakeholder input
- Issued the first Broad Agency Announcement in 2014, to solicit partnerships; second round in progress
- Consolidated and modernized IT systems, ready for first phase of cloud implementation
- Contracts (GPSC3) being established to address increased data volume
- Revised the base lidar specification to 3DEP quality levels

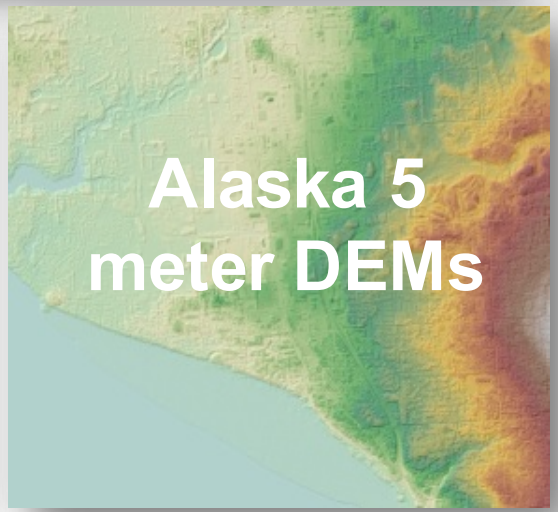


3DEP New Products and Services

In The National Map in 2015







USGS science for a changing world

The National Map
Your Source for Topographic Information

3DEP

Support for a National Lidar Program

Endorsements

Letters of endorsement and congressional support:

- American Society for Photogrammetry and Remote Sensing (ASPRS)
- Association of American State Geologists (AASG)
- Association of State Floodplain Managers (ASFPM)
- Coalition of Geospatial Organizations (COGO)
- Management Association for Private Photogrammetric Surveyors (MAPPS)
- National Geospatial Advisory Committee (NGAC)
- National Society of Professional Surveyors (NSPS)
- National States Geographic Information Council (NSGIC)

3DEP 8 Year Plan

Benefits to all levels of Government and the Nation's Taxpayers

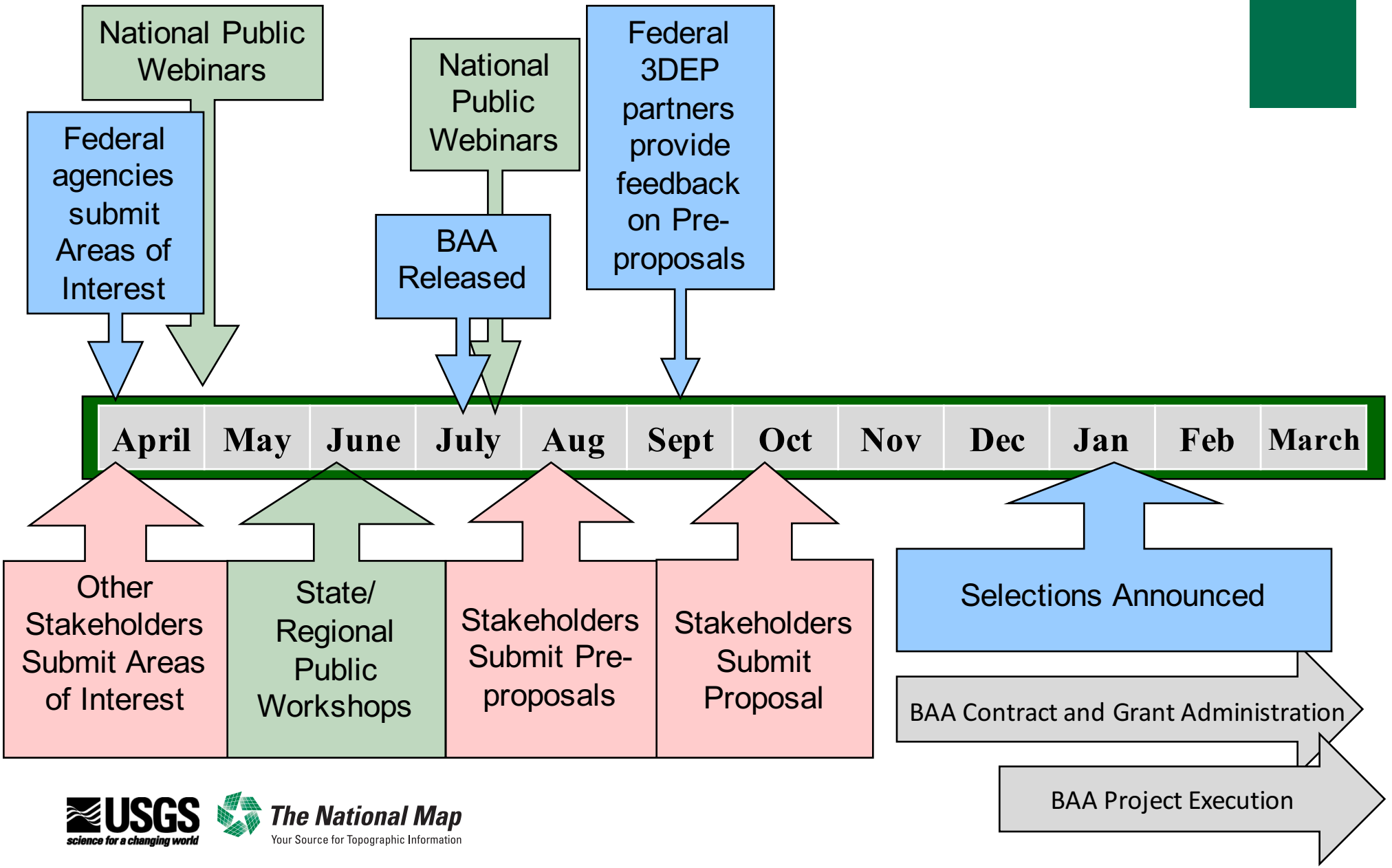
- Reduced unit costs
  - By pooling funding with other partners
  - Through the economy of scale achieved through larger project sizes
- Access to qualified and experienced mapping firms under contract to acquire and process data
- USGS programmatic infrastructure that issues and manages data acquisition contracts, and inspects, accepts, and distributes point cloud and derived data products; reduced costs for not replicating the same infrastructure in multiple agencies
- More consistent data from standardized acquisition and larger project areas
- Increased state, local, tribal and other data acquisition partnerships through advance planning and earlier notification of opportunities enabled by a defined, stable Federal acquisition budget
- The opportunity to "buy up" higher-quality data for specialized applications
- The opportunity to receive 3DEP cost-share funding to acquire lidar data
- Investments are maximized by data being made publicly available from one source

3DEP Data Acquisition

Broad Agency Announcement (BAA)

- Provides detailed information on how to partner with the USGS and other Federal agencies to acquire 3DEP quality data
- Announced at Fed Biz Opps and Grants.gov
- Partners may propose contributing funds toward a lidar data acquisition project using the USGS Geospatial Products and Services Contracts or they may request 3DEP funds toward a lidar data acquisition project using the partner's contract
- Provides a systematic, transparent process for non-Federal agencies to partner with Federal agencies - state and local governments, tribes, academic institutions and the private sector are eligible to submit proposals
- Begun in FY15 and second round for FY16 is in progress
- Augmented with additional Federal investments throughout the year

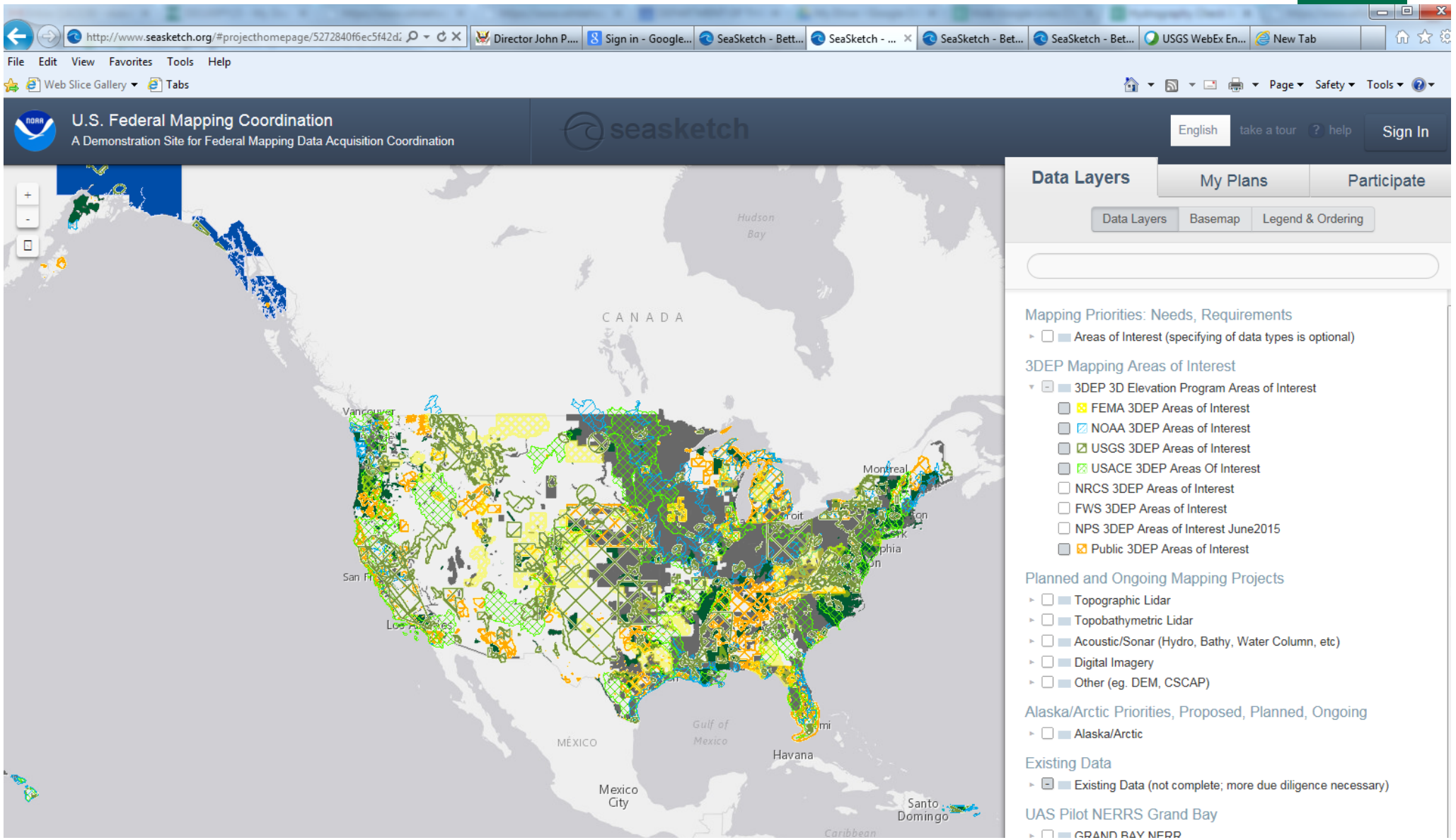
3DEP Annual BAA Cycle



USGS science for a changing world

The National Map
Your Source for Topographic Information

Interagency Tool for Sharing Areas of Interest



USGS science for a changing world

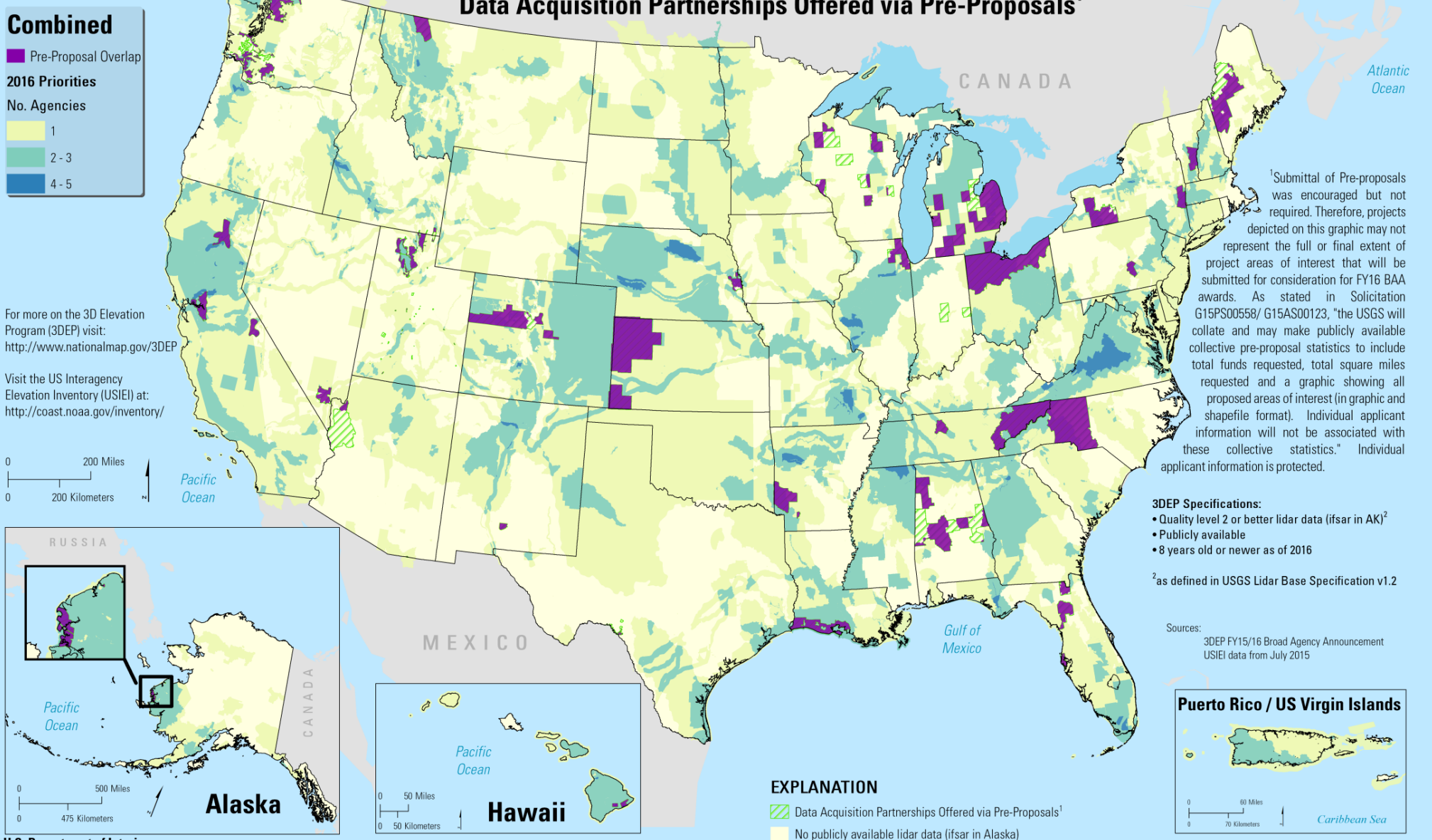
The National Map Your Source for Topographic Information

USGS science for a changing world

The National Map
Your Source for Topographic Information

As of 9/11/2015

3D Elevation Program: FY15/16 BAA Federal Priority Overlap Data Acquisition Partnerships Offered via Pre-Proposals[1]



For more on the 3D Elevation Program (3DEP) visit:
http://www.nationalmap.gov/3DEP

Visit the US Interagency Elevation Inventory (USIEI) at:
http://coast.noaa.gov/inventory/

[1]Submittal of Pre-proposals was encouraged but not required. Therefore, projects depicted on this graphic may not represent the full or final extent of project areas of interest that will be submitted for consideration for FY16 BAA awards. As stated in Solicitation G15PS00558/ G15AS00123, "the USGS will collate and may make publicly available collective pre-proposal statistics to include total funds requested, total square miles requested and a graphic showing all proposed areas of interest (in graphic and shapefile format). Individual applicant information will not be associated with these collective statistics." Individual applicant information is protected.

3DEP Specifications:
- Quality level 2 or better lidar data (ifsar in AK)[2]
- Publicly available
- 8 years old or newer as of 2016

[2]as defined in USGS Lidar Base Specification v1.2

Sources:
3DEP FY15/16 Broad Agency Announcement
USIEI data from July 2015

EXPLANATION
- Data Acquisition Partnerships Offered via Pre-Proposals[1]
- No publicly available lidar data (ifsar in Alaska)

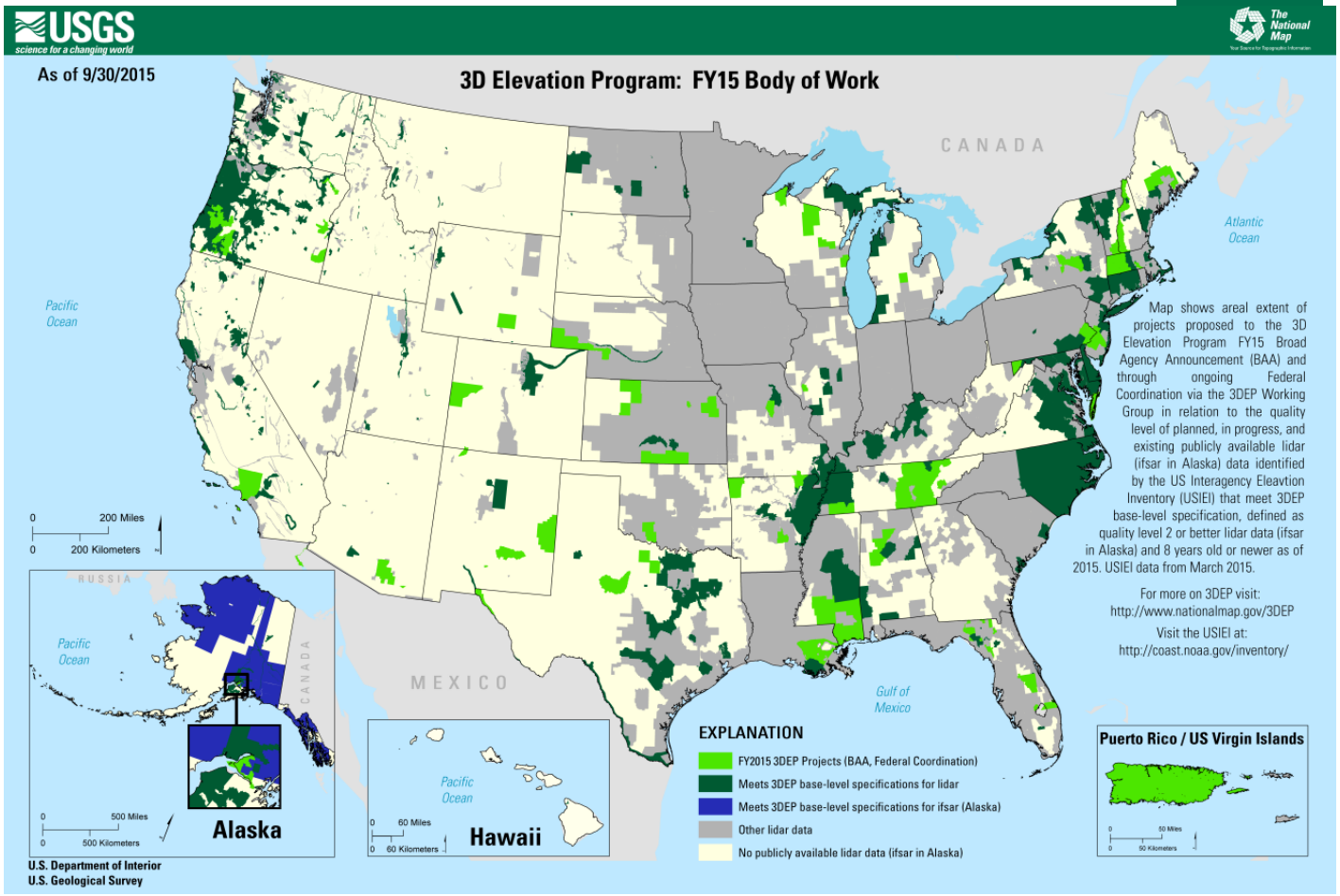
U.S. Department of Interior
U.S. Geological Survey

USGS science for a changing world

The National Map
Your Source for Topographic Information

FY15 3DEP Summary

Lidar Data Acquisition

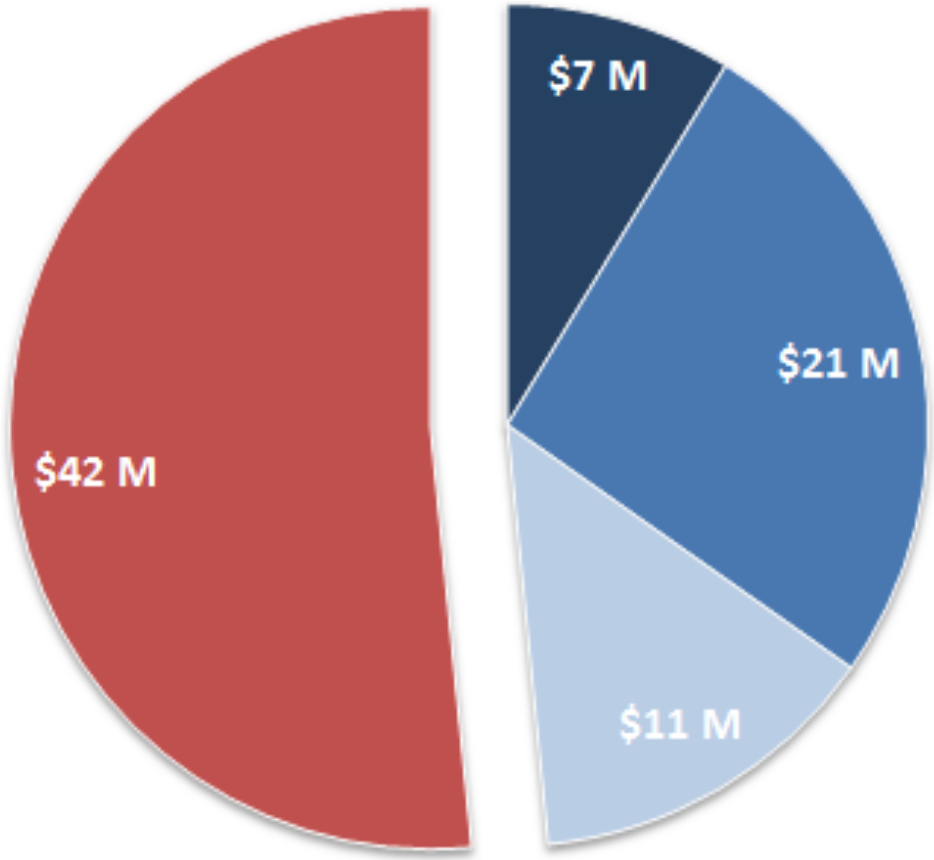


3DEP Lidar Data Contracted in FY15

3DEP Funds $M			Partner Funds $M		Total $M	Sq Miles
USGS	FEMA	NRCS	Other Feds	Non-Fed		
$7.2	$11.2	$7.1	$2.5	$11.0	$39.0	150,000
$25.5			$13.5			

3DEP Data Acquisition Funding

FY15 vs Funding needed for 8 Year Program



FY15 3DEP Data Acquisition

- USGS
- Other Federal Agencies
- Other Partners (non-Federal)
- GAP in annual funding needed for 8 year program

3DEP 2016 Awards that Include County Investment
as of 02/15/16 – selection on-going

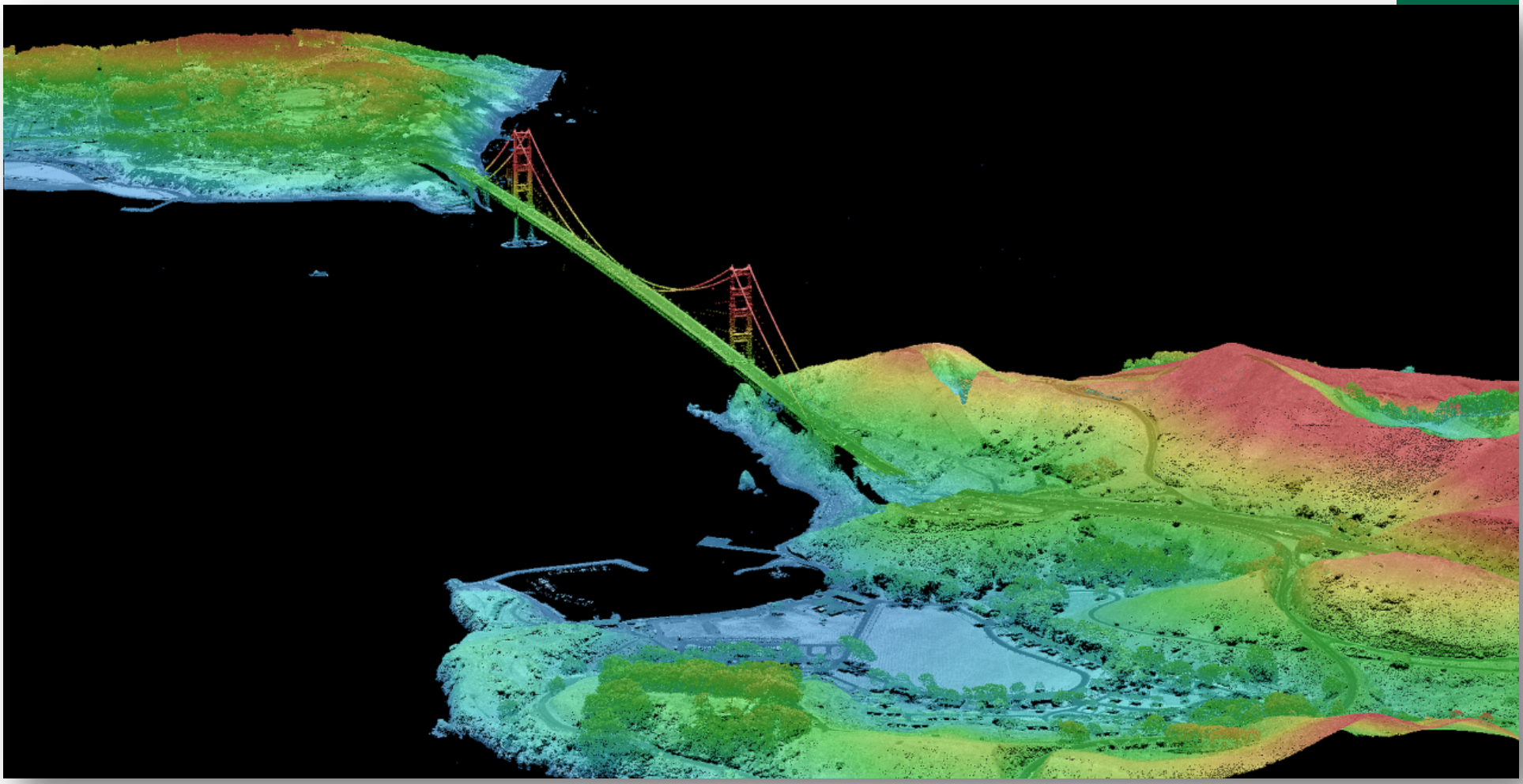
State	Primary Partner	Project Size (Square Miles)	# of Counties investing in project	Overall County Investment	% county investment in overall project cost	Contracting Mechanism
AL	AL Department of Economic and Community Affairs, Office of Water Resources Division; AL Geographic Information Office	8845	5	$59,500	13 %	GPSC
CO	CO Geological Survey	6145	1	$125,000	8%	Cooperative Agreement
FL	Palm Beach County Board of County Commissioners	2000	1	$226,300	40%	GPSC
ID	Boise State University; State of Idaho Elevation Techical Working Group	2000	1	$75,000	13%	GPSC
IL	IL 4 Counties: Cook, Kane, Lake, McHenry	3358	4	$745,760	69%	GPSC
PA	Tri-County Regional Planning Commission Dauphin County, PA	555	1	$90,000	57%	GPSC
OH	OH Department of Administrative Services Geographically Referenced Information Program	2483	3	$121,000	22%	GPSC
TN	TN Department of Finance and Administration	8042	4	$212,398	11%	GPSC
WA	WA Department of Natural Resources	5448	1	$205,000	6%	GPSC
WI	WI Department of Administration	432	1	$41,788	50%	Cooperative Agreement
WI	WI Department of Administration	4816	6	$662,199	50%	Cooperative Agreement
	TOTALS	44,124	28	$2.6M		

3DEP Project Selection

Considerations for Counties

- Of the 22 BAA projects that have been selected, 11 included direct contributions from county governments
- The average project size for projects in which counties participated was just over 4,000 square miles – partnerships are key
- County Governments who were part of a larger regional acquisition contributed overall smaller amounts to the project (average of 12%), received better return on investments as the cost was shared by multiple federal, state, local, tribal governments and regional consortiums
- County Governments who were the primary applicant received considerable cost share on their projects by submitting through the BAA
- County Cost share ranged from $1,500 - $255,000; 3DEP provides documentation and tools to encourage and assist in partnership development
- The BAA favors large regional acquisitions; counties part of a larger acquisition receive higher scores and stronger consideration than individual counties

Thank you!



USGS science for a changing world

The National Map
Your Source for Topographic Information

nationalmap.gov/3dep