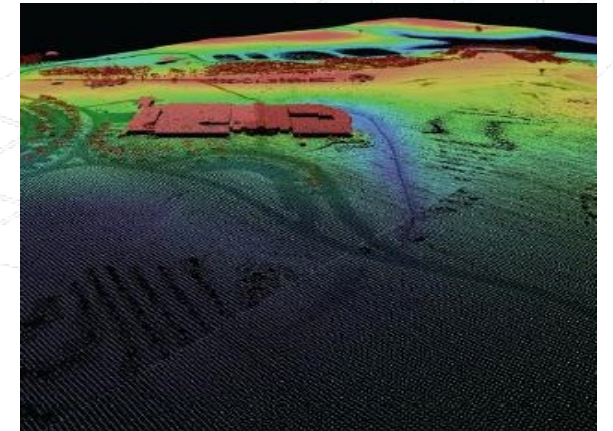
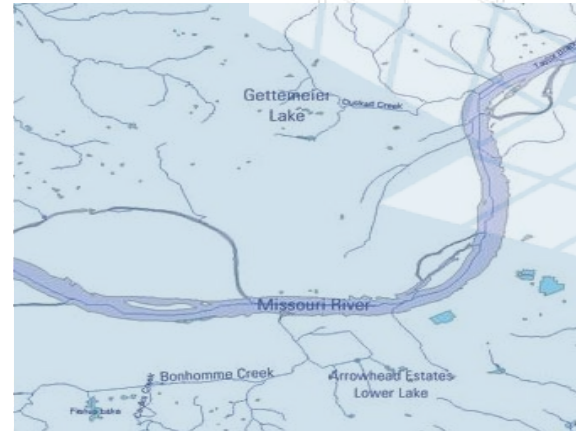
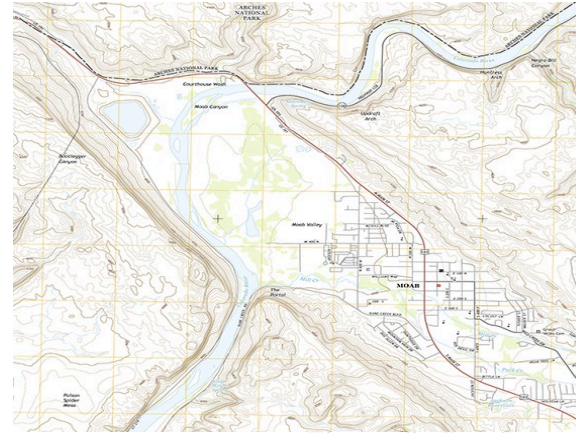


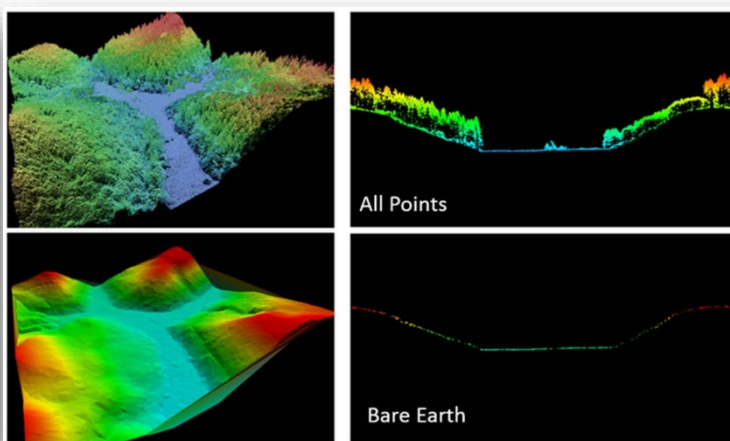
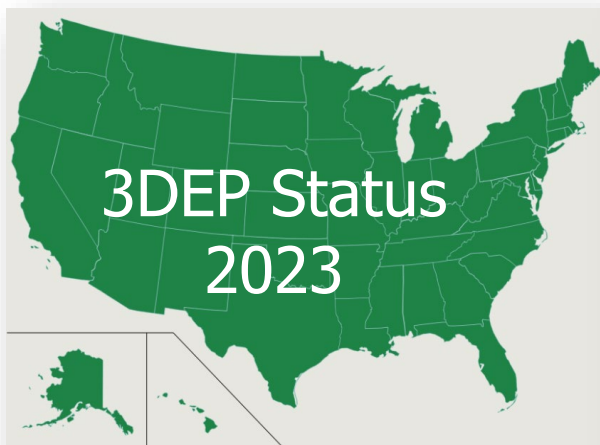


# US Geo Overview: 3D Elevation Program and National Hydrography Datasets



# 3D Elevation Program (3DEP) Goal

- Complete acquisition of nationwide lidar (IfSAR in AK) by 2023 to provide the **first-ever national baseline of consistent high-resolution elevation data – both bare earth and 3D point clouds – collected in a timeframe of less than a decade**
- Address Federal, state and other mission-critical requirements
- Realize ROI 5:1 and potential to generate \$13 billion/year
- Leverage the expertise and capacity of private mapping firms
- Achieve a 25% cost efficiency gain
- Completely refresh national data holdings

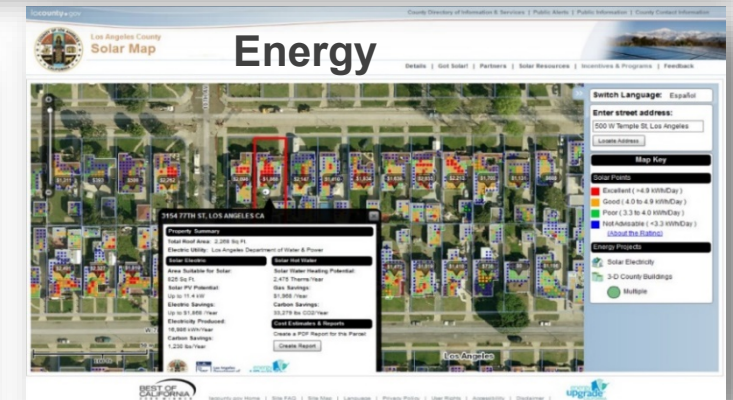
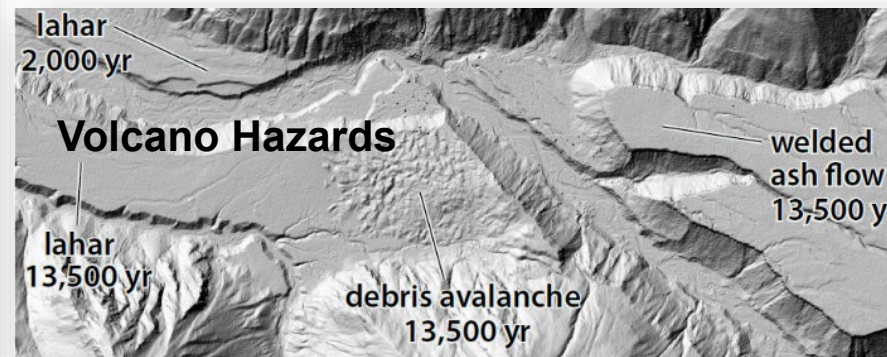
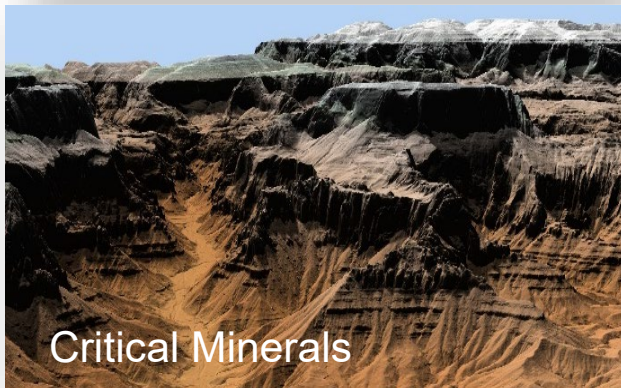
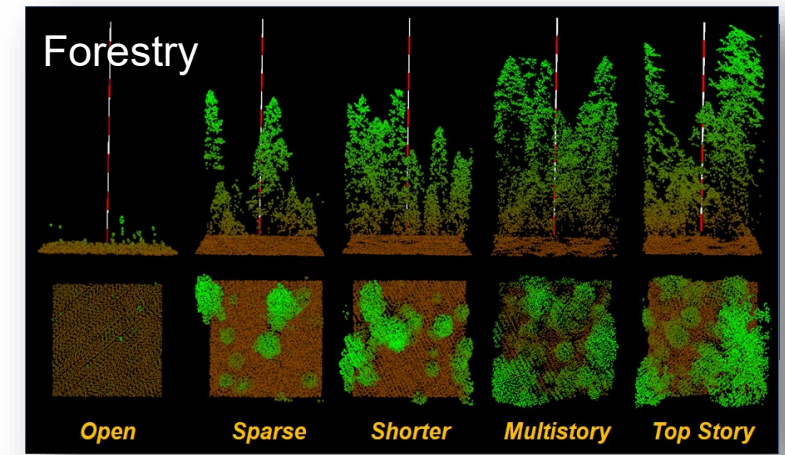
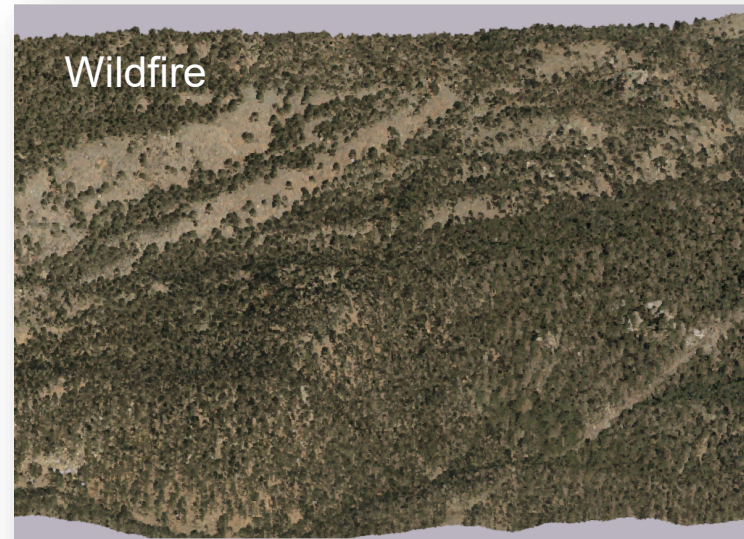
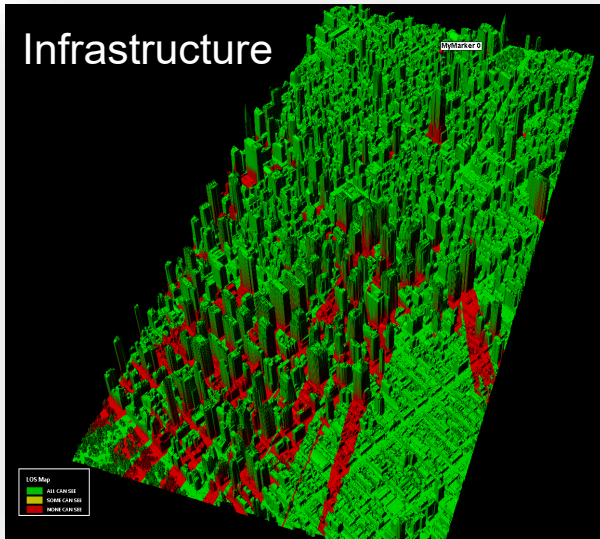


Rank	Business Use	Annual Benefits	
		Conservative	Potential
1	Flood Risk Management	\$295M	\$502M
2	Infrastructure and Construction Management	\$206M	\$942M
3	Natural Resources Conservation	\$159M	\$335M
4	Agriculture and Precision Farming	\$122M	\$2,011M
5	Water Supply and Quality	\$85M	\$156M
6	Wildfire 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



# + 3D Elevation Program (3DEP) Goal

Complete acquisition of nationwide lidar (IfSAR in AK) by 2023 to provide the **first-ever national baseline of consistent high-resolution elevation data** collected in a timeframe of less than a decade

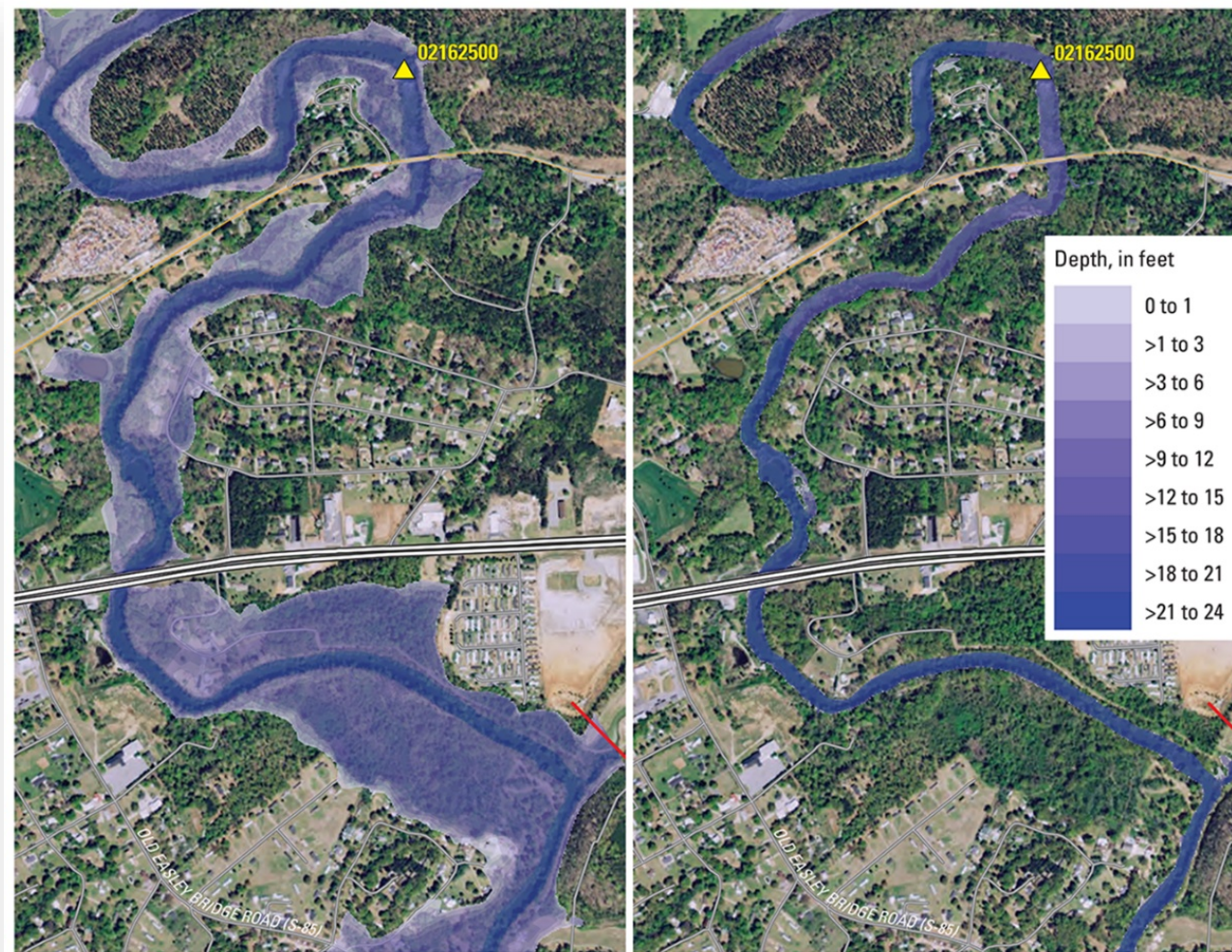




# 3DEP for Flood Risk Management

Lidar is essential for determining where flooding will occur

- Produce higher quality flood maps, including Flood Insurance Rate Maps
- Manage dam and levee safety programs to reduce flood risks
- Improve hydrologic modeling and flood forecasting
- Improve State and local flood risk management and response
- Improve storm water facilities and dam design
- Extract building footprints and identify the finished floor elevation to quantify potential damages based on flooding depths



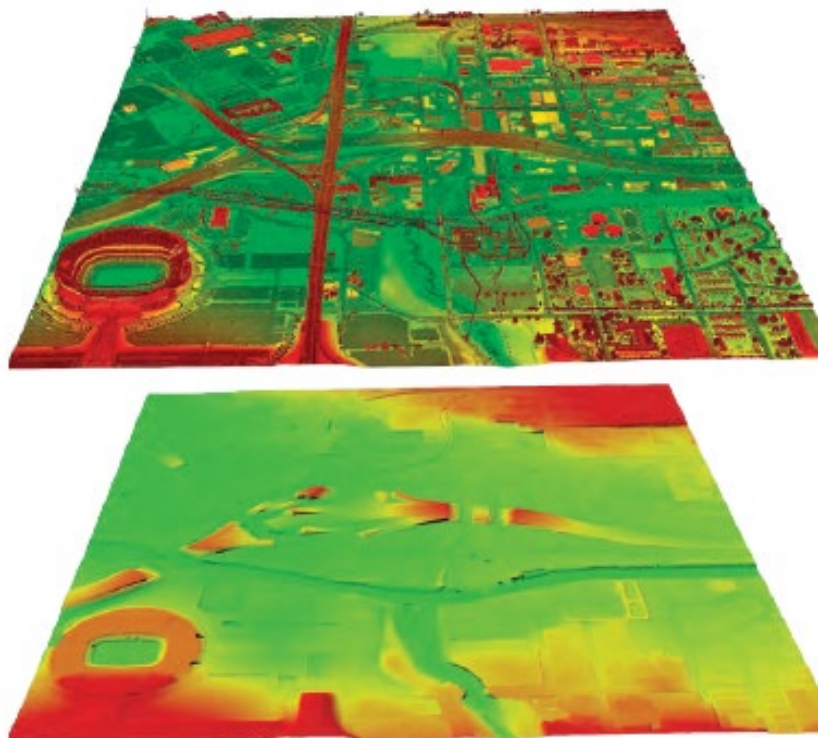


# 3DEP For America's Infrastructure

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

Applications include:

- 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
- Evaluations of geologic, coastal, and other natural hazards, and geotechnical evaluations
- 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
- Bridge site selection
- Base-map and elevation model creation



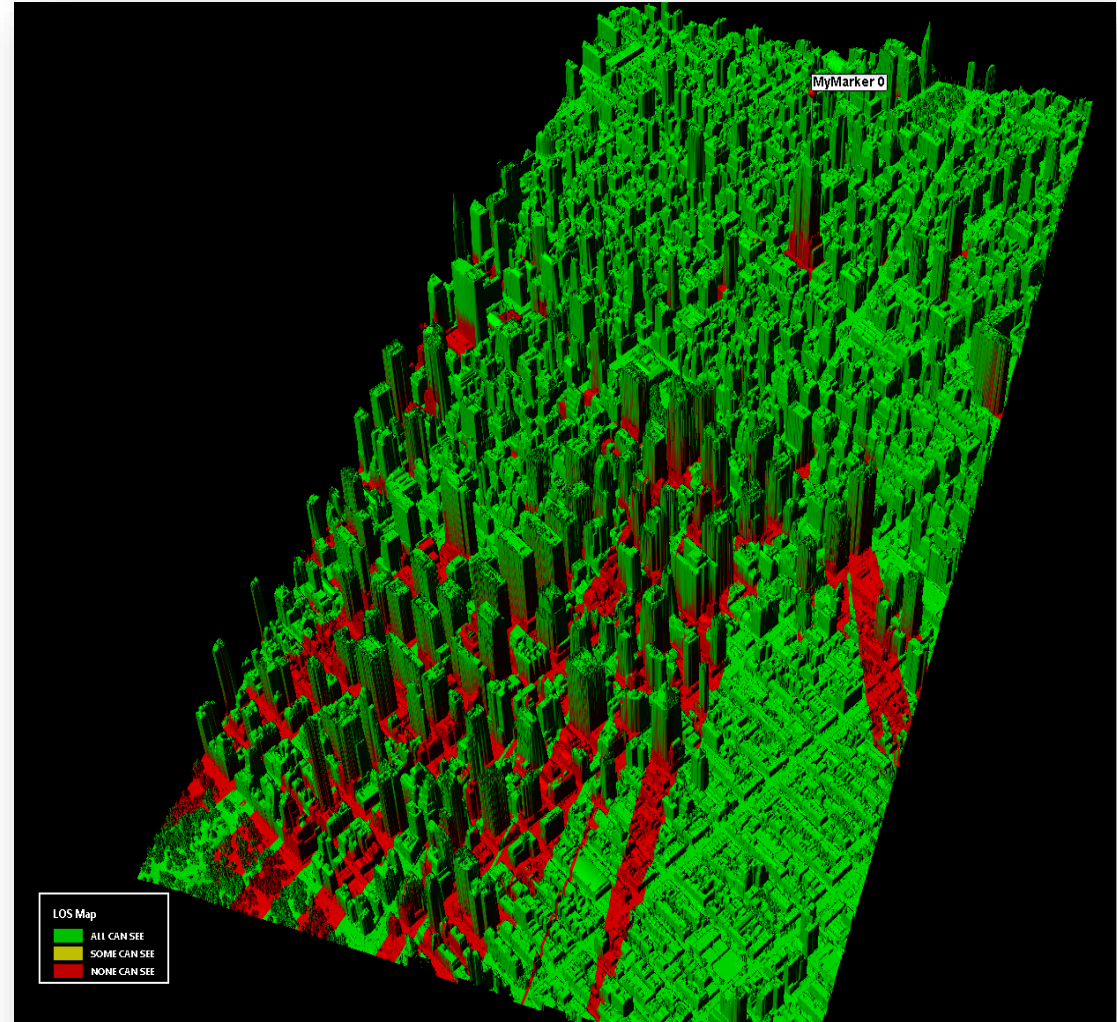
Lidar point cloud (top) and a derived bare-earth digital elevation model (bottom) for Denver, CO



# 3DEP for Broadband

Lidar is essential for permitting, design and siting

- Line-of-sight analyses for signal propagation studies
- Identification of the optimum locations for cell tower networks
- Modeling the potential impact to wireless signals of future development and vegetation growth
- Mapping existing towers and designing and permitting new infrastructure

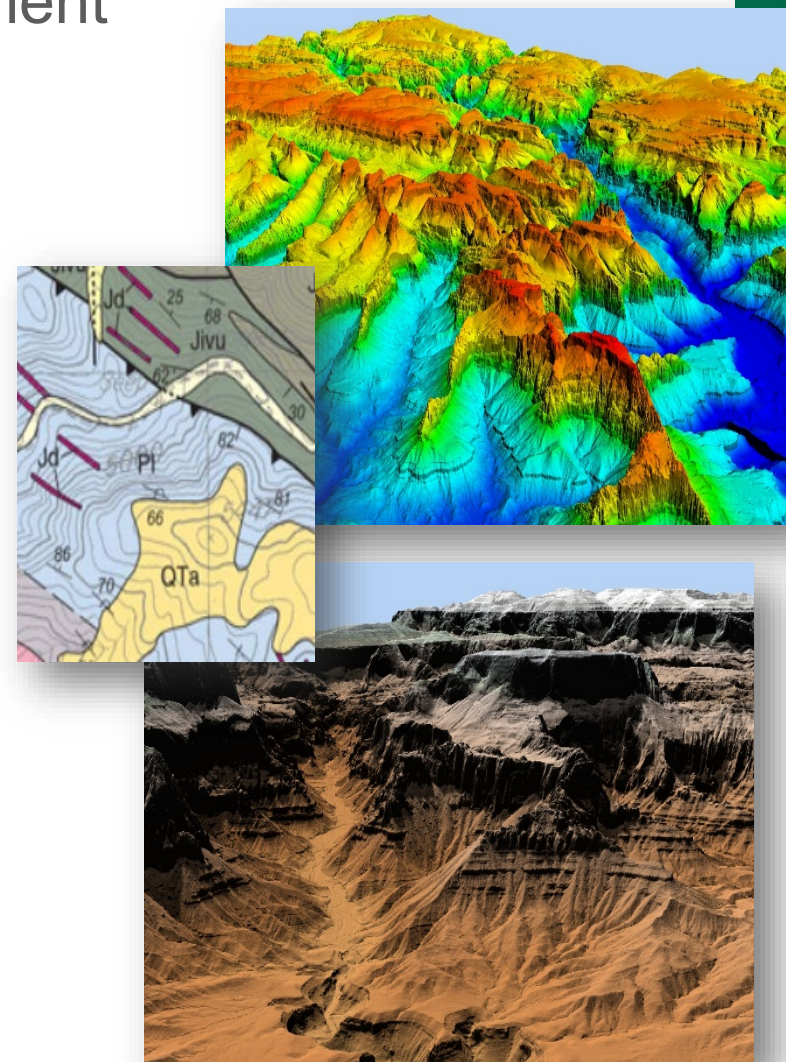




# 3DEP for Critical Mineral Independence

## Lidar is essential for Geologic Resource Assessment

- Critical for mapping young deposits and landforms, which are those most essential to understanding Earth resources
- Underpins geologic mapping that guides assessment and development of solid-Earth resources: base and precious metals, sand and gravel, coal, oil, and natural gas
- Supports site-specific engineering studies by the geotechnical industry
- Improves the efficiency of geologic mapping, dramatically improves the spatial precision of geologic maps, and increases the number of units that can be mapped, in some cases doubling them

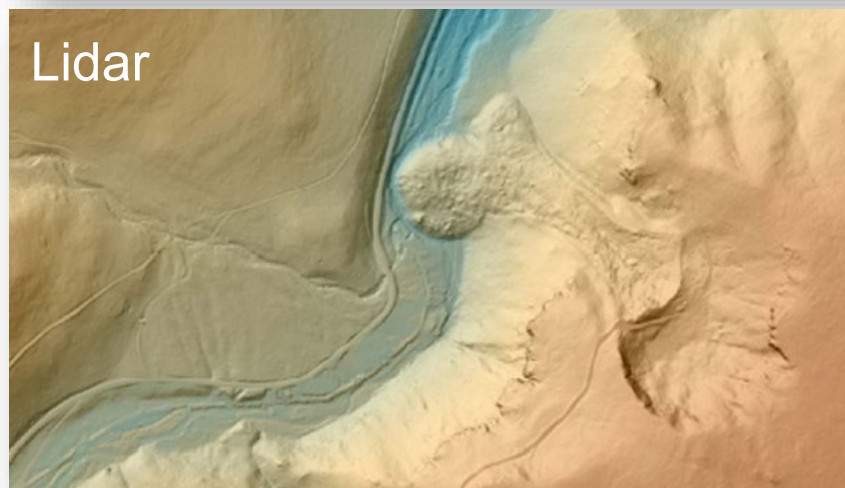




# 3DEP for Landslides

## Recognition, Hazard Assessment, and Mitigation

- Input to slope-stability models used to identify where shallow landslides may mobilize into fast-moving, potentially damaging and deadly debris flows
- Determine boundary and conditions for landslide initiation
- Plan for evacuations and staging areas
- Create accurate landslide inventory and deposits maps
- Estimate the shape and activity of landslides
- Provide baseline information for change-detection comparisons

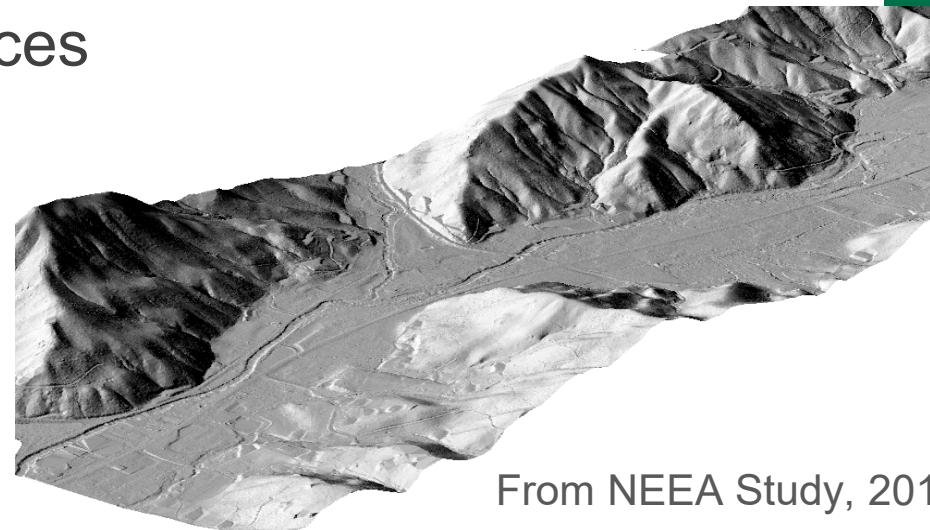




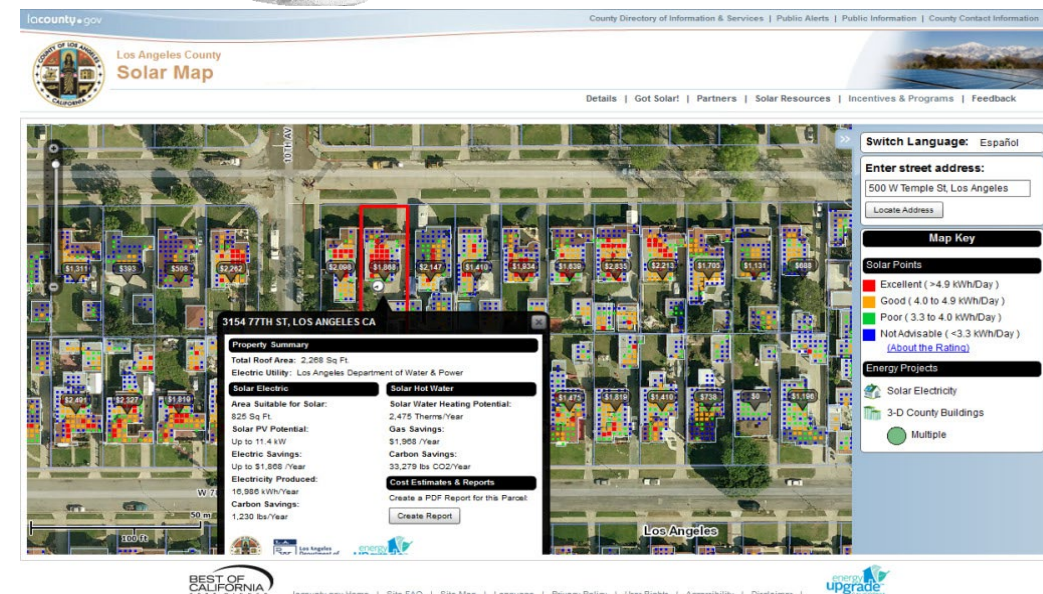
# 3DEP Powering Our Future

## Conventional and Alternative Energy Resources

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



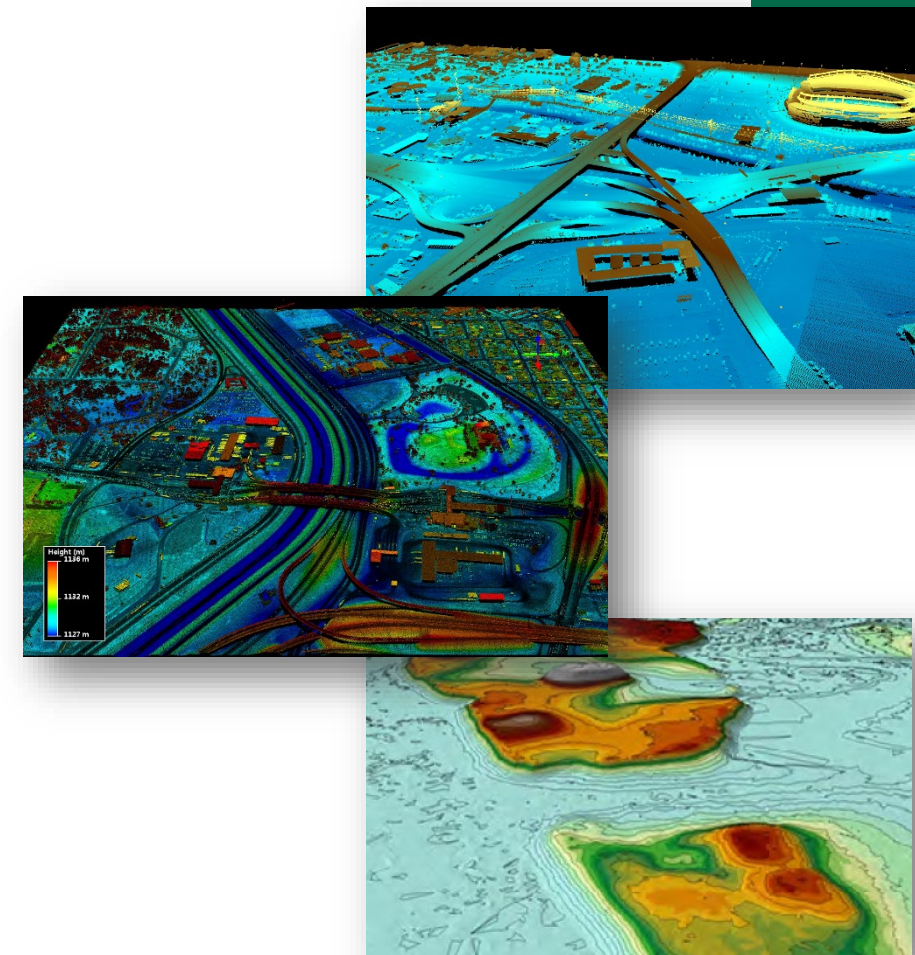
From NEEA Study, 2012



# + 3DEP for Transportation

## Planning and Development

- Economically site new or relocate existing infrastructure facilities and make final design plans
  - Dramatically reduces the amount of time needed to understand the area in 3D compared to surveying
  - Provides greater safety over other traditional surveying methods because it reduces the number of surveyors in traffic
  - Reduces intrusion into private properties
- Common uses include:
  - Calculate cut and fill, culvert sizing, amount of vegetation removal, grade calculation and more
  - Height clearances
  - Right of way and surface conditions
  - Identification of cultural and sensitive sites



The Kentucky Transportation Cabinet realized tremendous savings from compressed design timeframe and reduced fieldwork, including the identification of previously unknown prehistoric and historic earthworks and mounds and other cultural and sensitive sites

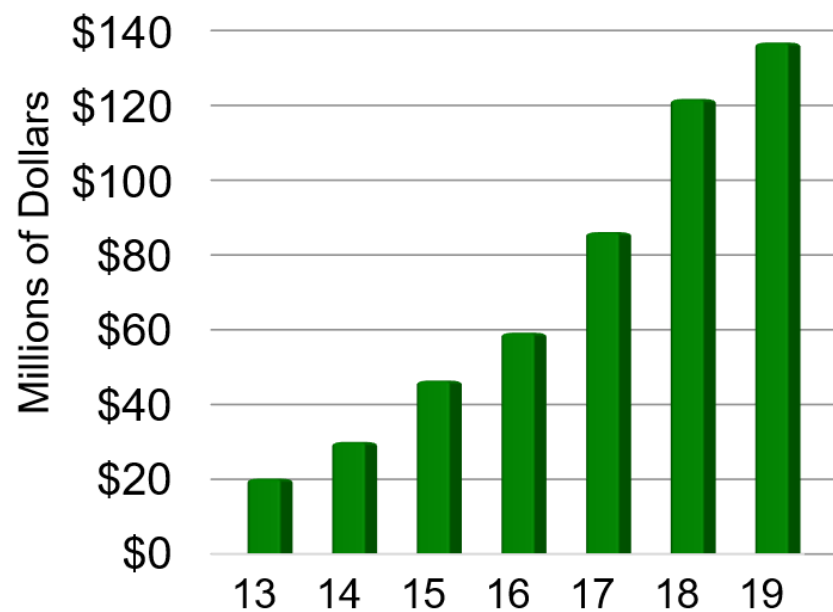




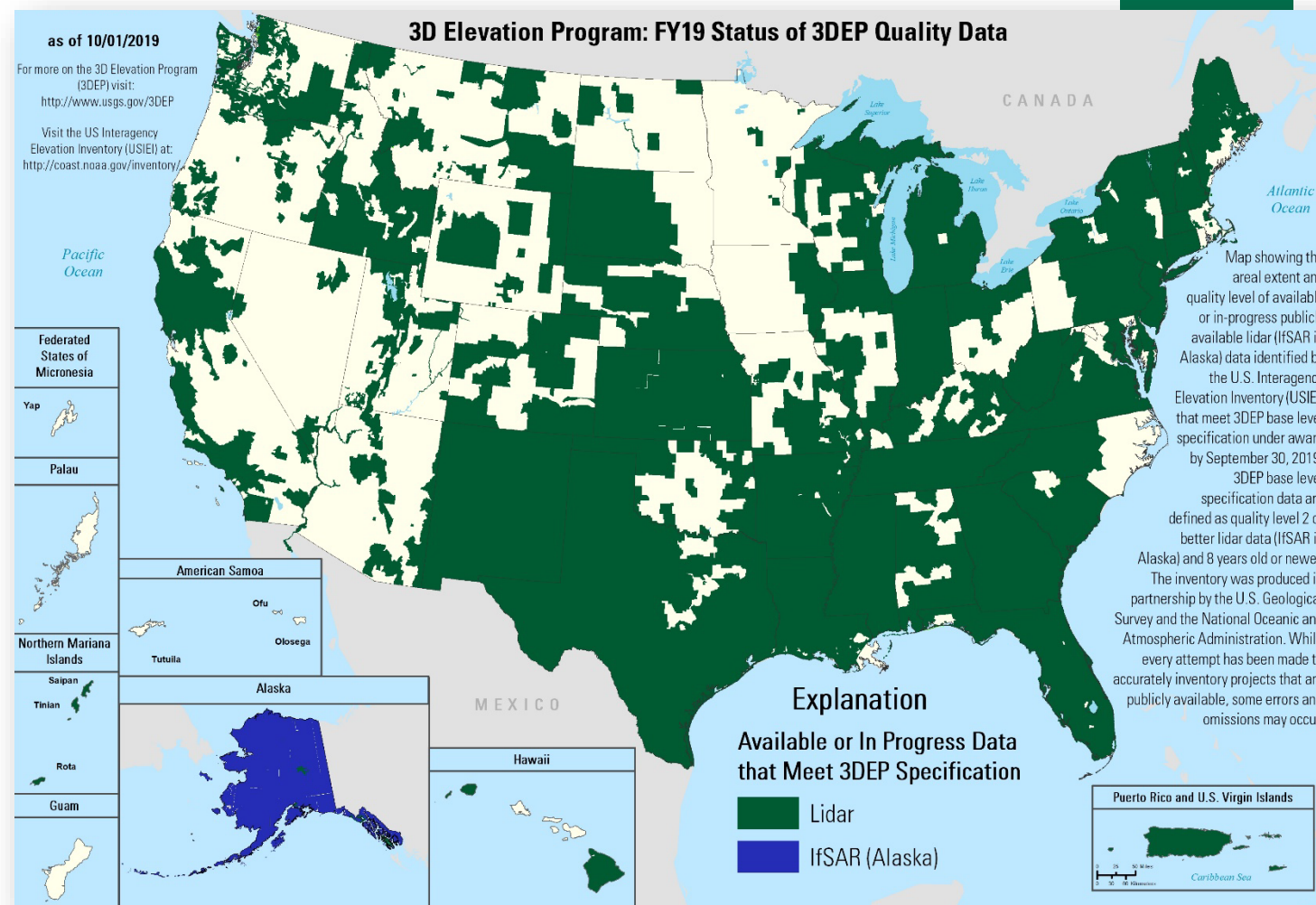
# 3DEP Status – End of Fiscal Year 2019

Data are available or in progress for 67% of the Nation

\*includes lidar and AK IfSAR



Data acquisition investments by all partners, by fiscal year



# Over 260 3DEP partners including 18 Federal agencies and 249 state and local governments

12

Bureau of Indian Affairs  
Bureau of Land Management  
DOD - AZ National Guard  
Department of Energy  
Federal Emergency Management Agency  
Fish and Wildlife Service  
National Geospatial-Intelligence Agency  
National Oceanic and Atmospheric Administration  
National Park Service  
Natural Resources Conservation Service  
Tennessee Valley Authority  
U.S. Navy  
US Army Corps of Engineers  
US Bureau of Reclamation  
USDA-ARS  
US Forest Service  
USGS  
AK Dept. of Natural Res.  
AK North Slope Borough  
City of Gustavus  
Fairbanks North Star Borough  
Golden Valley Electric Authority  
Matanuska  
Metlakatla  
Municipality of Anchorage  
Organized Village of Kake  
Sealaska  
The Nature Conservancy  
AL Department of Economic and Community Affairs  
AL Department of Transportation  
Chilton County, AL  
Cullman County, AL  
Franklin County, AL  
Huntsville, City of  
Russell County, AL  
Town of Thorsby, AL  
Tuscaloosa County, AL  
Walker County, AL  
AR Game and Fish Commission  
Northwest AR Regional Planning Commission  
Pulaski County Area GIS, AR  
Coconino County, AZ  
Pima Association of Governments, AZ  
C A Department of Water Resources

CA Geological Survey  
CA Natural Resource Agency  
CalFire  
City of San Diego OHS, CA  
Los Angeles Regional Imagery Consortium, CA  
San Diego County, CA  
San Diego Association of Governments, CA  
Southwest Wetlands Interpretive Association  
City of Montrose, CO  
CO Division of Rec and Mining  
CO Governor's Office of Information Technology  
CO Water Conservation Board  
Denver International Airport  
Garfield County, CO  
Gunnison County, CO  
Town of Castle Rock, CO  
FL Division of Emergency Management  
State of FL  
Martin County Engineering Dept., FL  
Northwest Florida Water Management District  
Osceola County, FL Office of Emergency Management  
Palm Beach County, FL  
Seminole Tribe of Florida  
St. Johns River Water Management District  
Suwannee River Water Management District  
City of Roswell, GA  
GA Coastal Regional Commission  
GA Environmental Protection Division  
GA Mountains Regional Commission  
IA Department of Agriculture and Land Stewardship  
Nez Perce County, ID  
Cook County, IL  
IL Champaign County GIS Consortium  
IL Department of Natural Resources  
IL State Geological Survey  
Kane County, IL  
Lake County, IL  
McHenry County, IL

Marion County GIS, IN  
Hamilton County, IN  
Wayne County, IN  
KS Department of Agriculture  
KS GIS Policy Board  
KY Commonwealth Office of Technology  
KY Division of Water  
LA Coastal Protection and Restoration Authority  
LA Department of Transportation and Development  
Arlington, MA  
State of MA  
MassGIS  
Baxter State Park, ME  
Bureau of Parks and Lands, ME  
Clayton Lake Woodland Holdings, LLC  
Cooperative Forestry Research Unit, ME  
Drinking Water Commission, ME  
King Pine Win, ME  
ME Bureau of Parks and Lands  
ME Department of Transportation  
ME Office of Information Technology  
Seven Islands Land Company  
Washington County, ME  
Charlevoix County, MI  
Gratiot County, MI Drain Commission  
Little Traverse Bay Band Odawa Indians  
The Southeast Michigan Council of Governments  
State of MI  
Boone County MO  
Metropolitan St Louis Sewer District  
MS Environmental Quality Department  
NC Department of Transportation  
NC Department of Public Safety  
NC Floodplain Mapping Program  
City of Blair, NE  
City of Fremont, NE  
City of Lincoln-Lancaster County, NE  
City of Omaha, NE  
Douglas County, NE  
NE Office of the Chief Information Officer  
Papio Missouri River Natural Resources District

Sarpy County, NE  
NH Department of Environmental Services  
NH Department of Transportation  
NJ Department of Environmental Protection  
DE Valley Regional Planning Commission  
City of Henderson, NV  
City of Las Vegas, NV  
Clark County Regional Flood, NV  
Clark County Water Reclamation District, NV  
Clark County, NV  
Lyon County, NV  
Southern NV Water Authority  
Storey County, NV  
University of Nevada Reno  
Washoe County, NV  
City of Buffalo, NY  
International Joint Commission (IJC)  
NY State Information Technology Services  
NY State Office of Information Technology Services  
City of Columbus OH  
Clinton County OH  
Delaware County OH  
Lucas County, OH  
Muskingum Watershed Conservancy District  
OH Department of Administrative Services  
Sandusky County, OH  
Wood County, OH  
City of Hillsboro, OR  
City of Portland, OR  
Coquille Indian Tribe  
Metro Regional Gov, OR  
OR Department of Geology and Mineral Industries  
OR Water Enhancement Board Grant  
OR Department of Forestry  
Umatilla Indian Reservation  
City of Allentown, PA  
PA Turnpike Commission  
PA Department of Environmental Protection  
PA Department of Transportation  
PA Dept of Conservation and Natural Resources  
PA Emergency Management Agency  
Susquehanna River Basin Commission  
Tri-County Regional Planning Commission, PA  
Puerto Rico Planning Board

Alken County, SC  
Anderson County, SC  
Beaufort County, SC  
Charleston County, SC  
City of Aiken, SC  
City of Greenville, SC  
City of North Augusta, SC  
Dorchester County, SC  
Jasper County, SC  
Lexington County, SC  
Newberry County, SC  
Pickens County, SC  
Richland County, SC  
SCANA Public Utility, SC  
South Carolina Lidar Consortium  
911, TN  
Appalachian Electric Co-op, TN  
Arlington, TN  
City of Bartlett, TN  
City of Bristol, TN  
City of Kingsport, TN  
City of Germantown, TN  
Hamilton County, TN  
Johnson City Metro Transportation Planning Organization, TN  
City of Lakeland, TN  
Memphis Chamber of Commerce  
Memphis Light, Gas and Water  
City of Memphis, TN  
Metropolitan Planning Department  
Nashville Davidson County  
City of Millington, TN  
Morristown-Hamblen GIS Group  
Rutherford County, TN  
Shelby County, TN  
Sullivan County, TN  
TN Department of Finance and Administration  
Town of Collierville, TN  
Houston-Galveston Area Council  
San Antonio River Authority  
TX Commission on Environmental Quality  
TX Water Development Board  
Williamson County  
UT Division of Emergency Management  
UT Geological Survey  
UT Forestry, Fire, and State Lands  
Moab City, UT  
Wasatch Ski Resorts  
Tooele Army Depot  
Bryce Canyon History  
Riverdale City, UT  
Park City, UT

Mohave County, UT  
Bear Lake Watch  
City of Tremonton, UT  
City of Logan, UT  
City of Brigham, UT  
Fairfax County, VA  
Henrico County, VA  
University of Virginia  
VA Dept of Environmental Quality  
VA Information Technologies Agency  
City of Williamsburg, VA  
VT Agency of Commerce and Community Development  
Columbia County  
WA Dept of Natural Resources  
Adams County, WI  
Bayfield County, WI  
Calumet County, WI  
Clark County, WI  
Dane County, WI  
Dodge County, WI  
Fond du Lac County, WI  
Forest County, WI  
Green Lake County, WI  
Jefferson County, WI  
La Crosse County, WI  
Lafayette County, WI  
Langlade County, WI  
Lincoln County, WI  
Monroe County, WI  
Oneida County WI Land Information  
Pepin County, WI  
Portage County, WI  
Price County, WI  
Sawyer County, WI  
Southeastern Wisconsin Regional Planning Commission  
Taylor County, WI  
City of Washburn  
Waupaca County, WI  
Winnebago County, WI  
Wisconsin Coastal Management Program  
Illinois Height Modernization Program  
MI Dept of Environmental Quality  
MI Department of Technology, Management and Budget  
Natrona County, WY  
Capitol Region Council of Governments  
County of Hawaii  
Wauwasha County, WI

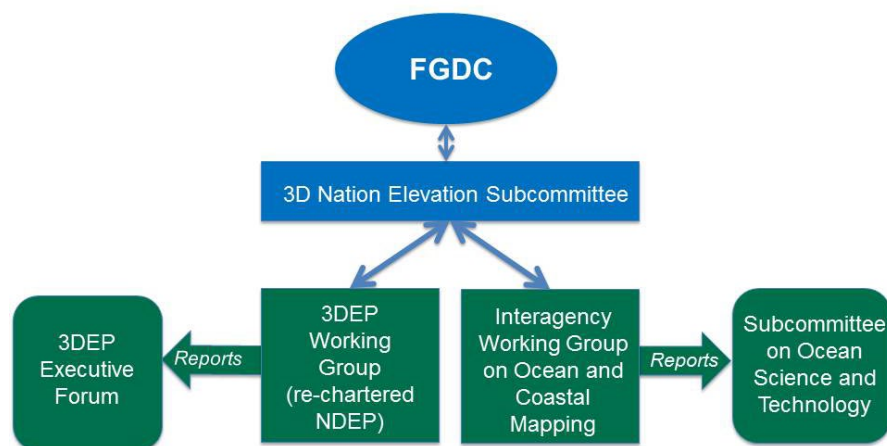




# 3D Elevation Program (3DEP)

## Governance

- USGS and NOAA co-lead the OMB A-16 Elevation Theme
- 3DEP Executive Forum
  - Facilitates executive collaboration on strategies to fund and implement 3DEP for the benefit of all its stakeholders
  - Executive Outreach to Industry Partners and Stakeholder Groups
  - Provides direction to 3DEP Working Group
- 3DEP Working Group - Coordinates implementation of 3DEP



## Member Agencies

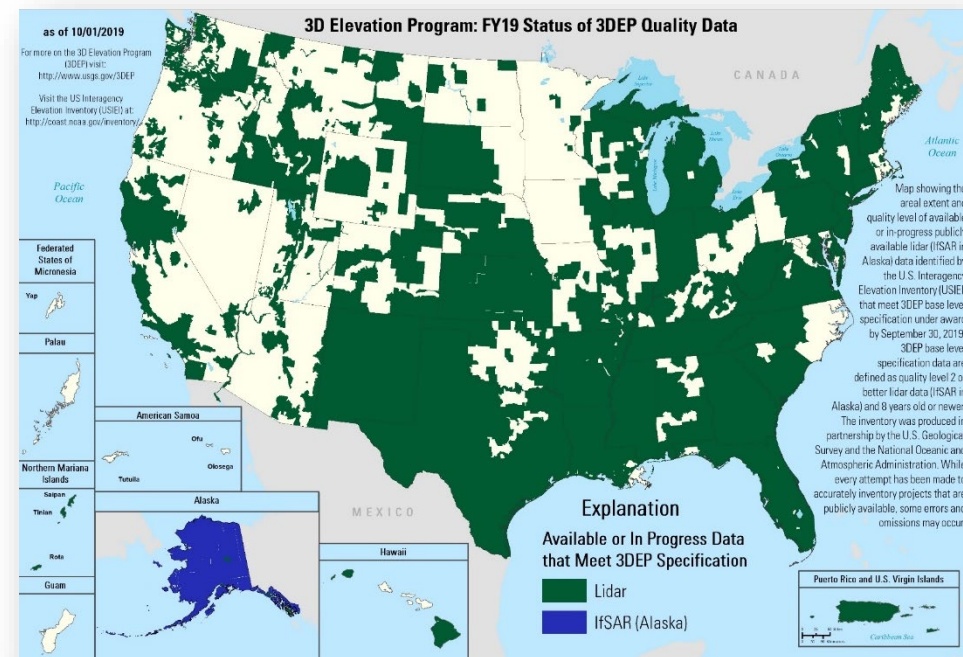
Bureau of Land Management
Department of Homeland Security
Department of Transportation
Environmental Protection Agency
Federal Aviation Administration
Federal Communications Commission
Federal Emergency Management Agency
US Forest Service
US Fish and Wildlife Service
National Oceanic and Atmospheric Administration
National Park Service
Natural Resources Conservation Service
Office of Surface Mining Reclamation and Enforcement
US Department of Agriculture
US Army Corps of Engineers
US Geological Survey
American Association of State Geologists
National States Geographic Information Council



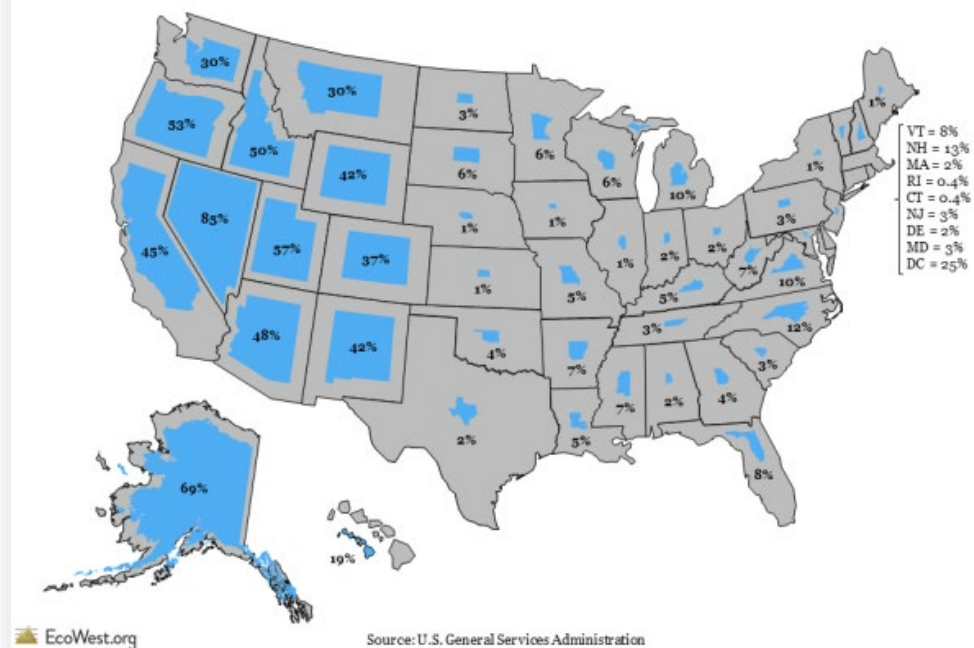
# Completion of 3DEP nationwide coverage

## Challenges and Strategies

- Significant amounts of Federal land in western US
- State and local investments in western states are mostly in populated areas, to support infrastructure, natural hazards
- What are strategies for increasing investment in the west?
  - Conducting an analysis of costs for Federal land under 3DEP Executive Forum
  - New Federal requirements (e.g. Broadband)
  - EarthMRI critical minerals initiative
  - Hazards - landslides legislation, supplementals
  - Developing state plans for completing coverage under a project with the National States Geographic Information Council
  - Other western initiatives or groups?



### Portion of each state that is federal land



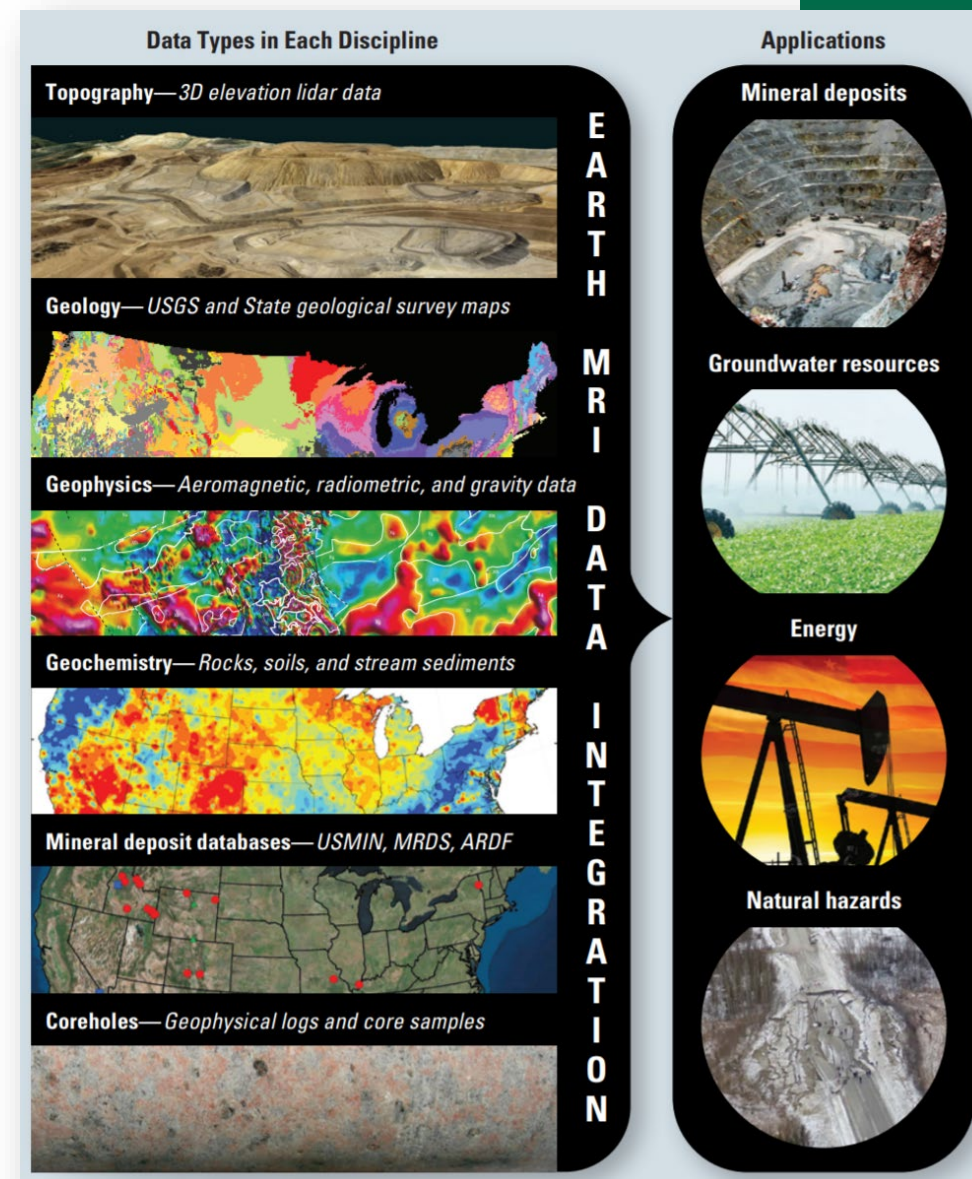


# Earth Mapping Resources Initiative (Earth MRI)

Goal to improve knowledge of the Nation's geologic framework and to identify areas of potential undiscovered critical mineral resources to decrease our reliance on foreign mineral sources

Leverage existing programs to collect data on the highest priority regions:

- Cooperative agreements with State geological surveys for new geologic mapping and data preservation
- Contracts with private industry to conduct geophysical and lidar surveys
- 3DEP partnerships under the Broad Agency Announcement
- In FY19, focus on areas potentially containing rare earth element mineral deposits



# FY19 Enacted and FY20 President's Budget

	2018 Enacted	2019 President's Budget Request	2019 CR	2019 Omnibus	2020 President's Budget
3DEP	\$36.2M	\$24.6M	\$36.2M	\$37.7M	\$36.2M

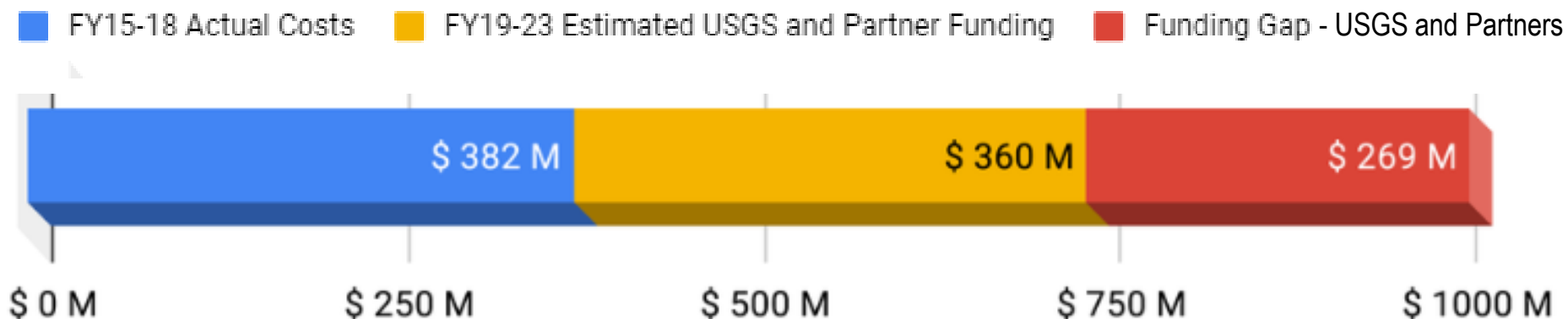
House Mark funds the NGP at \$84.6 million, a \$15.2 million increase, which includes:

- \$5.0 million for 3DEP specifically for completing lidar coverage in the Great Lakes region
- \$5.0 million for a Geologic Map GIS Database (supports National Cooperative Geologic Mapping Program)
- \$2.0 million for US Topos
- \$3.0 million to produce digital surface models using unclassified satellite optical data for the U.S. and territories not mapped with lidar by 2021



# 3DEP Goal to Complete Acquisition by 2023

## Estimated Funding Gap

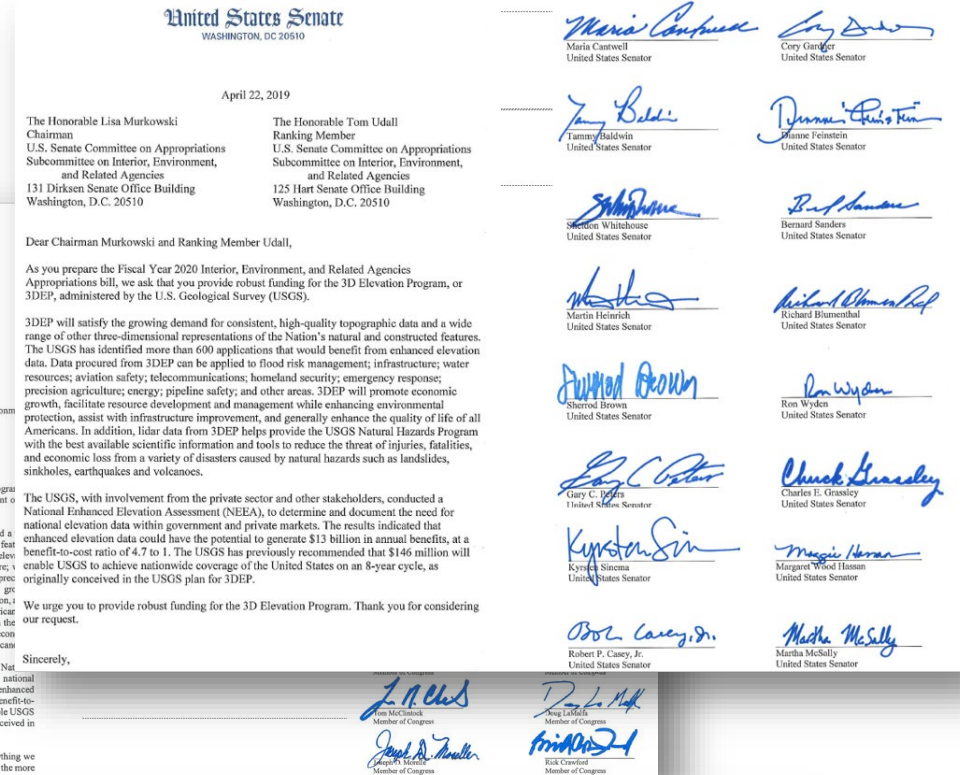


- To estimate the **funding gap for completing nationwide 3DEP data coverage by 2023**, three different partnership scenarios (1:4, 1:2 and 1:1 with Federal lands at 1:1 for all scenarios) were considered and the average is reflected in the bar graph
- Partner funding has been harder to raise for the western U.S. due to smaller tax bases and the presence of large areas of Federal lands, so we anticipate that completion of remaining areas will be at the lower ratios
- The estimate includes MANY assumptions and is being refined as we learn more



# Thank You JMPA!

- 3DEP Coalition
- 3DEP4America Web Site
- Support to legislation:
  - Geospatial Data Act
  - Bills that Authorize 3DEP
  - Appropriation Language (e.g. DOT)
- Coalition Letter to Appropriations Staff
- Member Letter to Appropriations Staff
- Model State Legislation



## DEPARTMENTS OF TRANSPORTATION, AND HOUSING AND URBAN DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS BILL, 2020

June 6, 2019

3D Elevation Program (3DEP).—3DEP is a national program managed by the U.S. Geological Survey to acquire high-resolution elevation data. The Committee understands the use of 3DEP data in infrastructure projects and construction management could increase safety and reduce costs, with applications such as spanning route, grade, line-of-sight, and utility surveys and corridor mapping; terrain and obstruction identification for aviation; evaluation of geologic, coastal, and other natural hazards; dam, levee, and coastal-structure failure modeling and mitigation; hydraulic and hydrologic modeling; drainage and cut-and-fill issues; and analysis of vegetation and topographic features. While the Committee recognizes the Department is an active participant in the 3DEP Executive Forum, the Committee encourages the Department to develop an efficient, systematic approach to acquiring foundational 3DEP data to support the work of all modal administrations."



# + The 3DEP Coalition

19

Alliance of Crop, Soil, and Environmental Science Societies  
American Bankers Association  
American Council of Engineering Companies  
American Geosciences Institute  
American Institute of Professional Geologists  
American Petroleum Institute  
American Property Casualty Insurance Association  
American Public Works Association  
American Society for Horticultural Science  
American Society of Agronomy  
American Society of Civil Engineers  
American Society of Farm Managers and Rural Appraisers  
American Water Resources Association  
American Water Works Association  
Association of American State Geologists  
Association of Environmental & Engineering Geologists  
Association of State Floodplain Managers  
Crop Science Society of America  
Insurance Institute for Business & Home Safety  
International Association of Emergency Managers

International Code Council  
Interstate Council on Water Policy  
Irrigation Association  
Land Improvement Contractors of America  
National Agricultural Aviation Association  
National Apartment Association  
National Association of Development Organizations  
National Association of Realtors  
National Association of Tower Erectors  
National EMS Pilots Association  
National Flood Association  
National Ground Water Association  
National Multifamily Housing Council  
National Society of Professional Surveyors  
National States Geographic Information Council  
National Wildlife Federation  
Rural & Agriculture Council of America  
Society for Range Management  
Soil and Water Conservation Society  
Soil Science Society of America

# National Landslide Preparedness Act

Introduced to Senate 04/03/2019 Committee on Commerce, Science, and Transportation

- Directs the USGS to establish a National Landslide Hazards Reduction Program to identify and understand landslide hazards and risks, reduce losses from landslides, protect communities at risk of landslide hazards, and help improve communication and emergency preparedness
- The USGS (1) shall establish the 3D Elevation Program and the 3D Elevation Federal Interagency Coordinating Committee, and (2) may make grants and enter into cooperative agreements to facilitate the improvement of nationwide coverage of 3D elevation data
  - Codifies governance and participation of Federal agencies
  - Codifies a 3DEP subcommittee under the National Geospatial Advisory Committee



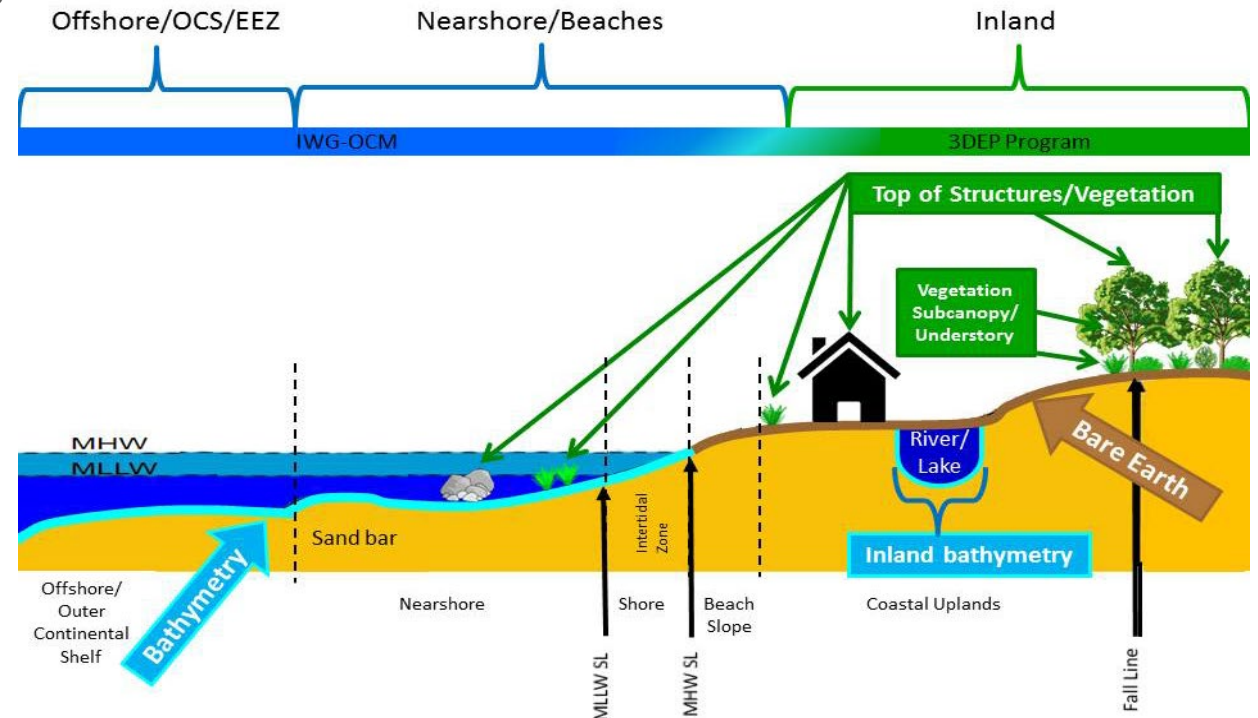
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# 3D Nation Elevation Requirements and Benefits Study

- 

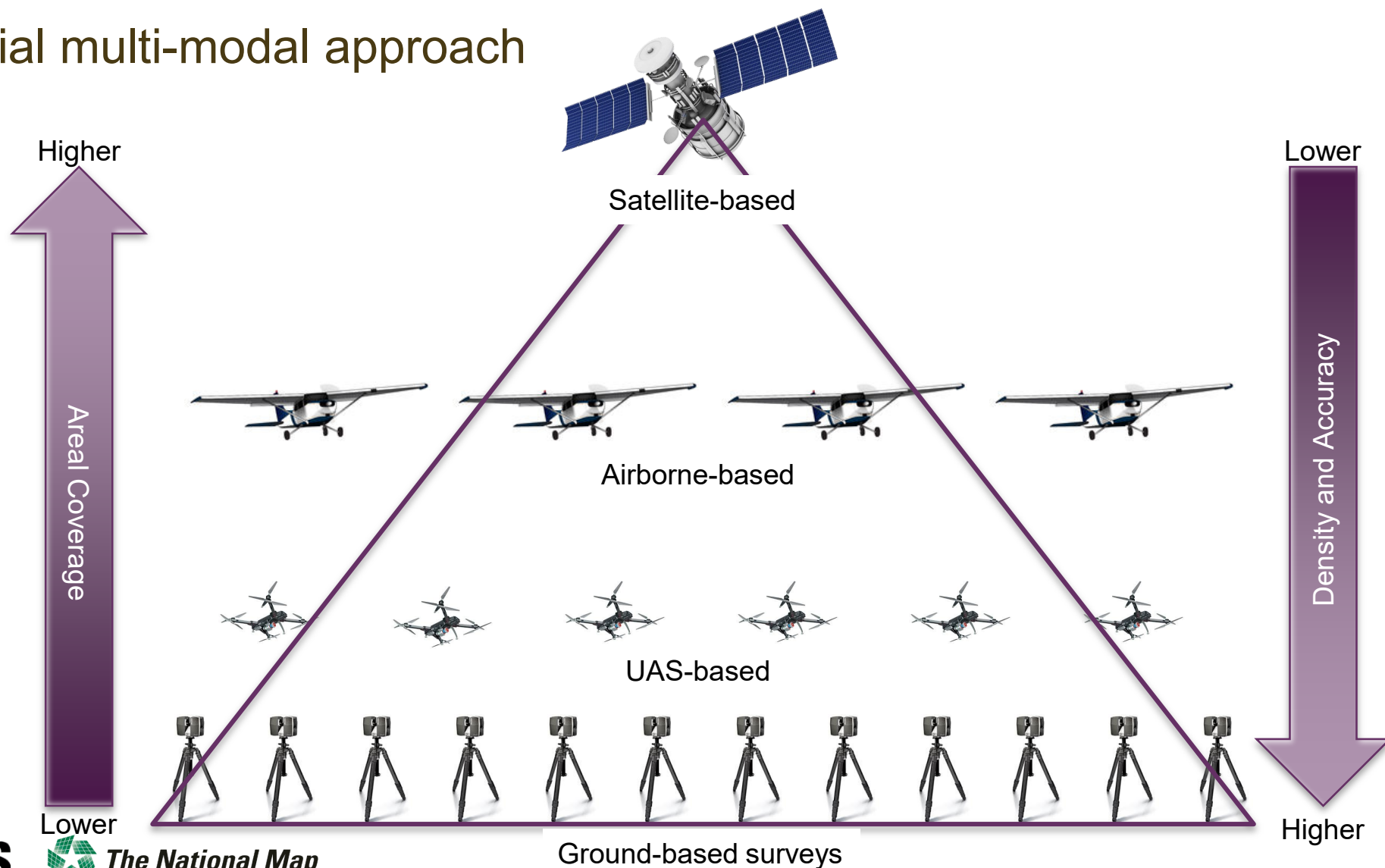




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# 3DEP Future Generation Just Around the Corner

Potential multi-modal approach



+

# Inland Bathymetry for 3DEP

3DEP pilot projects help inform

- Development of specifications
- Topo-bathy lidar collection criteria
- Eventual goal to operationalize inland bathy

3D Nation Study **PRELIMINARY** Information  
Source of approx. 500 mission critical activities that identified the need for inland bathymetry

State or U.S. Territorial government	43%
Federal Agencies and Commissions	31%
Regional, County, City, or other local government	11%
Academic or Not-for-Profit	10%
Private or Commercial	5%
Tribal government	1%

Completed surveys

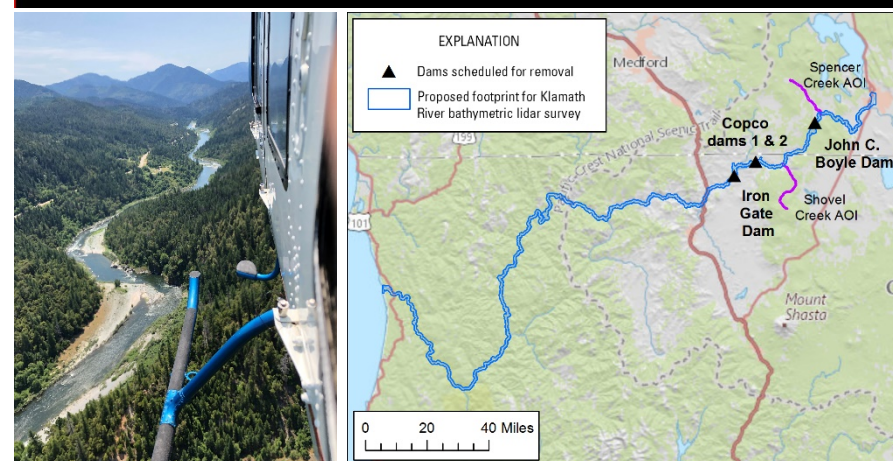
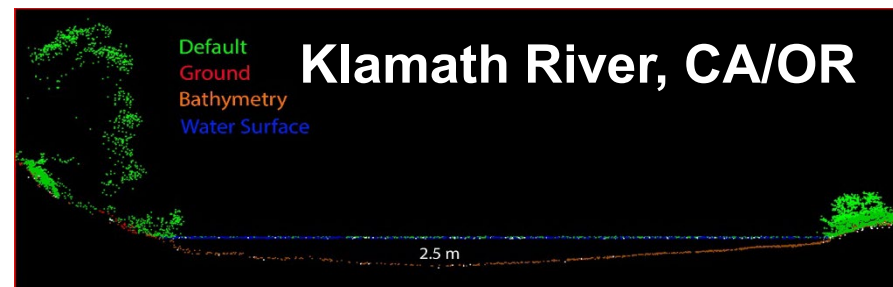
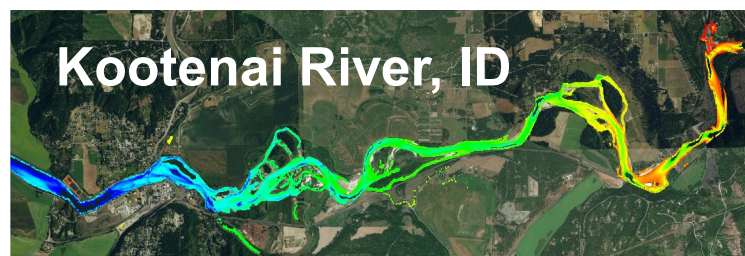


Image: Quantum Spatial Inc.

Planned surveys







# National Hydrography Datasets Support Critical Applications

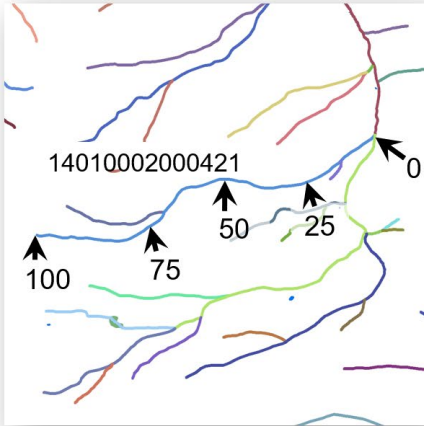
- Hydrography Requirements and Benefits Study documented 420 mission critical business uses with 23 Federal agencies, 50 states, 8 Tribal governments and 3 national associations
  - Ecological flows
  - Drought
  - Flooding
  - Spill response
  - Infrastructure engineering
  - Modeling and prediction
  - Watershed condition reporting and analysis
  - Resource reporting and analysis
  - Many more...
- Current Annual Benefits - \$538M, Total Potential Annual Benefits - \$1.14B



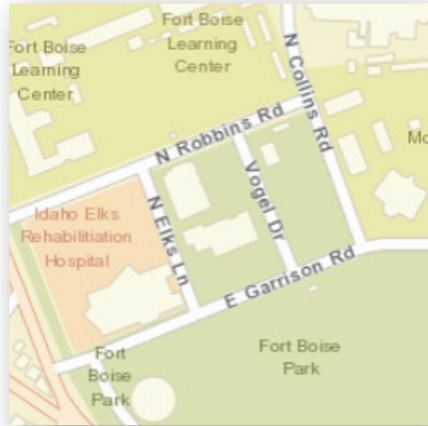
# + National Hydrography Datasets

Foundational datasets for indexing water-related information...

NHD reach code and measure



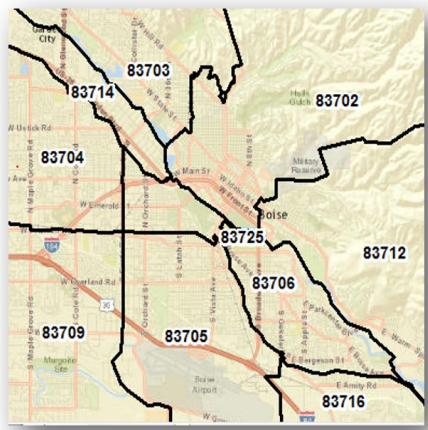
Street address



Hydrologic Unit Codes



Zip Codes



...and to the landscape: NHDPlus HR

Elevation-based catchments for each flowline in the stream network provide more detail like ZIP Code +4

Value-Added Attributes (VAAs) pre-calculate network characteristics to support routing like Google Maps driving directions

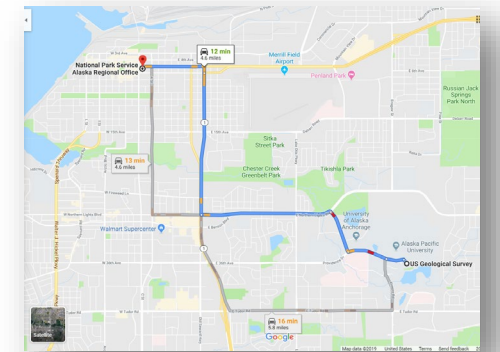
Together enable analysis between the stream network and terrestrial characteristics on the landscape, making network analysis easier and richer

Limitless data can be linked to NHDPlus HR, supporting development of consistent and repeatable modeling results

NHDPlus HR catchments and VAAs



Zip Code +4 and Google Maps routing



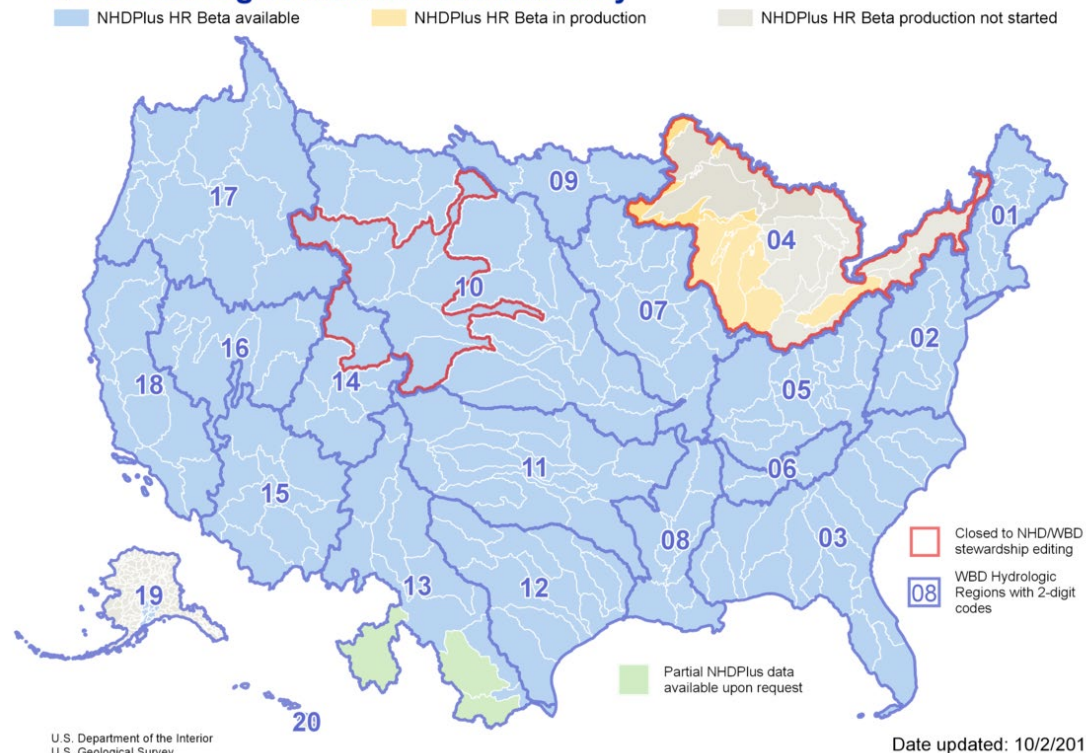
...to the network and drainage area: NHD and WBD



# + NHDPlus High Resolution (NHDPlus HR)

- Provides functionality of NHDPlus with detail and accuracy of high resolution 1:24,000-scale NHD and WBD data, and 3D Elevation Program (3DEP) 10m DEM data
- Beta version planned completion in 2020 for CONUS, HI and territories, followed by AK in later years
- Users are invited to provide feedback to the Beta version datasets - feedback will be used to improve subsequent dataset releases

## NHDPlus High Resolution Availability

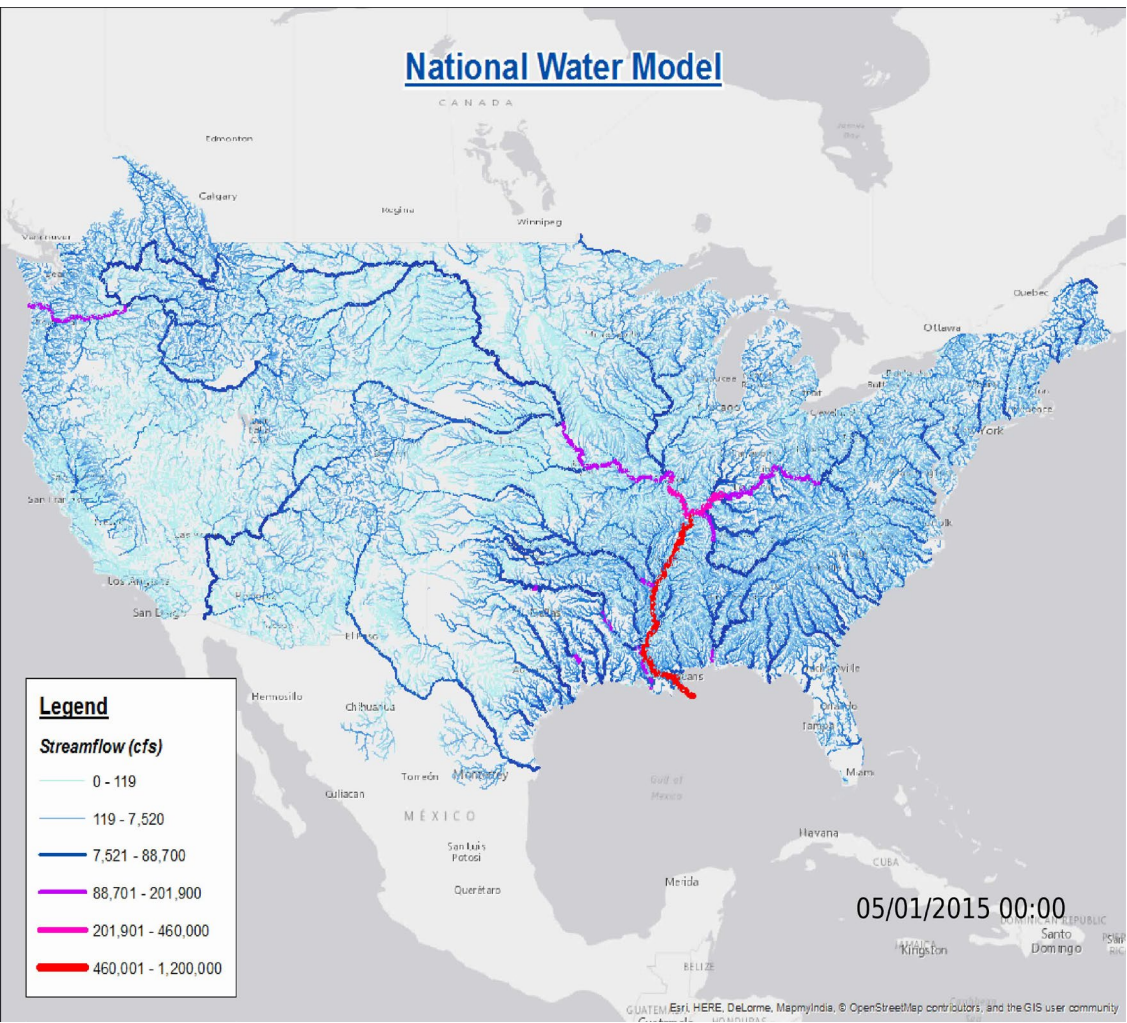


	IN USE TODAY: NHDPlus Medium Resolution	IN PROGRESS: NHDPlus High Resolution
<b>Hydrography source</b>	1:100,000-scale NHD	1:24,000-scale or better NHD
<b>Elevation source</b>	30 meter	10 meter
<b>Number of features nationwide</b>	2.7 million	26 million



+ Future

Hydrography derived from lidar



Simulates conditions for 2.7 million stream reaches, representing *the biggest improvement in flood forecasting ever*

Forecasting at neighborhood level

Forecasting at street level

28

	IN USE TODAY: NHDPlus Medium Resolution	IN PROGRESS: NHDPlus High Resolution	FUTURE: Hydrography Derived from Lidar
Elevation source	30 meter	10 meter	1 meter
Hydrography source	1:100,000-scale NHD	1:24,000-scale or better NHD	1:5,000-scale or better derived from lidar
Number of features nationally	2.7 million	26 million	200-300 million

# Water is among the defining issues of our times

## Too much, too little, poor quality

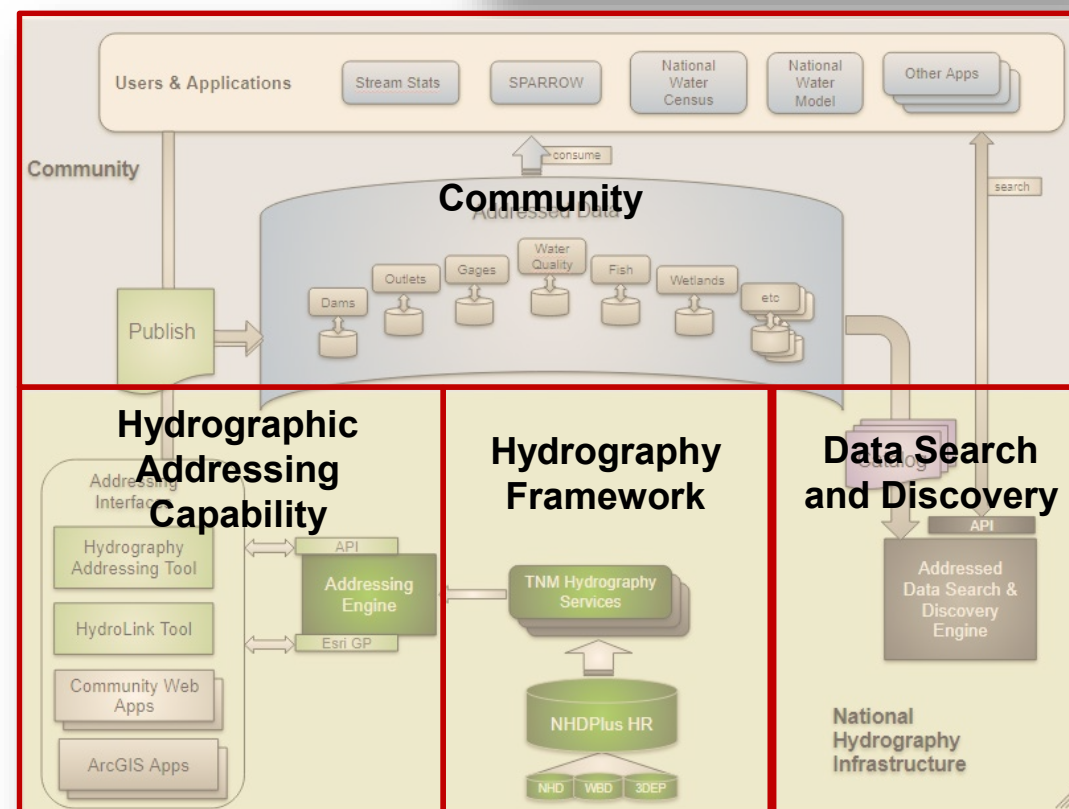
- Water crises are among the most probable and potentially impactful risks faced by society in the coming decade (World Economic Forum, 2014)
- A March 17, 2016 *New York Times* editorial summarizes that we as a nation have water-related “crises percolating all over, but lack the data necessary to make smart policy decisions”
- The nation has no **common infrastructure** for managing water information collected by the nearly two dozen federal agencies and hundreds of state and local organizations with water in their mission





# National Hydrography Infrastructure

- Combine foundational hydrography datasets with hydrographic addressing, catalog, and search engine functionality
- Provides the universal infrastructure for sharing and discovering limitless sources and types of water information
- Underpins interagency hydrologic observing systems and enable models that account for all the water in the water cycle – from the atmosphere to the oceans

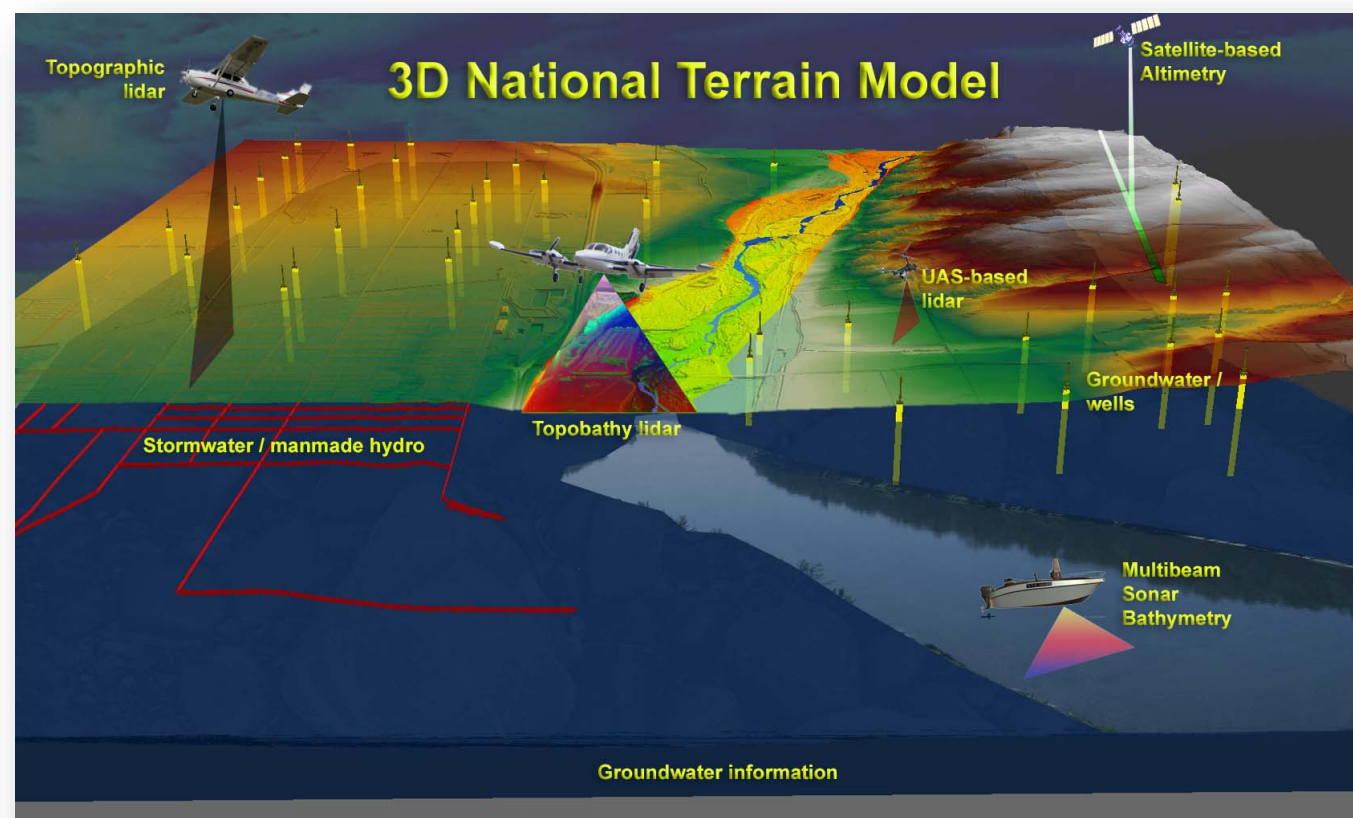




# Next Generation – 3D National Terrain Model

Implement the USGS-NOAA 3D Nation concept of continuous topographic/bathymetric information from the peaks of our mountains to the depths of our oceans

- Integrate surface and subsurface features
  - Elevation and hydrography
  - Inland bathymetry
  - Connection points to groundwater and manmade hydrographic features
  - NOAA bathymetric data
- Improve and enable critical applications
  - Flood forecasting in 3D, at the street level
  - Hydrologic observing systems and models that account for water from the atmosphere to the oceans
  - 3D Geologic models
  - New and unimagined 3D applications





# THANK YOU!