3D Elevation Program (3DEP)

Vicki Lukas
Chief, NGP Topographic Data Services
February 13, 2015
### The National Map

Geospatial products and services support key priorities

<table>
<thead>
<tr>
<th>Area of National Leadership</th>
<th>Program Emphasis</th>
<th>DOI/Administration Priorities Supported</th>
</tr>
</thead>
</table>
| A-16 Lead for Terrestrial Elevation | 3D Elevation Program (3DEP) | • Climate Action Plan  
• Building a Landscape-Level Understanding  
• Ensuring Healthy Watersheds and Sustainable, Secure Water Supplies  
• Powering Our Future and Responsible Use of Our Resources  
• Enhancing America’s Great Outdoors  
• Open Water Data Initiative |
| A-16 Co-Lead for Inland Waters | National Hydrography Dataset and Open Water Data Initiative |  |
| National Coverage of Topographic Maps | U.S. Topo and Alaska Mapping |  |
Climate Resilience

Cross-Cutting Priority

- Subsidence
- Flood Risk Mapping
- Wildfire Preparedness and Response
Powering Our Future
Conventional and Alternative 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
Building a Landscape-Level Understanding of our Resources

Oso, WA Landslide March 22, 2014

Lidar reveals historic and potential slides

Post-landslide
Hazards
Detecting Faults

Scarp found with lidar
Scarp found other means
Geomorphic evidence of shoreline uplift

Victoria
Seattle
Olympia

Holocene Tectonism PI: Ralph Haugerud, USGS
Advanced Applications

Using 3DEP and Derived Data

- Infrastructure Management
- Precision Forestry
- Carbon Cycle and Accounting
- Archaeology
3D Elevation Program (3DEP)

Applies ground-breaking lidar technology to acquire and distribute 3D data.

Addresses a broad range of critical applications of national significance.

- 3D data include surface elevations and natural and constructed features.
- 3DEP increases the quality level of lidar being acquired to enable more accurate understanding, modeling, and prediction.
- Goal to acquire national coverage in 8 years.
What is the 3D Elevation Program?

3DEP is a call for community action to...

- Address the mission-critical requirements of 34 Federal agencies, 50 states, and a sampling of local governments, tribes, private and not-for profit organizations documented in the National Enhanced Elevation Assessment.

- Increase the overall investment in 3D data from about $45 M to $146 M annually to return more than $690 million annually in new benefits (ROI 5:1).

- Leverage collaboration among Federal, states, local and tribal partners to systematically complete national 3D data coverage in 8 years.

- Leverage the capability of private industry mapping firms, create jobs.

- 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.
Only 6.8% of the lower 49 states meets the 3DEP quality goal (QL2 or better) lidar coverage.

About half the State of Alaska needs ifsar data to complete the 3DEP goal for coverage.

To view the inventory see: www.csc.noaa.gov/inventory
3DEP 2012-2015
READY for a national, 8-year program

Developed 3DEP infrastructure

- Documented comprehensive requirements and benefits in the National Enhanced Elevation Assessment (NEEA)
- Designed 3DEP based on NEEA and to maximize return on investment
- Developed the NEEA inventory into the annual U.S. Interagency Elevation Inventory in partnership with NOAA and others
- Published plan for action based on extensive stakeholder input
- Issued the first Broad Agency Announcement in 2014, with funding partnerships with FEMA and NRCS
3DEP 2012-2015

READY for a national, 8-year program

Developed 3DEP infrastructure

- Consolidated and modernized IT systems, ready to initiate first phase of cloud implementation
- GPSC3 to be in place in FY15 to address increased data volume
- Revised the base lidar specification to include 3DEP quality levels
- New products and services being made available in 2015 from *The National Map*
3DEP 2012-2015

READY for a national, 8-year program

Leadership, Coordination, and Outreach

- Formed the 3DEP Executive Forum
- Emerging Lidar Technology Federal Roundtable
- Working to align NDEP to coordinate at the operational level
- Collaborating with NOAA on A-16 co-leadership and joint messaging
- Executive outreach to key Federal agencies

USGS Director Kimball briefing on 3DEP at the White House Conference Center
3DEP Executive Forum

Governance and Executive Outreach

- **Purpose** - to facilitate executive dialog and collaboration on strategies to implement and sustain 3DEP for the benefit of all its stakeholders

- **Leadership** – USGS Associate Director for Core Science Systems, Chair

- **Objectives**
  - Monitor status, plans and coordination actions for 3DEP implementation
  - Strategize on significant developments regarding elevation or related geospatial activities, for example, legislation, GAO studies, supplemental funding, etc.
  - Share insights and develop strategies to communicate with industry and other stakeholder groups that could play a role in 3DEP funding
  - Provide executive direction and input to NDEP as the operational coordinating body

- **Membership**
  - FEMA
  - NASA
  - NGA
  - NOAA
  - NPS
  - NRCS
  - USACE
  - USFWS
  - USFS
  - BLM
  - DHS
  - DISDI
  - EPA
  - USFS
  - Others
Proposed Governance Structure

FGDC

3D Nation Elevation Subcommittee

Subcommittee on Ocean Science and Technology

3DEP Executive Forum

Interagency Working Group on Ocean and Coastal Mapping

3DEP Working Group (re-chartered NDEP)
3DEP 2012-2015

READY for a national, 8-year program

Leadership, Coordination, and Outreach

- Successful Congressional briefings
- State factsheets (43 available online)
READY for a national, 8-year program

Reports, Recommendations, and Announcements

"Establish and maintain a national program to standardize the regular collection of nationwide, high-resolution, three-dimensional data for surface modeling and volumetric analysis for multiple requirements (e.g., airborne light detection and ranging or LIDAR)." p.18
3DEP 2012-2015

READY for a national, 8-year program

Reports, Recommendations, and Announcements

■ NAPA Report Recommendation 15: “The Office of Management and Budget should use the 3DEP implementation plan for nationwide elevation data collection to guide the development of the President’s annual budget request”

■ 3DEP under discussion in the Technical Advisory Mapping Committee (TMAC)
FACT SHEET: Taking Action to Support State, Local, and Tribal Leaders as They Prepare Communities for the Impacts of Climate Change

Providing Federal resources to support climate preparedness:

- Developing advanced mapping data and tools. The Department of the Interior’s U.S. Geological Survey and other Federal agencies today launched a $13.1 million 3-D Elevation Program partnership designed to bring Federal agencies, academia, corporate entities, states, tribes, and communities together to develop advanced 3-dimensional mapping data of the United States. These data and related tools will be used in the areas of flood risk management, water resource planning, mitigation of coastal erosion and storm surge impacts, and identification of landslide hazards as an essential component of supporting action on climate resilience. More information is available at http://nationalmap.gov/3DEP/.
3DEP 2012-2015
READY for a national, 8-year program
Reports, Recommendations, and Announcements
3DEP 2012-2015

READY for a national, 8-year 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 2012-2015
READY for a national, 8-year program

**USGS Data Acquisition Budget**

<table>
<thead>
<tr>
<th></th>
<th>FY14 Lidar + AK Ifsar</th>
<th>FY15 Lidar +AK Ifsar</th>
<th>FY 16 Lidar + AK Ifsar</th>
</tr>
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<tbody>
<tr>
<td>President’s Budget</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enacted</td>
<td>$10M</td>
<td>$764k</td>
<td>$6M</td>
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<td>President’s Budget</td>
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<tr>
<td>Enacted</td>
<td>$6M</td>
<td>$5.2M</td>
<td>$9.7 est.**</td>
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<tr>
<td>Increase to elevation</td>
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<td></td>
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<tr>
<td>Total NGP acquisition funding</td>
<td>$15M</td>
<td>$6.2M</td>
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<tr>
<td>Total acquisition</td>
<td>NA</td>
<td>$24.4M*</td>
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<tr>
<td></td>
<td>NA</td>
<td>TBD</td>
<td>TBD</td>
</tr>
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</table>

* Funding leveraged via partnerships: approx. 1:6 for lidar, 1:1.8 for AK ifsar in FY14; additional $4.5M Sandy Supplemental funding in FY14 not included

** Increase to 3DEP is redirected NGP funding, NGP overall budget is approximately $2M reduced from FY14
3DEP 2015-2018

Call for ACTION!

- We are ready to increase throughput to reach a steady-state operational status
- Today, an annual average of around $45M is invested in lidar and ifsar data, and our FY14 inventory shows that only 6.8% of the lower 49 States has lidar data that meet 3DEP quality levels
- An approximate total of $146M among 3DEP stakeholders is needed annually to implement the national, 8-year program
  - Would result in a nearly 5:1 ROI, save lives, and improve our environment through informed decisions
  - Presents a unique opportunity for collaboration between all levels of government, to leverage the services and expertise of private sector mapping firms that acquire the data, and to create jobs
- The 2015-2018 “3DEP Call for Action” is to build the investment needed to establish a steady state program for a nationwide elevation program
Call for ACTION!

- To move from the opportunistic, patchwork approach that is enforced by current funding levels, investments must increase among USGS, Federal and other partners.
- To reach a viable, fully systematic 8-year program, recommend USGS provide half of the costshare.
- To move away from the opportunistic approach, recommend USGS provide a minimum of 1/3 of the cost share – numbers below are rough estimates subject to refinement and do NOT include AK Ifsar.
- Need feedback and input.

**PRELIMINARY - Numbers to be refined**

<table>
<thead>
<tr>
<th></th>
<th>USGS Annual 33% Share</th>
<th>Other Feds Annual 33% Total Share</th>
<th>State/Local/Other Annual 33% Total Share</th>
<th>Annual Total</th>
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<tbody>
<tr>
<td><strong>QL2 - 2026</strong></td>
<td>$25M - $6.5M est. base</td>
<td>$25M</td>
<td>$25M</td>
<td>$76M</td>
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<tr>
<td>12 years</td>
<td>$18.5M GAP</td>
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<tr>
<td><strong>QL2 - 2022</strong></td>
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<td>$38M</td>
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<tr>
<td>8 years</td>
<td>$31.5M GAP</td>
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Broad Agency Announcement (BAA)

Background

- As follow-up to the President’s announcement, the USGS issued a BAA via FedBizOps that provides information on how to partner with the USGS and other Federal agencies to acquire 3D elevation data.

- Designed to provide increased visibility and opportunity to the broadest stakeholder community possible - Federal agencies, state and local governments, tribes, academic institutions and the private sector are eligible to submit proposals.

- Establish a standard, fair and equitable competitive process that can easily be expanded to account for future growth in the 3D Elevation Program.

- To ensure data quality and efficient development of standard products and services, the USGS prefers that partners use the GPSC when possible and practical; proposals may use GPSC or partner contracts; in both cases 3DEP makes use of the commercial sector to do the acquisition.

- A means to recognize, aggregate and inspire collaborative funding partnerships in support of multi-agency lidar data acquisition requirements.
- 72 pre-proposals submitted, requested funds over $50M, 29 were funded
- Total estimated committed = $9.8M, with a total estimated value of $26.5M (estimates will be refined)
- The $9.8M is comprised of USGS, FEMA and NRCS funds
- The average cost share is 36% (offerors are covering an average of 64%)
- Total square miles is estimated at 94,114, with average project size of 3,245 sq mi
- Additional selections may follow with remaining funding as project estimates are refined and FY15 funding is clarified
Lessons

- Competitive grant structure resulted in changes to the liaison role in developing partnerships and forming projects
  - Contracting structure requires that all information be publicly accessible for liaisons to facilitate coordination between stakeholders
- FedBizOpps is publicly available but not user friendly – need to augment our approach to making the process transparent
- Other Federal agencies benefit from the process
  - FEMA and NRCS have some needs met through the BAA and are holding back funding to meet specific requirements outside of the BAA
  - Need more Federal participation, including more robust requirements gathering
- Need a pathway for other stakeholders to make requirements known
Next 3DEP BAA Cycle

Proposed steps and timeline

- Make Federal requirements publicly accessible – May 1
- Make the requirements tool (adapted from SeaSketch) publicly available for non-Federal stakeholders to input their requirements – May 1
- May – June - USGS Liaisons and Stakeholders coordinate public meetings to discuss potential partnerships
  - Meetings will be in-person with remote participation available
  - Participation by regional/field/state Federal offices will greatly enhance the effectiveness
  - Details on who would organize these meetings, how many there would be, etc. are under development
- Open the next BAA July 2015, awards in early FY16
Next 3DEP BAA Cycle
Make BAA More Accessible and Transparent

- Geospatial Platform as “Homebase” for Data Acquisition via the Elevation Community
- BAA process and timelines
- Publish requirements, allow ongoing updates
- Access to US Interagency Elevation Inventory
- Data Acquisition as a Service

Geospatial Platform Elevation Community “Mock Up”
Emerging Lidar Technology

Emerging 3D Technologies Working Group (E3D-WG)

E3D-WG will be established under the re-chartered NDEP as an unclassified forum for building collaboration between Federal Civilian and Defense agencies to explore the utility of emerging 3D technologies for future use in 3DEP

Draft Objectives

- Provide an unclassified forum for Defense and Civilian communities to learn from each other others’ activities
- Assist Federal Civilian agencies in obtaining and testing data.
- Define and agree to a process and/or maturity level scale that will help determine when the data are useable in 3DEP
- Publish a report documenting the E3D-WG analysis of and additional steps required to incorporate appropriate emerging technologies into 3DEP
- Collaborate and coordinate with industry groups such as ASPRS and MAPPS to leverage their capabilities, networks and goals for advancing lidar technology
3DEP Stakeholder Meeting

April 15, 1-5 at The National Surveying, Mapping and Geospatial Conference

- Purpose - to provide a status report to our primary Stakeholders and discuss strategies, challenges and opportunities to fully implement 3DEP in collaboration

- Stakeholders
  - 3DEP Executive Forum
  - 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)
Budget Cross Cut

3DEP Executive Forum

- OMB is required to submit a budget cross cut to Congress annually for flood risk determination data and digital elevation data, as required under Biggert-Waters legislation.

- Proposed near-term approach to improve data.
  - Develop consistent language about 3DEP as a joint mechanism for aligning federal, state and local investments in elevation data and coordinating across agencies.
  - Add a row for agencies to investment via 3DEP: maintains baseline but highlights that elevation spending is coordinated across the Federal agencies and the 3DEP is helping to build a coordinated national approach.

- Longer-term approach – further refine reporting approach, take into account FGDC work to define investments.
NGAC Study Questions

Summary

■ NAPA Report Recommendation

**Recommendation 15:** The Office of Management and Budget should use the 3DEP implementation plan for nationwide elevation data collection to guide the development of the President's annual budget request.

Though there is conceptual support for 3DEP among several Federal agencies, coordination across budgets remains a challenge to unifying data acquisition investments into a single, collaboratively funded program. What advice and/or recommendations does the NGAC have for advancing the NAPA recommendation?

■ 3DEP Data Acquisition Coordination

Given the new approach, what advice and/or recommendations does NGAC have for improving coordination and communication on 3DEP partnerships among community stakeholders?

■ Emerging Lidar Technology

What advice and/or recommendations does NGAC have for further enhancing the coordination and outreach, and for commercializing these technologies?
Thank you!