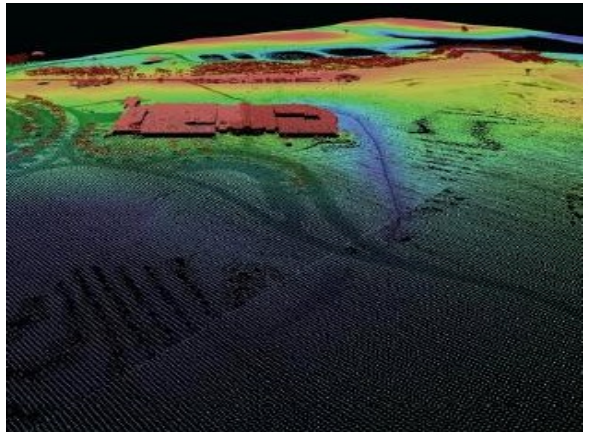
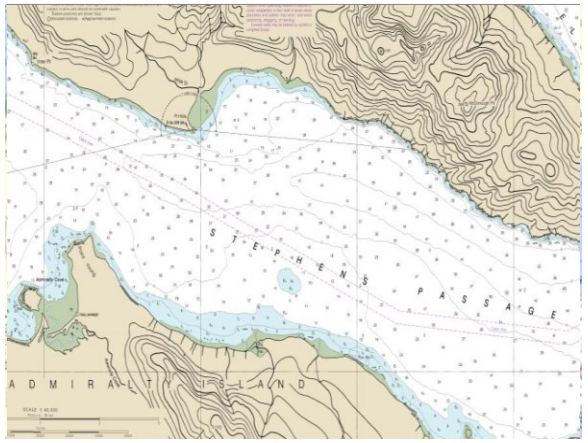
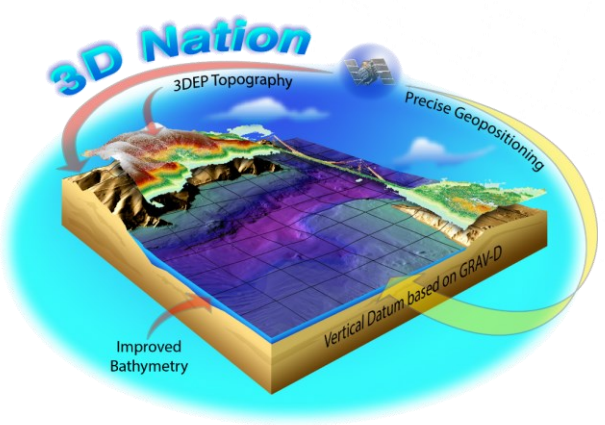
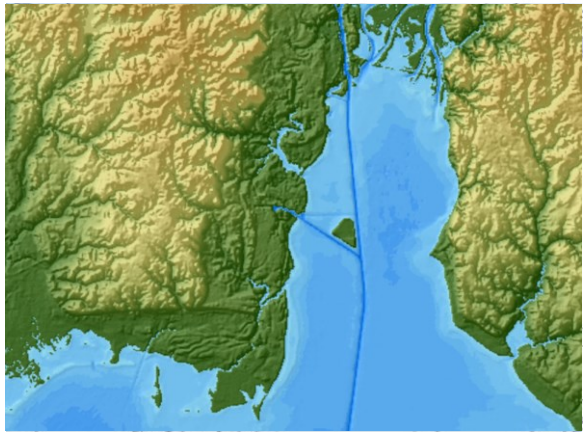
Alaska GeoSummit: 3D Nation Elevation Study and Hub Site









Study Leads

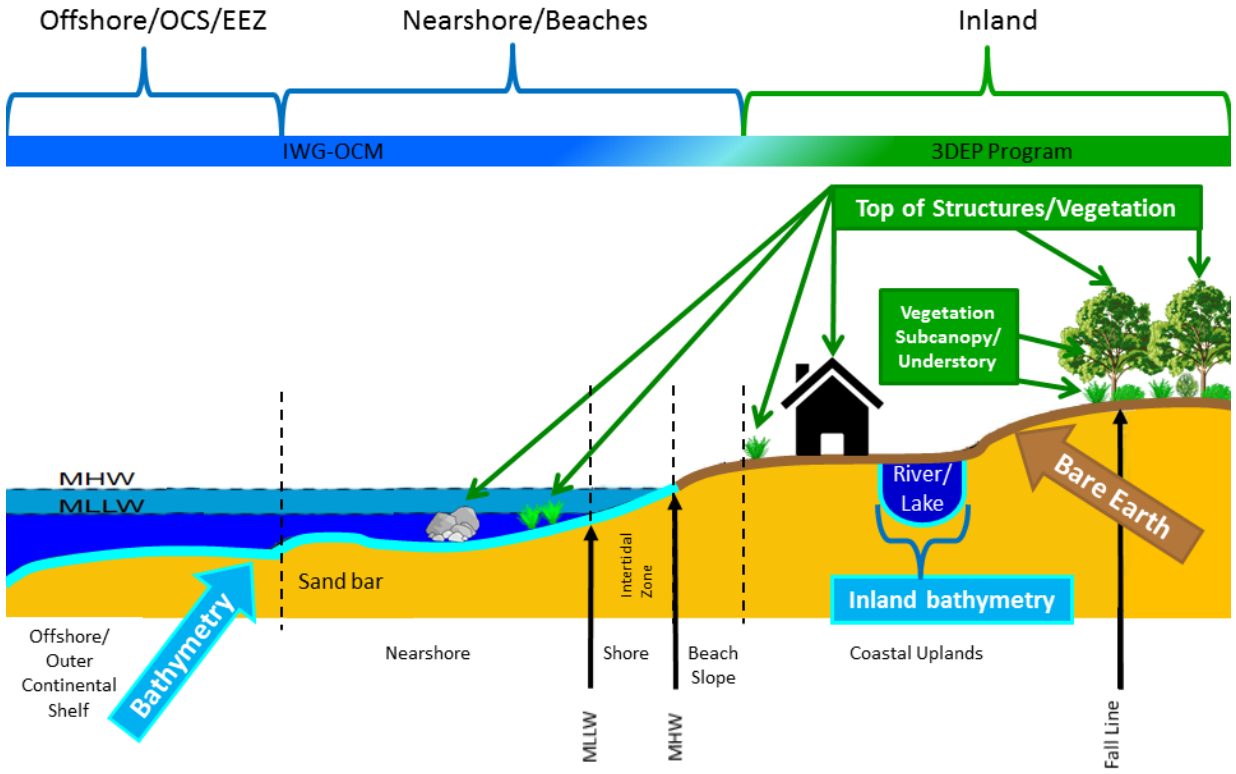
3D Nation - Builds a modern elevation foundation from the peaks of our mountains to the depths of our waters for stronger, more resilient communities and U.S. economy.

Cathleen Yung, NOAA Integrated Ocean and Coastal Mapping

Mapping a 3D Nation: Study Goals

Understand 3D Elevation Data Requirements

- Understand inland, nearshore, and offshore elevation data requirements and benefits
- Understand how requirements and benefits dovetail in the coastal zone
- Improve understanding of needs to guide planning for NOAA and the next generation of 3DEP for USGS after completion of nationwide coverage
- Gather technology-agnostic user information to assess new technologies against requirements and tradeoffs between different approaches



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What we asked about

3D Elevation Data Needs

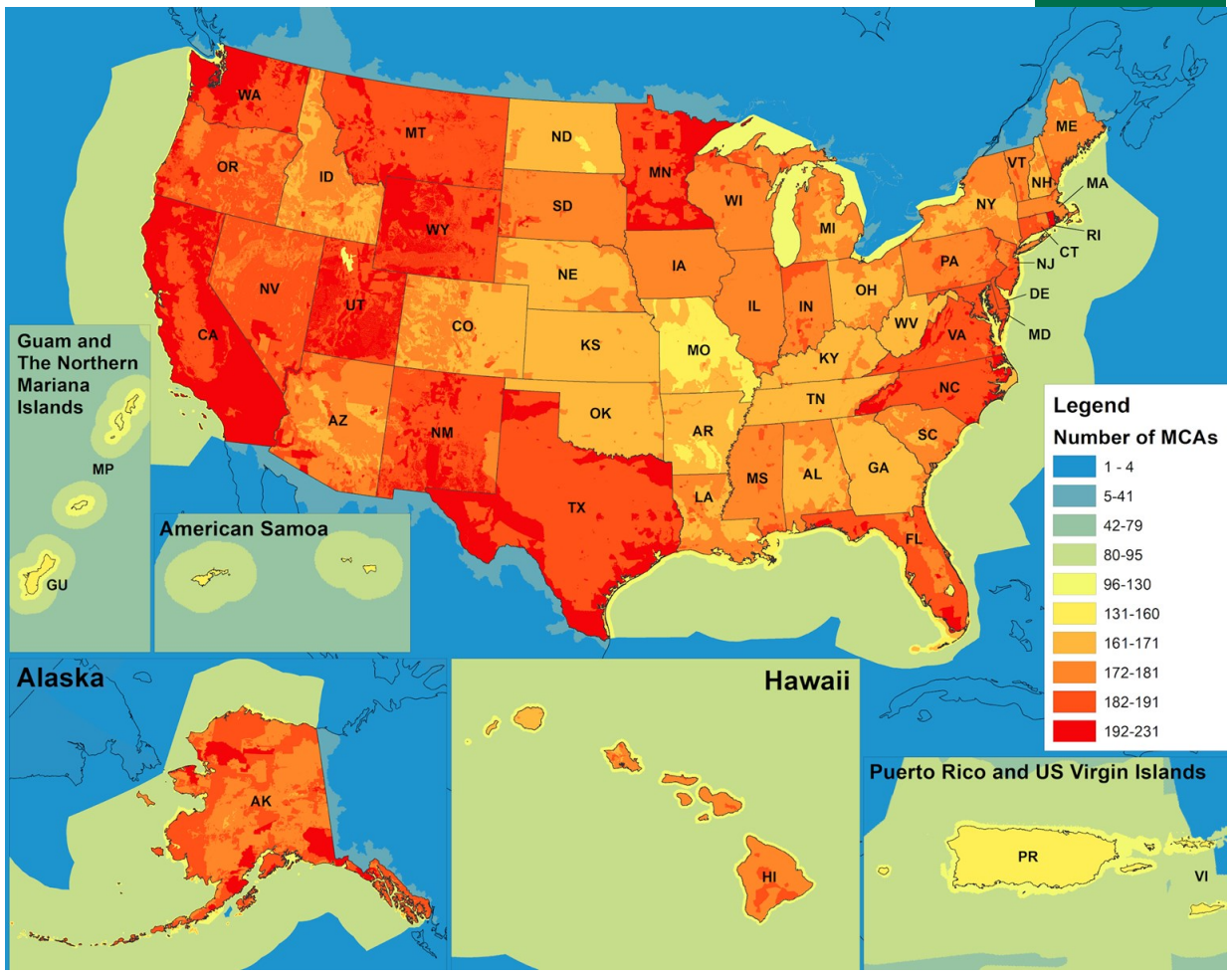
- Geographic extent of MCA
- Characteristics of 3D elevation data needed to perform the MCA
  - Quality Level/IHO Order
  - Update frequency
  - Acceptable error (Horizontal & Vertical)
  - Beach profile
  - Cross sections/transects
  - Hydrologic processing
  - Tide correction
  - Seamlessness
  - Data products
  - Integration with other datasets

- Benefits of having 3D elevation data
  - Operational Benefits - Time or cost savings, mission compliance
  - Customer Service Benefits - Products or services, response or timeliness, customer experience
  - Societal Benefits (not quantified) - Education or outreach, environmental, public safety, including lives and property

Study Results

- Respondents
  - 45 Federal agencies
  - 56 State, 99 Local, 8 Tribal governments
  - 10 Non-Governmental Orgs
  - 14 Academics
  - 34 Private companies
- 1350+ Mission Critical Activities binned into 30 different business cases and 4 Geography Types

Number of MCAs - by Area of Interest



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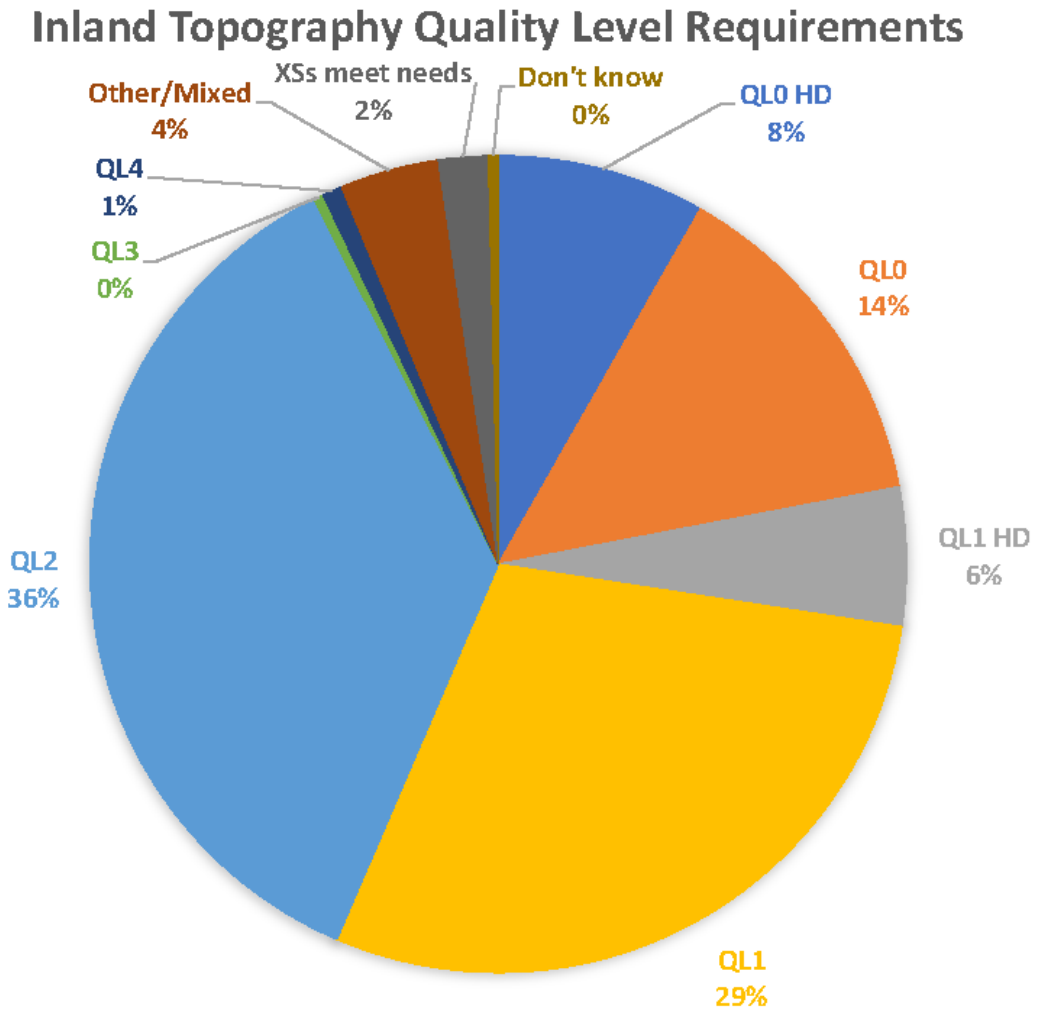
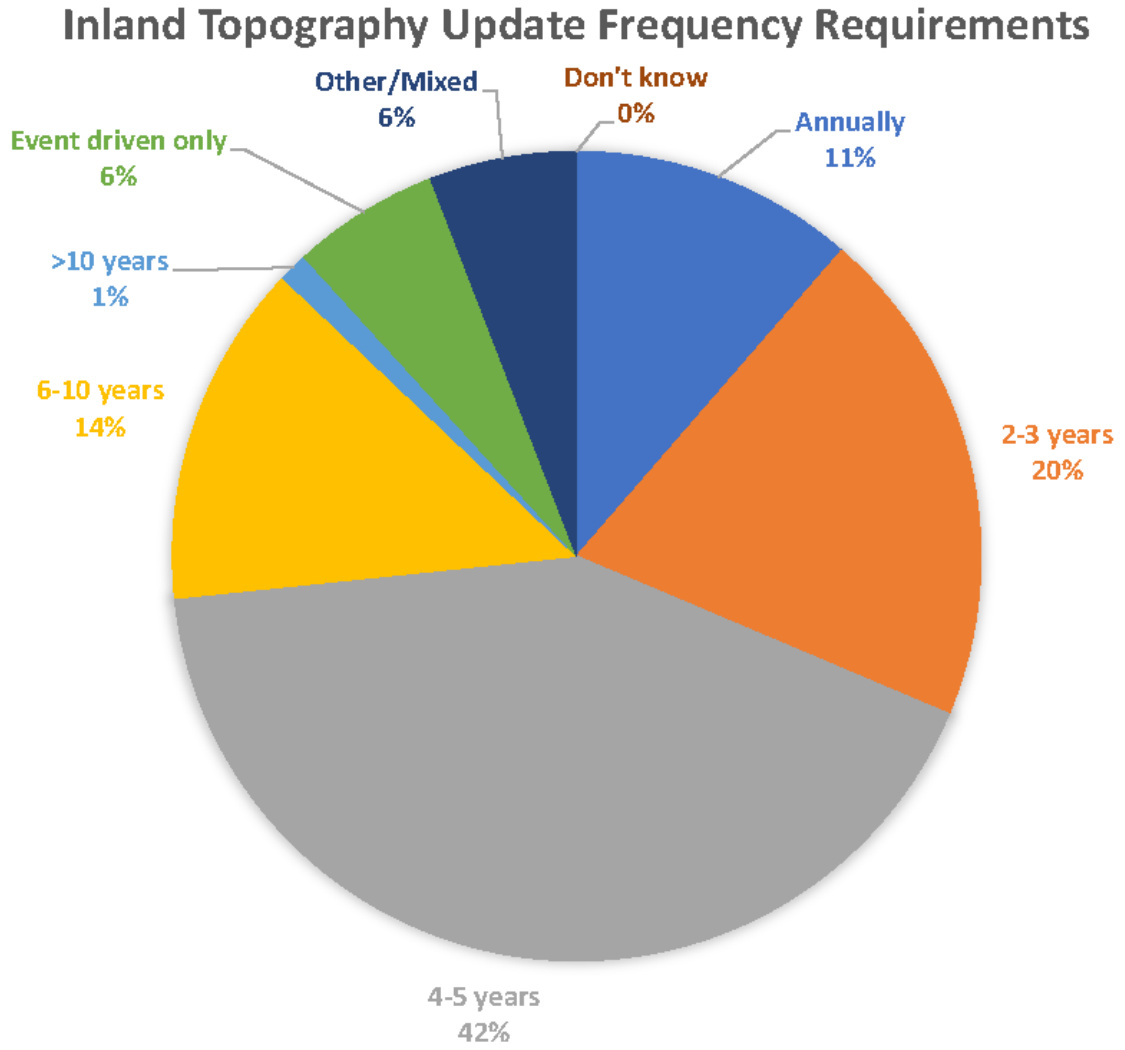
Alaska Inland Topography Requirements





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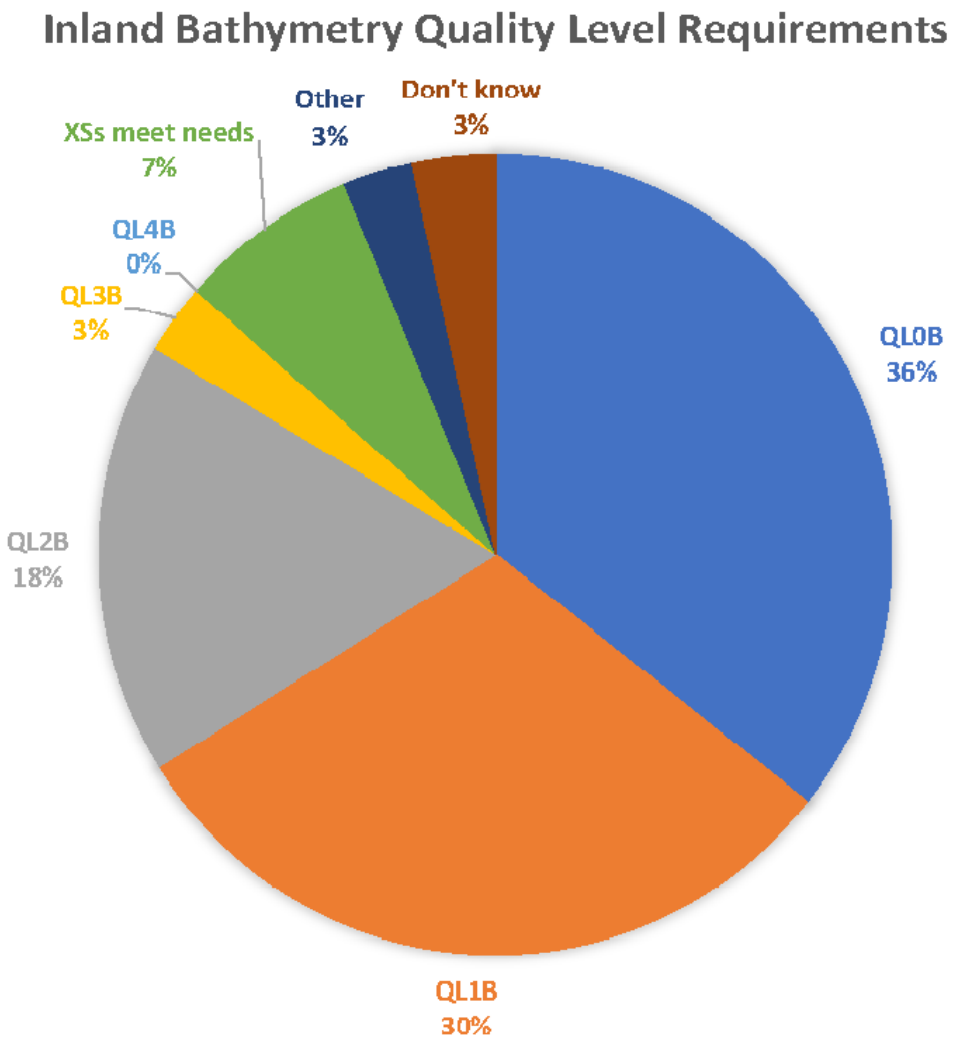
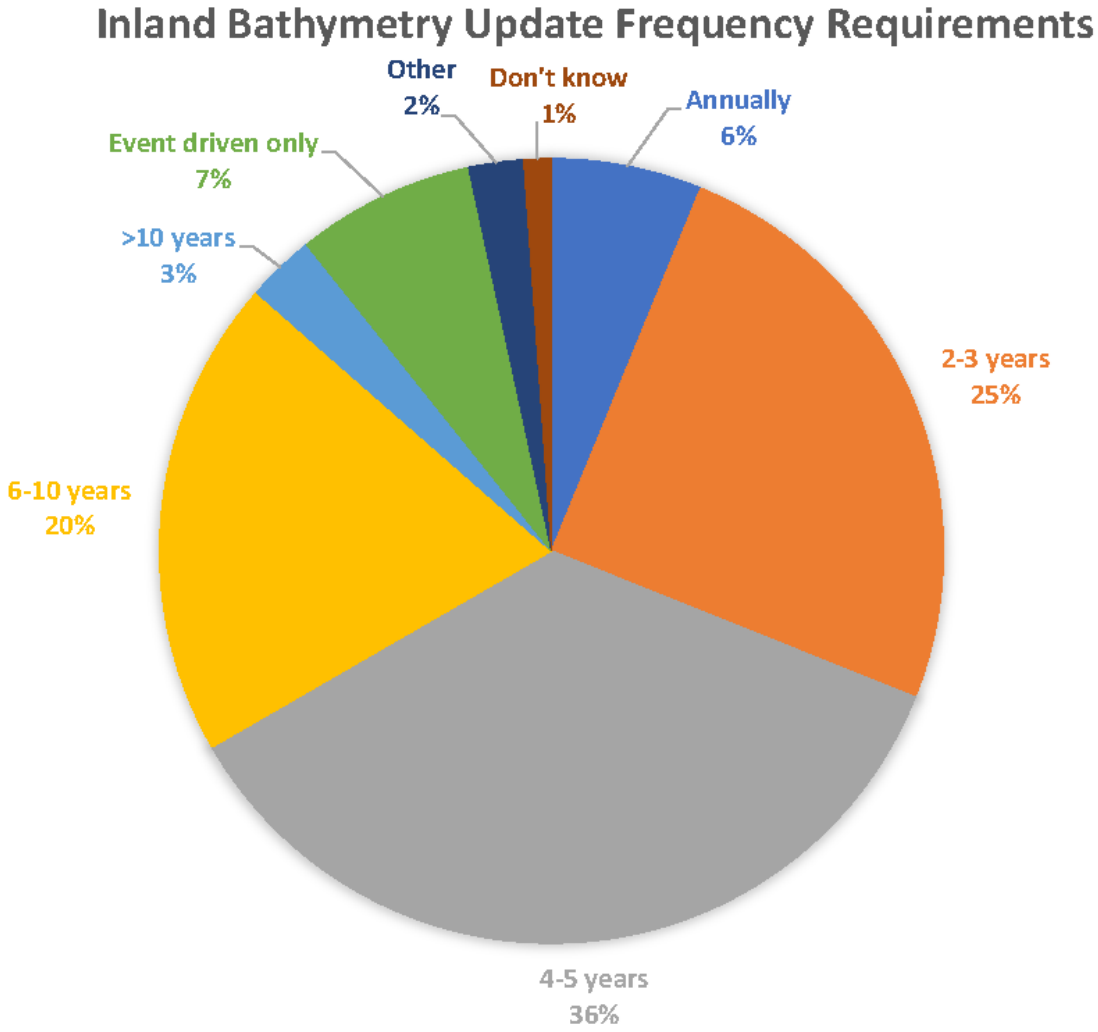
Alaska Inland Bathymetry Requirements





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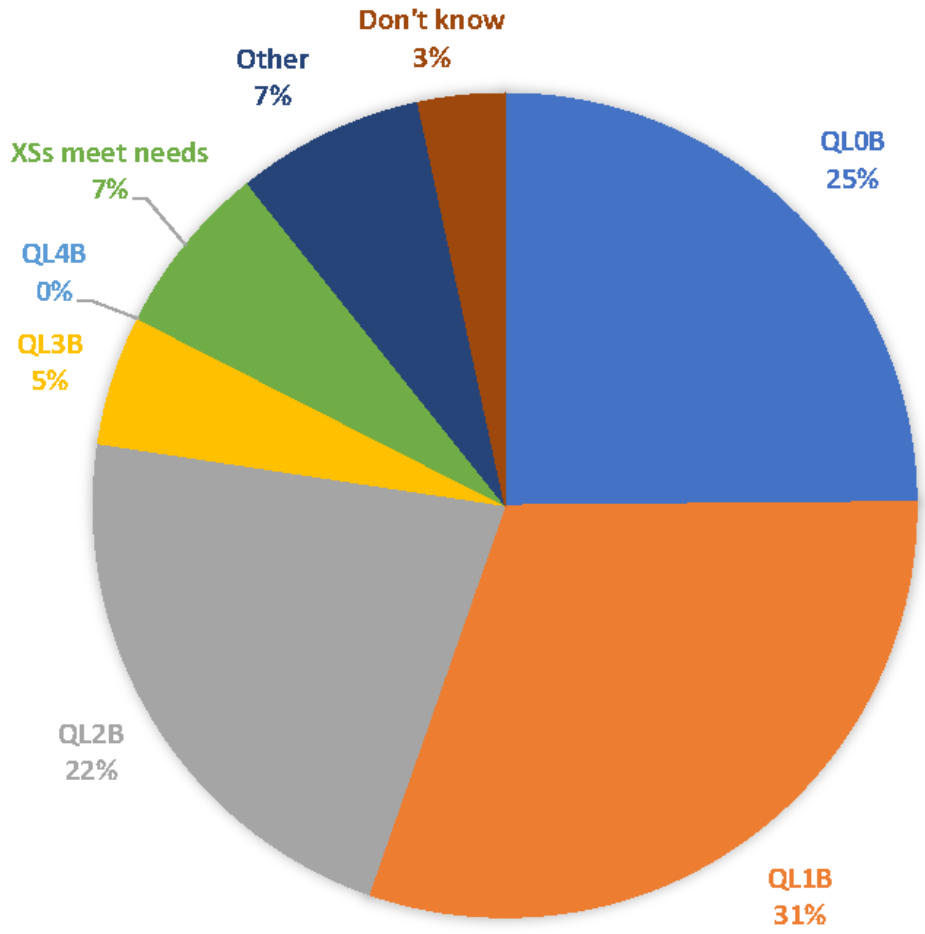
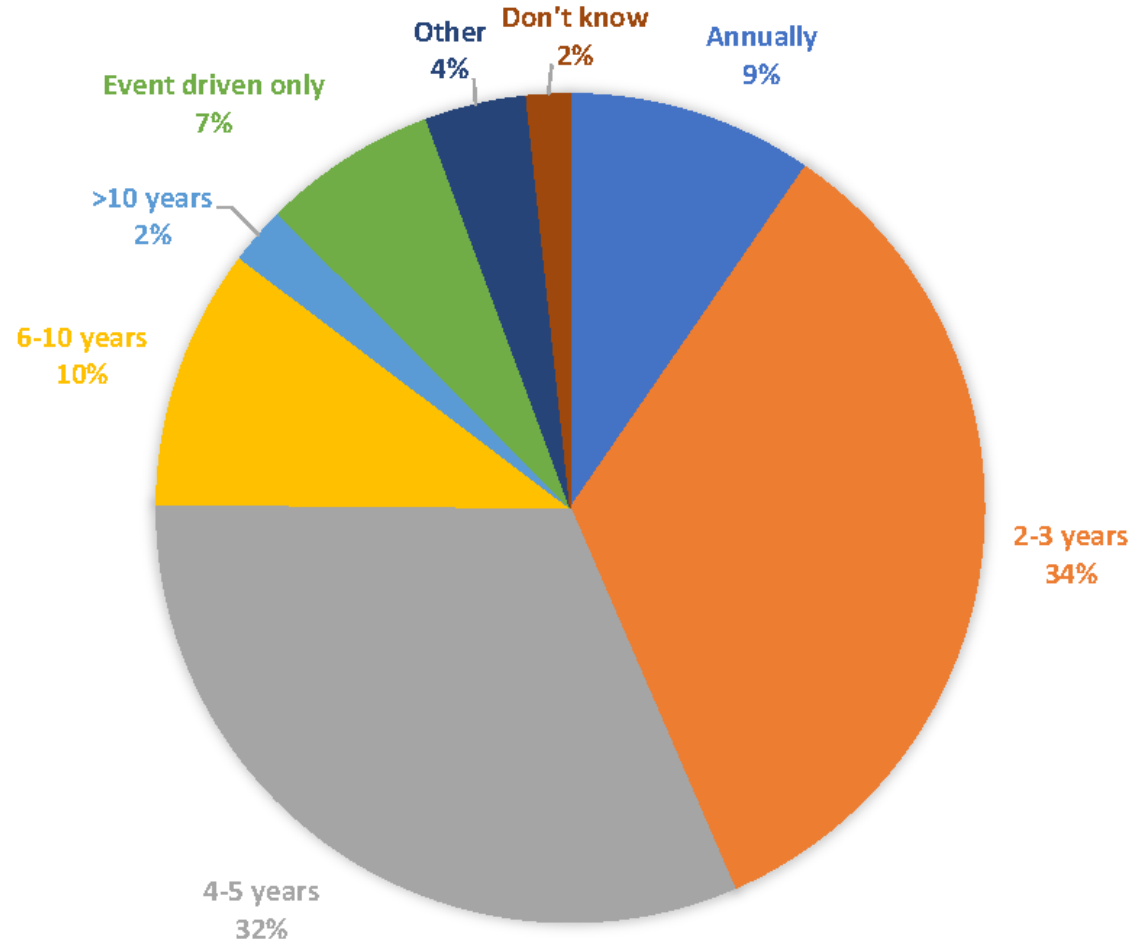
Alaska Nearshore Bathymetry Requirements

Nearshore Bathymetry Quality Level Requirements



Nearshore Bathymetry Update Frequency Requirements



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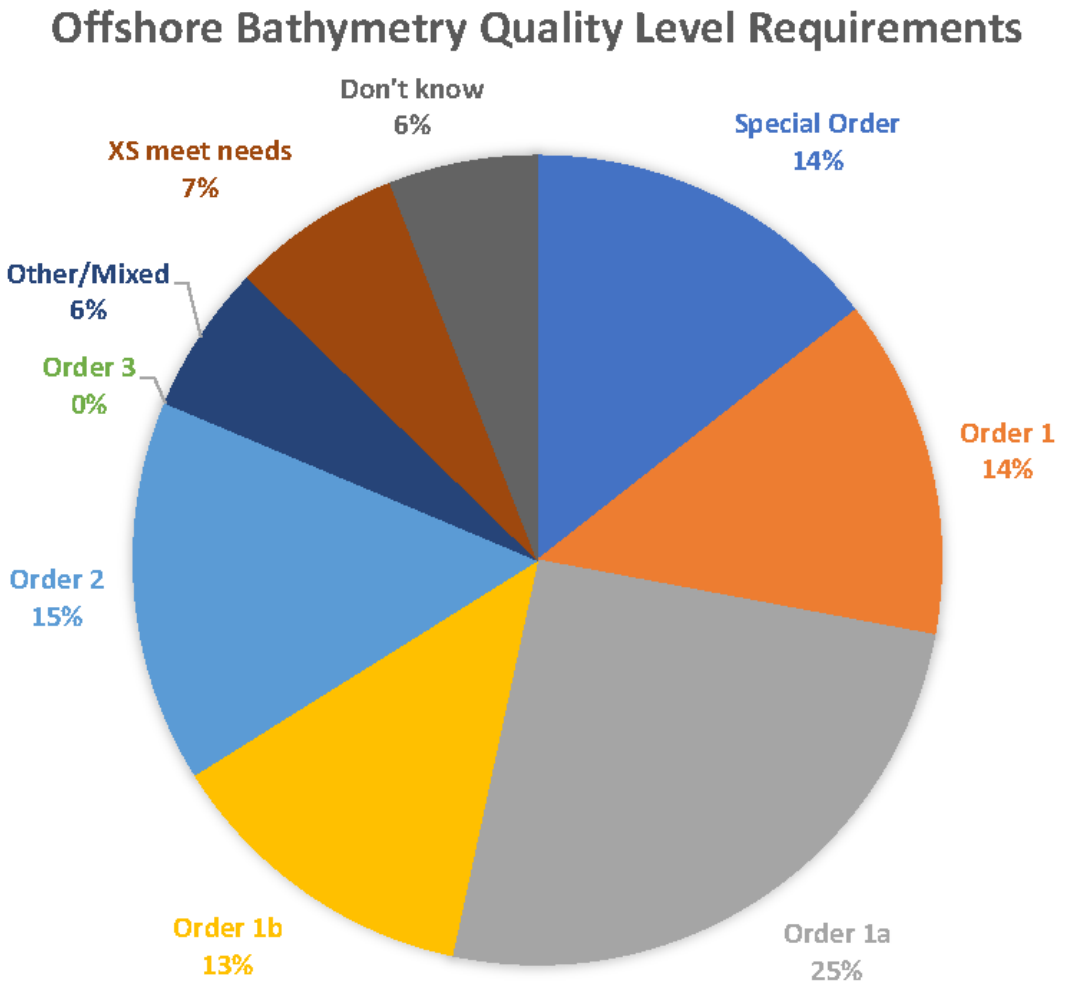
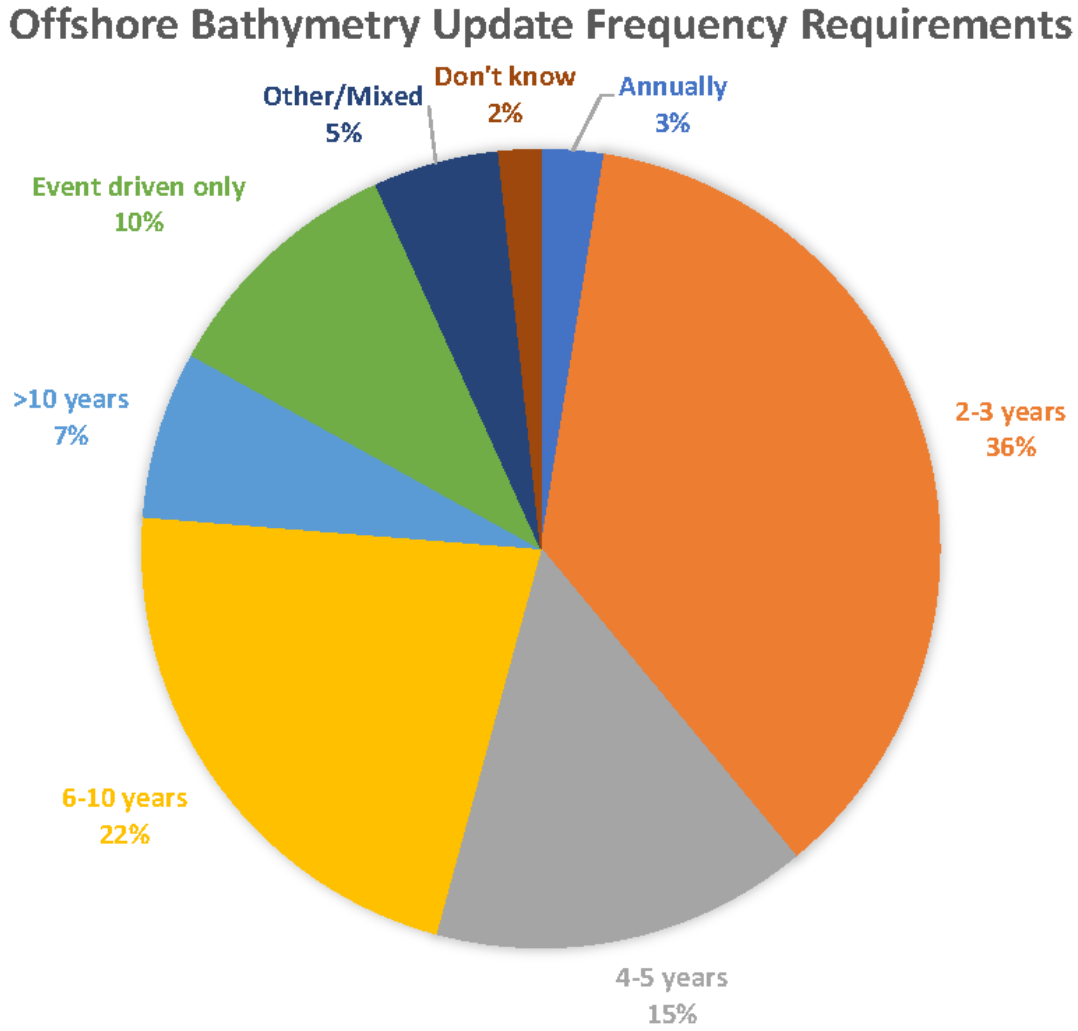
Alaska Offshore Bathymetry Requirements





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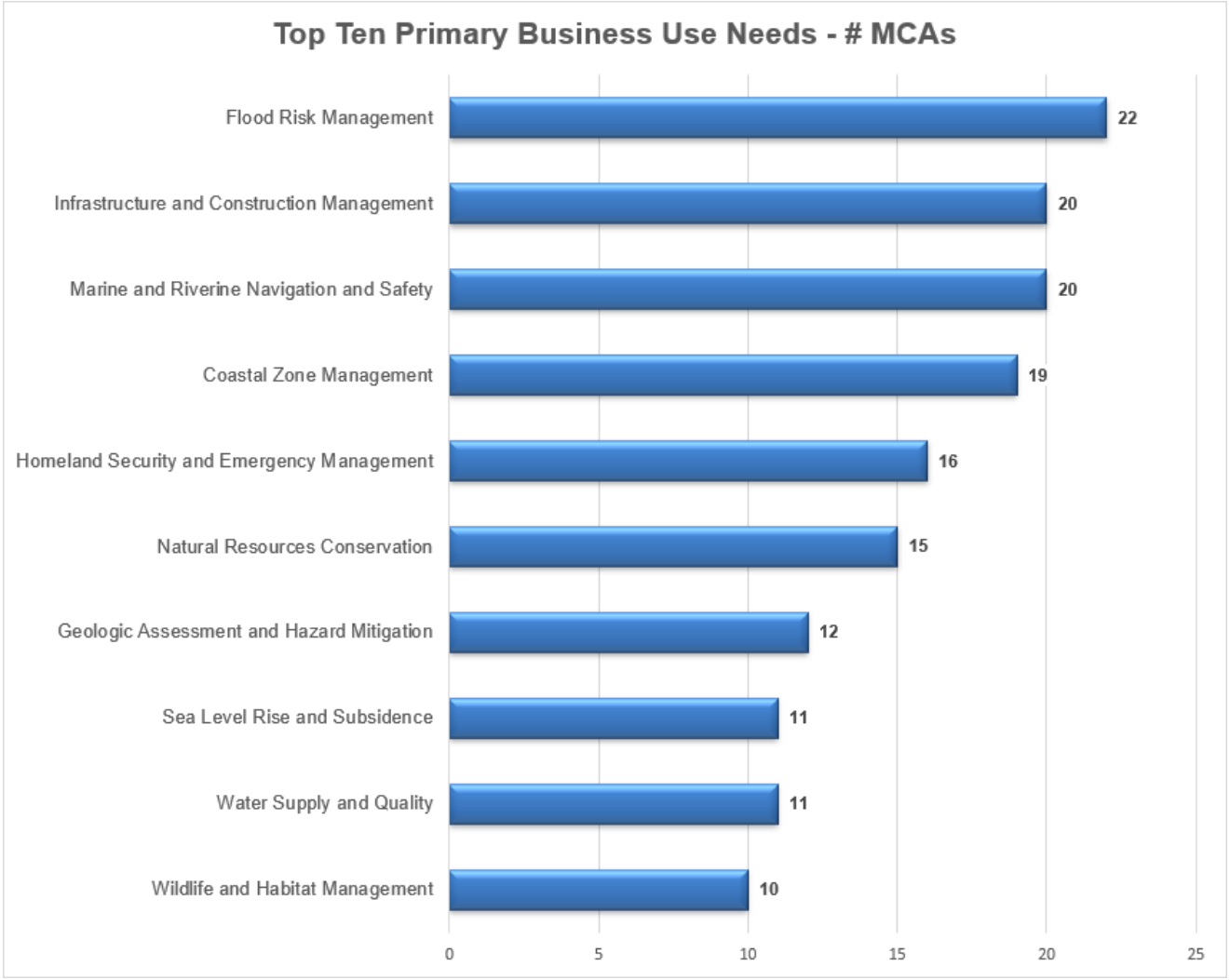
Alaska Top 10 Business Uses



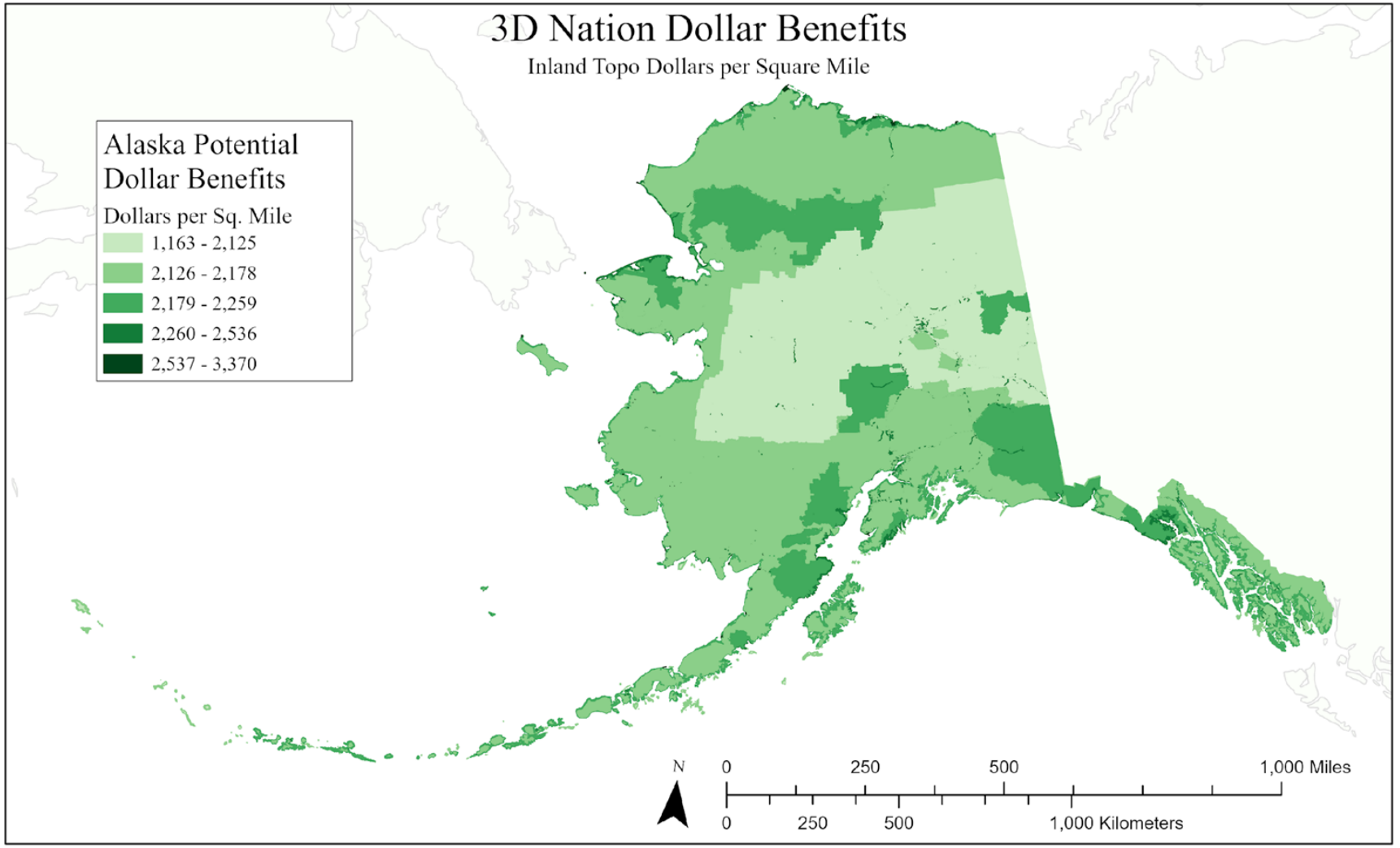
Future Annual Benefits

Annual Dollar Benefits by Organization and Geography Type

Organization Type	Future Annual Benefits
Federal agencies	$5.84B
State, regional, county, local, and tribal government	$7.68B
Not-for-profit and private entities	$0.04B
Total	**$13.56B**

Geography Type	Future Annual Benefits
Inland topography	$9.99B
Inland bathymetry	$0.86B
Nearshore bathymetry	$2.55B
Offshore bathymetry	$0.16B
Total	**$13.56B**

Alaska Dollar Benefits – Inland Topography



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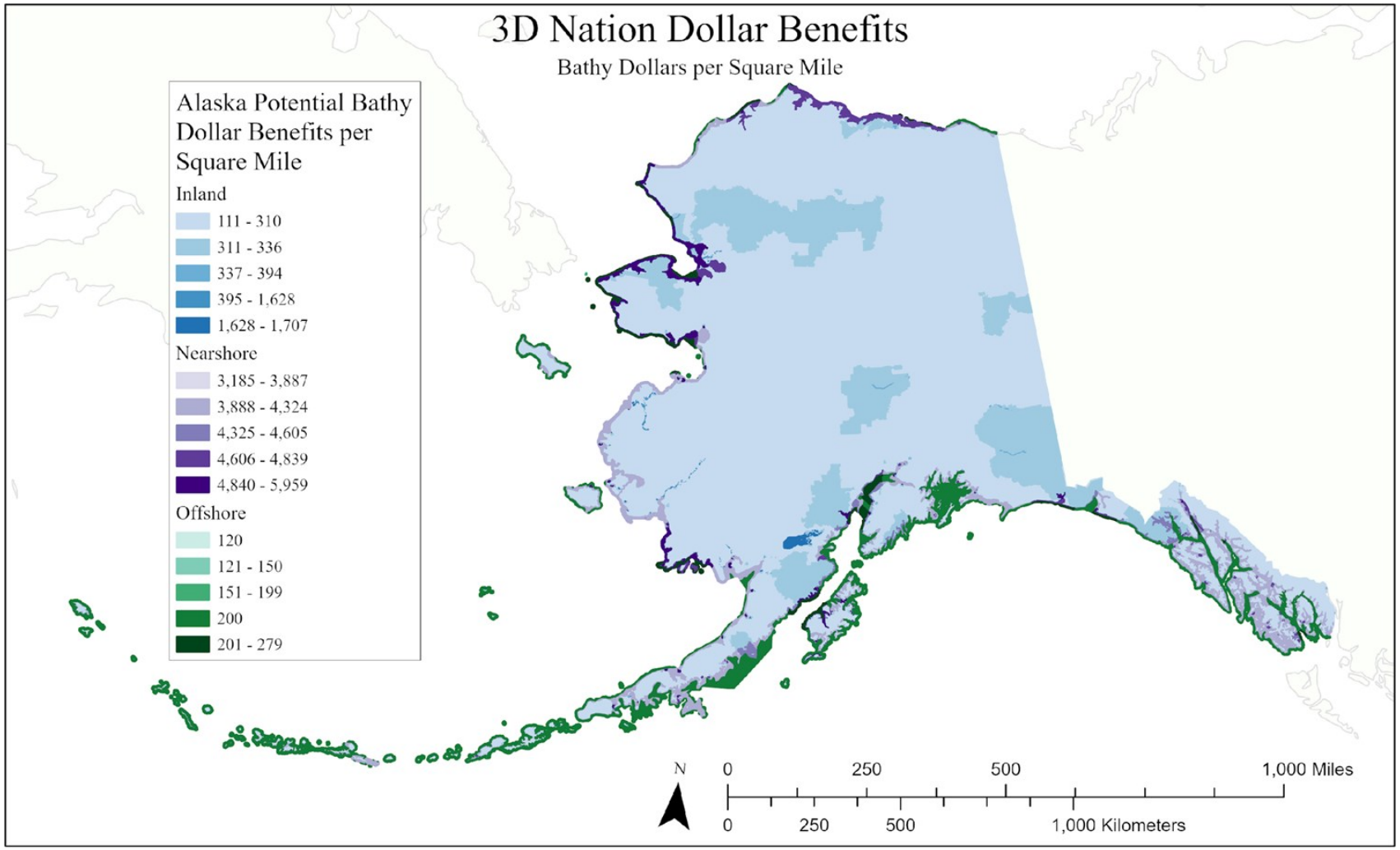
Alaska Dollar Benefits – Bathymetry



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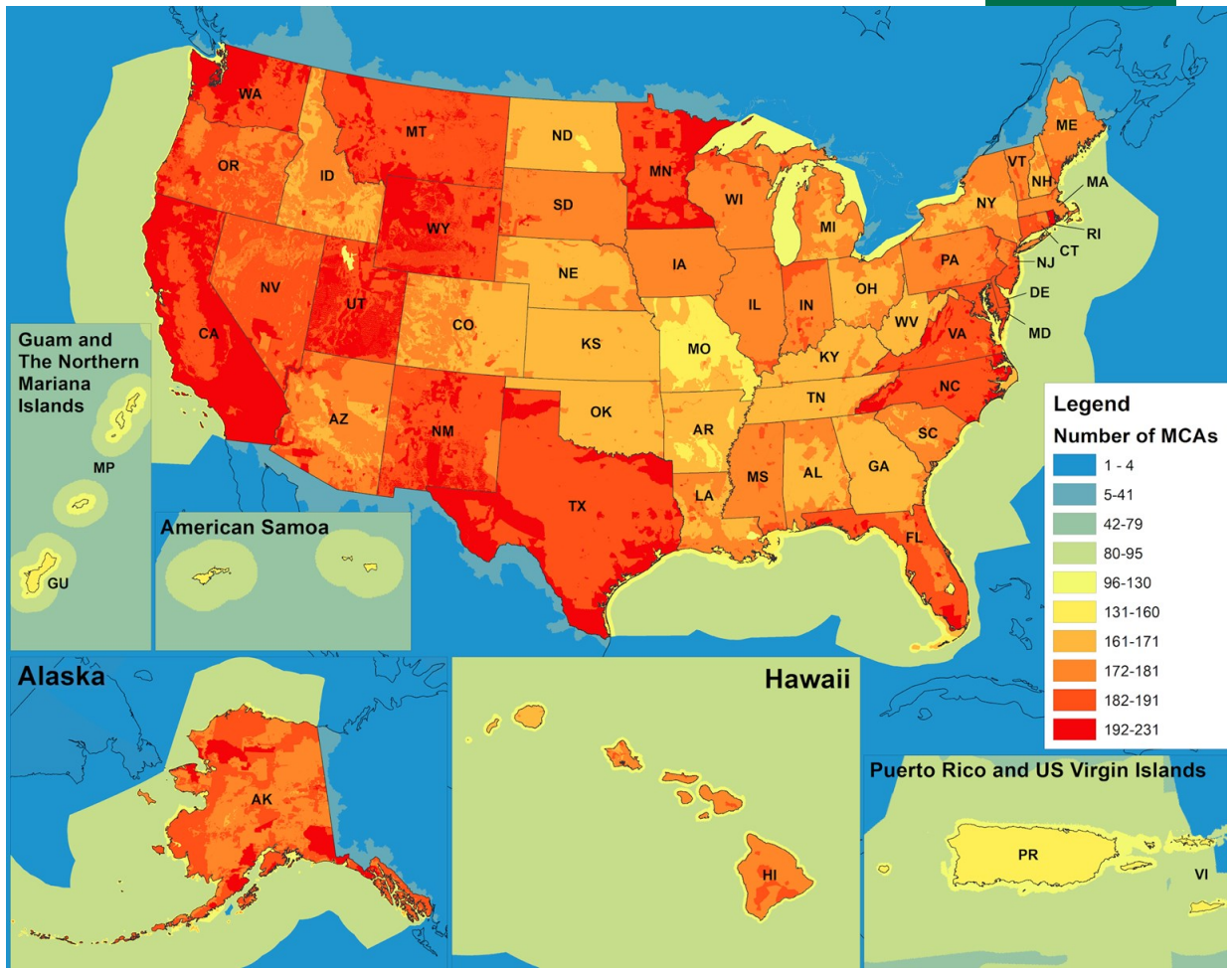
Benefits are Likely Underestimated

- Respondents were hesitant to estimate benefits from data they do not have yet or use regularly. 3DEP data are better known and understood than bathymetry.
- Missing input from smaller private firms and individual users:
  - Only one small engineering firm responded to the 3D Nation Study, indicating millions of dollars in annual savings from the availability of public domain elevation data. If many of the 24,000 other engineering firms and 16,000 land survey firms had similarly responded, the annual benefits would have been billions of dollars higher.
- Missing future annual dollar benefits from key industries:
  - Commercial timber
  - Precision agriculture
  - Fish and seafood aquaculture
  - Mining
  - Wind energy
  - Oil and gas
  - Motor vehicle manufacturers
  - Shipping, boating, fishing, and cruise lines
  - Port and harbor managers
  - Engineering and surveying
  - Real estate, banking, mortgage, and insurance
  - Telecommunications

Geospatial Benefit Cost Analyses

- All user requirements and benefits are tied to geospatial AOIs
- 1km grid overlaid on land and water areas
- Requirements, benefits, and costs are calculated per grid cell and aggregated to HUC, state, and national scales
- Cost information derived from data provided by the Government
- Reduced Value Multipliers applied
- Scenarios were run for all combinations of QL and update frequency plus some mixed QLs/update frequencies



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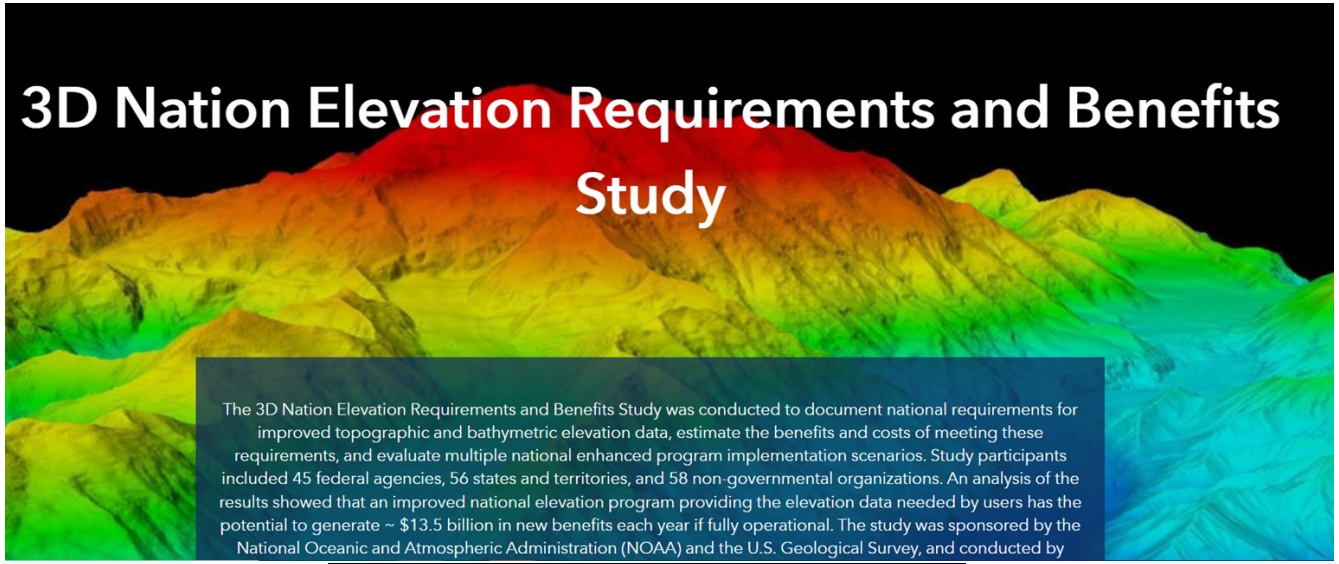
What's Next for the 3D Nation Study?

- **Hub Site!**
- **Develop** 3DNTM Call for Action Part 2: Next Generation 3DEP – *USGS FY24*
- **Consider** approaches to 2024 study update – simpler, faster



https://3dnation.iocm.noaa.gov/

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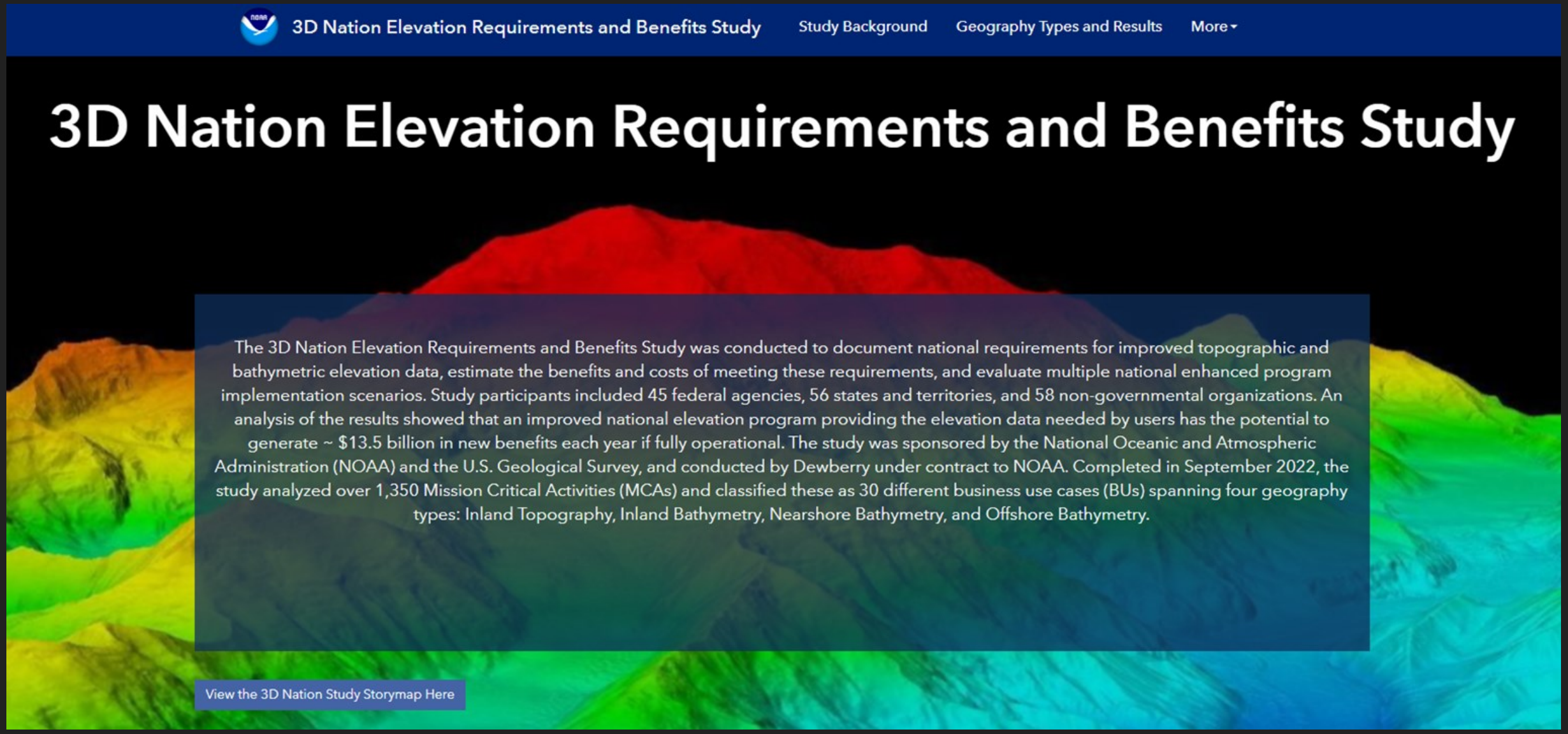

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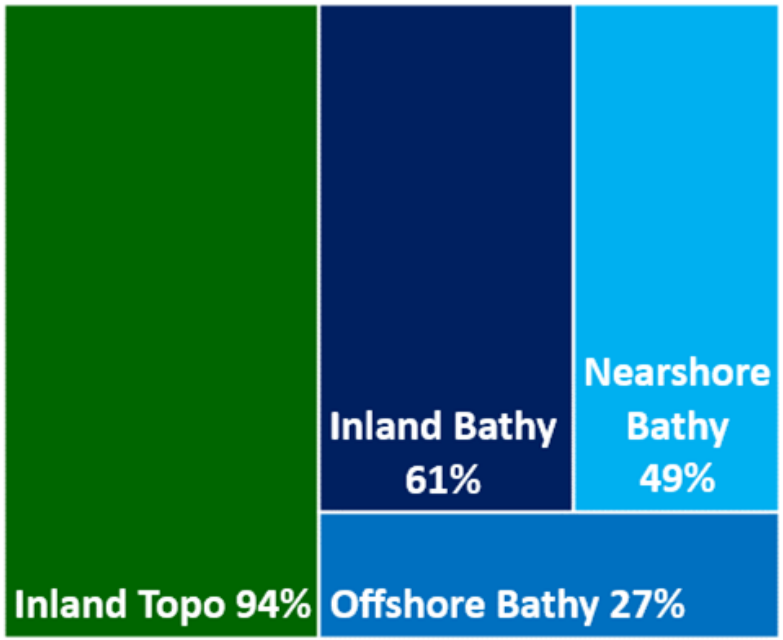
Study Background



Percentage results of survey participants identifying elevation data requirements for various geography types.

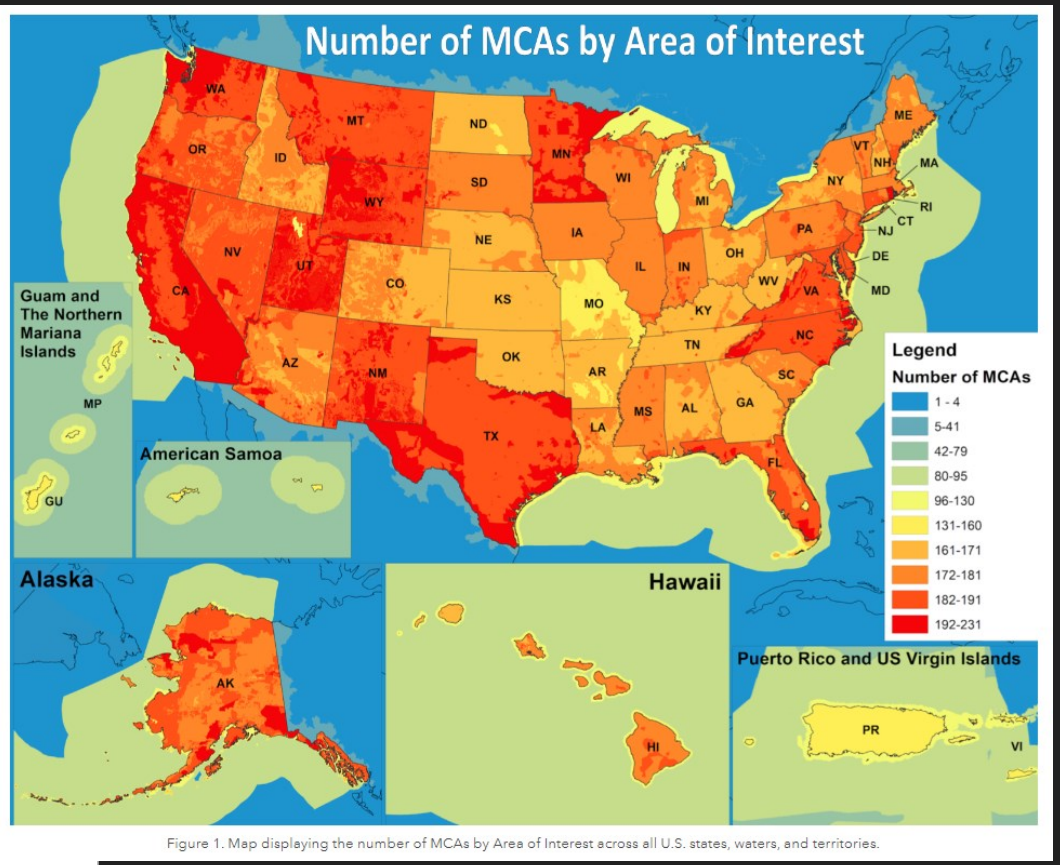


Figure 1. Map displaying the number of MCAs by Area of Interest across all U.S. states, waters, and territories.

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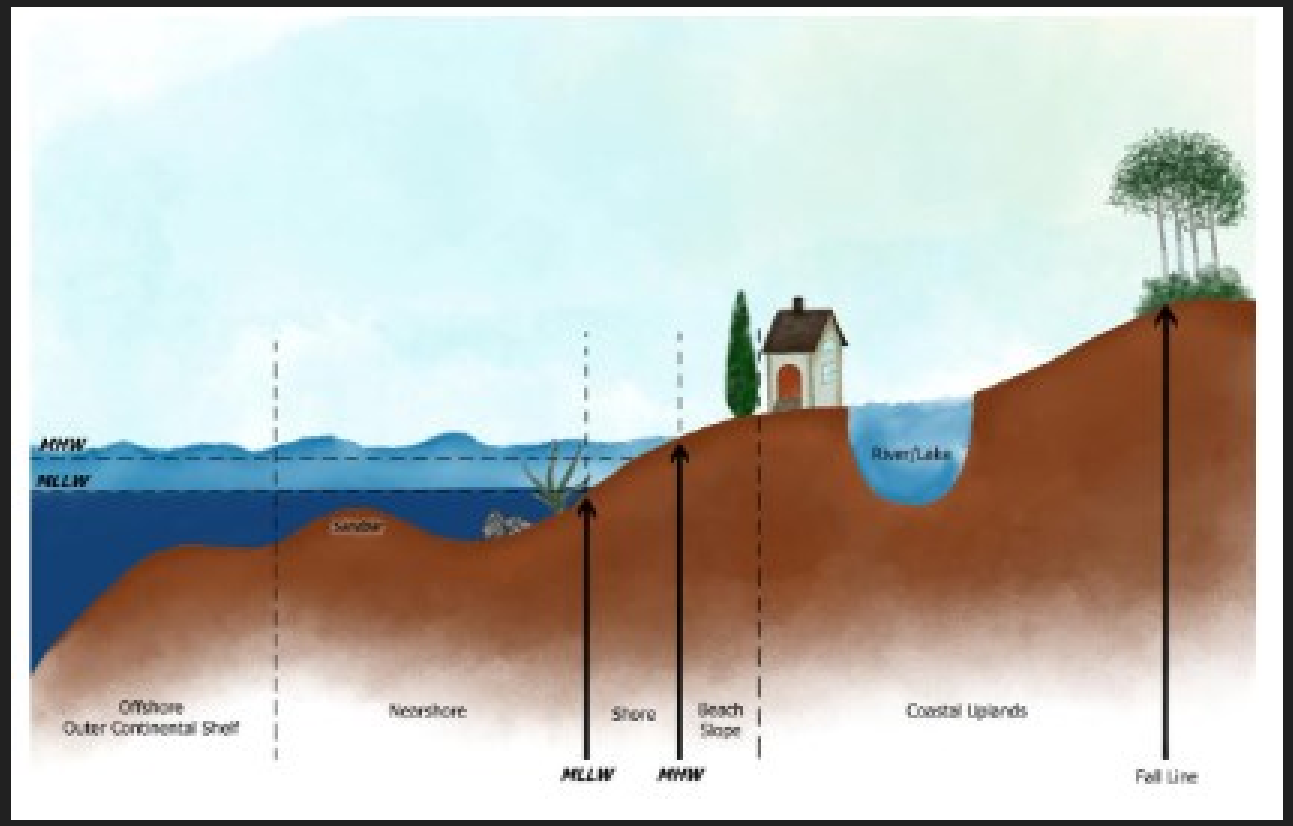
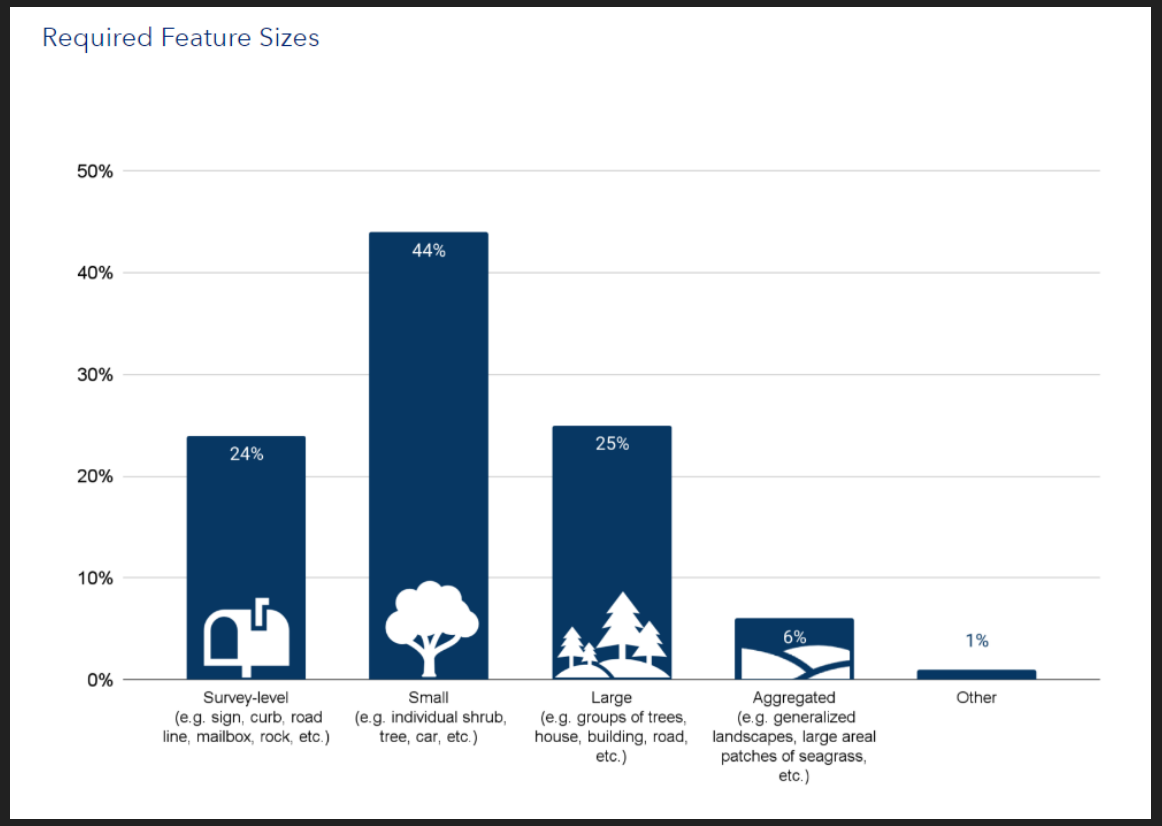
Geography Types





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All Business Use Cases

Flood Risk Management

$1,660,213,708 in tangible, future annual benefits if all conditions are satisfied. Busin...

Water Supply and Quality

$301,467,658 in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Coastal Zone Management

$4.35 billion in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Natural Resource Conservation

$720,897,661 in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Geologic Assessment and Hazard Mitigation

$873,423, 421 in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Wildlife and Habitat Management

$43,179,972 in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Marine and Riverine Navigation

$577 million in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

Renewable Energy Resources

$11,548,240 in tangible, future annual benefits if all conditions are satisfied. Business Use Sub..

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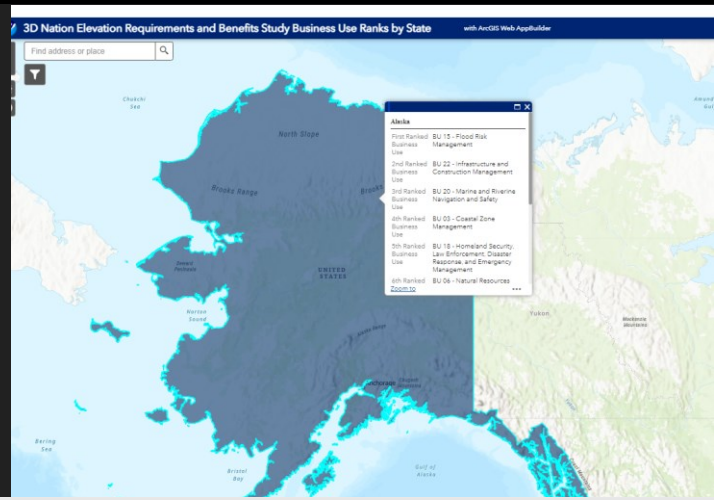
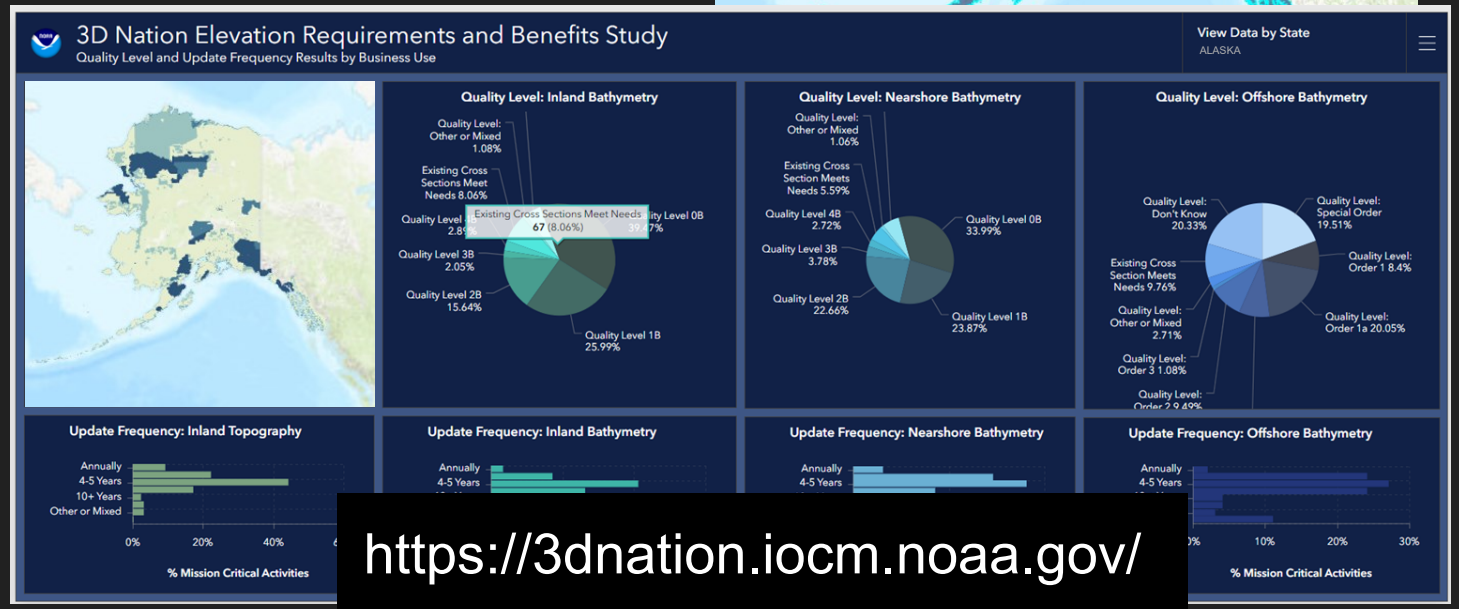
State Level Data

- Business Uses by State
- More functionality in work
- To be added:
  - State MCAs
  - QLs for all geographies
  - AOIs submitted
  - $ benefits by sq. mile and topography type





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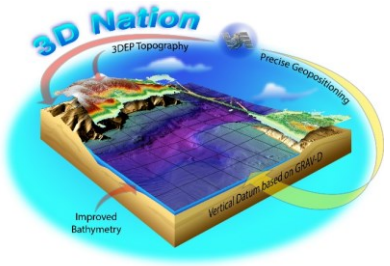
Thank You



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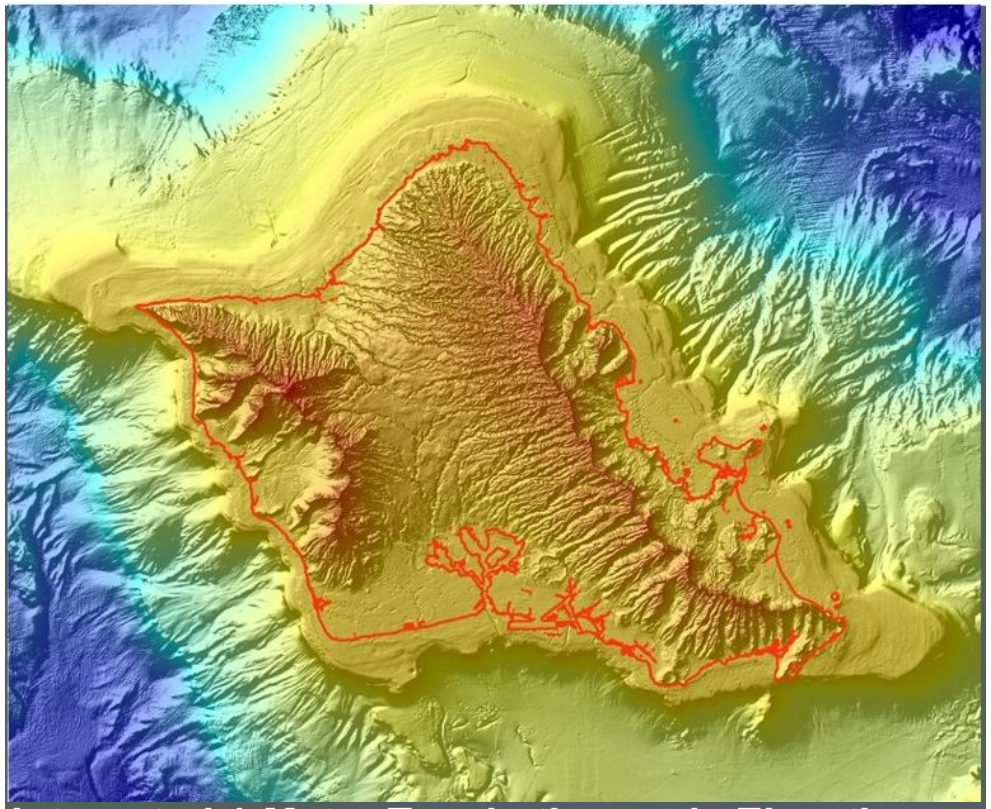

Integrated 1-Meter Topobathymetric Elevation Model (TBDEM) for Oahu, Hawaii (USGS CoNED)

Image: Coastal National Elevation Database (CoNED)

Study Report

https://usgs.gov/3DEP/3DNationStudy

Hub Site

https://3dnation.iocm.noaa.gov/

Questions?

Whole study: shoegberg@dewberry.com
Topography & Inland Bathymetry: 3dep@usgs.gov
Nearshore & Offshore Bathymetry: iwg-ocm.staff@noaa.gov

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