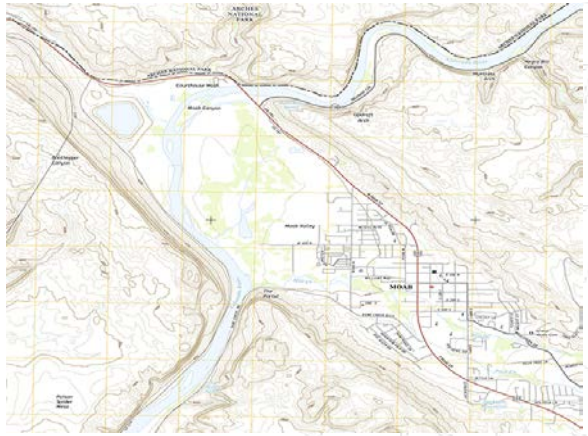
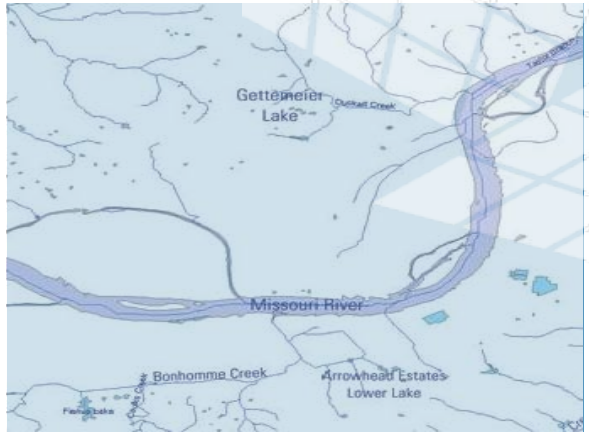
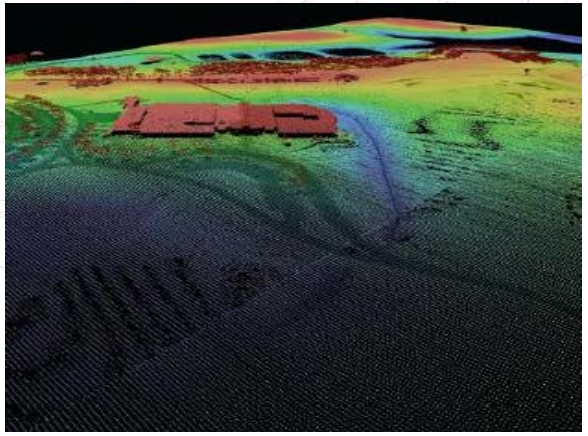
3D Nation Elevation Requirements and Benefits Study





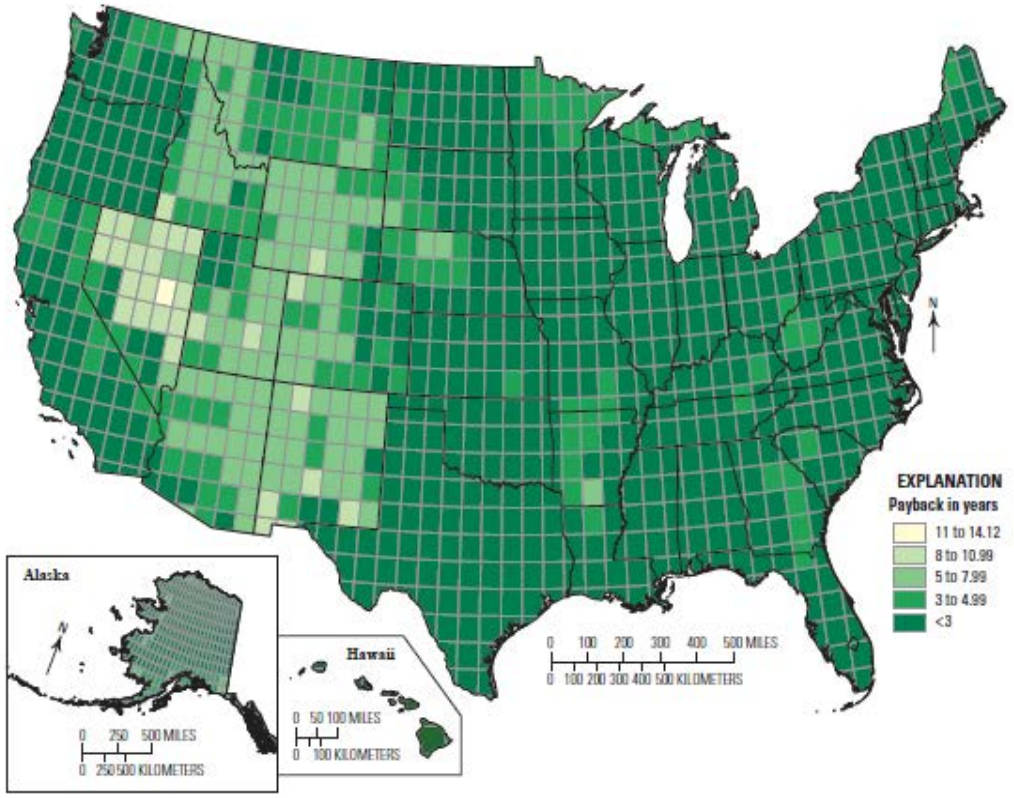


Ashley Chappell, NOAA
Sue Hoegberg, Dewberry
May 23, 2019

National Enhanced Elevation Assessment (NEEA)

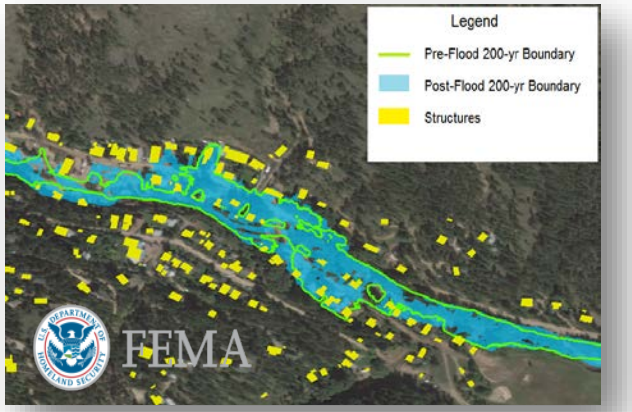
A comprehensive inventory of user requirements and benefits for elevation data

- Conducted in 2011 – 2013
- Data collection
  - 34 Federal Agencies
  - 50 States
  - Local Government, tribal, private, not-for-profits
- Results
  - 602 Mission critical activities that need significantly better data than are currently available
  - Between $1.2 billion and $13 billion in benefits annually
  - Increases in President's budget in FY14 - 17
  - http://nationalmap.gov/3dep

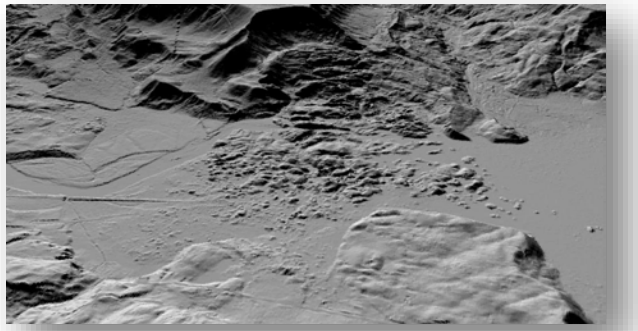


Mission Critical Applications

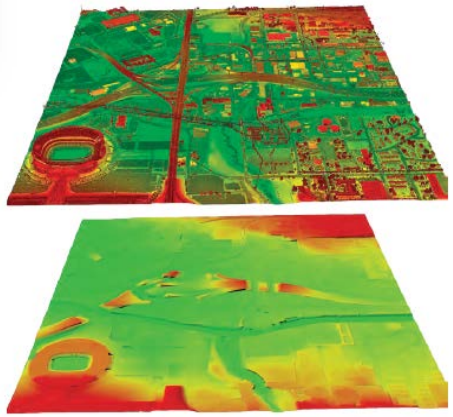
Rank	Business Use	Annual Benefits	
		Conservative	Potential
1	Flood Risk Management	$295M	$502M
2	Infrastructure and Construction Management	$206M	$942M
3	Natural Resources Conservation	$159M	$335M
4	Agriculture and Precision Farming	$122M	$2,011M
5	Water Supply and Quality	$85M	$156M
6	Wildfire Management,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



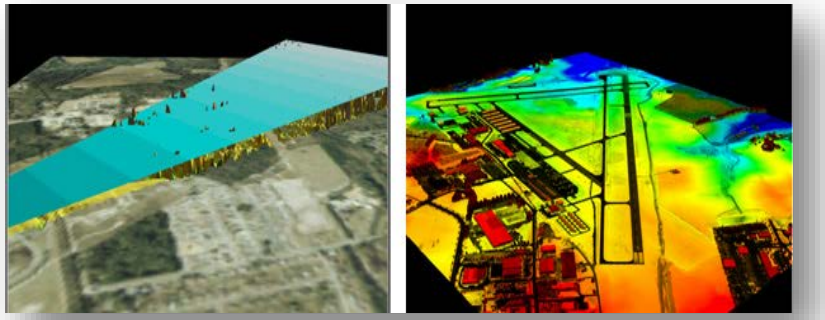
Flood Risk Management



Geologic Hazards



Infrastructure



Aviation Safety

NEEA Benefits for Top Business Uses

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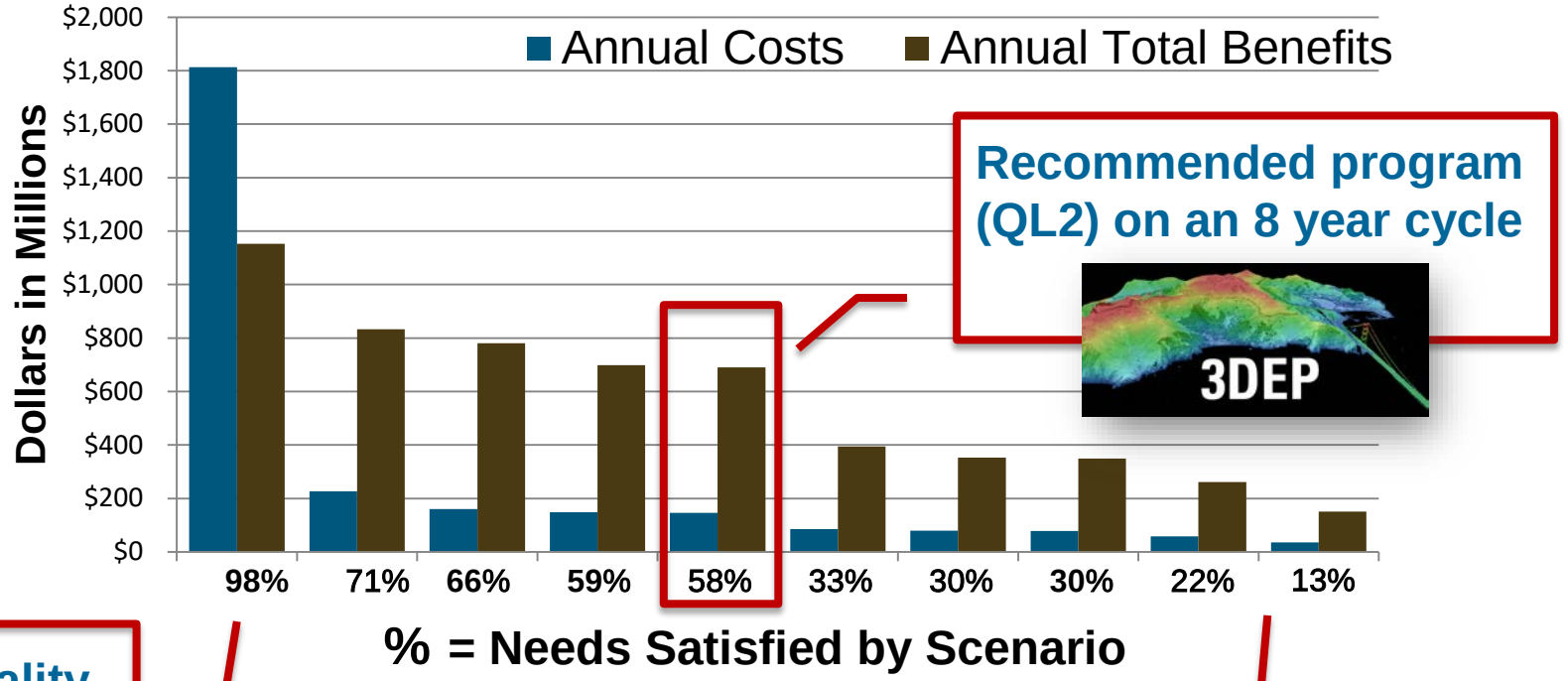
National Elevation Program Recommendation

Multiple Scenarios Considered

- Avg. Annual Costs: $146M
- Avg. Annual Benefits: $690M
- Avg. Annual Net Benefits: $544M
- Benefit Cost Ratio - 4.7:1
- Total Benefits Satisfied: 58%



Recommended program (QL2) on an 8 year cycle

Highest quality level (QL1) on an **annual** cycle

QL3 on a 25 year cycle (closest to existing program in 2010)

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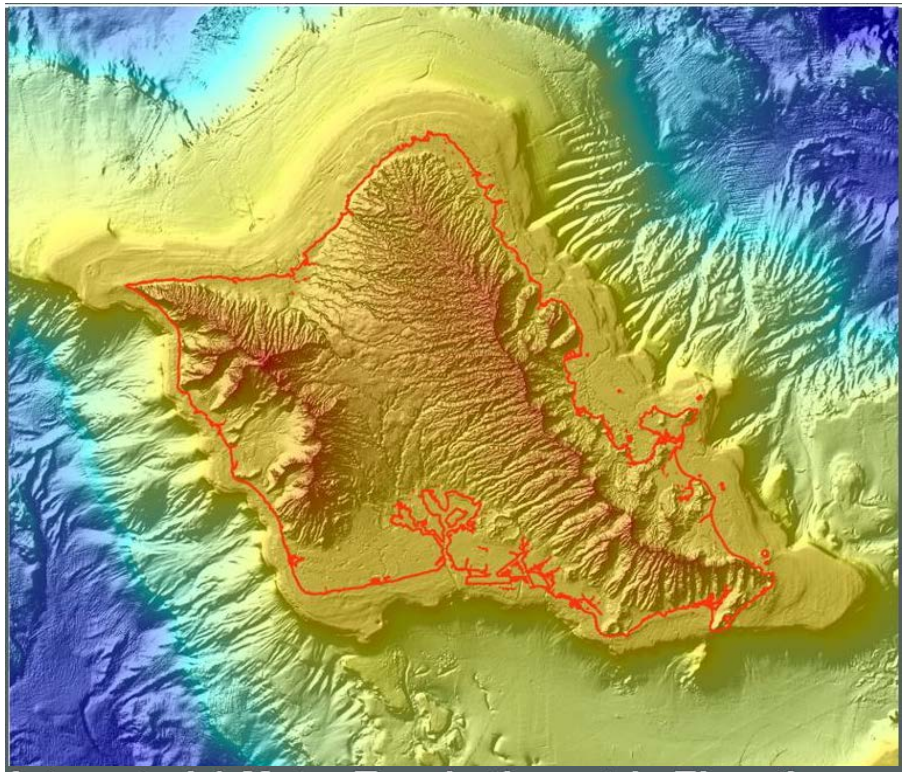
3DEP

Mapping a 3D Nation: Study Goals

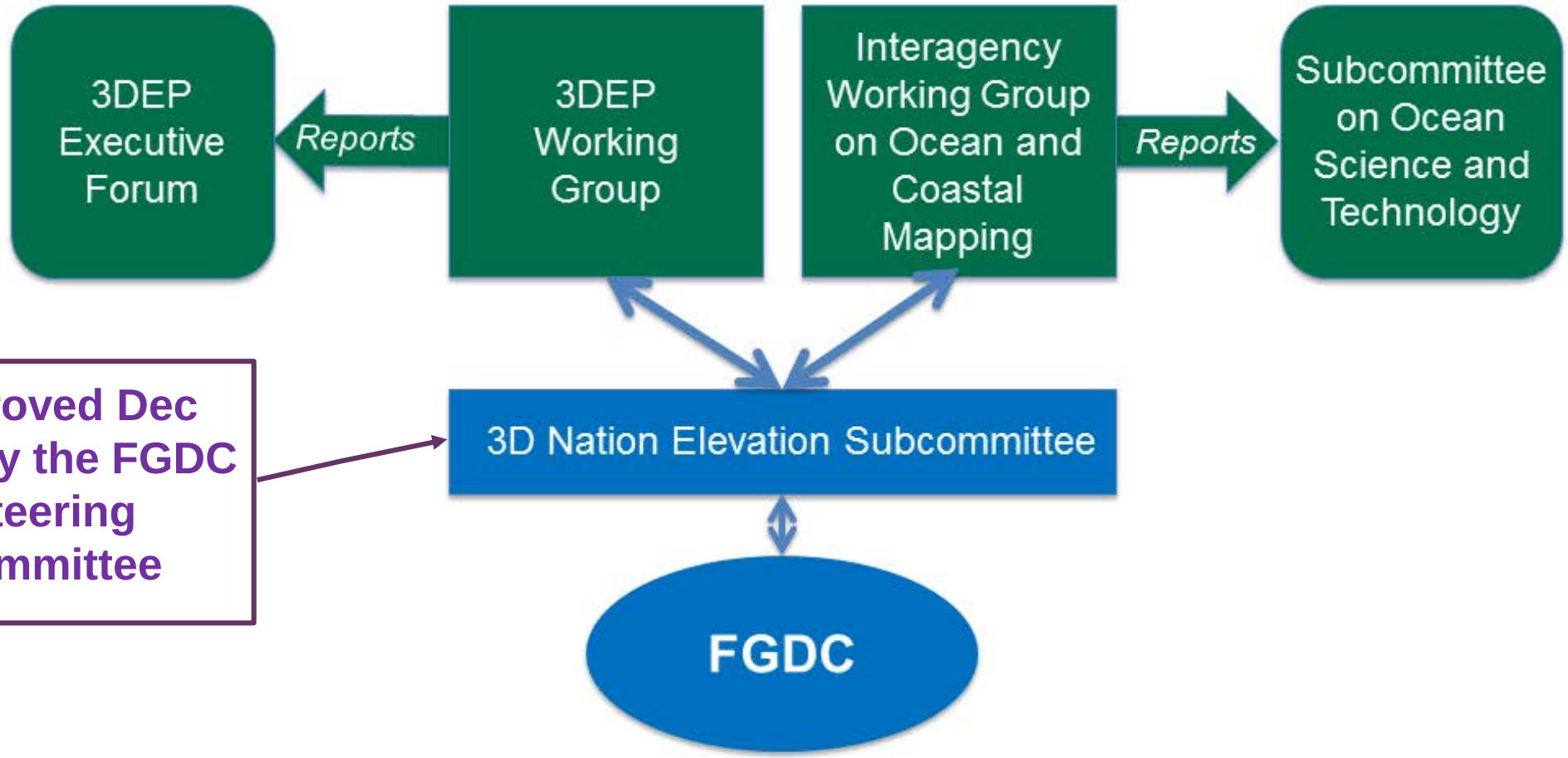
Understand 3D Data Requirements

- Refresh NEEA for the years beyond the initial 8-year acquisition program
- Understand inland, nearshore, and offshore bathymetric data requirements and benefits
- Understand how requirements and benefits dovetail in the coastal zone
- Sensor Agnostic/Technology Neutral
  - Focused on need for, and value of, elevation data

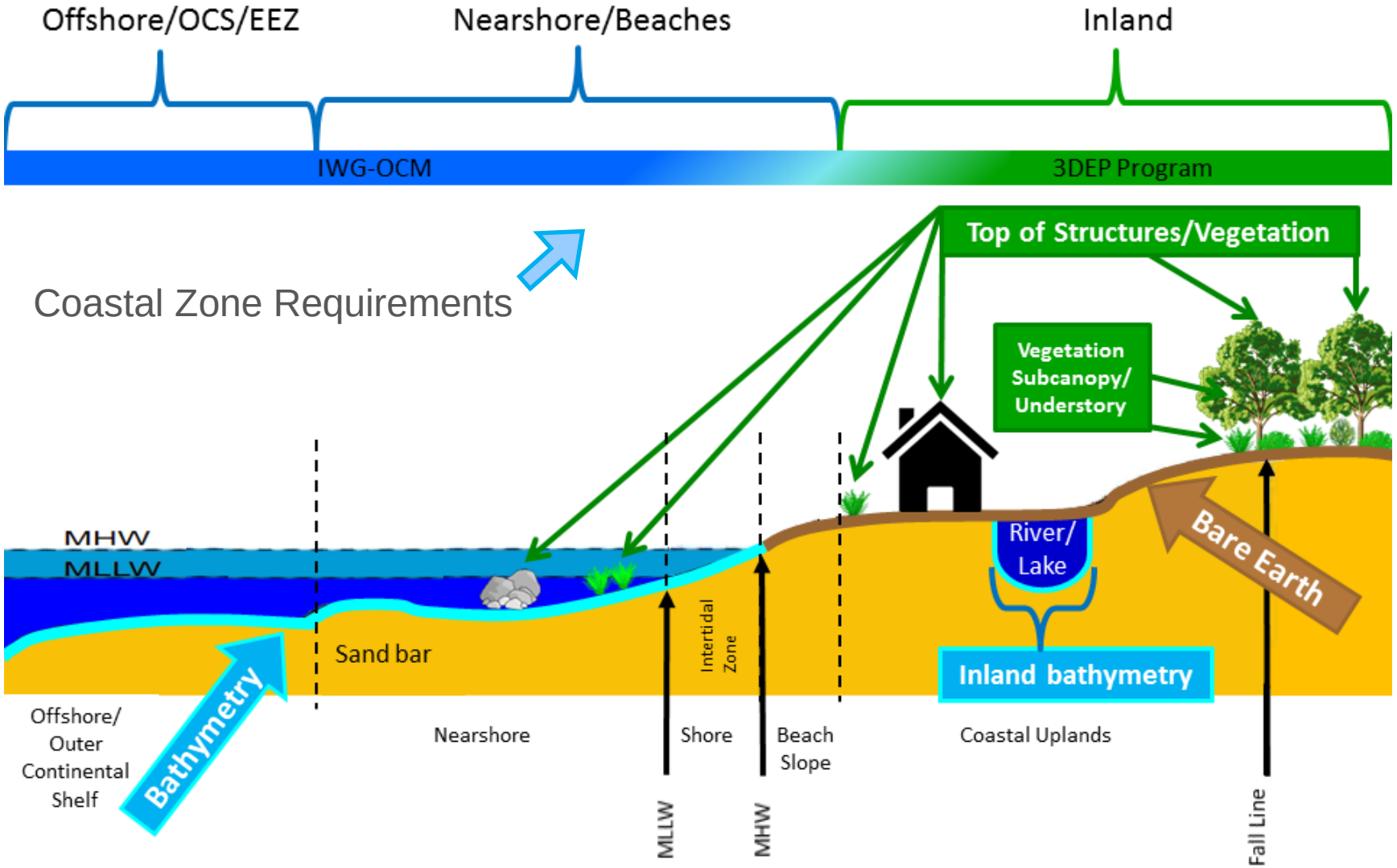


Integrated 1-Meter Topobathymetric Elevation Model (TBDEM) for Oahu, Hawaii (USGS CoNED)

Elevation Theme Governance



3D Nation Study Context



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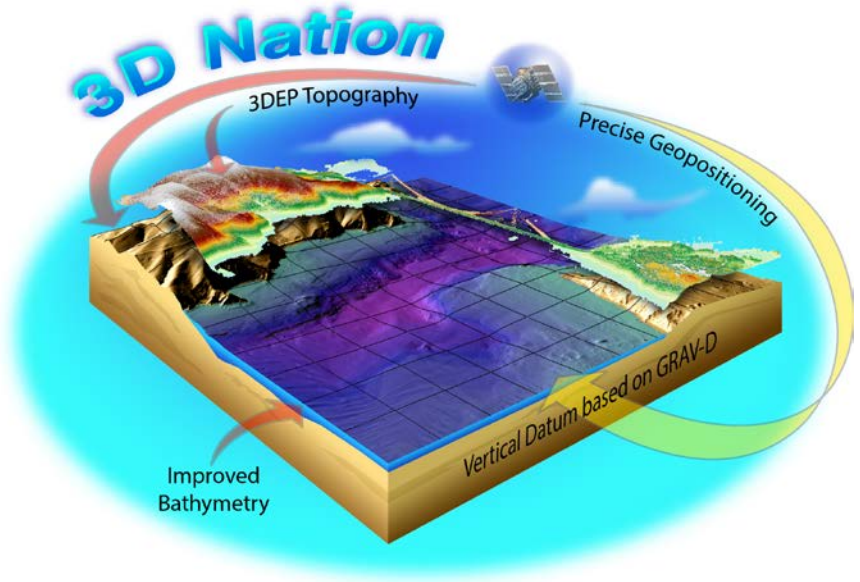
3D Nation Stakeholders

Federal, State, Local, Tribal, Non Profit, Academia, and Private

- 58 Federal departments and agencies
- 4 Federal commissions or committees
- 50 states plus D.C. and territories
- Local and regional stakeholders
- Non-profits
- Private/commercial
- Tribes



3D Nation from the tops of the mountains, to the depths of the seas, to include our inland rivers and lakes.

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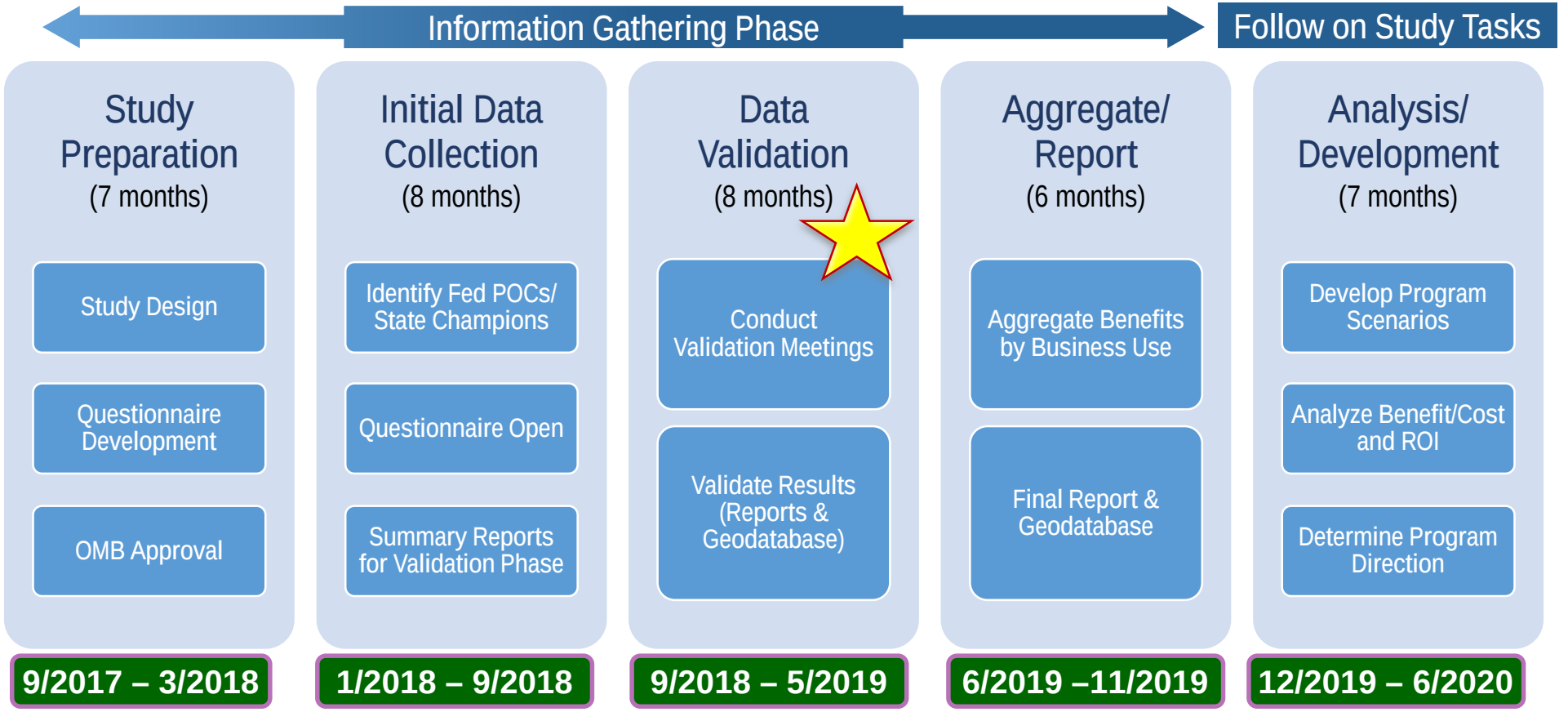
Study Phases and Timeline



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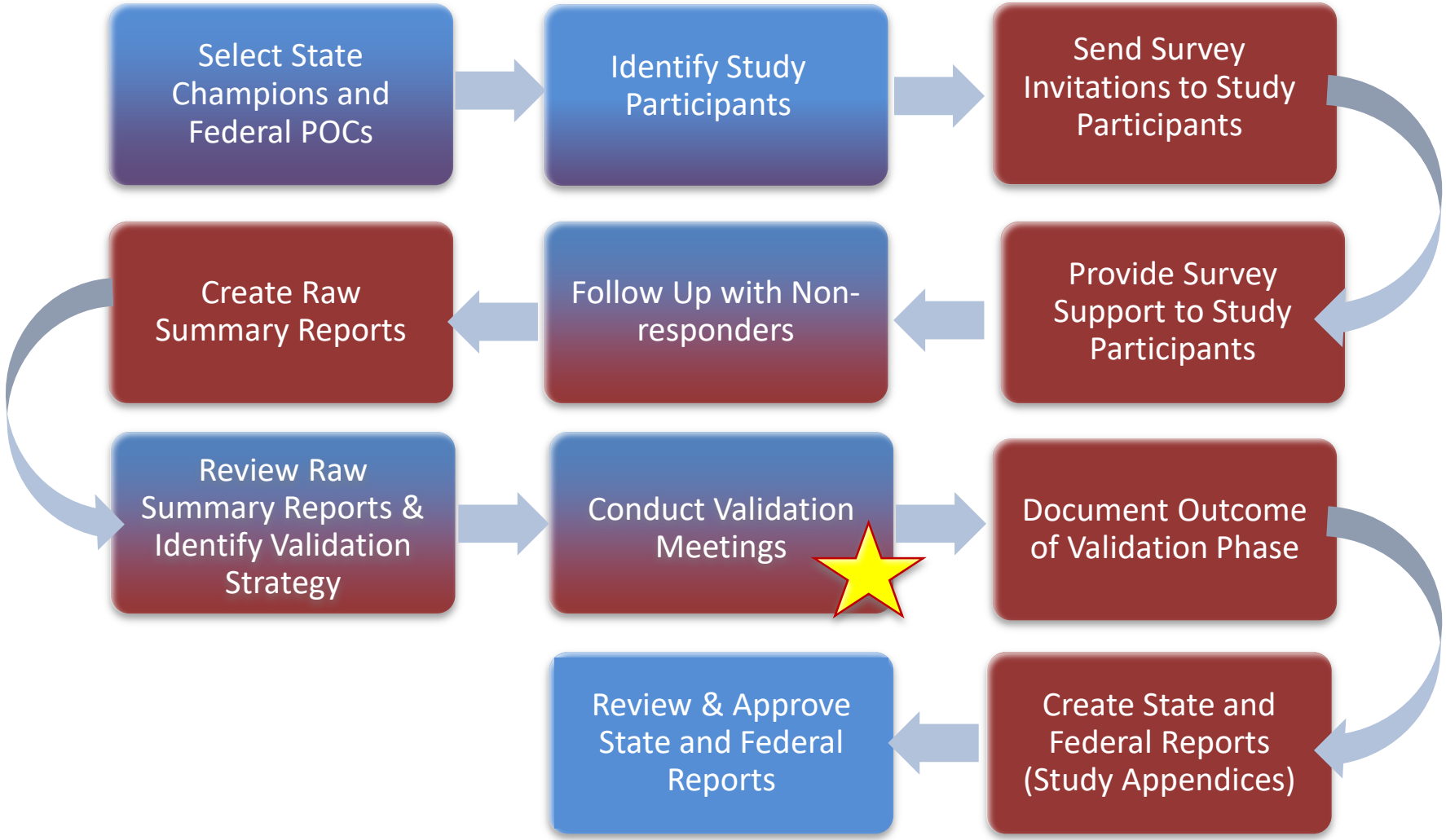
Study Methodology

Overview

- On-line questionnaire to collect user requirements and benefits with spatial extents of area of interest
  - Federal, State, local, Tribal governments
  - Not for profit
  - Private, commercial
- Geodatabase to store study data
- In person interviews with agencies and states to refine and consolidate results
- Analysis of consolidated responses to identify key requirements and benefits

3D Nation Study Workflow Process



Responsibility | State Champion / Federal POC | USGS / NOAA | Dewberry

Questionnaire Overview

Inland Topo, Inland Bathy, Nearshore Bathy, Offshore Bathy

- Geographic extents of MCA
- Characteristics of 3D elevation data needed to perform the MCA
  - Quality Level/IHO Order
  - Update frequency
  - Acceptable error (horizontal and vertical)
  - Beach profile
  - Cross sections/transects
  - Hydrologic processing
  - Tide correction
  - Seamlessness
  - Data products
  - Integration with other datasets
- Currently used data
- Current benefits
- Future benefits

Quantifying Benefits

Benefits Categories

- 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

Questionnaire Validation Process

Validate and Consolidate Questionnaire Responses

- In-person and/or virtual meetings
- Review responses for agency/state
- Understand agency/state uses of data
- Consolidate duplicate responses and/or group lower level activities into higher level activities
- Fill gaps in responses
- Clarify responses if needed
- POCs/State Champions sign off on validated information

Regional Review

Further Validate Questionnaire Responses

- We are considering the addition of a regional review so states can see how their responses compare to other states in their region
- If a state would like to add a Business Use or activity, a partially filled-out response that is based on other similar respondents can be provided as a “template” for refinement

Preliminary Results

48 Federal Agencies, 56 States and Territories

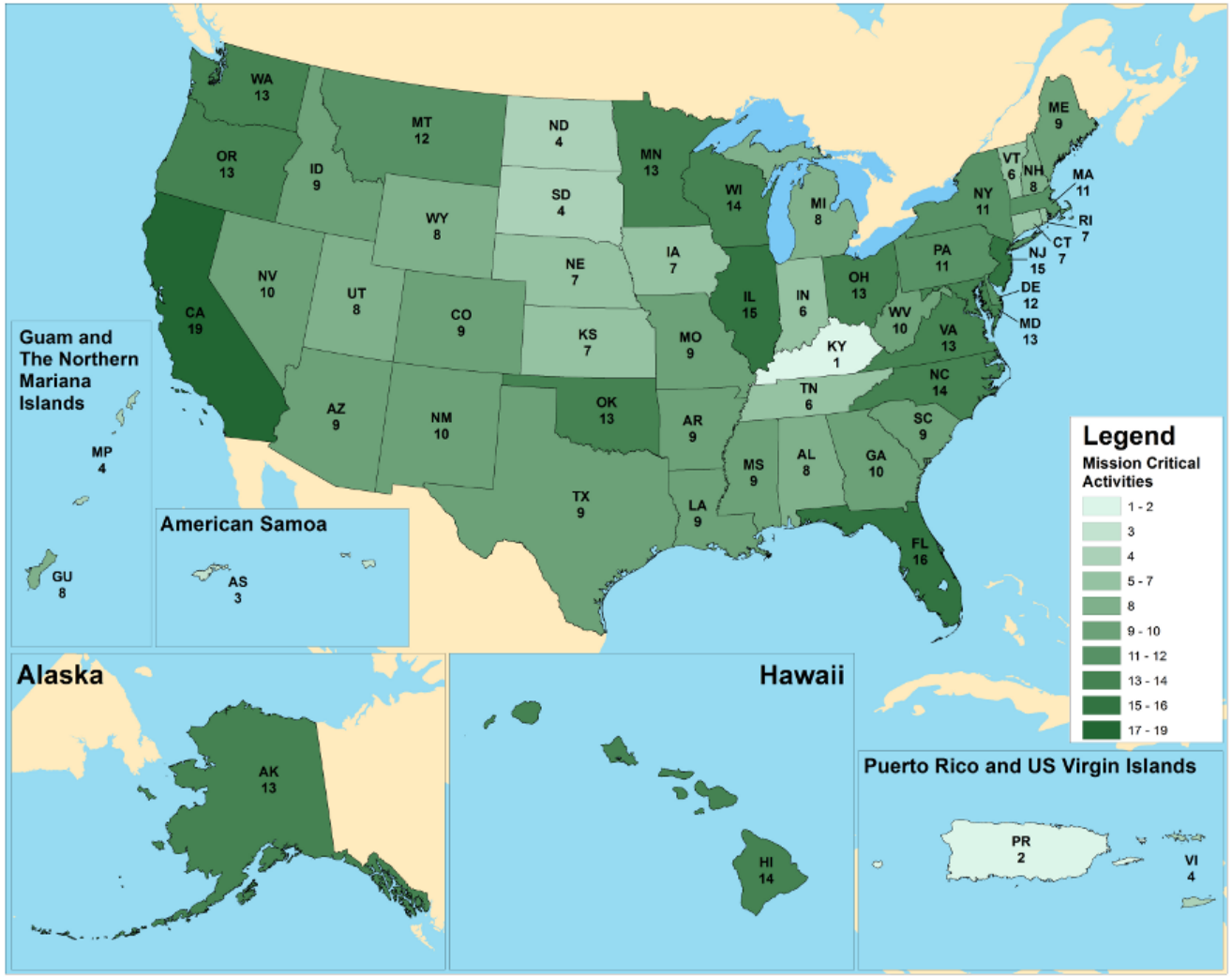
Organization Type	Number of MCAs	Percent of MCAs
Federal Agencies and Commissions	292	34%
Not for Profit	11	1%
Private or Commercial	26	3%
State, Regional, County, City or Other Local Government	521	61%
Tribal Government	10	1%
Total	860	100%

Preliminary Results

Top Ten Business Uses by Number of MCAs

Business Uses	Number of MCAs	Percent of MCAs
Flood Risk Management*	103	12%
Water Supply and Quality*	84	10%
Infrastructure and Construction Management*	78	9%
Coastal Zone Management	66	8%
Natural Resources Conservation*	60	7%
Urban and Regional Planning	59	7%
Geologic Assessment and Hazard Mitigation*	55	6%
Homeland Security, Law Enforcement, Disaster Response, and Emergency Management	49	6%
Wildlife and Habitat Management	37	4%
Marine and Riverine Navigation and Safety	33	4%

State Mission Critical Activities



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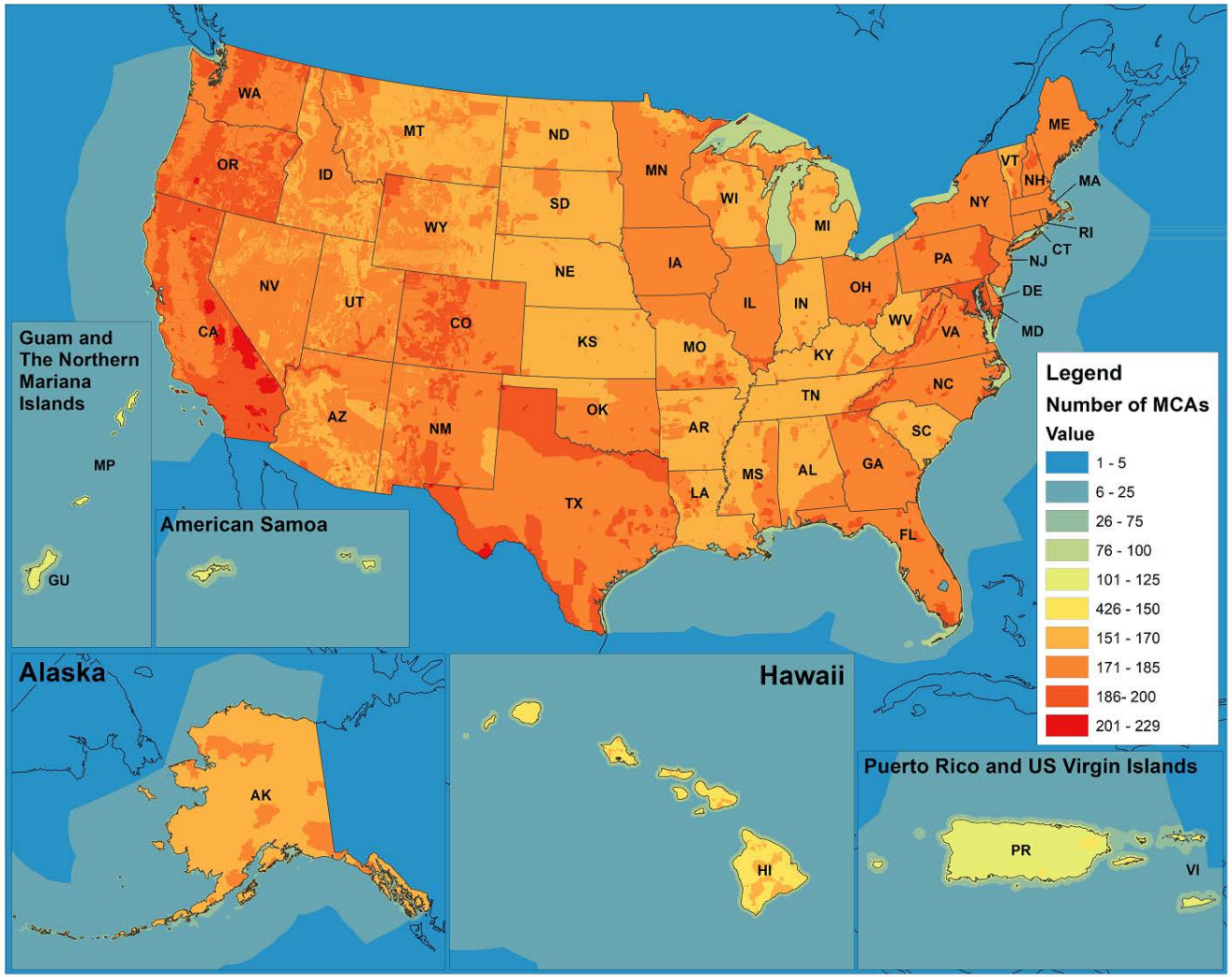
Mission Critical Activity AOIs



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Preliminary Results

Future Annual Benefits by Geography

Geography Type	Future Annual Benefits
Inland topography	$1.8B
Inland bathymetry	$0.6B
Nearshore bathymetry	$0.4B
Offshore bathymetry	$1.5B
Total	$4.3B

PRELIMINARY

Preliminary Results

Future Annual Benefits by Organization Type

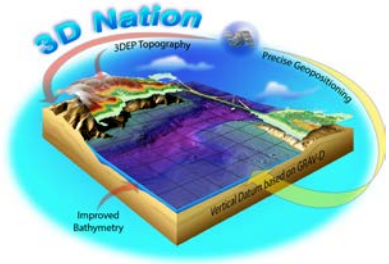
Organization Type	Future Annual Benefits
Federal agencies	$0.8B
State, regional, county, local, and tribal government	$3.4B
Not-for-profit and private entities	$0.1B
Total	$4.3B

PRELIMINARY

What's Next

- Complete the validation process
- Final study geodatabase
- Consolidated report of study findings to date
- Analysis of consolidated responses to identify key requirements and benefits
- Develop program scenarios
- Analyze Benefit/Cost and ROI for scenarios
- Determine program direction

Thank You



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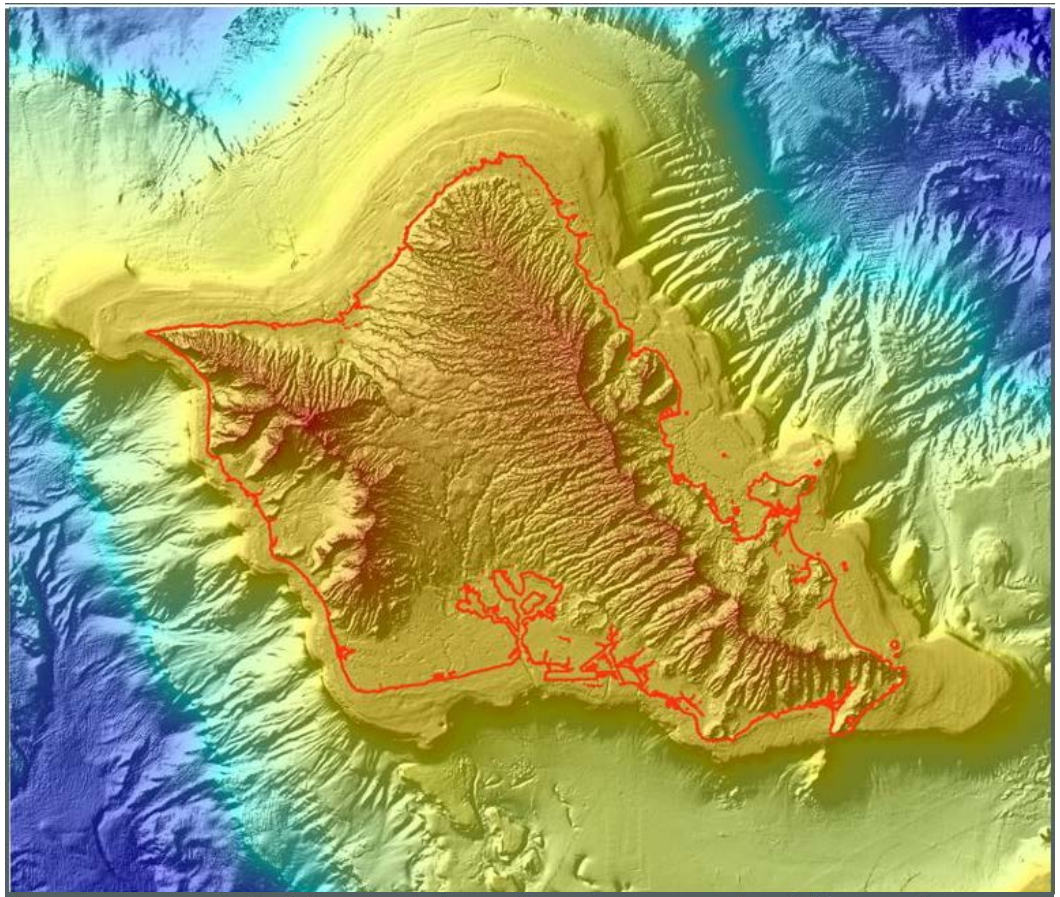

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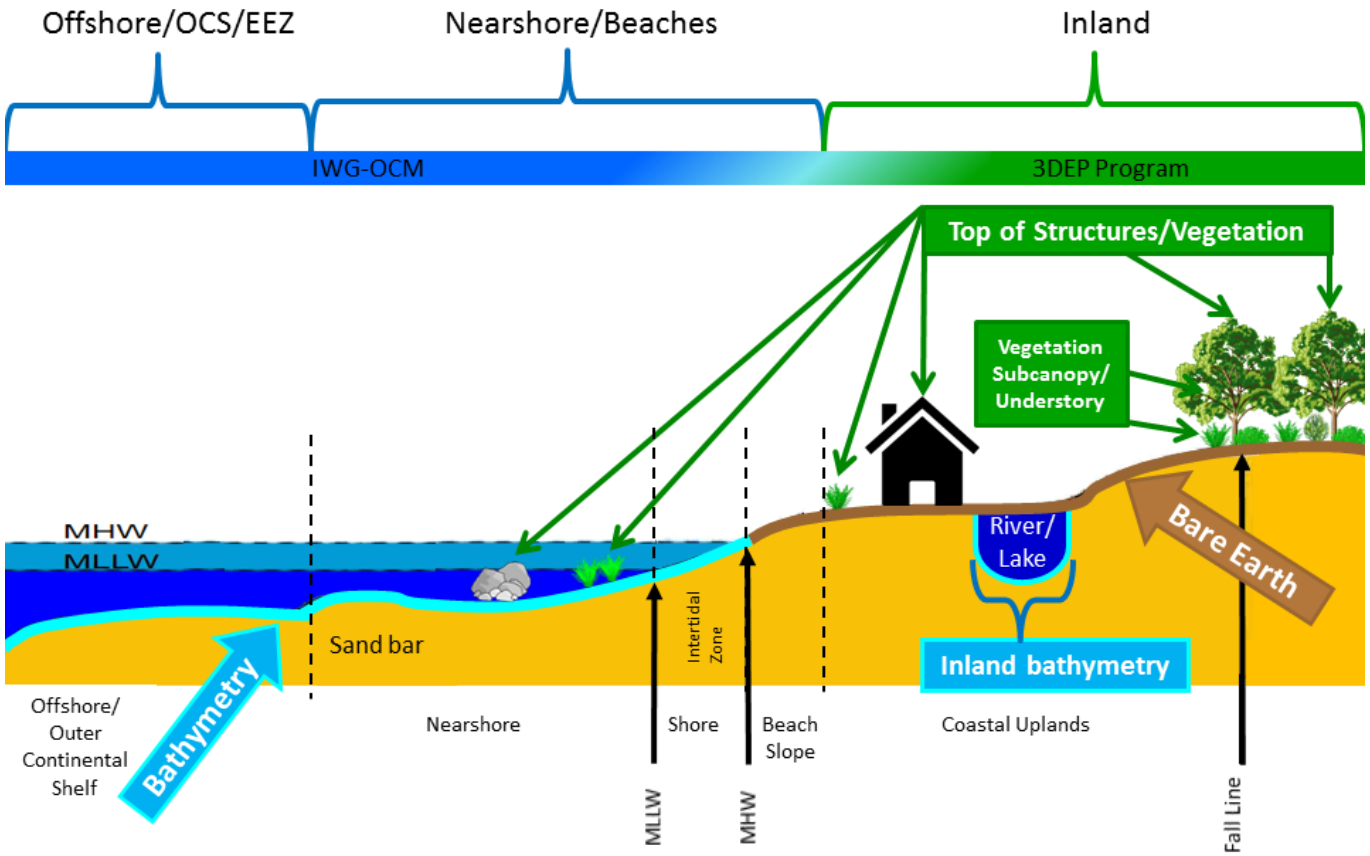

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Questions?

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