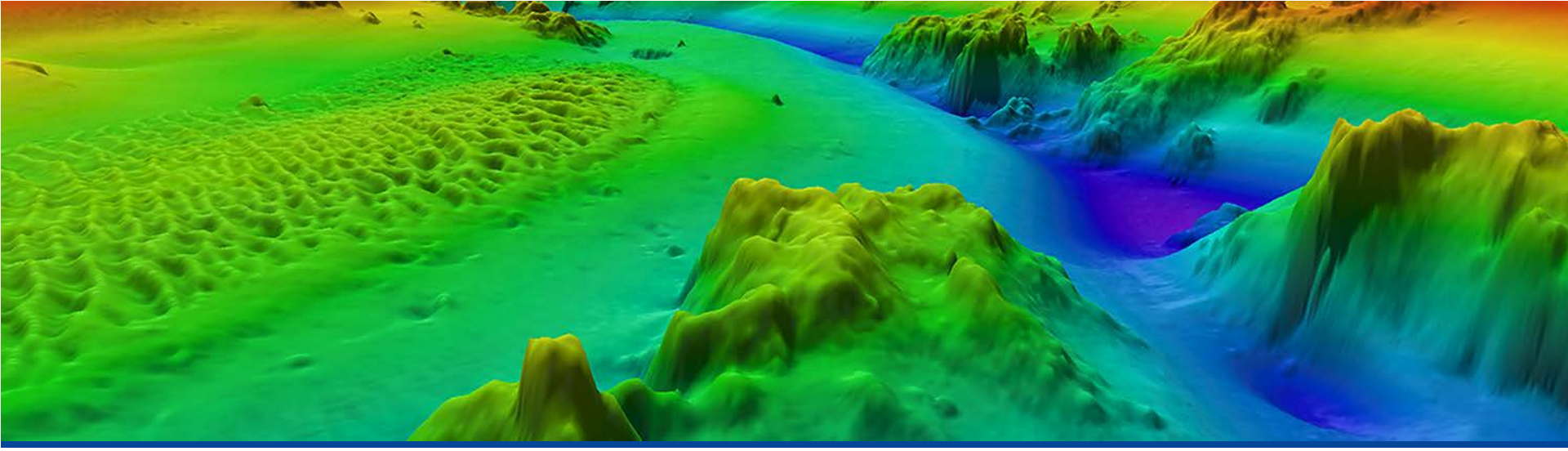


A Bathymetric Sounding Density Analysis to Inform Ocean Mapping Strategies

Meredith Westington[1], Jesse Varner[3], Mike Sutherland[3], Andrew Armstrong[1], & Jennifer Jencks[2]

1 - NOAA, NOS, Office of Coast Survey
2 - NOAA, NESDIS, National Centers for Environmental Information (NCEI)
3- Cooperative Institute for Research in Environmental Sciences, University of Colorado and NCEI

February 13, 2019

The Nippon Foundation-GEBCO Seabed 2030

- Scope of Initiative: Map the entire ocean floor
- Target Resolution: 100 meter*
- Target Completion Date: 2030

*May establish varying resolutions as a function of water depth, data density, and quality

Basic U.S. Definition of "Mapped"

- Survey Vintage: 1960 to present
- Data Density Classifications

  1 – 2 measurements per 100 meter cell

  3 or more measurements per 100 meter cell

*May establish varying resolutions as a function of water depth, data density, and quality

Principal Layers of Bathymetry

NOAA NCEI/IHO Data Center for Digital Bathymetry

- Multibeam Bathymetry
- Single-beam Bathymetry (>1960)
- NOS/OCS Hydrography (BAG-formatted + multibeam)
- NOS/OCS Hydrography (>1960)
- Crowdsourced Bathymetry
- Extended Continental Shelf Grids

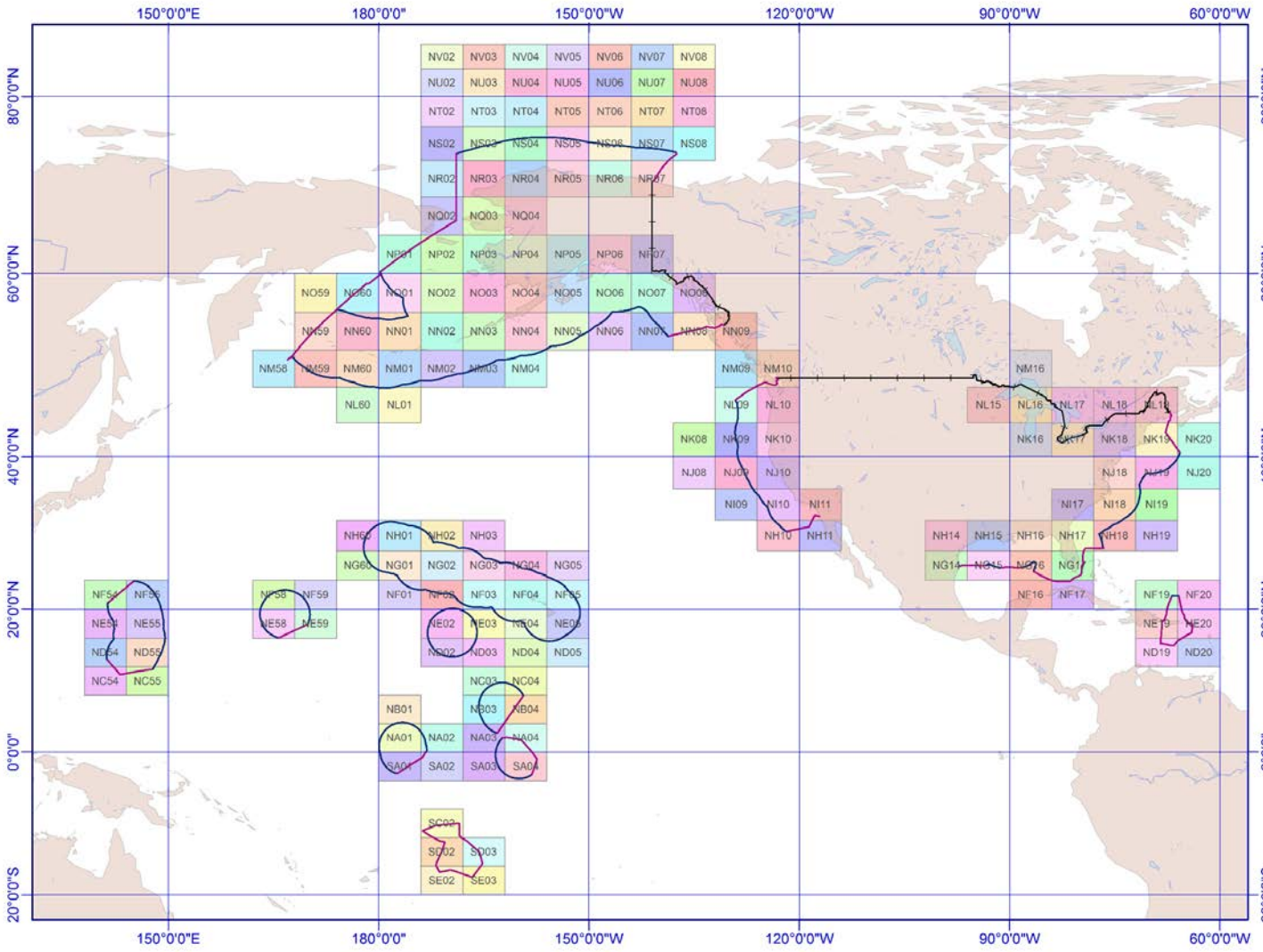
NOAA's Digital Coast

- Bathymetric LIDAR

Processing Framework

177 tiles

4 degrees latitude
X
6 degrees longitude



Gridding Process

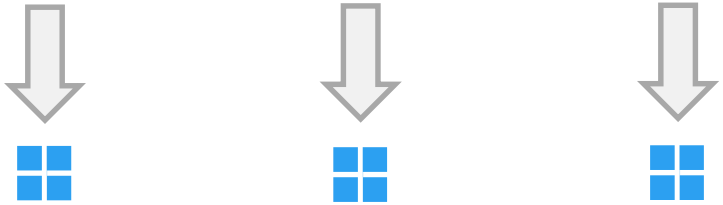
MB-SYSTEM: mbgrid

Raw multibeam, single-beam, crowdsourced bathymetry, and NOS hydrography soundings

100-m resolution sounding density grids

GDAL: gdal_rasterize

NOS hydrography (BAG + multibeam), U.S. extended continental shelf grids, and bathymetric LIDAR footprints



100-m resolution footprint grids

Grid Merging and Reclassification Rules

- AND, not ADD

Extended Continental Shelf Grids

Bathymetric LIDAR

NOS Hydrography (BAG-formatted + MB)

Multibeam Bathymetry

NOS Hydrography (> 1960)

Single-beam Bathymetry

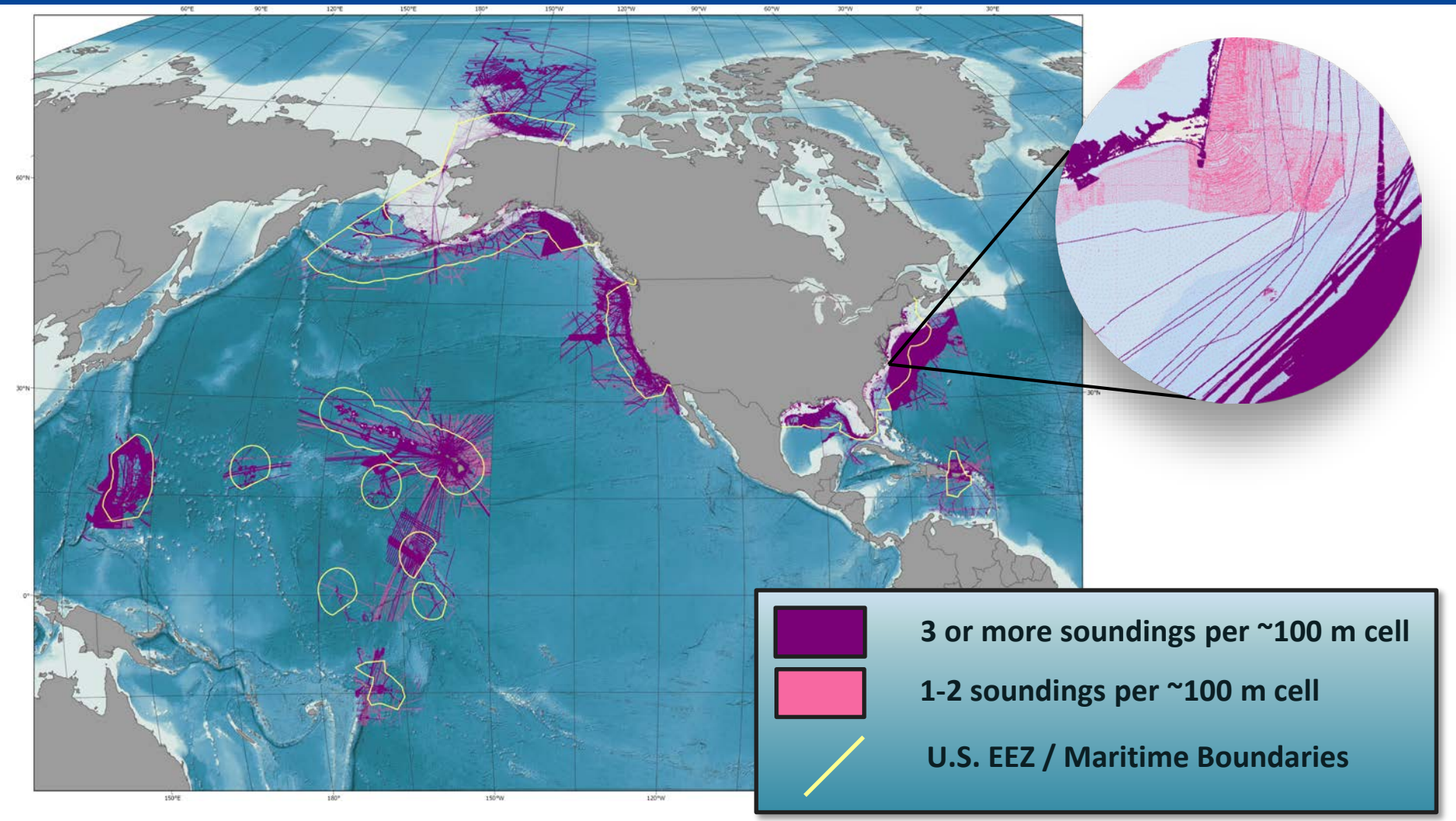
Crowdsourced Bathymetry

- Reclassed Cells

Sounding density of 1 – 2 = 1

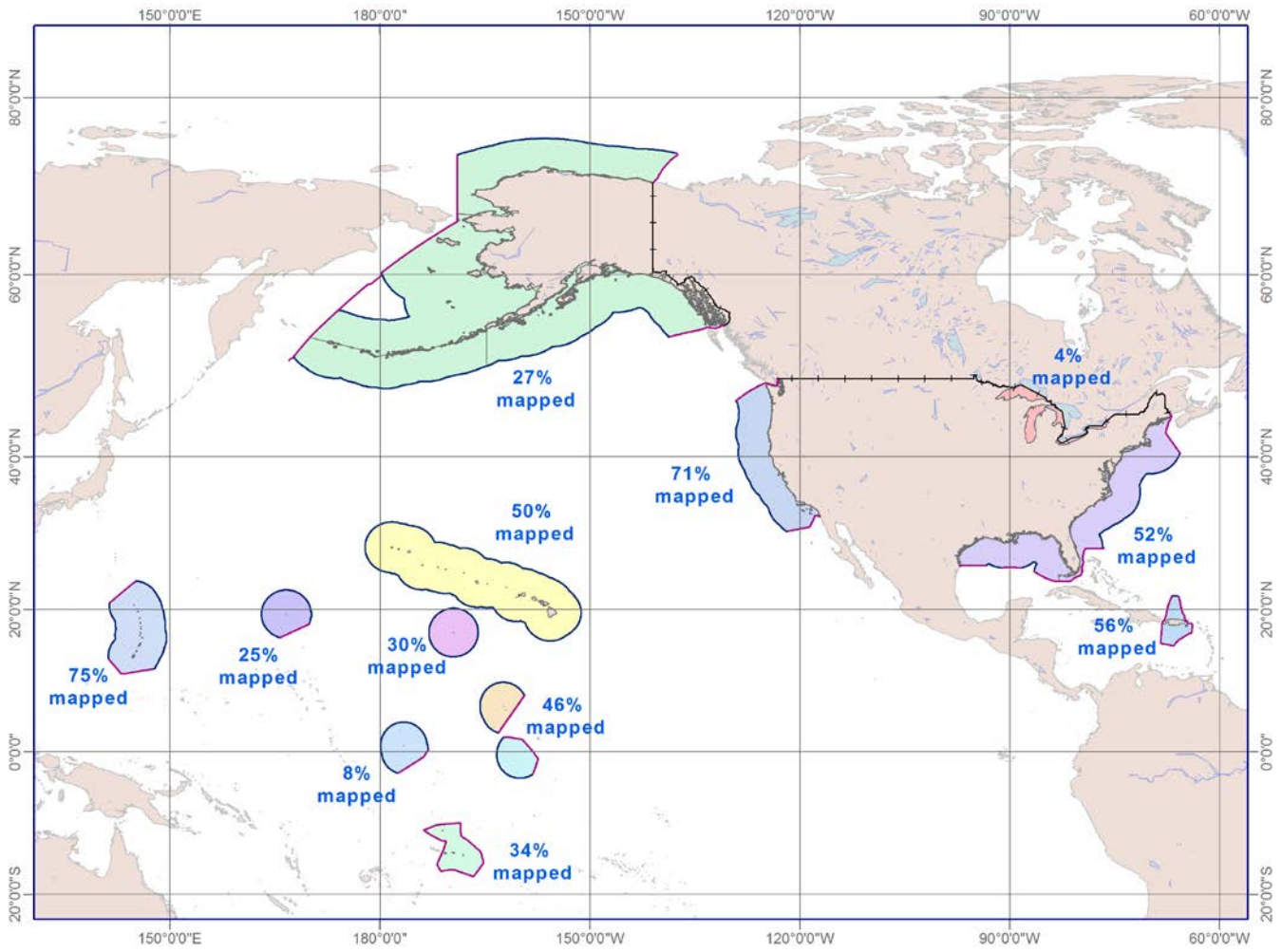
Sounding density of 3 or more = 3

Geospatial Web Service



U.S. Waters Mapped with at least 1 sounding

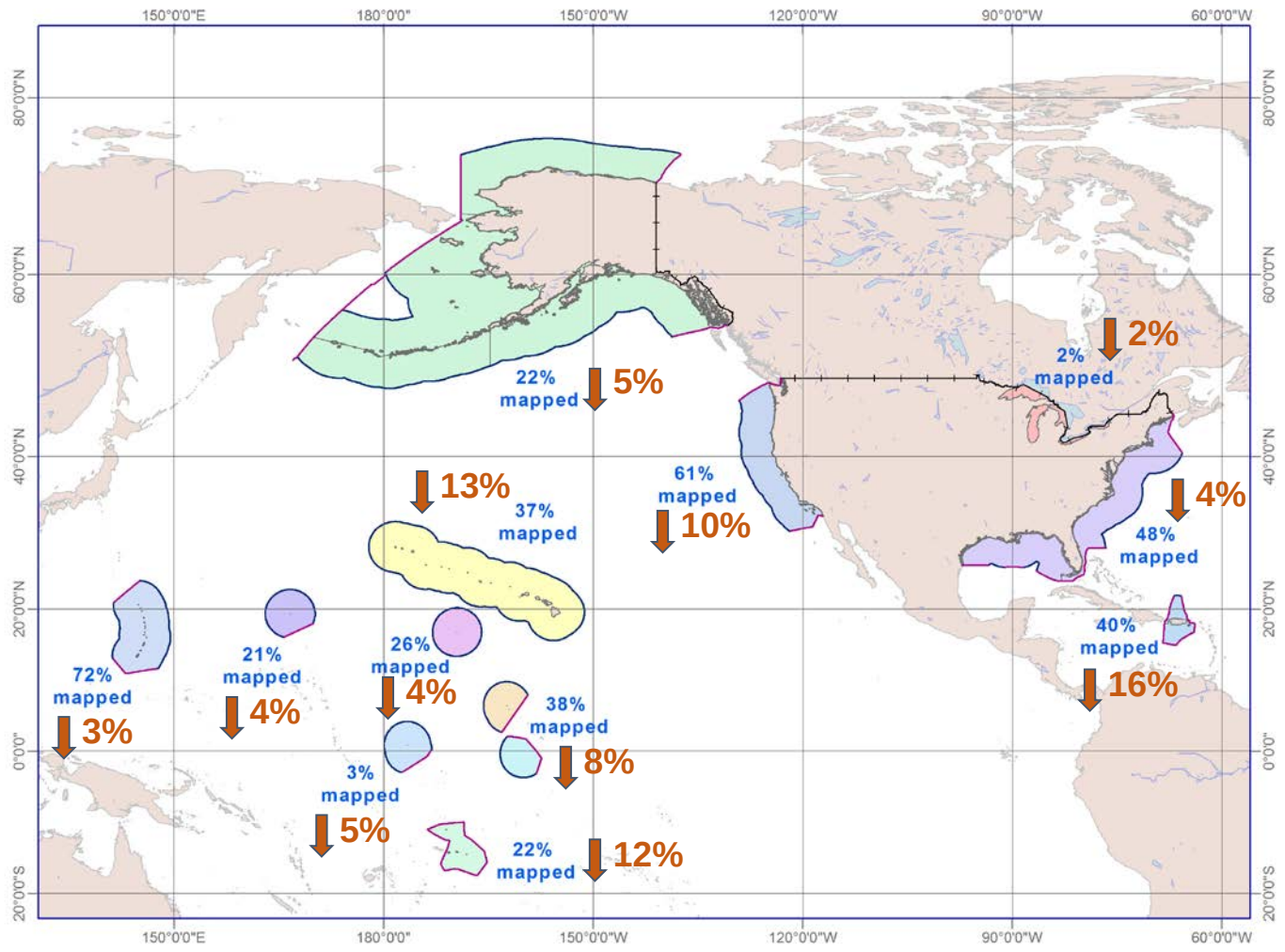
42% of total U.S. waters are minimally mapped



3,438,000 sq nm of EEZ
+ 154,000 sq nm of coastal waters
3,592,000 sq nm of U.S. waters

U.S. Waters Mapped with 3 or more soundings

35% of total U.S. waters are better mapped



3,438,000 sq nm of EEZ
+ 154,000 sq nm of coastal waters
3,592,000 sq nm of U.S. waters

Coastal Waters Mapped with at least 1 sounding

Region	% Minimally Mapped	Area of Minimally Mapped Coastal Waters (sq nm)	Total Area of Coastal Waters (sq nm)
Atlantic and Gulf of Mexico	42%	15,500	36,400
Caribbean	84%	3,700	4,400
Pacific (WA, OR, CA)	65%	5,200	8,000
Alaska	35%	18,800	53,500
Hawaiian Islands	80%	2,800	3,500
CNMI and Guam	81%	1000	1,200
American Samoa	100%	400	400
TOTAL	**44%**	**47,400**	**107,400**
Great Lakes	4%	2,000	46,600
GRAND TOTAL	**32%**	**49,400**	**154,000**

Next Steps for Bathymetry Gap Analysis

- FY19 update to be posted in early December
- Adding a source identifier grid

Ongoing Activities

- Looking to include more openly accessible data holdings
- Exploring the feasibility of an expansion to cover the Meso American - Caribbean Sea Hydrographic Commission (MACHC)
- Evaluating need for a ‘full bottom coverage’ category

Thank You!

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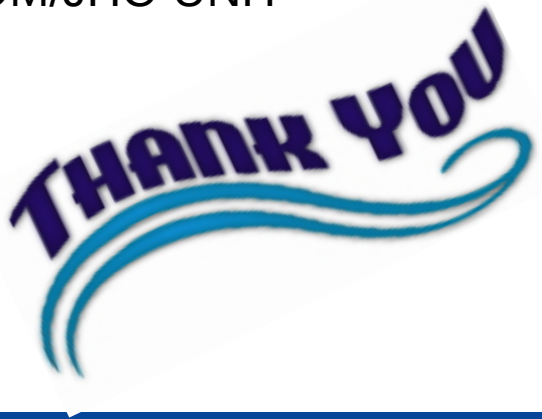
- Andy Armstrong & Paul Johnson at CCOM/JHC-University of New Hampshire (UNH)

Data Managers:
- Jason Baillio- NOS Hydrography Manager at NCEI-Boulder, CO
- Brian Meyer- Single-beam Manager at NCEI-Boulder, CO
- Kirk Waters- LiDAR Manager at NOS/OCM-Charleston, SC
- Paul Johnson & Jim Gardner- ECS grid developers at CCOM/JHC-UNH

Web Service and BAG Footprint Developers:
- Jesse Varner & John Cartwright at NCEI-Boulder, CO



Questions?

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