NOAA OFFICE FOR COASTAL MANAGEMENT

From Marshplains to Abyssal Plains: Perspectives from the Nation's Marine Protected Area Systems

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March 7, 2024 – Hydrographic Survey Review Panel Meeting

Topic One: Marshplains

Accurate Land Elevations and Water Levels in the Research Reserves

Overarching Drivers

- National Spatial Reference System modernization in 2025
- Bipartisan Infrastructure Law and other funding for coastal resilience
- Reserve staff capacity and expertise

Hydrographic Services Review Panel May 2022 Recommendation

Complex Technical Challenges and Critical Needs

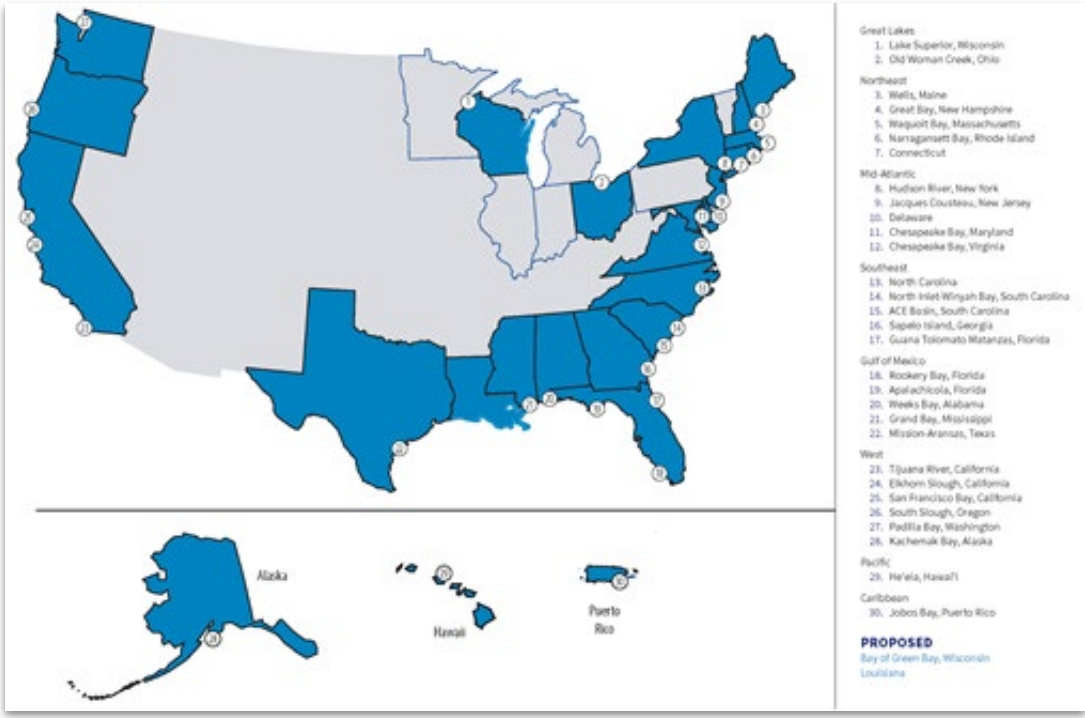
- Conversion of existing tide and reference frame information to the modernized NSRS
- Development of user-friendly transformation tools;
- Education of users on the modernized NSRS and tide information, and how users can incorporate passive control into the new NSRS;
- Impact on hydrographic surveys;
- Conversion of reference frame and tide software to support the modernized NSRS;
- Requirement of complete metadata for all mapping products;
- Modernization of tools that will provide an efficient and consistent method to submit GNSS, leveling, gravity, and traverse data to the NGS for inclusion in the NSRS; and
- Surveying in regions of local crustal deformation not modeled by a plate rotation model.

Recommendations for NOAA Action:

- Require (to the extent practicable and legally allowed) all federal agencies using or producing geodetic coordinates of any type to prepare and develop an orderly transition to the modernized NSRS.
- In collaboration with the user community, develop and implement user friendly tools to easily transform positional information to the modernized NSRS.
- Establish an ad hoc group to include datum and tide information users to ensure they are included in the decision making process for transition to the modernized NSRS.
- Provide status reports on the new reference frames and datum and obtain feedback from users by participating in National and State surveying and mapping conferences.
- Develop and document guidelines, algorithms, and user-friendly tools for incorporating geodetic leveling data into the new geopotential datum.

National Estuarine Research Reserve System: 30 places that serve as sentinels of change

- State and university host partners
- 1.3+ million acres protected (and growing)
- Focus: Environmental change, habitat protection, water quality



Reserves: Designed for Observation

System-wide Monitoring Program (SWMP)

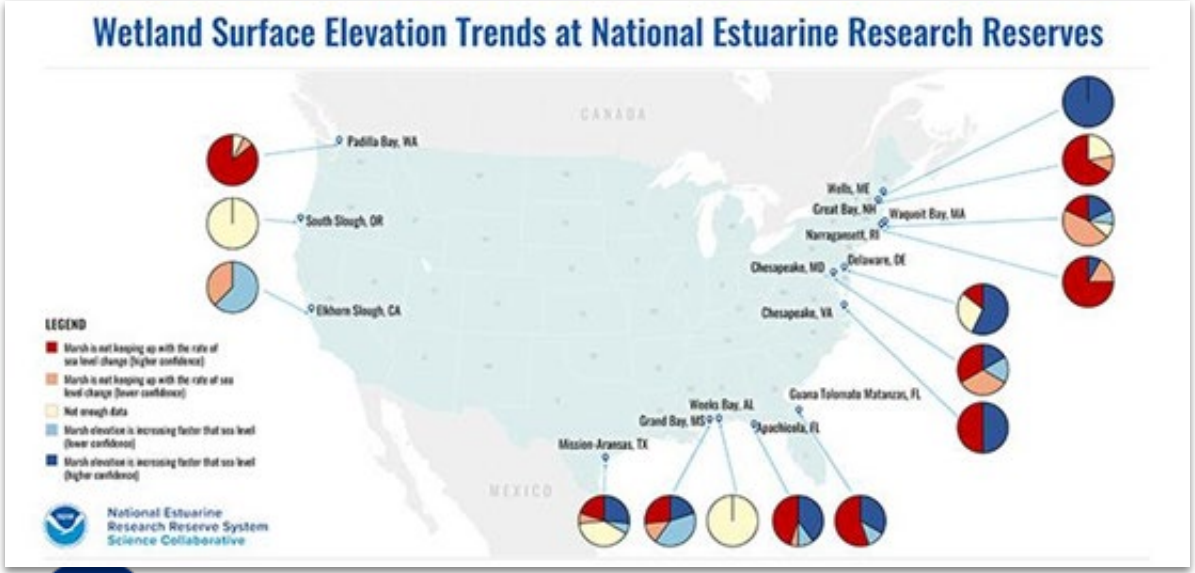
- *Currently*: near real-time water quality, meteorology
- *Coming*: elevation, vegetation, habitat classification

National impacts (within and beyond reserves' boundaries)

- Satellite algorithm development, ground truthing for national coastal products (methane, turbidity)
- Innovative scientific research for estuarine management
- Wetland carbon sequestration and stocks

Examples from Science Collaborative

SETr: Developing Tools and Visualizations to Track Changes in Wetland Surface Elevation

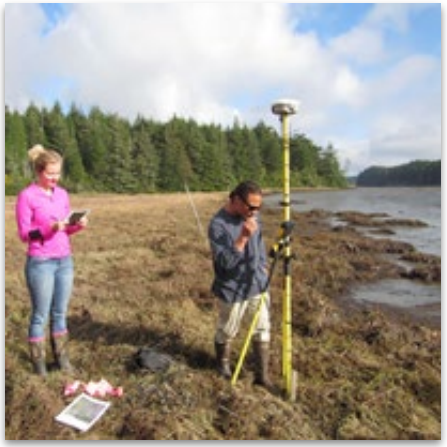


Transfer of a Low-Cost Tidal Wetland Water Level Monitoring System: Hyperlocal Calculations of Inundation and Tidal Datums for Understanding Change and Restoration

Wetlands and Water Levels Program

Vegetation:
Three transects, vegetative cover, height, elevation

Sediment dynamics:
Six surface elevation tables



Surface elevation:
Three benchmarks

Water levels:
Sonde tied to benchmarks to get tidal datums

Wetlands and Water Levels Program

Applications

Restoration and conservation

Informing coastal decision-makers

Education and outreach

Reserves Community Input on Barriers

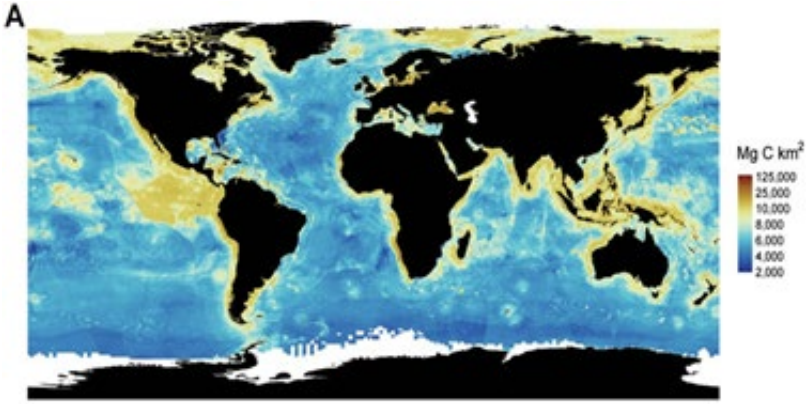
People	• Staff time for training, installation, monitoring
Places	• Geographic variability (distances, ice, etc)
Productivity	• Sensor and instrument quality output • Maintaining vertical control networks

Topic Two: Abyssal Plains

Ocean Blue Carbon in the Sanctuaries

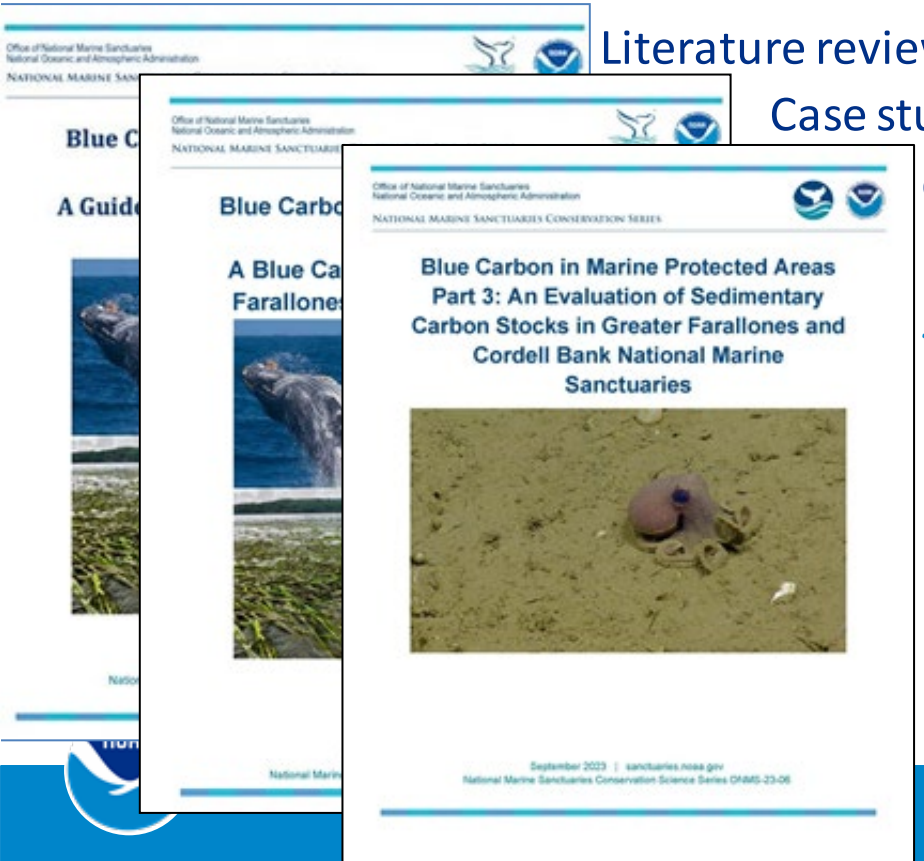
Global Seabed Carbon Stocks

- Marine sediments store ~2,300 Pg organic carbon → nearly twice that of terrestrial soils
- Shallow seas (<1,000ms) and continental shelf (<200ms) – 11.5 to 15.5 percent of total
- Only ~4% of sediment C stocks located in highly to fully protected areas that prevent disturbance of seafloor



Atwood et al., 2020

Blue Carbon in Marine Protected Areas Project: 2020 to 2023



Literature review, guiding principles, path forward

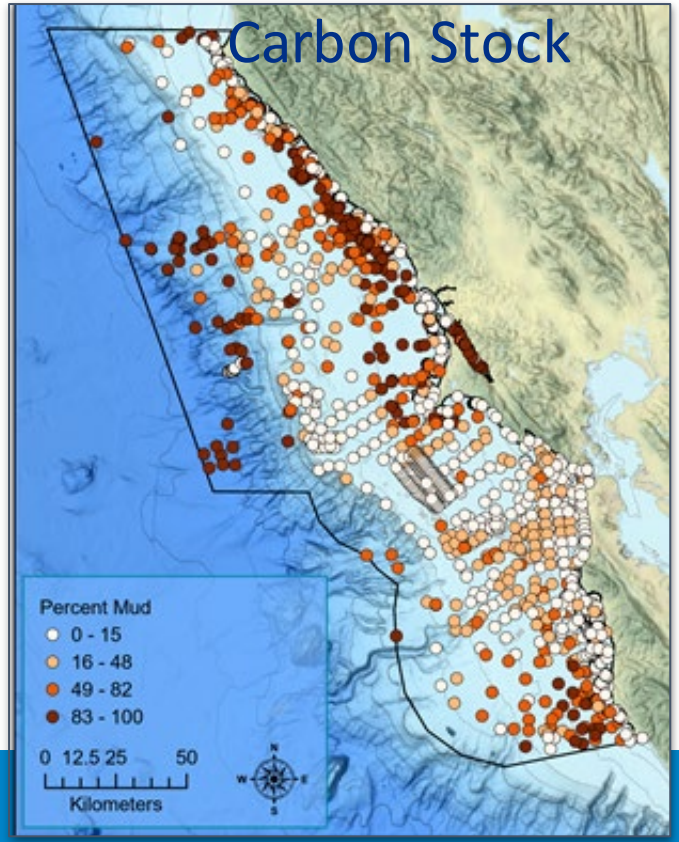
Case study assessment of Greater Farallones

Carbon stock analysis in seafloor sediment

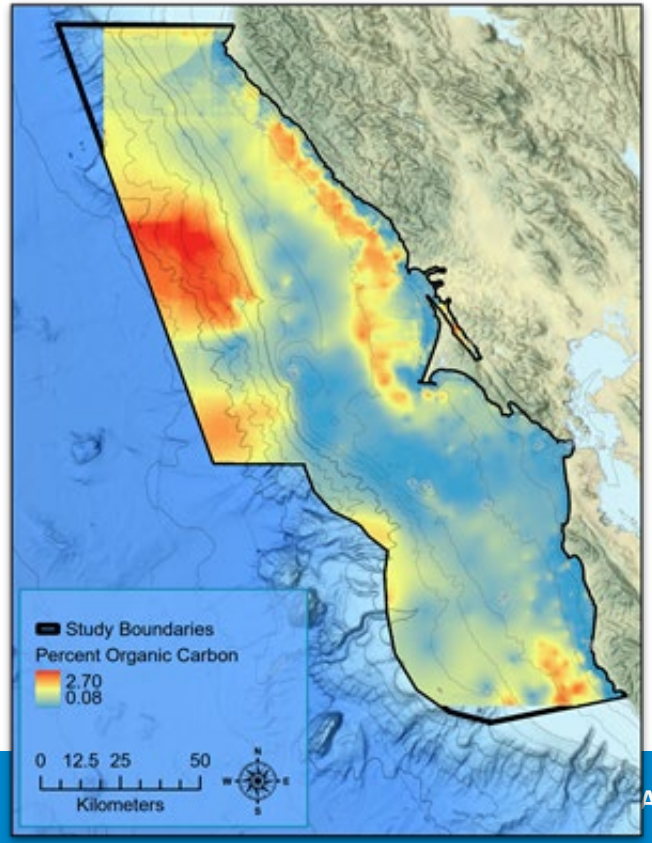
Collaboration between Office of National Marine Sanctuaries and Office for Coastal Management

Carbon Stock in Central California Sanctuaries*

Sediment →



Carbon Percentage →



= 9 million metric tons C

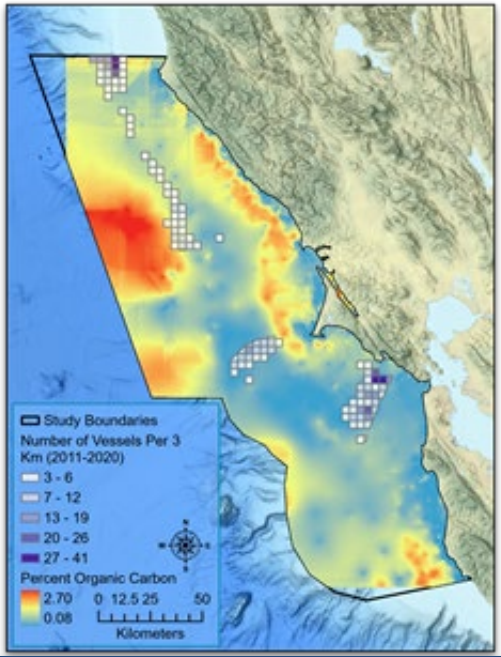
= 32 million metric tons of CO_2e

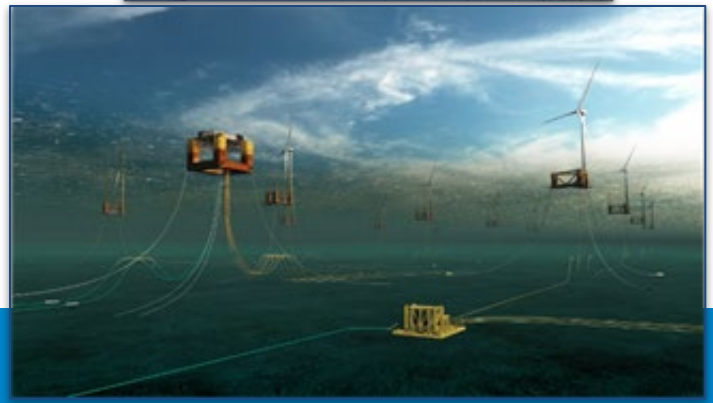
= 3.5 billion gallons of gas

**only the top 10 cm*

Sources of Seabed Disturbance

1. Violations of marine protected area seabed protections (i.e., sunken objects that impact seafloor)
2. Bottom-contact fishing
3. Permitted activities, such as mooring installations, salvage and recovery, and trawling for scientific purposes
4. Infrastructure installations (e.g., wind farms, fiber optic cables)

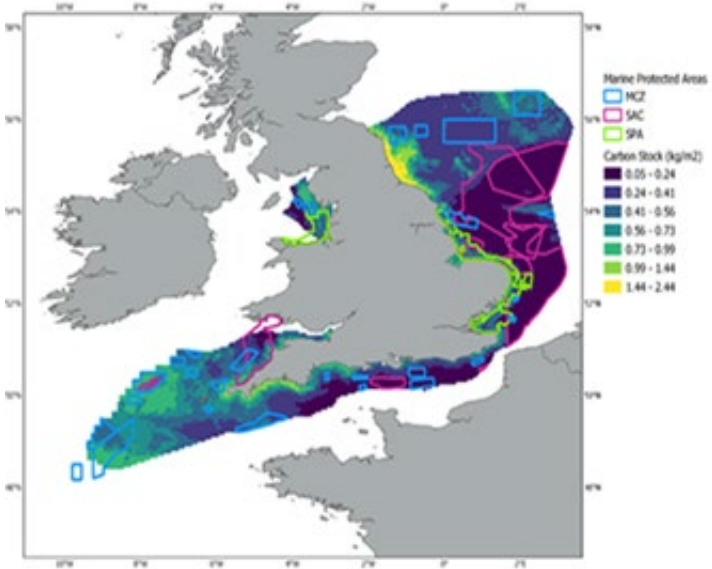




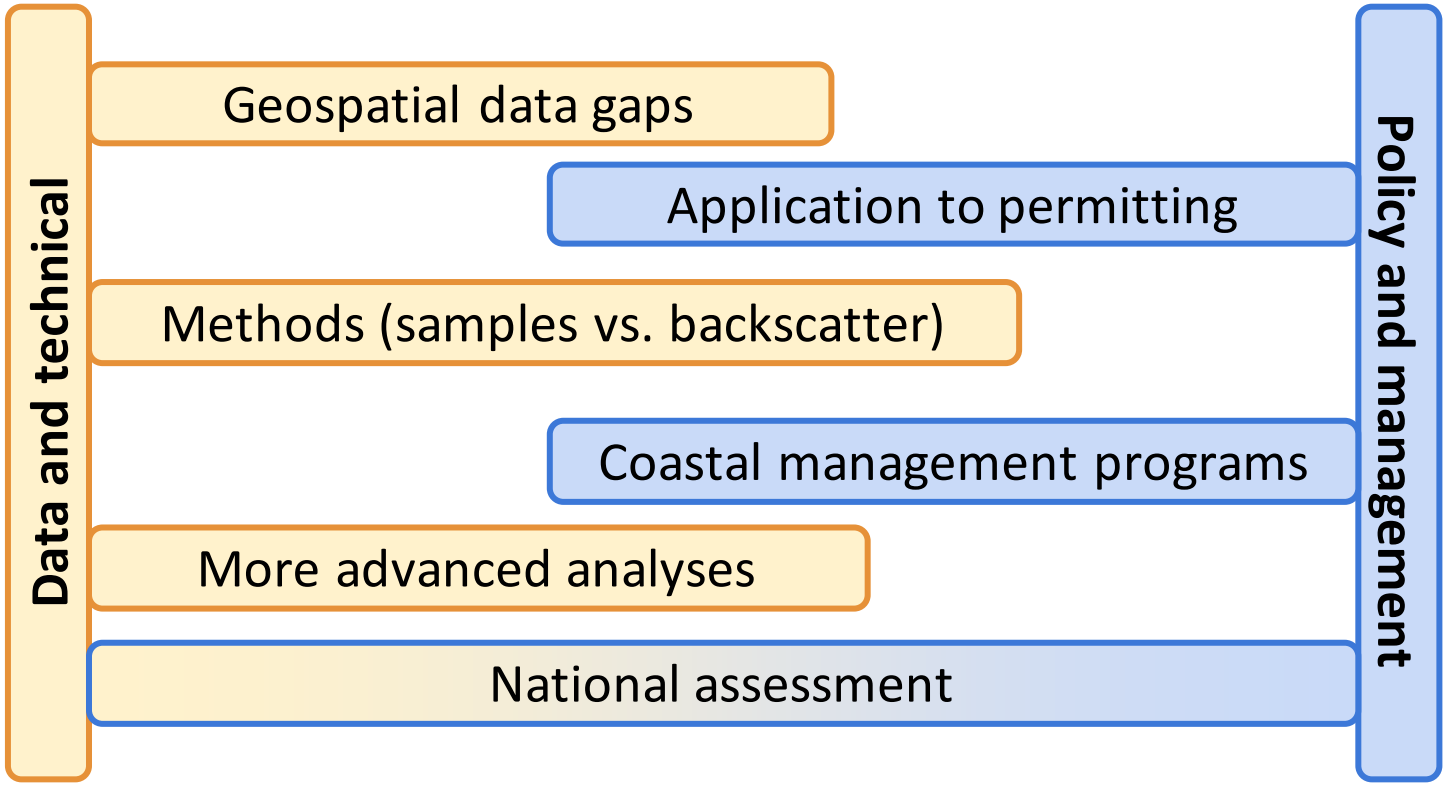
Applications and Opportunities

- Contributes to Biden administration goals and initiatives
- Demonstrates value of existing marine protected areas that include seafloor protections
- Informs future marine protected area and sanctuary designations
- Informs management decisions in existing sanctuaries
- Informs state coastal programs' efforts regarding installation of offshore infrastructure

UK example



What's Next?

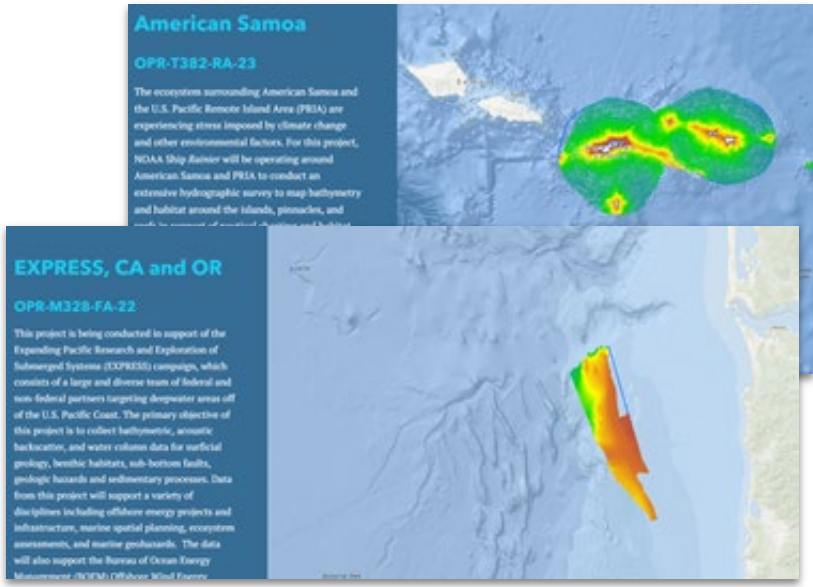

Data and technical
Geospatial data gaps
Application to permitting
Methods (samples vs. backscatter)
Coastal management programs
More advanced analyses
National assessment
Policy and management

Collaboration Opportunities at Scales

Mapping, characterizing substrate ideas

- Regional
  - Studied sanctuaries only (Greater Farallones, Cordell Bank as targets)
  - Known muddier regions around the nation (TX-LA-MS Gulf Coast or Pacific Northwest/CA)
- National
  - All sanctuaries as pilot program
  - Exclusive economic eventually

2023 Office of Coast Survey Pacific Ocean surveys



Connections to global effort?

Thank you on behalf of

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