USGS Coastal and Marine Mapping Priorities in the Pacific: Past, Present, and Future.

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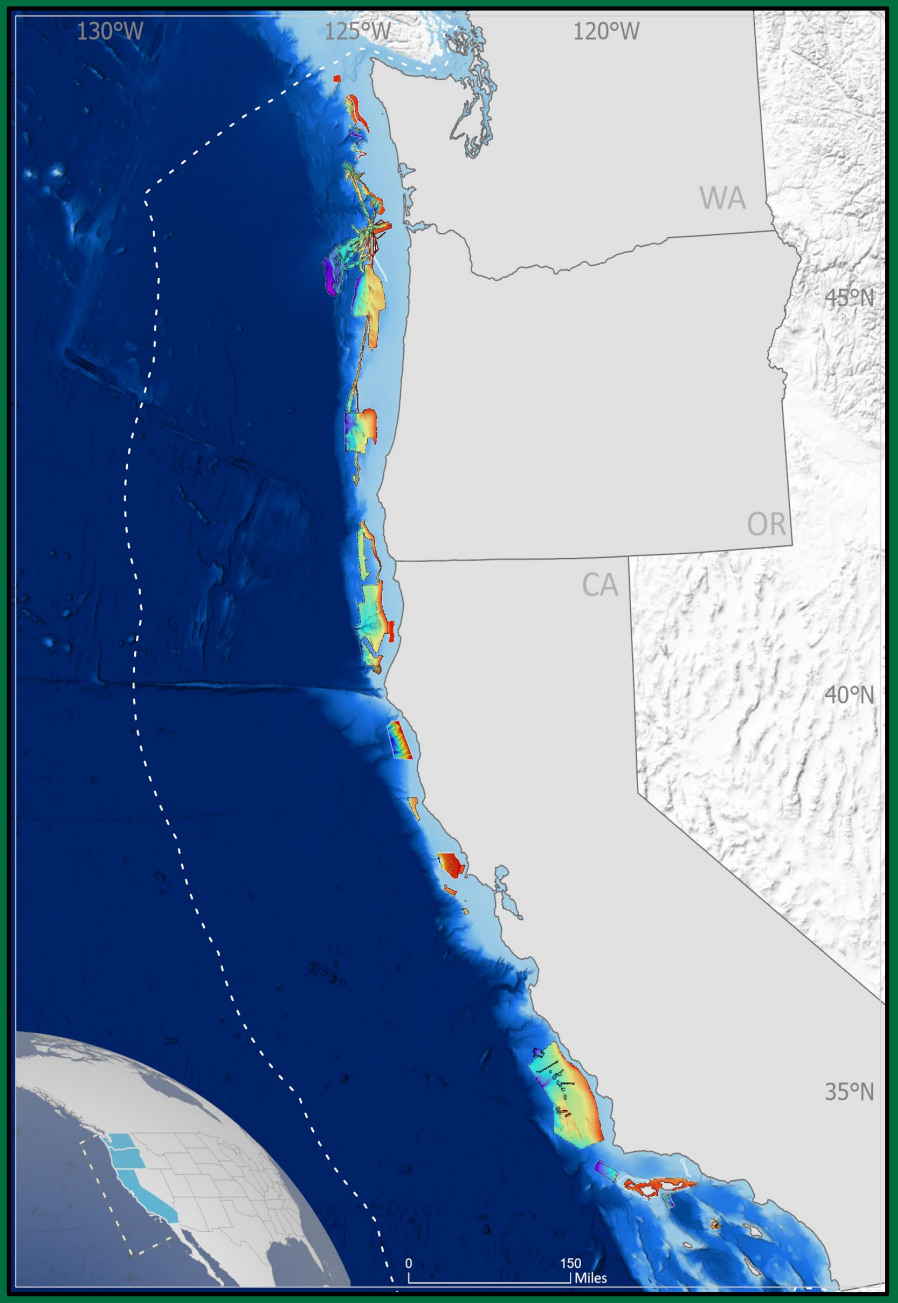


Expanding Pacific Research and Exploration of Submerged Systems

EXPRESS is a multi-year, multi-institution cooperative research campaign in deep sea areas of California, Oregon, and Washington, including the continental shelf and slope. These areas are home to deep-sea corals, chemosynthetic communities, and other sensitive habitats that could be impacted by the development of energy and mineral resources. The EXPRESS campaign will map and characterize these special areas and data collected through EXPRESS is intended to guide wise use of living marine resources and habitats, inform ocean energy and mineral resource decisions, and improve offshore hazard assessments.

The unique partnership of EXPRESS allows federal and non-federal entities to collaborate in identified priority areas. These are directly aligned to the National Strategy outlined by the White House Office of Science and Technology Policy and Council on Environmental Quality.

EXPRESS partners include NOAA, BOEM, USGS, MBARI, and USC Sea Grant. Collaborative mapping to date includes 11,700 square miles of ship-based MBES and 167 square miles of AUV MBES data, seismic profiling, ROV video, and coring.

USGS science for a changing world

USGS Contact: Dr. Nancy Prouty, Pacific Coastal and Marine Science Center (nprouty@usgs.gov)

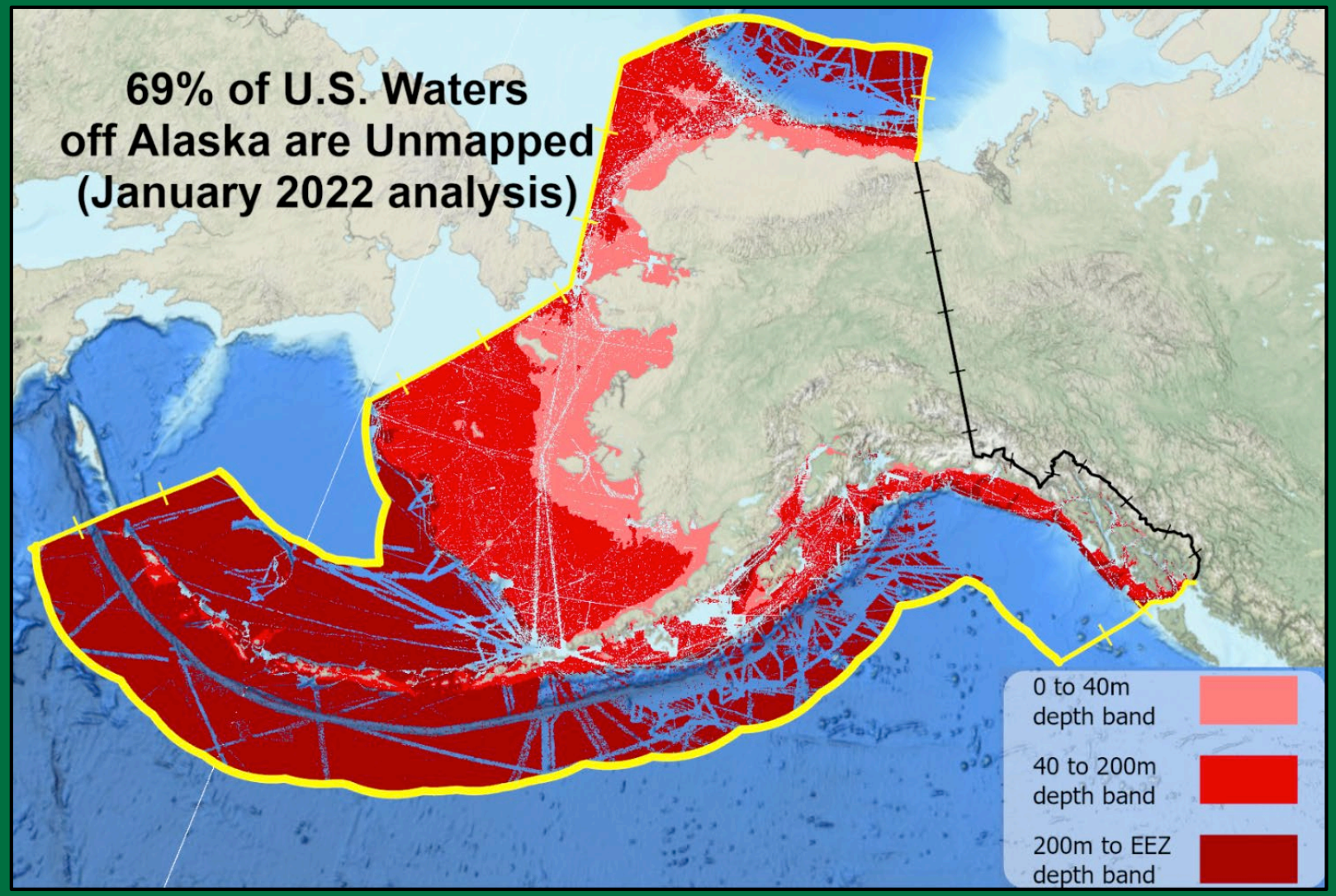
Seascape Alaska

A NOAA-led regional campaign supporting NOMEC, working toward a common goal to fully map the U.S. waters off Alaska. The campaign is a collaboration among federal, tribal, state, and non-governmental partners with a wide range of interests and dependencies on mapping data.

Partners include NOAA, BOEM, USGS, State of Alaska, NPS, US ACE, USCG, AK DFG, Saildrone, Seasats, Fugro

Seascape Alaska's role is to:

- Inventory pre-existing data and ingest them into centralized repositories
- Encourage mapping of areas are unexplored or under explored
- Encourage multidisciplinary plans and technology to maximize data collection



Want to join the effort or learn more? Contact Meredith.Westington@noaa.gov

USGS science for a changing world

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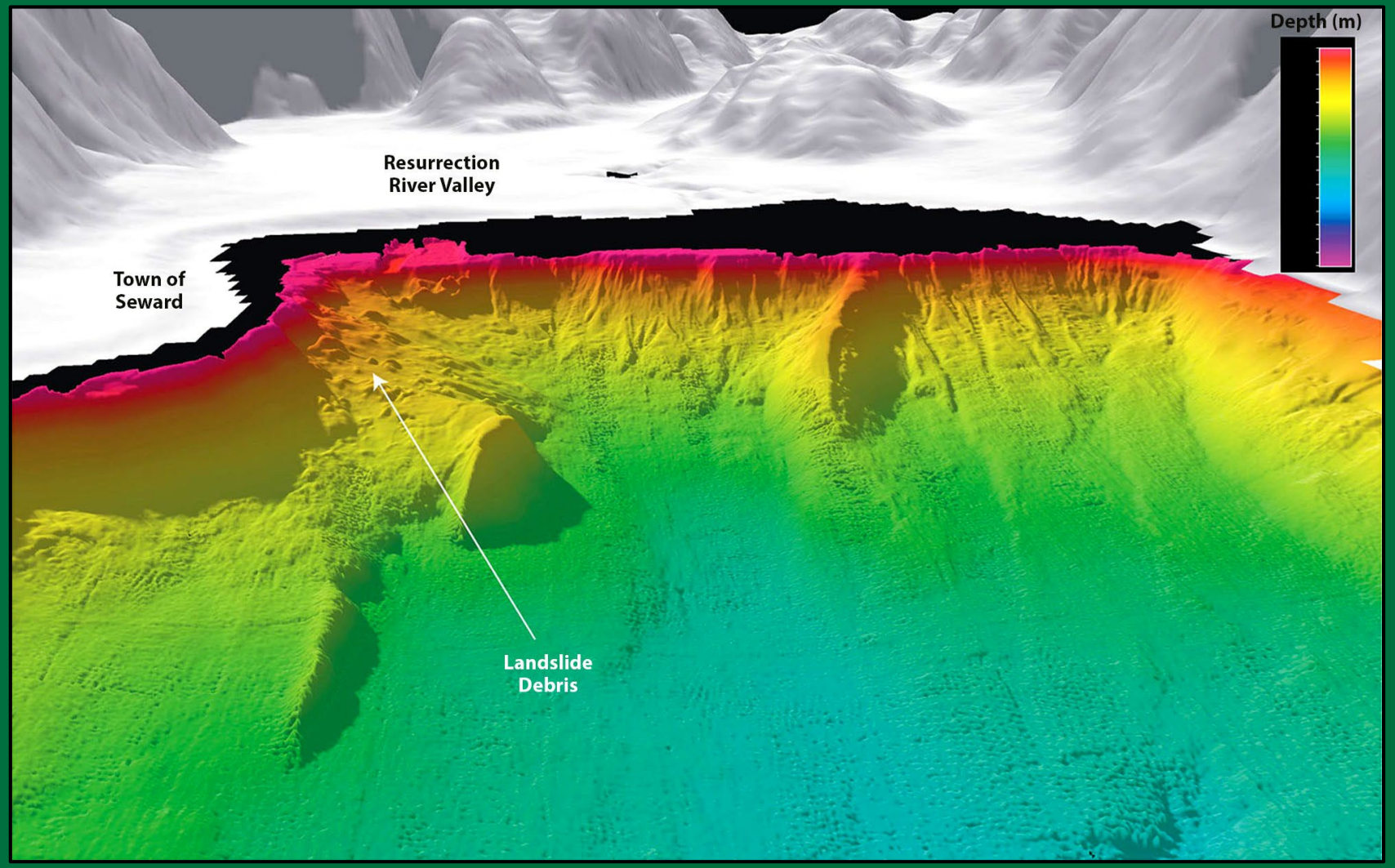
U.S. West Coast and Alaska Marine Geohazards

The marine geohazards group has been coordinating and working directly with NOAA Office of Coast Survey Hydrographic Surveys Division every year since 2016, partly through a range of mechanisms, including EXPRESS. This partnership includes data that both USGS and NOAA collected along the Queen Charlotte Fault (NOAAS Fairweather), surveys in Prince William Sound (e.g., Barry Arm, Chenega, Resurrection Bay, Valdez landslide complexes), numerous surveys along the Cascadia margin aboard NOAAS Fairweather and Rainier, and numerous surveys offshore California.



Bathymetry used to assess landslide potential near the head of Resurrection Bay, Alaska. Landslide debris is from the collapse of a fan-delta following the great Alaskan earthquake of 1964. The town of Seward, which suffered much damage and lost lives due to the quake, had been built on this fan-delta (just above and to the left of the arrow).

USGS science for a changing world

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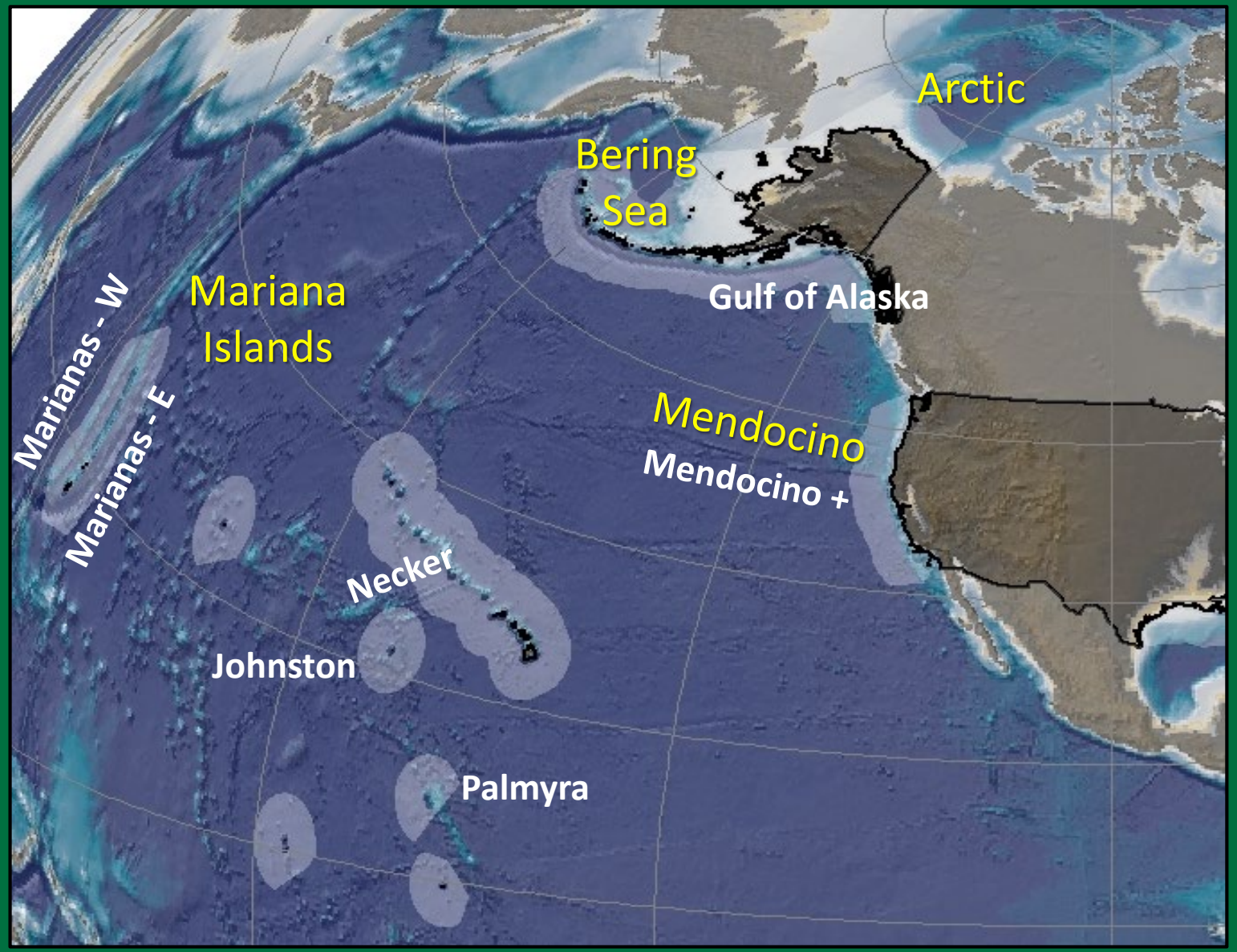

Seven U.S. Extended Continental Shelf Regions, including three in the Pacific. Seven others regions extensively evaluated.

US Extended Continental Shelf Project

ECS is US seabed territory beyond the 200M EEZ: sovereign rights to the resources of the seabed and subsoil.

The USGS is a member of the U.S. ECS Task Force and is the lead for geological and geophysical information. USGS describes the geologic framework of U.S. margins within the context of the Convention on the Law of the Sea and provides expertise in the interagency partnership. USGS scientists also collaborate with international geological surveys and academic partners to complete ECS studies.

Project needs going forward:

- Mapping & scientific characterization: structures, processes, hazards, resources
- Data to inform policies related to managing the ECS once its outer limits are finalized

USGS science for a changing world

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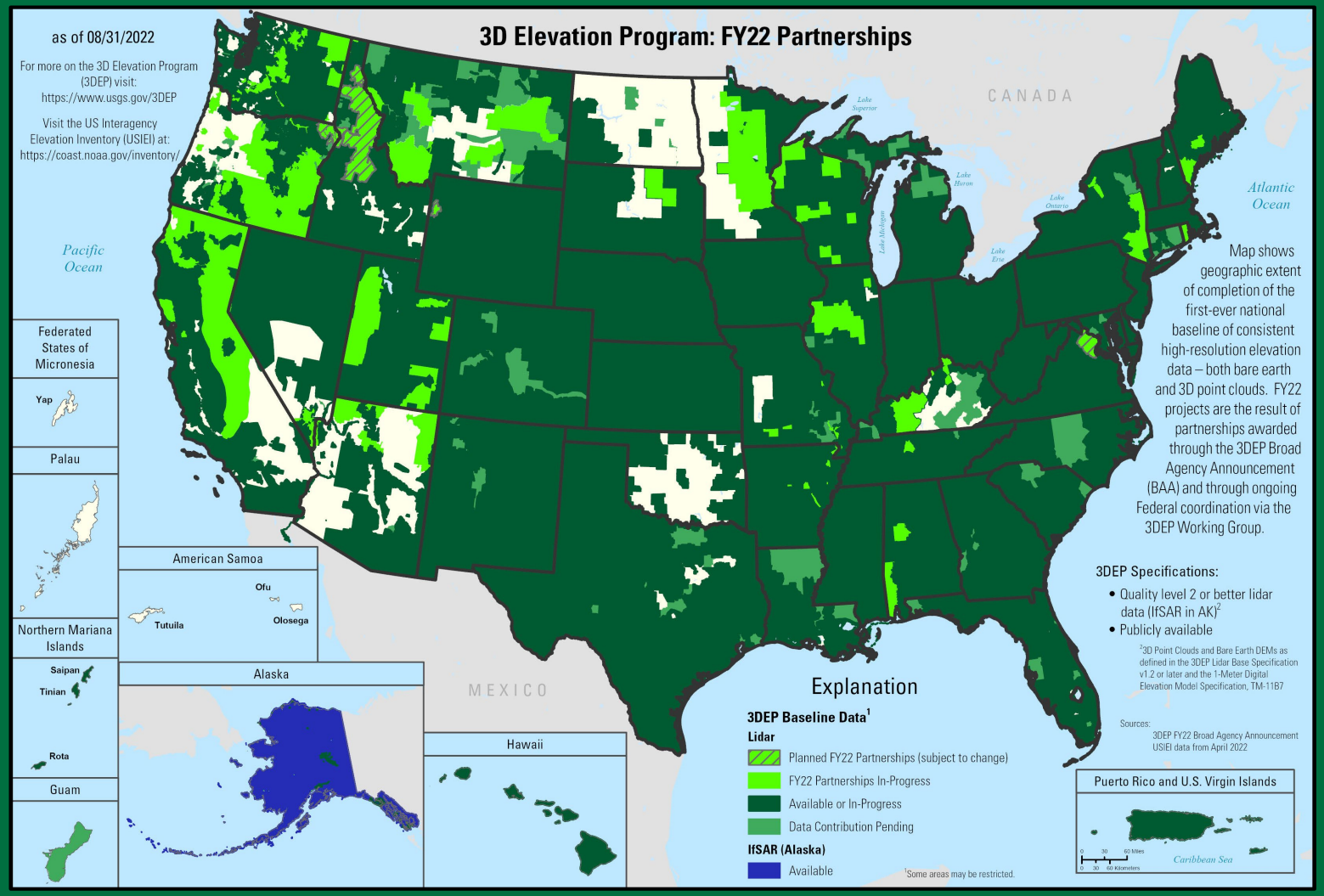


The National Enhanced Elevation Assessment, completed in 2011, identified more than 600 requirements for enhanced (3D) elevation data to address mission-critical information requirements of 34 Federal agencies, all 50 States, and a sample of private sector companies and Tribal and local governments.

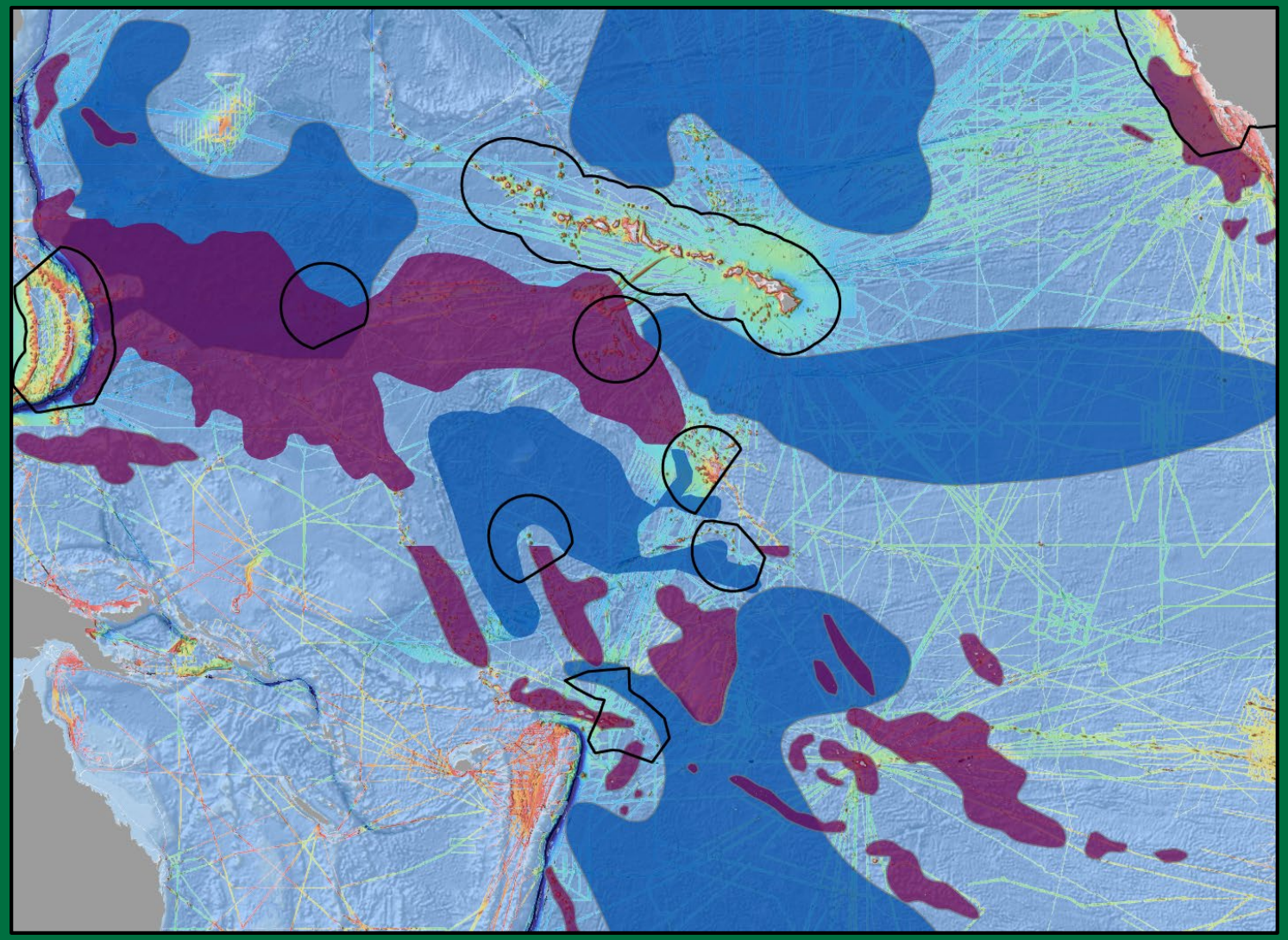
3D Elevation Program

3DEP is managed by the USGS National Geospatial Program to respond to growing needs for high-quality topographic data and for a wide range of other 3D representations of the Nation's natural and constructed features. 3DEP informs critical decisions that are made across our Nation every day that depend on elevation data, ranging from immediate safety of life, property, and environment to long term planning for infrastructure projects.

- Between FY19-FY22, NOAA and 3DEP worked together across several projects to collect topobathy for most of subaerial CNMI
- NOAA collected data for all of Guam (FY20) and USGS will bring data into 3DEP as a contributed project
- NOAA provided significant portions of topographic lidar data for the Island of Hawaii

USGS science for a changing world

Contact: Drew Decker, National Map Liaison to the Pacific Basin and Hawaii, (ddecker@usgs.gov)



Map of Pacific ferromanganese crust (purple) and polymetallic nodule (blue) regions of interest. Ship-based bathymetry and backscatter are required to plan necessary sample collections.

Global Marine Mineral Resources Project

Focused on deep ocean minerals, both within and outside of the US EEZ, and understanding the setting, genesis, and enrichment processes of them, the relationship between them and deep-sea biota, and the potential geochemical footprint of any seafloor mining. The project aims to provide stakeholders with the best available science regarding potential resources and environmental impacts associated with accessing those resources.

Priority Areas:

- For polymetallic nodule and ferromanganese crust: abyssal plains seamounts around, Wake Island, Jarvis Island, Kingman Reef and Palmyra Atoll
- For hydrothermal minerals: Gorda Ridge, the Mariana arc and back-arc, and the Aleutian arc (as yet unidentified/exploration).

USGS science for a changing world

Contact: Dr. Amy Gartman, Pacific Coastal and Marine Science Center (agartman@usgs.gov)

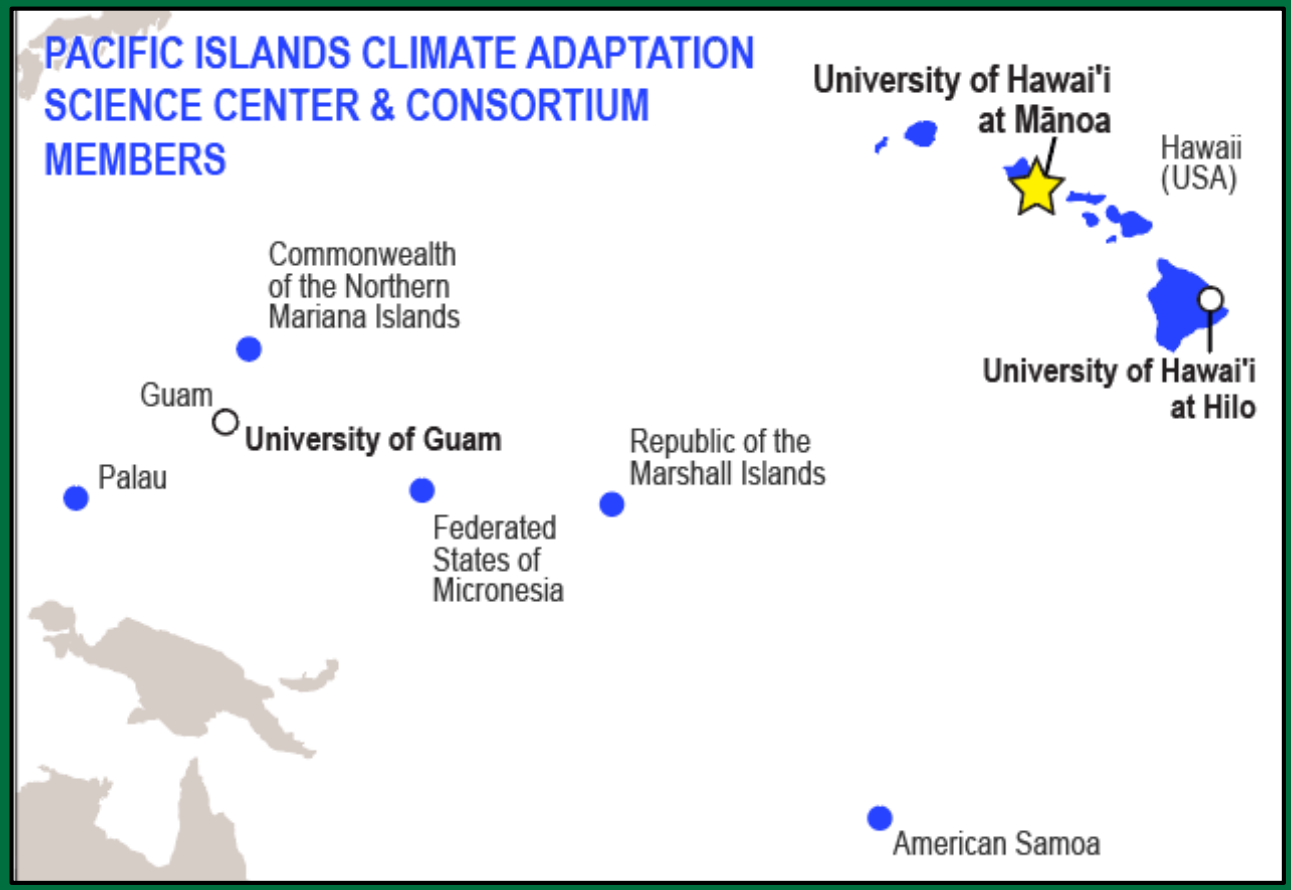
Pacific Islands Climate Adaptation Science Center

PI-CASC is a collaborative partnership between the USGS and a university consortium hosted by the University of Hawai‘i at Mānoa, designed to support sustainability and climate adaptation in communities across the Pacific Islands.

New topo/bathy data has implications for DOI (FWS) and DOS for "Resilient Boundaries for the Blue Pacific," a project assessing what critical lands ("base points" defining EEZs) might be lost due to CC/SLR and how that would affect maritime boundaries.

Priority Areas for new topo/bathy data:

- Pacific Remote Island Areas
- Republic of Marshall Islands
- Federated States of Micronesia (3DEP in the future?)
- Palau (UN-sponsored project)
- *American Samoa (high priority, planned by NOAA)*
- *Guam (complete, NOAA)*
- *CNMI (most islands covered, NOAA/USGS)*



The vision is to develop science to support policy and management promoting sustainable, interconnected human and ecological communities and species conservation in Hawai‘i and the Pacific Islands. Partners include the University of Hawai‘i at Mānoa; the University of Hawai‘i, Hilo; and the University of Guam.

USGS science for a changing world

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IWG-OEC Thematic and Geographic Priorities

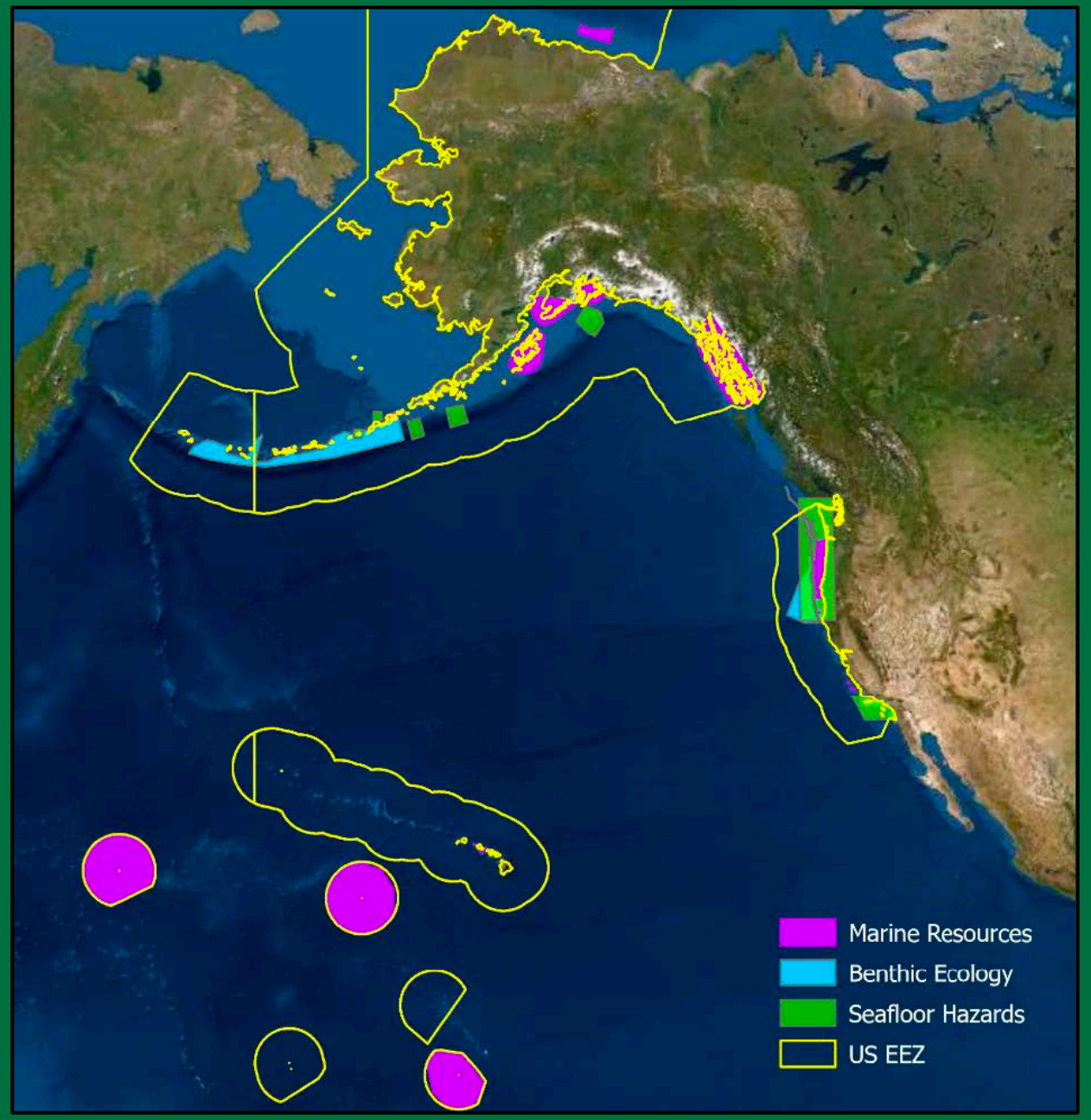
Marine Resources (Natural Products)
- Johnston Atoll
- Jarvis Island

Benthic Ecology
- Aleutian Islands and slope
- Cascadia Margin and Gorda Ridge

Underwater Cultural Heritage (Paleocultural landscapes)
- Gulf of Alaska/Bering Sea, 60 m (200 ft) contour
- U.S. Pacific Coast, 140 m (460 ft) contour

Seafloor Hazards
- Cascadia Subduction Zone Frontal Thrust and Splay Faults
- Central Aleutian Arc
- Eastern Alaska-Aleutian Subduction Zone Area
- California Continental Borderland
- American Samoa
- CNMI

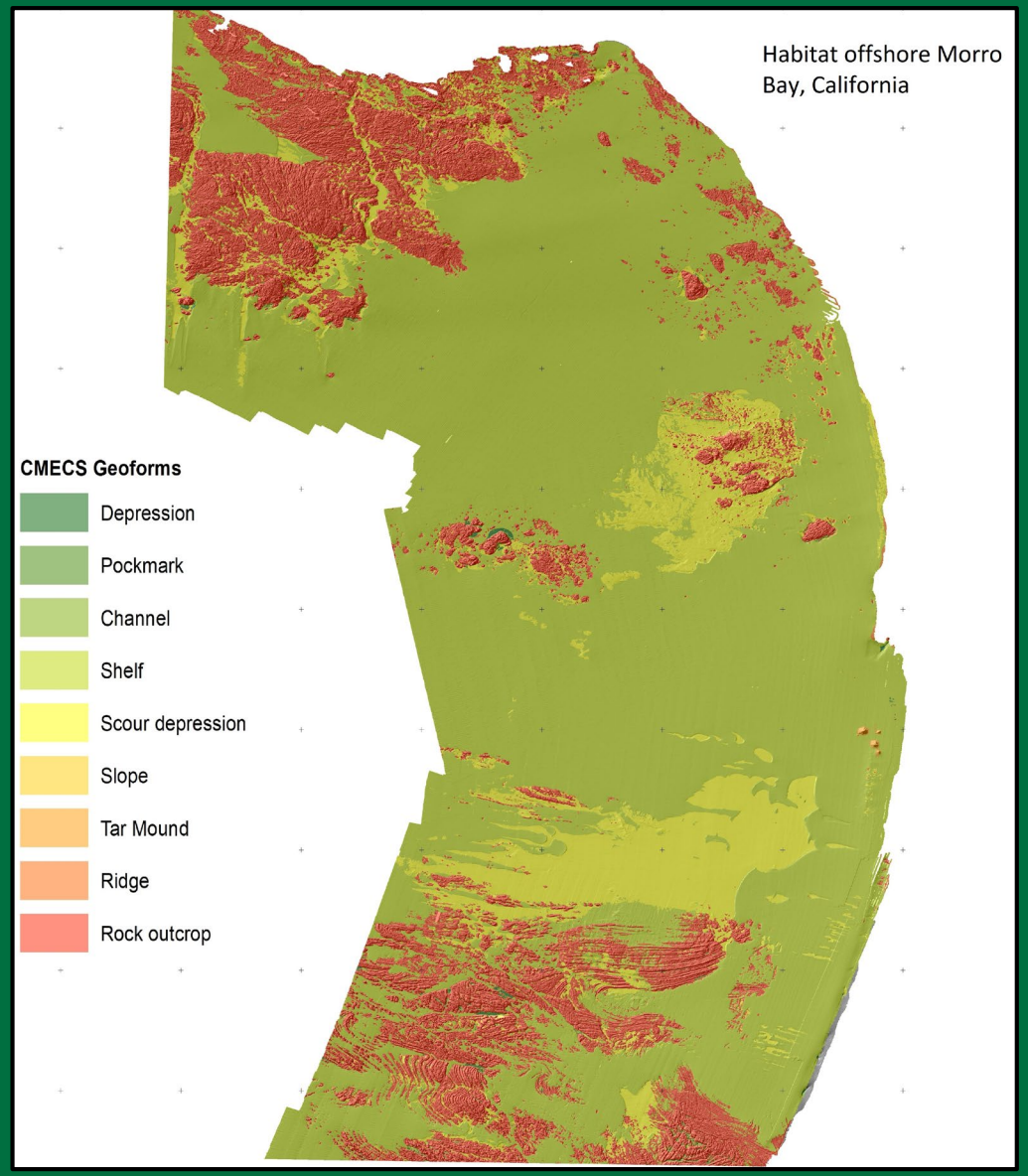
Water Column



IWG-OEC Priority Areas with need of higher resolution mapping data

Does include other exploration/characterization methods (video, sampling, SSS, MCS, etc.)

	Benthic Ecology	Cultural Heritage	Marine Resources	Seafloor Hazards	Water Column
Aleutian Arc	✓	< 1 meter	✓	✓	✓
Cascadia		< 1 meter		✓	
Hawaiian Islands		< 1 meter	✓		✓
Remote Pacific Islands		< 1 meter	✓	✓	✓
California Coast		< 1 meter	✓	✓	✓



CMECS habitat classification offshore Morro Bay, California

Marine Geomorphology, Evolution, and Habitats Project

Seafloor resource managers and modelers need maps that can be combined in GIS, modeling, and statistical analysis environments and related successfully to biologic and oceanographic data. This project collaborates with other government agencies to produce these maps, including collaborating with **EXPRESS** and **Seascape Alaska** and participating in the Coastal and Marine Ecological Classification Standard (CMECS) development working group. Geographic areas of interest are anywhere in the East Pacific and Gulf of Alaska that is prioritized by government agencies managing marine resources.

Selection of Project Objectives:

- Develop seafloor habitat maps for offshore energy impact modeling
- Create coastal/marine geologic and habit maps for all of California's State Waters (multi-agency cooperative)
- Determine the geomorphology and seafloor character of the Gulf of Alaska (multi-agency cooperative)
- Generate geo-referenced video mosaics from seafloor video collected by other USGS projects in cooperation with the University of New Hampshire's Center for Coastal and Ocean Mapping

USGS science for a changing world

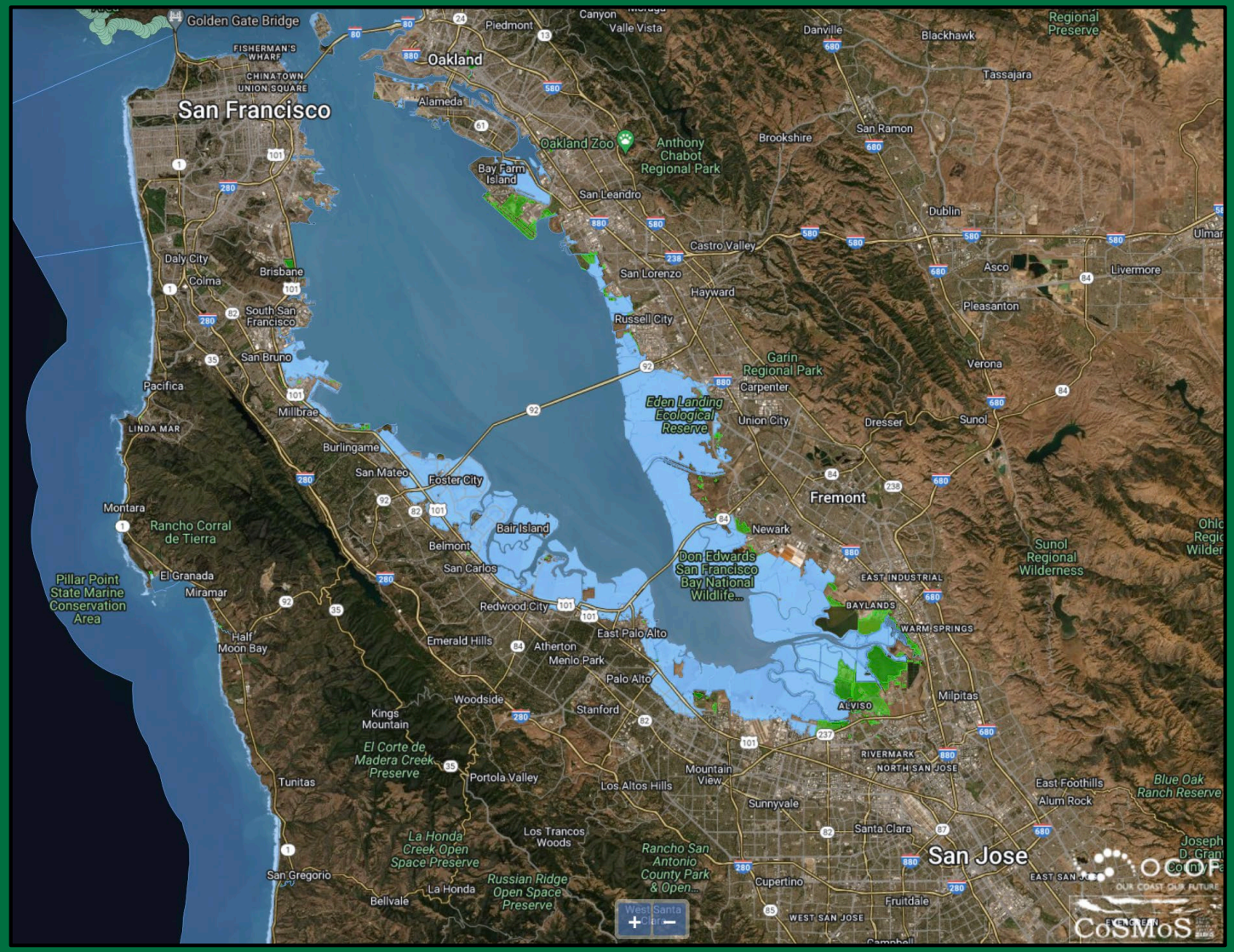
Contact: Dr. Guy R. Cochrane, Pacific Coastal and Marine Science Center (gcochrane@usgs.gov)

Coastal Storm Modeling System

CoSMoS provides modeling and detailed predictions of coastal flooding for science-based decision-support tools to help coastal planners and emergency responders understand, visualize, and anticipate local impacts from sea-level rise, storms, and river flooding driven by climate change.

Multiple storm scenarios (daily conditions, annual storm, 20-year- and 100-year-return intervals) are provided under a suite of sea-level rise scenarios ranging from 0 to 2 meters (0 to 6.6 feet), along with an extreme 5-meter (16-foot) scenario. This allows users to manage and meet their own planning horizons and specify degrees of risk tolerance.

CoSMoS projections are currently available for the north-central coast (Half Moon Bay to Pt. Arena), San Francisco Bay, southern California, and the central California coast. The north coast of California will follow.



CoSMoS modeling of 0.5 m sea-level rise and flooding from a 20-year storm in the San Francisco Bay Region. Models are hosted by the collaborative project Our Coast Our Future

USGS science for a changing world

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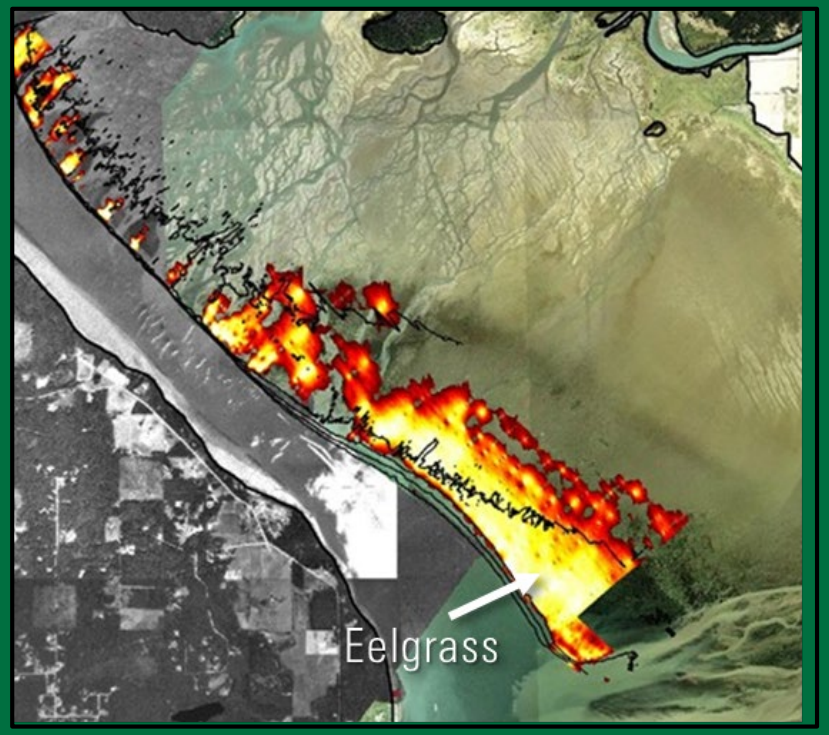
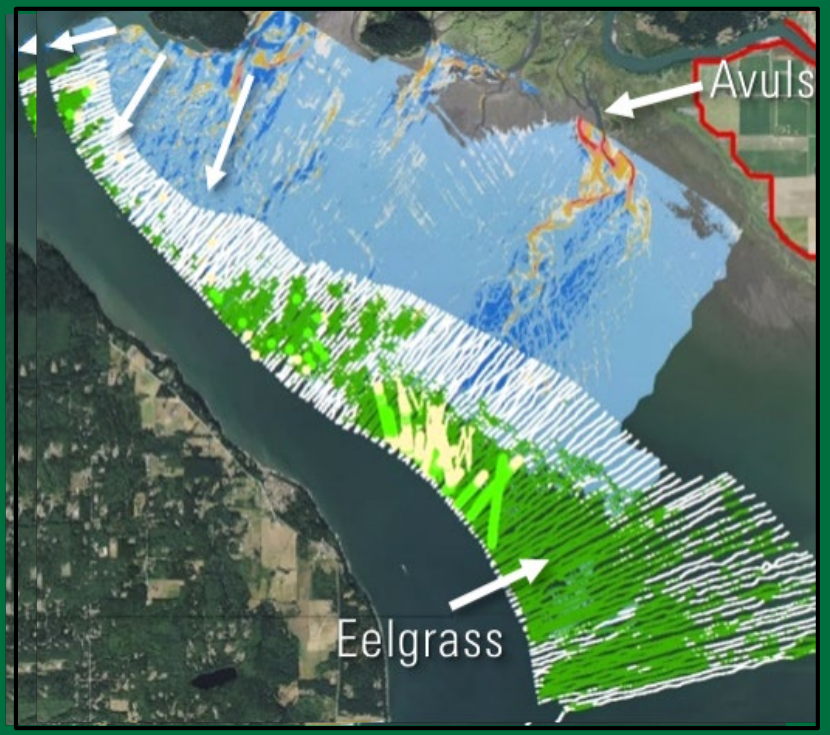
Coastal Habitats in Puget Sound Project

CHIPS evaluates changes in coastal habitats with dual frequency sonar to inform concerns of habitat loss associated with land use and sediment disturbance that limits salmon recovery important to US EPA, Tribes and diverse agencies tasked with ecosystem restoration.

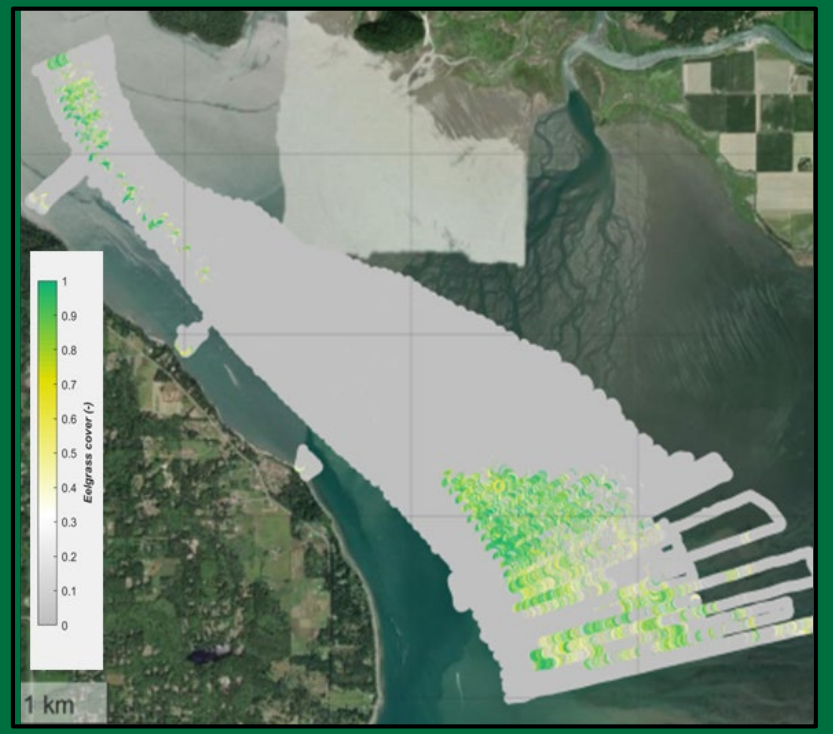
2008



2015



2021



Between 2015 and 2021 there was an estimated 750 ha loss of eelgrass in the Skagit River delta, representing 3-5% of the total in Puget Sound and a concern for recovery targets, blue carbon sequestration and delta stability with sea level rise.

USGS science for a changing world

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