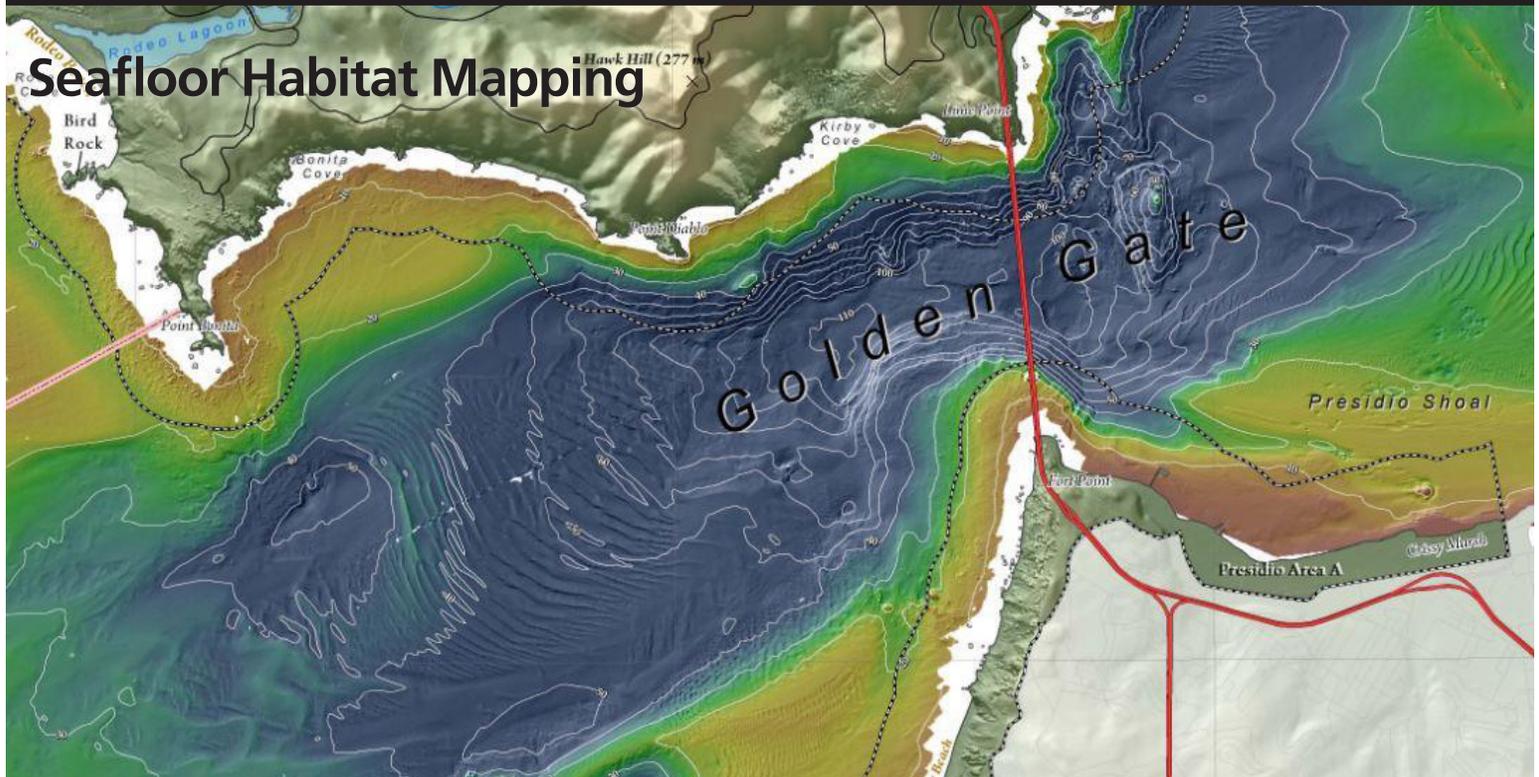


A Call to Action

Crystal Clear

National Park Service
U.S. Department of the Interior

Ocean, Coastal, and Great Lakes Parks



Seafloor habitat map of Golden Gate National Recreation Area created from multi-beam echo sounder data.

The National Park Service (NPS) has 85 ocean, coastal, and Great Lakes parks with more than 11,000 miles of shoreline and 2.5 million acres of marine and estuarine areas across 22 states and four U.S. territories. Seafloor, also called *benthic*, habitat data and maps are lacking for most of these parks, but are essential for understanding and managing park natural and cultural resources. Acoustic multi-beam echo sounder data were used to create bathymetry maps (with contour lines) showing depth and seafloor features. The methodology was developed and tested on several parks throughout the nation. Golden Gate National Recreation Area, Point Reyes National Seashore, San Juan Islands National Historical Park, and Channel Islands National Park have been completed, or are near completion.

Background

Habitat maps in marine and coastal systems, like maps of forests, grasslands, and streams in terrestrial systems, are the foundation for ecosystem-based management and for detecting and monitoring human-caused changes. Without habitat inventories and maps, park managers cannot locate, let alone manage, their natural and cultural resources.

A variety of technologies is available for seafloor mapping, and technologies and techniques are constantly evolving. NPS applied tested and reliable technologies to create the benthic maps at pilot parks, but also took advantage of rapidly advancing and experi-

mental technologies being applied in collaboration with other federal and state agencies.

In California, multi-beam echo sounder (MBES) signals transmitted from boats provided information about water depth, seafloor roughness, and hardness. High-resolution, three-dimensional models of the seafloor were then created from the data, which allow visualization of bottom topography. The resolution of these data continues to improve, and even historic ship wrecks were identified in parks, such as at the mouth of the Golden Gate in San Francisco.

Status

The Coastal and Marine Ecological Classification Standard (CMECS) is the nationally standardized structure for organizing and synthesizing physical, biological, and chemical information about coastal and marine ecosystems and was mostly used in creating the benthic habitat maps for parks. Thirty-nine habitat types were defined: 11 in estuaries and 28 on the continental shelf (figure 2).

Pilot park project methods varied depending on existing data, funding, environmental conditions, and the classification system used. Products included imagery, GIS data and metadata, six 1:48,000 scale maps, and a sheet of perspective views of areas of special interest. The seascape perspective views (figures 3 and 4, examples of Point Reyes) facilitate visualization of the distribution of benthic habitats and their relationship to the adjacent landscape.

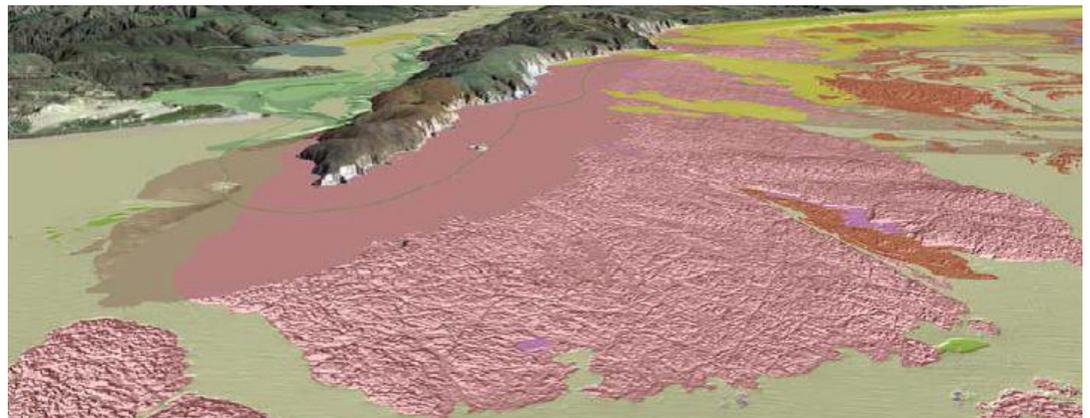
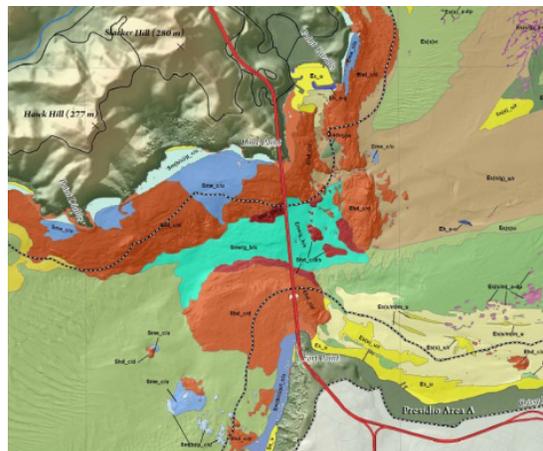
Resource managers are already applying habitat maps for resource protection. Applications include modeling sea level rise, storm surge, and species habitat associations, such as fish habitat. In California, benthic habitat maps recently were used to identify marine protected areas including marine reserves and marine conservation areas at Golden Gate NRA and Point Reyes NS.

Benthic environments are dynamic, though, and a habitat map is a snapshot of conditions that existed when the data were collected. Seasonal and inter-annual events, such as currents, storms, earthquakes, tsunamis, etc., can affect bathymetry and benthic habitat structure. Opportunities for collecting new data in the wake of habitat-changing events should be pursued.

Near right: Figure 2, Benthic habitat map showing habitat types.

Far right: Figure 3, Seascape perspective view of Point Reyes National Seashore.

Bottom: Figure 4, Seascape perspective view of Point Reyes National Seashore from a different angle showing habitat types.



More Information

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www.nature.nps.gov/water/oceancoastal/seafloorhabitatmaps.cfm