

Science Needs Assessment

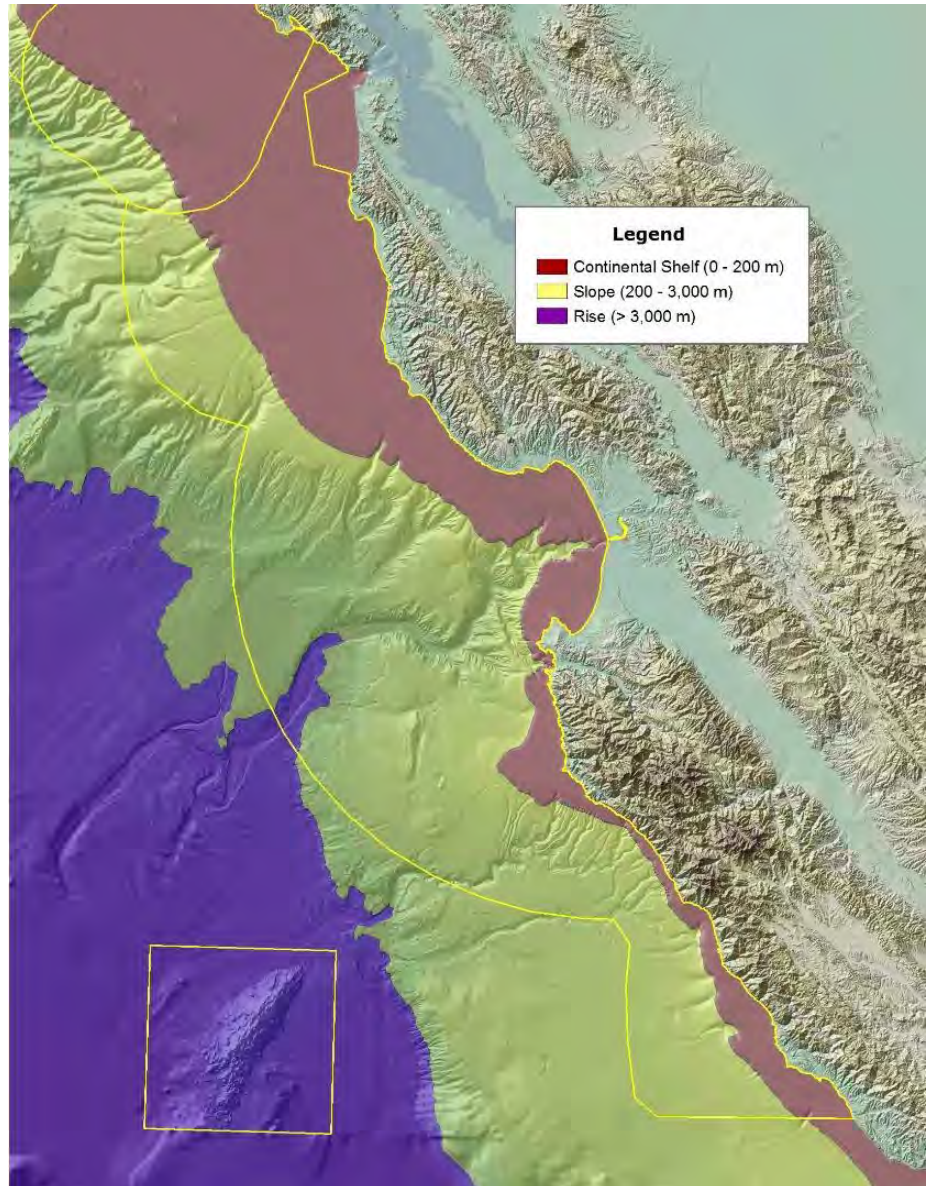
Habitat Characterization of the Continental Slope

Conservation Issue

Seafloor characterization of the continental slope (200–3000 m) is necessary to ground truth habitat maps and inform management decisions at Monterey Bay National Marine Sanctuary (MBNMS).

Description

Seafloor habitats on the continental slope, ranging from 200–3000 meters depth, comprise 9,247 km² of MBNMS and represent 58.6% of the total area of the sanctuary. Yet, they have only been minimally characterized and systematic monitoring has not occurred. Presently, there is a need to collect additional data on continental slope habitats and synthesize existing data that have been collected by different institutions and research efforts. More complete data can be used to better understand species associations with particular types of habitat, as well as interactions between species and the vulnerability of particular species to human activities. Digital images and video captured using remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and towed camera sleds facilitate rapid, qualitative assessments of specific



The continental slope comprises the majority of habitat within MBNMS.
Image: NOAA

locations where human activities are planned or have occurred (e.g., laying cables, marine reserves). These images can also be used for more detailed quantitative assessments through time to monitor natural changes and recovery from human disturbances. Web-based GIS applications can provide easy access to geolocated images, facilitating the use of this information by educators and managers.

Data and Analysis Needs

1. Geology and substrate type at specific continental slope locations
2. Distribution and abundance of organisms and habitats on the continental slope
3. Areas of high species diversity associated with continental slope hard- and soft-bottom habitats
4. Biogenic habitat provision by corals and chemosynthetic communities on the continental slope
5. Changes in benthic organisms through time in specific areas of interest (e.g., marine reserves)
6. Vulnerability of different continental slope habitats and living marine resources, and whether some continental slope habitats are able to recover from disturbance at different rates than others
7. Distribution of keystone and foundation species in continental slope habitats
8. Distribution of species of particular management interest on the continental slope, and how their populations are changing

Potential Products

- Higher-resolution maps of continental slope geology and substrate type
- An integrated map of the distribution of fishes, invertebrates, and habitats of the continental slope seafloor
- Georeferenced still and video imagery available on the internet through interactive maps
- Identification of continental slope areas that are most vulnerable to human activities
- Recommendations for marine protected areas management processes, and assessments of the effectiveness of existing protections such as essential fish habitat areas
- “Fly-throughs” to share with the public at sanctuary visitor centers

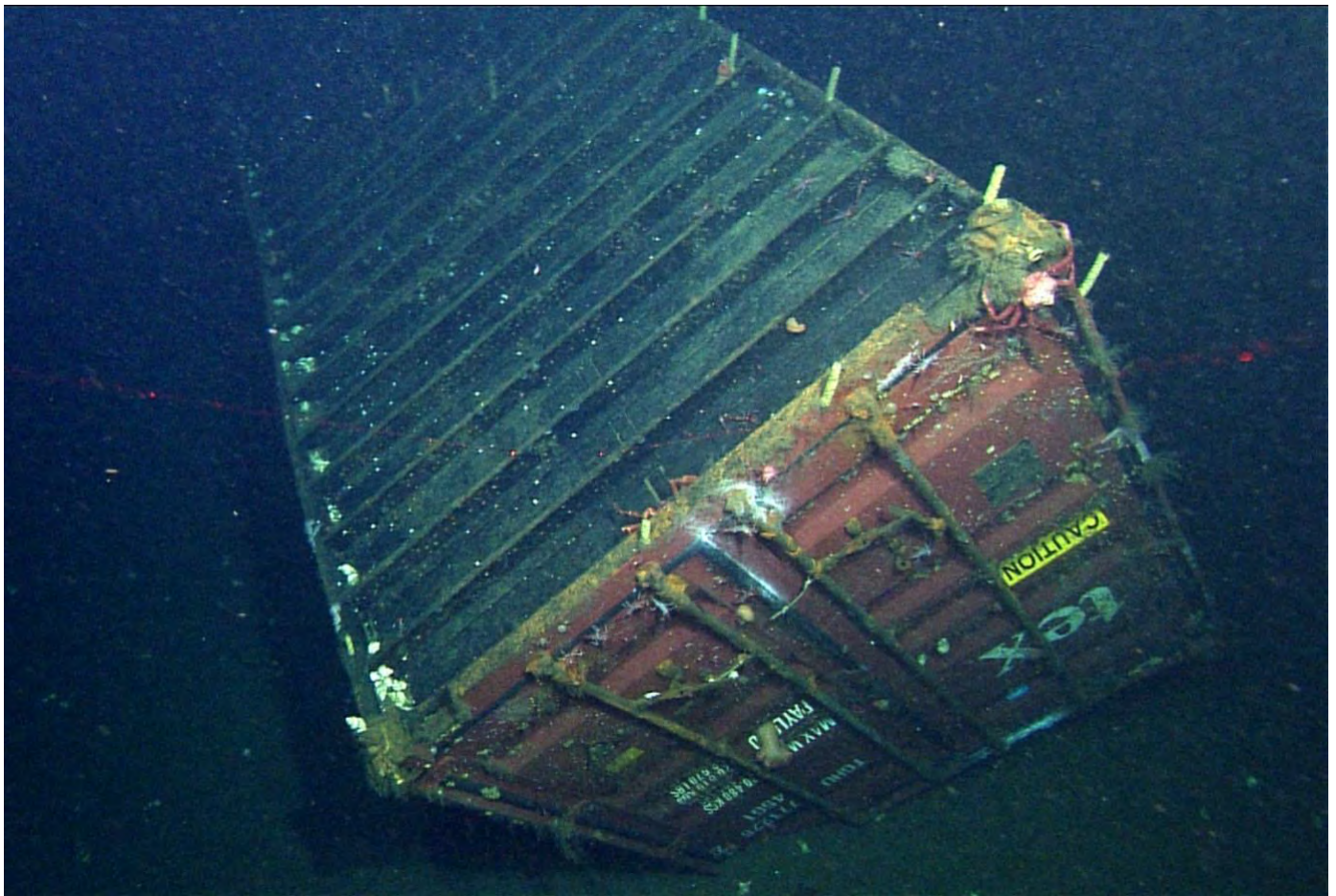
Suggested Scientific Approach and Actions

- Ground truth topographic and geologic habitat features on existing maps
- Scope areas for future comprehensive surveys using operationally expensive equipment (i.e., submersibles, ROVs, and AUVs)
- Complete rapid qualitative data collection with towed camera systems and smaller ROVs and AUVs for areas of the MBNMS slope that are not characterized but might be accessible using this technique
- Synthesize existing continental slope data from Monterey Bay Aquarium Research Institute, Ocean Exploration Trust, California State University Monterey Bay, and other research efforts
- Utilize baseline data to mitigate future environmental impacts
- Develop methods to geographically display images over the internet and educate the public about continental slope habitats and living marine resources
- Participate in local and regional efforts to acquire and contribute information about the continental slope (e.g., Expanding Pacific Research and Exploration of Submerged Systems [EXPRESS])
- Monitor areas of interest through time, including marine reserves and trawl recovery zones

Key Partners

Monterey Bay Aquarium Research Institute, NOAA Fisheries, Naval Postgraduate School, California State University Monterey Bay, U.S. Geological Survey, Ocean Exploration Trust, Woods Hole Oceanographic Institution

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Surprises occasionally occur in the deep sea, including on the continental slope. This lost shipping container, photographed by the remotely operated vehicle *Doc Ricketts* during a research expedition in December 2013, sits at an angle on the ocean floor at a depth of 1,290 meters. This container was lost at sea during a storm in February 2004 and was located on the seafloor by MBARI later that year. It has since been surveyed twice by MBNMS (in 2011 and 2013). Photo: MBARI