

Greater Farallones National Marine Sanctuary

Sensitive Seafloor Communities and Threats

Management Issue

Adequate protection of sensitive benthic resources (wildlife and habitats), such as those communities that occur on rocky reefs and deep sea corals, requires improved understanding of distribution and community structure of benthic communities, as well as threats such as injuries from bottom contact fishing gear and ocean acidification from climate change. There is a need for analyzing existing mapping data and video data collected during recent surveys in 2014 and 2016. Also needed is completion of multibeam mapping, substrate characterization and mapping, and video ground-truthing of rocky substrates and in areas of potential deep sea corals, such as Point Arena Biogenic Areas North and South, The Football, Rittenburg Bank, Cochrane Bank, Fanny Shoal, Farallon Escarpment within the Greater Farallon National Marine Sanctuary (GFNMS or sanctuary), Pioneer Canyon and Deep Reef in the northern portion of Monterey Bay National Marine Sanctuary (sanctuary). Baseline and monitoring data should include assessment climate change, specifically ocean acidification impacts to deep sea corals, impacts from bottom contact gear, and identify which sunken vessels may be sources of pollutants, e.g. leaking fuels and other hydrocarbons. Benthic mapping and corresponding ground-truthing provides management with a portal to the health and status of the sanctuaries benthic communities, anthropogenic pressures on those communities, and recovery after restoration or mitigation.



A black coral and spot prawn on a rocky ledge at Farallon Escarpment. Photo credit: Ocean Exploration Trust/NOAA

Description

Portions of the sanctuary's benthic substrates has been either side-scanned or multi-beamed over the past 20 years, but only since 2009 have these areas been surveyed using modern multibeam and backscatter data collection, resulting in more reliable substrate maps. In 2010, fine scale multibeam and side scan sonar mapping of state waters was accomplished by California State University of Monterey Bay, resulting in detailed substrate maps within three miles of the coast. From 2009-2016, fine scale multibeam and backscatter data were collected at some of the offshore areas of the sanctuary. ROV and camera sled video were used to ground-truth some of the modeled substrate maps, but many other areas remain to be ground-truthed, cataloged, quantify habitat types and associated biological communities, inspect cultural resources, and identify anthropogenic threats. Areas in need of additional mapping, ground-truthing and characterization include: Arena Canyon in the Point Arena Biogenic Area North (PABAN), Point Arena Biogenic Area South (PABAS), The Football, Rittenburg Bank, Fanny Shoal, Cochrane Bank, Farallon Escarpment, Pioneer Canyon, and Deep Reef. The sanctuary also protects over 400 shipwrecks. Many of these shipwrecks act as artificial reefs and are important not only as cultural resources but also as substrate for natural resources. The value of shipwrecks as substrate for deep sea corals and sponges also needs to be quantified. Once characterization has begun, monitoring needs to be established to better understand if there are impacts to corals containing CaCO_3 that may lead to shifts in ecosystem structure and dynamics.



Approximate locations of rocky reefs in GFNMS and northern MBNMS.

Questions and Information Needs

- 1) Where are deep sea corals and sponges in relationship to management zones, i.e. essential fish habitats restricting various types of bottom contact gear and how do corals and sponges provide habitat for fish?
- 2) What are the anthropogenic and climate change pressures on the benthic communities and cultural resources of the sanctuary? What are potential mitigation measures to reduce or eliminate these pressures?
- 3) To what extent are deep sea corals and sponges impacted by climate change or ocean acidification? What are potential mitigation measures to increase resiliency of these resources and better adaption to those impacts?
- 4) To what extent are the impacts from bottom trawling and other bottom contact fishing gear? In areas that have been closed to bottom contact fishing gear, to what extent are these areas recovering?
- 5) How do the densities and percent coverage of calcifying (CaCO_3 containing) organisms compare between shallow (<50 meters) and deepwater habitats?

Updated: 11/30/2016

For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>

Scientific Approach and Actions

- Conduct a literature search for species inventories and mapped information to identify information gaps and identify areas for fine-scale investigations
- Digitize or update data formats and databases
- Identify areas adequately mapped with modern acoustic technology, such as side scan sonar and multibeam and determine if the level of resolution is adequate and comparable to future analysis
- Determine high priority targets within Arena Canyon, Point Arena Biogenic Areas North and South, The Football, Rittenburg Bank, Cochrane Bank, Fanny Shoal, Farallon Escarpment, Pioneer Canyon, and Deep Reef
- Analyze information to develop fine-scale bathymetry and substrate maps, maps of marine debris, cultural resources, and sunken vessels as potential sources of pollutants and those that may act as coral and sponge habitat
- Use fine scale maps to determine areas for further investigations using ground-truthing techniques, such as ROV, AUV, submersible, camera sled arrays, acoustic surveys and habitat modeling
- Identify pressures for specific areas of the sanctuary and corresponding mitigation measures, including ocean acidification
- Develop abundance and distribution maps for deep sea corals and sponges and determine critical associations between invertebrate and fish communities

Key Partners and Information Sources

NMFS Deep Sea Coral Research and Technology Program, NCCOS, California Academy of Sciences, CA Department of Fish and Wildlife, CA State University Monterey Bay, NOAA Ocean Exploration and Research, National Park Service, Moss Landing Marine Labs, Marine Applied Research and Exploration, US Geological Survey, CBNMS, MBNMS



Image data collected by remotely operated vehicles are used to verify mapped substrates and associated epifaunal and mid-water communities.

Management Support Products

- Comprehensive maps of benthic habitats and species
- Species inventory, density and distribution of benthic epifauna and fish communities
- Species inventory of sensitive species, e.g. deep sea corals
- Identification and extent of anthropogenic pressures
- Maps impacts and recovery after mitigation or restoration

Planned Use of Products and Actions

- Develop criteria for selecting and prioritizing habitats to vulnerable anthropogenic pressures
- Identification of potential pollution sources from sunken vessels
- Identification of sensitive species and habitats most vulnerable to anthropogenic pressures and development of adaptive management actions

Program References

GFNMS Management Plan (2014)

STRATEGY FA-1: Develop an ecosystem characterization of the sanctuary

STRATEGY CS-4: Develop and implement sanctuary ecosystem assessment and monitoring programs

STRATEGY CS-5: Complete characterization of sanctuary biological and physical features.

STRATEGY IS-3: Develop a monitoring program to detect and monitor introduced species

GFNMS Condition Report (2010) – Questions 1, 4-9, 11-14

- What are the status and trends of human activities that may influence water quality, habitats, and living resources, including invasive species, biologically structured habitats, key and foundation species

Climate Action Plan Strategies (2016) – H-7, HD-1, IS-1, IS-2, SN-4-6

Updated: 11/30/2016

For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>