Greater Farallones National Marine Sanctuary

Oil Pollution and Restoration Measures

Management Issue

Oil pollution is a constant threat to sanctuary wildlife and habitats because of heavy shipping traffic within the Greater Farallones National Marine Sanctuary (GFNMS or sanctuary) and northern portion of Monterey Bay National Marine Sanctuary (sanctuary), the increased likelihood of illegal dumping of oily bilge waste, ship collisions, and from hundreds of shipwrecks potentially leaking oil in to the sanctuary. Managers need information on the status and trends of water column and benthic wildlife and habitats that would also be impacted from oil pollution and clean-up efforts, such as chemical dispersants and in-situ burning.

Description

Three major shipping lanes converge in the sanctuary just west of the Golden Gate Bridge at the entrance to San Francisco Bay. The volume of traffic in and out of San Francisco Bay is large, with nearly 4,000 tank and non-tank vessels transiting the sanctuary on an annual basis. California's oil production and distillation activities and status as the nation's greatest gasoline consumer, provide high level risk from oil tankers moving up and down the coast. Historically, the total number of spills from transiting vessels is small, but the potential impacts may be enormous given the number and volume of vessels, and their proximity to the Farallon Islands and other major seabird and marine mammal populations. In 2007, in a report from the Harbor Safety Committee, the U.S. Coast Guard documented 868 tank vessels and 2,787 deep-draft non-tank vessels that transited San Francisco Bay. Large commercial vessels are of particular concern for spills, since they can carry up to one million gallons of bunker fuel, a heavy, viscous fuel similar to crude oil. For example, the S/S *Jacob Luckenbach* sank in the Gulf of the Farallones in 1953. Over a period of several decades, as the ship's fuel storage tanks corroded, the shipwreck released over 85,000 Liters of oil over several decades, killing over 51,000 seabirds and marine mammals.

In 1984, T/V Puerto Rican *exploded and released 5.4 million gallons of oil into the sanctuary. Photo credit: GFNMS*

Baseline and research data of offshore benthic and surface biogenic habitats, e.g. deep sea corals, sponges, krill, and surface drift algae, are needed. Photo credit: Mojoscoast GFNMS

Much of the sanctuary's current monitoring programs target the early detection of oil pollution nearshore, sampling levels of oil pollution coming from natural seeps and illegal discharges, impacts to coastal and intertidal wildlife, and the ecological health of coastal wildlife populations and habitats most vulnerable to oil pollution. Managers need similar information on the status and trends of krill and offshore biogenic habitats, e.g. deep sea corals, sponges, and drift algae. Research is needed on the short and long term impacts from toxicity and smothering of oil, and in-situ burning.

Questions and Information Needs

1. What are the ecological values, status and trends of drift algae, deep sea corals, and sponges in the sanctuary?
2. How and when are drift algae vulnerable to oil pollution, dispersants, dispersed oil and in-situ burning?
3. How does dispersed oil affect whale prey species, e.g. zooplankton? How toxic is dispersed oil to zooplankton? Could there be population level impacts by disruption or loss regional zooplankton?
4. What are the short and long term impacts, e.g. reproduction and productivity of krill, drift algae, corals and sponges when exposed to oil, chemically dispersed oil and in-situ burning of oil? Are there habitat refugia for krill, drift algae, corals and sponges? If so, where and when to they occur? What sizes of refugia are needed to ensure krill availability for foraging whales and seabirds?
5. What is the abundance and distribution of deep sea corals and sponges in the sanctuary?
6. What are the net environmental benefits of the use of dispersants on oil pollution vs. oil pollution alone for abalone, drift algae, zooplankton, deep sea corals and sponges, and Dungeness crab? How do the benefits change by season or year?

Scientific Approach and Actions

- Assess the abundance, distribution, seasonality and biodiversity of drift algae, abalone, zooplankton, deep sea corals and sponges, and Dungeness crab
- Determine the ecological value, location and size of refugia needed to ensure long term productivity of drift algae, abalone, zooplankton, deep sea corals and sponges, and Dungeness crab
- Determine susceptibility and toxicity of drift algae, abalone, zooplankton, deep sea corals and sponges, and Dungeness crab to oil pollution, dispersants, and chemically dispersed oil
- Identify fine scale and regional habitat characterization programs that analyze: physical factors (e.g. surface currents, frontal and convergent zones, larval transport and deposition zones), chemical factors (e.g. salinity, pH, alkalinity, CO_2), and biological factors (e.g. abundance and distribution of seabirds, marine mammal, invertebrates)
- Identify any ecological hotspots where oil pollution, dispersants, and chemically dispersed oil are most damaging to the sanctuary resources
- Update the 2001 Net Environmental Benefits Analysis (NEBA) for key species and sanctuary specific resources

Key Partners and Information Sources

Cordell Bank National Marine Sanctuary, NOAA Deep Sea Research and Technology Program, University of California, Bodega Marine Lab, San Francisco State University, CA Ocean Protection Council and Ocean Science Trust, CA Sea Grant, PISCO, CA State University Monterey Bay, USGS, NOAA Restoration Center, CA Department of Fish and Wildlife-Office of Spill Prevention and Response, Point Blue Conservation Science, Farallones Institute, Greater Farallones Association, Tenera Inc., NPS, USFWS, Central-Northern California Ocean Observing Systems (CeNCOOS)

Management Support Products

- Species inventory and map of seasonality, abundance and distribution of drift algae throughout the sanctuary
- Update current Appendix IV in the Vessel Spill Response Technologies report, June 2012
- Update the 2001 NEBA, specifically for the sanctuary
- Interpretive, web enabled, maps that illustrate key data including physical, biological and behavioral data, habitat characterization, annual and seasonal variations, trend comparisons, historic, cultural resource data
- Database of key biological and physical data sets to detect changes in upwelling and productivity, and potentially support adaptive management strategies
- Models of key biological and cultural resources, physical processes and habitats in the near and off shore environments relative to shipping lanes, areas to be avoided, and areas for vessels in distress, in relationship ecological hotspots

Planned Use of Products and Actions

- Use NEBA in drills, planning and during oil spills to determine if sensitive resources need extra protection
- Highlight ecological hotpots and assess if current monitoring efforts are adequate to develop damage assessment of oil pollution
- Determine recovery time of and restoration actions of sensitive resources, e.g. krill, drift algae and corals

Program References

GFNMS Management Plan, (2014)

- STRATEGY VS-7: Continue to improve integration of GFNMS Beach Watch and ACCESS data into Area Contingency Plan
- STRATEGY RP-7: Review and revise the sanctuary's spill response plan and emergency response portfolio in order to be prepared to respond to an incident.
- STRATEGY CS-1: Maintain the Beach Watch program to monitor marine life and human activities
- STRATEGY CS-2: Conduct research as needed, to guide permit conditions
- STRATEGY CS-3: Host a biennial research workshop to facilitate information exchange in the GFNMS
- STRATEGY CS-4: Develop and implement ecosystem assessment and monitoring programs, and integrate with CeNCOOS and other West Coast observing and monitoring programs
- STRATEGY CS-5: Complete characterization of sanctuary biological and physical features

GFNMS Condition Report (2010)

- Questions: 1, 3-8, 12, 14 and 15