

Greater Farallones National Marine Sanctuary

Vessel Traffic and Threats to Baleen Whales

Management Issue

Vessel activity has the potential to impact resources of the Greater Farallones National Marine Sanctuary (GNMS or sanctuary) and northern portion of Monterey Bay National Marine Sanctuary (sanctuary) resources through discharge of materials and oil spills, acoustic disturbance, ship strikes and collisions in areas where there is a co-occurrence of whales and ships. Adequate protection of sensitive species, such as the endangered humpback and blue whales, requires improved understanding of the fine-scale distribution and foraging behaviors of baleen whales in relation to shipping lanes and heavy vessel traffic areas. There is a need to determine the level of risk to baleen whales from collision by large, medium and small vessels and determine if there is a need to develop guidelines or regulations that will reduce the level of risk of vessels colliding with and killing baleen whales.

Description

Three shipping lanes converge within the sanctuary, which funnels nearly 4,000 commercial vessels per year into and out of San Francisco Bay; therefore, all inbound and outbound traffic to and from San Francisco Bay passes through the sanctuary on their approach into or departure from San Francisco Bay. There is a need to determine the risk to wildlife from vessel traffic by determining the co-occurrence of vessels in areas of greatest ecological sensitivity, determine the species, age and sex classes of the baleen whales most vulnerable to ship strikes, and determine the extent of disruption of foraging behavior from ship noise.

Questions and Information Needs

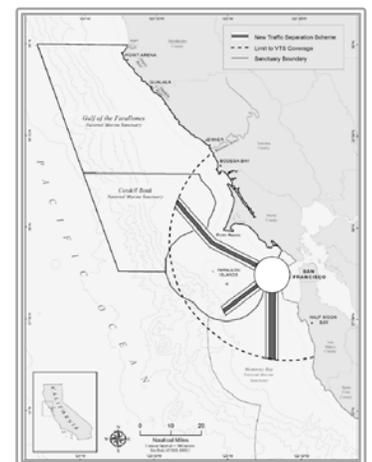
- 1) What are the spatial and temporal patterns of vessel activity (by vessel type) within the sanctuary?
- 2) What are the spatial and temporal patterns of noise produced by vessels within the sanctuary? Does this noise disrupt foraging patterns of baleen whales within the sanctuary?
- 3) What are the spatial and temporal patterns of seabird and marine mammal abundance within the sanctuary?
- 4) Are there areas of overlap between high vessel use and areas of biological sensitivity (e.g., foraging areas)?
- 5) Are certain age classes or gender of whales more vulnerable than others?
- 6) Are there persistent physical features (e.g. upwelling, convergent zone, freshwater plume, frontal zones) that have the potential to accumulate oil and other discharge materials?
- 7) Do marine mammals and seabirds concentrate their feeding at persistent physical features?
- 8) How does dispersed oil affect whale prey species, e.g. zooplankton? How toxic is dispersed oil to zooplankton? Could there be population level impacts to baleen whales or seabirds by disruption or loss regional zooplankton?
- 9) Will seasonal slowdown of vessels reduce the likelihood of vessels striking and killing baleen whales? What are the optimal vessel speeds to reduce the likelihood of mortal collisions and reduce acoustic impacts?
- 10) What months of the year are most effective to implement slowdowns of commercial shipping traffic vessel?



Large vessels such as cruise ships and cargo vessels have the potential to directly impact marine mammals. Photo credit: Bob Wilson/GFNMS.



A dead baleen whale on the bow of a cargo vessel in the Port of Oakland. Photo credit: GFNMS Library



Vessel traffic separation scheme and vessel traffic communication area (dashed line).

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

Scientific Approach and Actions

- Develop software to automatically compile Automatic Identification System (AIS) data to determine spatial and temporal patterns of vessel activity (by vessel type) within the sanctuary and compliance with voluntary speed reduction posted in the Local Notice to Mariners
- Conduct vessel-based and aerial surveys to determine the extent and types of vessels not using AIS
- Compile vessel-based survey data to determine spatial and temporal patterns of seabirds and marine mammals
- Produce environmental sensitivity maps (including temporal component) that illustrate regions needing additional protection from vessel disturbance and discharge, including oil spills
- Investigate the patterns of persistent oceanographic features (e.g. convergent and frontal zones) and the response of marine organisms (e.g. zooplankton, fishes, seabirds, marine mammals) to these physical features
- Refine available oil dispersal simulation models to predict surface and sub-surface patterns of oil dispersal and concentration within the sanctuary with and without the application of dispersants
- Conduct passive acoustic monitoring to identify and quantify sources of underwater anthropogenic noise and determine if acoustic monitoring is a feasible monitoring tool to detect abundance and distribution of blue, humpback and fin whales.

Potential Key Partners and Information Sources

Cordell Bank National Marine Sanctuary, Point Blue Conservation Science University of California, Bodega Marine Lab, San Francisco State University, CA Ocean Protection Council and Ocean Science Trust, CA Sea Grant, USGS, NOAA Restoration Center, CA Department of Fish and Wildlife, Farallones Institute, Greater Farallones Association, USFWS, Central-Northern California Ocean Observing Systems (CeNCOOS), NOAA Office of Response and Restoration, Scripps Institution of Oceanography, NOAA Fisheries

Management Support Products

- Integrated maps of vessel activity, persistent physical features and areas of biological concentration
- Environmental sensitivity maps for offshore areas that can be used to assess the potential impacts of vessel activities, including oil spills, physical and acoustic wildlife disturbance, and collision with marine mammals
- Simulation models to predict surface and sub-surface patterns of oil dispersal with and without the application of dispersants
- Baseline acoustic information that can be used to determine the potential disturbance levels to marine mammals and that will identify the abundance and distribution of blue, humpback and fin whales

Planned Use of Products and Actions

- Develop policies, procedures and regulations to minimize the effects of vessel activities on sanctuary resources and determine effectiveness of seasonal reduction of vessel speed to reduce mortal collisions
- Utilize environmental sensitivity maps and simulation models to evaluate the potential impacts of vessels on sanctuary resources
- Consult with United States Coast Guard to ensure that proposed vessel management policies are compatible with safe and legal maritime practices and also increase protection of natural resources
- Evaluate scenarios of oil dispersal to improve ability to respond to potential future oil spills and guide mitigation and restoration activities
- Utilize research results to develop educational products that will inform the public about potential impacts of vessels on the sanctuary and practices that can be undertaken to minimize these impacts

Program References

GFNMS Management Plan (2014)

- STRATEGIES WD-1-4, WD-9, VS-3, VS-7-9: Create spatial database pertaining to wildlife disturbance; monitor impact on marine wildlife and key habitats of the sanctuary; coordinate with other agencies to better understand and address anthropogenic noise, light, visual and physical impacts on wildlife; increase outreach and law enforcement efforts to address human behavior that may adversely impact wildlife evaluate current motorized personal watercraft (MPWC) use and potential impacts to sanctuary wildlife resources; evaluate recent vessel routing changes; continue to improve integration of GFNMS Beach Watch and ACCESS data into Area Contingency Plan; and conduct outreach to mariners to increase stewardship.

GFNMS Condition Report (2010) Questions 4, 5, 8, 12-14

- What are the status and trends of key resources, acoustic baseline and impacts from vessel traffic, and what are the impacts from human activities, such as shipping traffic and MPWC (i.e. jet skis)?

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