

# Cordell Bank National Marine Sanctuary

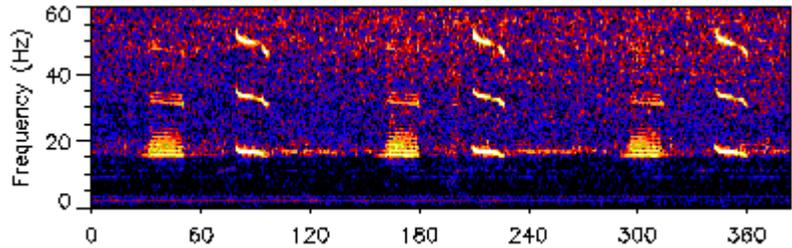
## Sanctuary Soundscape

### Management Issue

Increasing levels of human activity in coastal waters are accompanied by increasing levels of anthropogenic underwater sound. Many marine animals, including mammals, fish and invertebrates, use sound to communicate, navigate, and feed. Information on the ambient noise environment including biological and anthropogenic sounds is needed as a first step towards understanding the impacts to resources in Cordell Bank National Marine Sanctuary (CBNMS or sanctuary), particularly endangered large whales of concern.

### Description

The level of ocean noise in the marine environment, its anthropogenic components, and its impact on marine resources are national and international issues. Off the coast of San Francisco Bay, one of the busiest ports on the US west coast, ship strikes have drawn attention to human impacts on whales, including acoustic impacts. As a result, in 2012, the advisory councils for Cordell Bank and Gulf of the Farallones National Marine Sanctuaries recognized the need for information on ocean noise and provided recommendations to both sanctuaries in their working group report for research and monitoring to protect whales from multiple anthropogenic impacts. Characterizing the CBNMS soundscape and gathering baseline data on acoustic inputs may help to answer questions about potential impacts from underwater sound on CBNMS living resources.



*Spectrogram of Northeast Pacific blue whale call. Image credit: NOAA PMEL (<http://www.pmel.noaa.gov/acoustics>)*

### Questions and Information Needs

- 1) What are the relative inputs of sound from various sources to the Sanctuary's total soundscape and how do they vary at temporal and spatial scales?
- 2) What species of vocalizing marine mammals are heard and when are they present?
- 3) What are the temporal and spatial variations of vocalizing marine animals in the Sanctuary?
- 4) What is the spatial and temporal overlap of anthropogenic sound and marine mammals in the sanctuary?
- 5) Are changes in the behaviors of vocally-active marine animals relative to anthropogenic sound sources biologically significant, and how can this information inform underwater noise policy for the Sanctuary?

### Scientific Approach and Actions

- Deploy acoustic listening instrumentation to continuously monitor the Sanctuary's acoustic environment, particularly within low frequency bandwidths
- Monitor long-term variance and trends in underwater ambient noise arising from anthropogenic and natural sources
- Integrate acoustic and vessel tracking data with other data regarding distribution of sound-producing activities
- Analyze acoustic data for presence and absence of vocalizing marine animals
- Develop and use analytic techniques to combine temporally specific geospatial data sets (e.g., animal behavior, bottom topography, prey fields and received levels of sound)

*Updated: 12/3/2014*

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

# *Cordell Bank National Marine Sanctuary*

## **Sanctuary Soundscape**

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- Provide data on spatial and temporal overlap between anthropogenic sound and vocalizing marine animals
- Validate acoustic models by integrating data from acoustic instruments with Automated Identification System (AIS) data, bathymetric, and oceanographic data.

### **Key Partners and Information Sources**

NOAA Ocean Noise Reference Station partners, National Marine Fisheries Service

### **Management Support Products**

- Descriptive statistics regarding relative inputs of noise within the Sanctuary from various sources, including variation in time and space
- Descriptive statistics regarding distributions of vocally-active marine animals, including variation in time and space
- Identification of potential mitigation actions and associated socioeconomic impacts

### **Planned Use of Products and Actions**

- Inform stakeholder communities how animals and human activities influence the underwater acoustic environment
- Solicit user input for management strategies to reduce anthropogenic noise in the sanctuary
- Work with appropriate partners to develop mitigation policies

### **Program References**

#### CBNMS Management Plan

- Conservation Science Action Plan, strategy CS-2, CS-7

#### CBNMS Condition Report

- What are the levels of human activities that may influence living resource quality and how are they changing?

#### ONMS Performance Measures

- By 2015, 100% of the sanctuary system is adequately characterized.
- Number of sites in which habitat quality, based on long-term monitoring data, is being maintained or improved.

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