

# Gray's Reef National Marine Sanctuary

## Acoustic Impacts to Resources

### Management Issue

Increased human activity in coastal waters produces greater inputs of anthropogenic noise into the marine environment. Many marine animals, including mammals, fish and invertebrates, use sound to communicate, navigate, and/or feed. It is unknown how anthropogenic noise impacts these sound cues used by marine organisms. Impacts to resources in Gray's Reef National Marine Sanctuary (GRNMS) due to underwater noise warrant attention and research.

### Description

The impact of anthropogenic noise on marine resources is an issue of national and international concern. The National Research Council has identified the potential for harm to marine organisms from excessive noise, and the need for information on the amount of sound introduced into the oceans by human activity as key scientific questions. Characterizing the GRNMS soundscape and gathering baseline data on acoustic inputs may help to answer questions about potential impacts on living marine resources.



NOAA and academic partners service the hydrophone and other instrumentation on NDBC buoy #41008 which is located inside the sanctuary. Photo credit: NOAA

### Questions and Information Needs

- 1) What are the relative inputs of sound from various sources to the sanctuary's total "ocean noise budget", and how do they vary at temporal and spatial scales?
- 2) What organisms within the sanctuary are sensitive to increased anthropogenic noise within the sanctuary? What are the temporal/spatial distributions of those organisms in the sanctuary?
- 3) Are marine animals changing their behaviors due to anthropogenic sound? If so, are those behavior changes biologically significant? How can this information inform underwater noise policy for the sanctuary?

### Scientific Approach and Actions

- 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/absence and/or localization of sounds from the marine community
- Use and develop analytic techniques to combine temporally specific geospatial data sets (e.g., animal behavior, bottom topography, prey fields and received levels of sound)
- Provide data on spatial and temporal overlap between anthropogenic sound and marine organisms identified as sensitive to soundscape disruption

*Updated: 11/12/2014*

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

## Key Partners and Information Sources

NOAA Ocean Noise Reference Station, University of Georgia

### Sanctuary Resources Available

- Two research vessels complete with captain and crew
- NOAA ship time
- Support staff for field operations and instrument deployment including science divers
- NDBC buoy located within the boundaries of GRNMS outfitted with a hydrophone to collect ocean noise (along with atmospheric and oceanographic data)
- Habitat map
- Monitoring data

### Resource Needs

- Financial support
- Partnerships for: grant application, project design, data collection and analysis, reporting, and monitoring

### 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
- Descriptive statistics regarding distributions of marine organisms sensitive to soundscape disruptions, including variation in time and space
- Identification of potential mitigation actions and associated socioeconomic impacts
- Case studies for noise management inside and outside of GRNMS Research Area
- Education and outreach materials that inform the public of the issue of acoustic impacts to sanctuary resources

### Planned Use of Products and Actions

- Inform stakeholder communities how animals use 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
- Education and outreach materials that inform the public of the issue of acoustic impacts to sanctuary resources

### Program References

#### GRNMS Management Plan

Objective SR-3: Activity SR3B; Objective SR-5, Activity SR5B; Objective SR-4: Activity SR4C

#### GRNMS Condition Report

- Question 8: What are the levels of human activities that may influence habitat quality and how are they changing?
- Question 14: What are the levels of human activities that may influence living resource quality and how are they changing?

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