A critical part of BOEM’s mission is to protect the environment while ensuring the safe development of traditional and renewable offshore energy and marine mineral resources on more than 1.7 billion acres of U.S. federal waters. With about 200 environmental staff members, including specialists in marine biology, ecology, and acoustics, BOEM works tirelessly to produce and evaluate the best available science in all of our management decisions. Through research and environmental reviews, BOEM has played a key role in improving the overall scientific understanding of the potential effects of anthropogenic (human-generated) sound. BOEM has also played an important role in adaptive management by constantly adjusting to evolving information and needs.

Since 1998, BOEM has invested more than $75 million on protected species and sound-related research by using four general research methods: 1) literature reviews, syntheses, and workshops; 2) field surveys; 3) empirical studies in the laboratory and in the field; and 4) sound source verification and modeling.

Managing Adaptively

Understanding potential impacts of human-induced sound on marine life is complex. Given some of the uncertainty related to the current scientific understanding of impacts, BOEM’s course of action is to implement an adaptive management approach that: (1) uses our environmental assessments to identify information needs, then (2) addresses those needs through scientific research. Research results from BOEM studies, as well as other available research results, are applied to future reviews of offshore resource development projects.

Decisions can then align with BOEM’s environmental stewardship responsibilities as well as requirements under a suite of environmental laws (e.g., National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fishery Conservation and Management Act).

As human presence in the offshore environment has grown, so have the anthropogenic sound levels. Current science shows us that some of these sounds may adversely impact marine life in certain situations. Some sounds can interrupt important biological behaviors (courtship, nursing, feeding and migration) and can interfere with communication between animals. In more extreme instances, exposures to
sounds at high levels or for extended periods of time can lead to physiological effects, including hearing loss and mortality. Research shows that the same level of sound may have a different impact on the same species of marine life depending where in the ocean the sound occurs, and the behavioral context in which the animal encounters the sound.

Balancing human activities with the protection of marine life can be a difficult task, but as BOEM approaches its management decisions, it uses the best science available. This includes applying an understanding of different types of geological and geophysical surveys to our decision-making process. While debates on best practices remain and opinions on the path forward are diverse, BOEM continues to implement strict mitigation and monitoring measures to help protect marine life from the impacts of energy and marine mineral-related ocean sounds. BOEM remains steadfastly committed to funding and supporting the science needed to better understand anthropogenic sounds and their impacts on marine life. BOEM is also dedicated to using adaptive management for this complicated issue, so that our approaches evolve as our understanding expands and the science matures.

BOEM-Funded Sound-Related Research

Present-day research funded by BOEM covers a range of topics, including: bioacoustics of fish and marine mammals; measuring source levels and propagation from anthropogenic sound sources; ambient noise measurements; methods to detect, classify, and locate marine life; measuring hearing thresholds of key marine species; observing behavioral responses to anthropogenic sound sources; and improving mitigation methods. Along with our many federal and academic partners, BOEM has been examining the complex issue of cumulative effects from chronic exposure to anthropogenic sounds.

BOEM was one of the earliest federal pioneers in sponsoring research on ocean sounds. BOEM’s first sound-related studies began in the early 1980s and explored effects of industrial sounds on large whale species in the Pacific Ocean. Similar studies involving seals and sea lions began in the late 1980s. During the 1990s, BOEM co-funded early scientific reviews on sound by the National Academy of Sciences and the 1995 book Marine Mammals and Noise (W. John Richardson, et al., Academic Press, 579 pp).

Selected Workshops and Syntheses

BOEM also partners with diverse stakeholders to share information and ideas on science needs as well as best management practices, often in the form of workshops, such as:

- Effects of Noise on Marine Life conferences (Proceedings (Open Source) for 2010, 2013, and 2016)
- Assessment of cumulative effects of anthropogenic stressors on marine mammals (2017)
- Effects of Noise on Fish, Fisheries, and Invertebrates in the U.S. Atlantic and Arctic from Energy Industry Sound-Generating Activities Workshop (2013)
- Quieting Technologies for Reducing Noise During Seismic Surveying and Pile Driving Workshop (2014)
- Cetacean and Sound Mapping Project and Symposium (2012)

For access to a wide range of BOEM’s ongoing and completed environmental research, please visit www.marinecadastre.gov/espis/.