

MMS acoustic studies in the Gulf of Mexico, FY 2000

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Of the potential environmental effects resulting from offshore oil and gas activities, impacts on marine mammals are a concern from an ecological viewpoint and because of unique legal status. Many species of whales, dolphins, and seals have been exploited by man for centuries, some to the brink of extinction (a few to extinction). In U.S. waters, all marine mammals are legally protected from exploitation under the Marine Mammal Protection Act (MMPA), and many of the large whales are also protected under the Endangered Species Act (ESA). Marine mammals and habitats are also part of environmental analyses conducted under the National Environmental Policy Act (NEPA).

Historically, "effects" of offshore oil and gas operations on the environment were predominantly associated with water quality and chemical pollutants (oil spills, in particular); other concerns were drilling discharges and other potential chemical releases and platform runoff. In addition to contamination and toxic effects on marine mammals, other potential effects from offshore operations were recognized. For marine mammals, loss of hearing or masked communications can ultimately lead to dire consequences. Noise contamination—the effects of loud and/or disturbing sounds—was a particular concern in Alaska and west coast waters because of special circumstances. They included possible disruption of migratory routes of gray whales and bowhead whales and interference in native whale hunts. Minerals Management Service (MMS) funded several pioneering studies on the effects of noise on marine mammals and, with the Office of Naval Research, supported publication of the landmark book *Marine Mammals and Noise* in 1995.

More recently, a 1995 3-D seismic survey in the Santa Barbara Channel brought Exxon, MMS, the National Marine Fisheries Service (NMFS), several state and local agencies, fishermen, and environmental groups to an impasse over survey procedures and mitigation. Issues were resolved only after several last-minute meetings. MMS's Pacific OCS Region met in June 1996 with all interested stake-

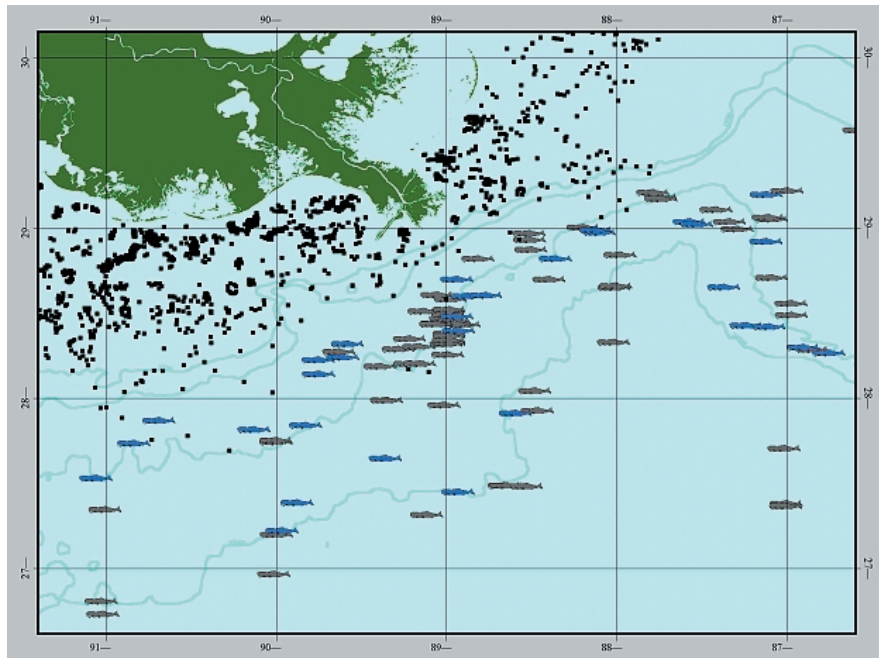


Figure 1. The study area. Each sperm whale symbol represents a sighting (one or more whales) from NMFS ship and aerial surveys between 1991 and 1999. Squares are oil and gas platforms. Sightings are raw data concentrated along repeated track lines and indicate persistence and some preference for depth, but this figure does not depict areawide distribution. (Prepared by Michelle Morin, MMS, with survey data provided by NMFS.)

holders and established the High-Energy Seismic Survey (HESS) Team to develop acceptable procedures for the review of seismic survey proposals off southern California. HESS also agreed to discuss the environmental review necessary to conduct future surveys and possible mitigation measures. The review process and mitigation guidelines were then to be presented to the Pacific OCS regional director for approval.

These concerns are not restricted to U.S. waters. For example, recent debates on renewing petroleum exploration on Canada's Georges Bank and Scotian Shelf resulted in a series of studies and environmental analyses. One, a preliminary report on environmental impacts by the Canadian Department of Fisheries and Oceans, discusses seismic effects as a concern equal to those from operational discharges and oil spills.

MMS has dealt with essentially regional issues of noise effects on marine mammals from seismic and drilling activities, but concerns with all sources of noise pollution in the

oceans have rapidly escalated. Commercial shipping and military activities have triggered a new level of noise pollution awareness, most recently highlighted by a 1999 Natural Resources Defense Council (NRDC) report. The offshore oil and gas industry was a listed "offender" in the NRDC report, and the NRDC offered specific recommendations to MMS regarding seismic issues. These included:

- MMS would do well to issue general noise-reduction guidelines within its next five-year plan.
- HESS could provide a blueprint for similar protocols elsewhere in the country.
- Greater funding should be directed toward examination of industry's cumulative impacts on the Gulf of Mexico ... "it is time that the MMS shed some light on its most highly impacted region."

A very recent book on marine mammals in the Gulf of Mexico noted that for acoustic effects, "It is incum-

bent upon us to do the requisite monitoring of cetaceans near seismic vessels, oil rigs, and other industry related activities. This type of 'behavioral monitoring' has occurred in oil productive areas elsewhere in U.S. waters, the Arctic, and off the shores of California, but it has been curiously absent from the political agenda of needs for the Gulf of Mexico." (Wursig et al., 2000.)

Because the Gulf of Mexico has a dearth of endangered marine mammals in shelf waters, no native hunting issues, no known migratory routes, no consistent feeding grounds, and no local breeding grounds that concentrate cetaceans in critical areas, marine mammals in general are less of an issue (or lower-funding priority) than in California and Alaska waters. From the MMS perspective, that more intensive marine mammals studies, including acoustic research, have until now been directed to Pacific and Alaska regions is not the least "curious."

The main message of this article is that marine mammal acoustic issues in the Gulf of Mexico have elevated to a level where funding priority now exists. Two key reasons are (1) the rapid and recent elevation of concern over marine noise effects (oil and gas activities being one of the identified sources contributing to this problem), and (2) the expansion of industry activities into deeper Gulf of Mexico waters where a markedly diverse cetacean population resides, including rare and endangered species not found in shelf waters.

MMS is funding acoustic studies that ultimately will contribute to informed decisions on proposed actions, the formulation of regulations, and better compliance with NEPA, MMPA, and ESA. With this in mind, here are some details on active and proposed fiscal year (FY) 2000 acoustic studies for the Gulf of Mexico.

The MMS Gulf of Mexico OCS Region has three active or proposed studies dealing with acoustic issues for FY 2000-2001:

- 1) Programmatic Environmental Assessment (EA) on Geologic and Geophysical (G&G) Exploration in the Gulf of Mexico (active contract with Continental Shelf Associates).
- 2) Application of Sperm Whale Research Techniques in the Northern Gulf of Mexico, a Pilot Study (interagency agreement with NMFS).

- 3) A Study of the Effectiveness of Airgun Array Ramp-up in Reducing Potential Impacts to Marine Mammals (proposed for award in FY 2001).

These studies, although directed at the same basic topic of marine mammals and acoustic effects, represent distinctly different types of research. The first is essentially a review of existing information to produce a NEPA document. The sperm whale study will test methods to conduct more detailed research about marine mammals. It should also provide immediate data on sperm whales residing in proximity to deepwater platforms off the Mississippi River delta. The proposed ramp-up study represents a full-field effort to study responses of marine mammals to actual seismic survey operations, in particular, if ramp-up starts (slowly increasing the output of air guns over time) result in marine mammals moving away from air guns before potentially damaging decibel levels are attained.

The ramp-up contract has not been awarded; thus, no further details exist on who will conduct the study and the methods that will be employed. The initial study was planned for the Pacific Region in FY 99. However, further evaluation of costs and projections that seismic survey activity in this region would be very low led to changing this study to Gulf of Mexico.

NEPA requires that all federal agencies use a systematic, interdisciplinary approach, integrating the natural and social sciences, in planning and decision-making that may impact the environment. NEPA requires preparation of a detailed environment impact statement (EIS) on any federal action that may significantly impact the environment. If significant environmental impact is uncertain, an environmental assessment (EA) may be initially prepared. The EA may result in a finding of no significant impact (FONSI) or document significant impact and lead to an EIS. If no significant environmental effects are reasonably certain, either individually or cumulatively, actions may be classified as a categorical exclusion (CE).

G&G surveys or exploration occur both prelease and postlease during offshore oil and gas operations, and data from these activities are used for many purposes, including resource evaluation, avoiding geologic hazards, site selection, avoiding archaeological sites or biological resources,

and site clearance.

For MMS purposes, G&G activities directed at OCS mineral exploration are considered a federal action under NEPA and subject to a complex series of permits and notices. The results from a 1976 USGS EIS and a 1984 MMS Gulf of Mexico OCS Regional Office EA led to all OCS G&G being listed as categorical exclusions (CEs), except drilling of deep stratigraphic test holes or use of explosives. Thus, virtually all G&G permitted by MMS in the Gulf of Mexico is considered to have no significant environmental effects under NEPA criteria and is excluded from further NEPA analyses.

However, a review of current G&G technology and evolving environmental concerns, such as underwater acoustic effects on marine organisms, concluded that some G&G activities now listed as CEs should be evaluated under a new EA to verify that recent technology or environmental information have not altered the 1984 determinations. Because of internal workload considerations and desire for additional expertise on marine acoustics, preparation of this EA was awarded to Continental Shelf Associates (CSA).

CSA prepared a programmatic EA using a systematic, interdisciplinary approach as described under NEPA and MMS guidelines. The focus is on G&G activities now listed as CEs that have the potential to result in significant impacts or represent new technologies not previously addressed. Seismic operations are of particular concern. The area of consideration is the Gulf of Mexico OCS.

It is anticipated that the EA may confirm that most G&G activities should remain as CEs. But effects of seismic activities on marine mammals, under NEPA definitions for significant impact, require careful analysis, and the ultimate conclusion is uncertain. One possible outcome would be a determination of probable significant impact that would lead to a full EIS on seismic activities (and any other G&G activity determined significant).

With a programmatic EA (unlike an EIS), no public hearings are scheduled. However, on 6 June 2000, CSA briefed government agency representatives on the draft EA, and MMS will request review and comments from this group and additional experts. The final EA is expected by August 2000.

MMS has a multiyear interagency agreement with NMFS to place marine

mammal observers on spring and fall ichthyoplankton cruises conducted in the Gulf of Mexico. For FY 2000, this included a cruise in July 2000 to develop methods and test new instruments to study a resident sperm whale population off the Mississippi River delta. An estimated 550 sperm whales reside in the Gulf of Mexico. Sperm whales are the only large whale species with a population of this size in the Gulf and are listed as an endangered species. A group of these whales is consistently observed off the Mississippi River delta, most often in waters with depths of about 1000 m. It is highly likely this "delta group" remains in this area year-round and represents a resident population. The area is also one of offshore industry activity, including several existing and proposed production platforms (Figure 1) and years of seismic surveys.

The pilot study will target this group of whales to perfect relatively routine marine mammal study methods such as close approach, using a newly designed chase boat for photographic identification of individual whales, skin tissue sampling, and tag attachment. In addition, a new acoustic tag, developed with Office of Naval Research funding, will be

tested. The tag can record received sound levels and behavioral responses such as movement and heartbeat. This technology will be useful for future "effects" studies to determine levels of sound exposure and animal responses to specific sound events. The cruise also will test several acoustic means to track and count sperm whales by "clicks" they produce while submerged.

A final component, at this time proposed, will place acoustic recording devices (ACDs) on the seafloor for intervals of several months. The ACDs will record ambient noise and detect sperm whale clicks (and perhaps other marine mammal sounds). Data from these devices can lead to estimates of sound exposure at depth, seasonal presence of whales and, less likely, correlations with noise sources and whale acoustic responses.

One common theme in current research is lack of information. There are many concerns and suspicions, but few data to refute or support them. MMS has funded these studies to obtain information to support informed decision making. These studies will perhaps lessen information gaps but certainly will not fill them. We hope coordinated efforts between industry and agencies lead

to additional research and documentation of the effects (or lack of) for seismic operations on marine mammals.

Suggestions for further reading. *The Possible Environmental Impacts of Exploratory Activities on Georges Bank Aquatic Resources*, edited by Boudreau (Canadian Stock Assessment Secretariat Research Document 98/170). *Environmental Assessment of Seismic Exploration on the Scotian Shelf* by Davis et al. (Canada/Nova Scotia Offshore Petroleum Board, 1998). *Cetaceans, Sea Turtles and Seabirds in the Northern Gulf of Mexico: Distribution, Abundance and Habitat Associations, Volume I: Executive Summary* by Davis et al. (USGS/BRD/CR-1999-0005, OCS Study MMS 2000-002). *Sounding the Depths: Supertankers, Sonar, and the Rise of Undersea Noise* by Jasny (Natural Resources Defense Council, 1999). *Marine Mammals and Noise* by Richardson et al. (Academic Press, 1995). "Man-made noise and behavioral responses" by Richardson and Malme (in *The Bowhead Whale*, Special Publication Number 2, The Society for Marine Mammalogy, 1993). *The Marine Mammals of the Gulf of Mexico* by Wursig et al. (Texas A&M University, 2000). **E**

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