

of sperm whales attributable to seismic operations in the GOM; the MMS presently does not have access to such a model.

There is a reasonable potential that seismic surveys are exposing sperm whales to noise levels that may cause behavioral disturbance. The most probable disturbance is avoidance (moving away) from an actively-transmitting seismic vessel. The degree of displacement, length of time involved, and types of normal activities interrupted would influence the significance of this disturbance. Less likely, but possible, is that sperm whales will remain within acoustic exposure levels that will cause temporary hearing impairment or permanent hearing damage. This outcome would require whales to lack the ability to detect harmful sound intensities, "ignore" the signal in favor of other behavior such as feeding, or be in close proximity to a sudden start-up of the airguns. The GOM environment is deep, open waters. Short of a physically impaired whale or a whale being caught between two seismic sources, no physical constraints exist in the GOM that would "trap" a whale near a seismic sound source.

The area of most concern is the area of apparent concentration of whales located on the continental slope offshore of the Mississippi River mouth (and extending east to the DeSoto Canyon area in the Eastern Planning Area), where a year-round population of sperm whales has been documented. Although sperm whales apparently are not being displaced from this area due to seismic surveys, it is unknown whether their site fidelity reflects low sensitivity to seismic noise or a high motivation to remain in the area in spite of this noise. Because there is some evidence of sperm whale responses to low frequency noise, including possibly leaving an area where seismic surveys are occurring, it is reasonable to presume that these animals are being exposed to adverse noise levels (i.e., noise levels that would cause behavior modification, such as avoidance or displacement) in a preferred habitat. Minor behavioral changes typically do not adversely affect either the individual or the population. To date, there is no evidence that behavioral changes prompted by seismic noise are of sufficient magnitude to have meaningful effects on this population in that no large-scale displacement or voids in sperm whale occurrence relative to seismic activities have been observed. The present state of knowledge indicates sperm whales may react to seismic activity, but results are

not consistent. Studies are underway to precisely determine the behavioral responses of Gulf sperm whales to airguns. Current mitigation procedures include ramp-up, visual monitoring and shut-down of seismic operations if sperm whales are within the 500-m (1,640-ft) impact zone. These measures are expected to significantly reduce the potential for noise impacts to sperm whales. However, because the potential for acoustic impact by oil and gas seismic surveys cannot be completely eliminated, nor are potential impacts clearly documented or understood at this time, a precautionary approach taken by MMS is to keep any impacts at an insignificant level. Therefore, MMS has preliminarily determined that while impacts on sperm whales are still somewhat speculative, and the potential for harm to the species or stock is unlikely, impacts to the species or stock will not be more than "negligible."

Research

A major field study of GOM sperm whales and other cetaceans, sponsored by MMS, in cooperation and with support from the GOM seismic industry (the Sperm Whale Seismic Study (SWSS)), has been completed. Major accomplishments included tagging a number of sperm whales with data-reporting satellite tags, and field testing a passive acoustic listening system for its ability to detect and locate sperm whales, relative to effectiveness of visual marine mammal observers. Although formal reports on findings have not yet been published, MMS has determined that the passive acoustic monitoring system was far superior to visual observers, as it could detect cetaceans underwater and at distances or in sea states where visual observations are not reliable.

In 1999, MMS hosted a workshop to identify protected species concerns in the GOM. The expert panel concluded possible acoustic impacts from anthropogenic sources were a valid concern and that information for the marine environment in the GOM was extremely limited. Recommendations to MMS included initiation of research on acoustic effects on marine mammals. Seismic exploration (i.e., airgun arrays) was identified as the sound source of primary concern. The MMS, with cooperative funding from the Office of Naval Research (ONR), immediately modified the existing research to develop and test research methods to address this topic. The pilot study successfully developed a multi-disciplinary approach and new technology to conduct research. In FY 2002, MMS and ONR initiated a 3-year

study, the SWSS, managed by Texas A&M Research Foundation, to establish habitat use and normal behavior of sperm whales in the GOM, evaluate physical oceanographic correlates to whale locations and movements, obtain DNA profiling of GOM whales, and investigate seasonal movements and breeding behavior. In addition to addressing many aspects of sperm whale biology, the study will look at both short-term behavioral responses to seismic airguns and any longer-term displacement using two types of whale tags. The offshore industry contributed use of a seismic vessel and acoustic array in FY 2002 to support this research. In FY 2003, MMS/ONR will obtain additional support from the National Science Foundation and the oil industry to expand the efforts so far described and also to begin investigating effects on sperm whale prey (squid). Embedded in SWSS are efforts to improve underwater detection (range, bearing, depth estimates) for sperm whales using passive acoustics. The immediate intent is to study sperm whale locations near seismic vessels and for effective tagging efforts. A spin-off of this work will be the means to detect and estimate relative locations to sperm whales using acoustics. Applications for using this technology for mitigation monitoring are being explored by MMS.

If NMFS proceeds with rulemaking, it intends to monitor the results of this research during the rule's effectiveness period to ensure that the determinations made during the rulemaking are correct. As appropriate, research results may lead to amendments to LOAs and/or rulemaking to ensure that marine mammals are protected to the greatest extent practicable.

Mitigation

In response to NMFS' question regarding the availability and feasibility (economic and technological) of equipment, methods and manner of conducting oil and gas seismic surveys to effect the least practicable adverse impact on potentially affected marine mammals, MMS noted that current mitigation measures for the oil and gas seismic industry in the GOM include: ramp-up, visual monitoring, establishment of an impact zone (currently 500 m (1,640-ft) around the sound source), and mandatory "shut-down" to avoid injury to whales in or about to enter the impact zone. Each of these helps insure the least practicable adverse impact to the sperm whales. Ramp-up, or soft start, requires seismic operators to start firing the acoustic array with one gun and gradually over