

United States Department of the Interior



MINERALS MANAGEMENT SERVICE
Washington, DC 20240

DEC 20 2002

Mr. Donald Knowles
Director, Office of Protected Resources
NOAA Fisheries
1315 East West Highway, Room 13821
Silver Spring, Maryland 20910

Dear Mr. Knowles:

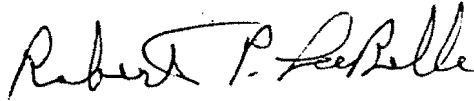
The Minerals Management Service (MMS) hereby petitions, as a precautionary measure, for rulemaking under section 101(a)(5) of the Marine Mammal Protection Act (MMPA) to authorize any potential take of sperm whales incidental to seismic surveys ("specified activity") in the Gulf of Mexico ("specified geographical region"). This taking will involve only small numbers of sperm whales, have no more than a negligible impact on the species or stock and have no unmitigable adverse impact on the availability of the species or stock for subsistence uses. The MMS will include the potential incidental take of non-listed marine mammal species such as dolphins, beaked whales, and Bryde's whales in this petition for rulemaking in the near future.

The fourteen items of supporting information required at 50 CFR 216.104 for take authorizations are addressed in the attachment to this letter. This package also includes the MMS Draft Programmatic Environmental Assessment, "Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf" and an Addendum that describes events during the past year that have influenced the MMS position on marine mammal protection.

The draft Programmatic Environmental Assessment (PEA) has been prepared for the MMS by Continental Shelf Associates (CSA), a consulting firm. The draft PEA has undergone and continues to undergo extensive review by MMS, other Federal agencies, and interested parties. The Final PEA is expected to be available for release in early 2003, and will be substantially revised from the February 2002 version. However, the February 2002 version contains sufficient technical information to support the rulemaking request.

Your consideration of this petition for rulemaking is greatly appreciated. For purposes of coordination and further clarification, please contact Richard Wildermann, Chief, Environmental Division at (703) 787-1670.

Sincerely,



Thomas A. Readinger
Associate Director for
Offshore Minerals Management

Enclosures

cc: Chris Oynes
Richard Wildermann
Donna Wieting

**Addendum to
Draft Programmatic Environmental Assessment on
Geological and Geophysical Exploration for Mineral Resources on the
Gulf of Mexico Outer Continental Shelf (February 2002 version)**

December 2002

This Draft Programmatic Environmental Assessment (PEA) is being submitted to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office of Protected Species to support a request by the Minerals Management Service (MMS) for rulemaking under the Marine Mammal Protection Act (MMPA) to authorize "small takes" of marine mammals incidental to geological and geophysical (G&G) activities in the Gulf of Mexico.

This Draft PEA has been prepared for the MMS by Continental Shelf Associates (CSA), a consulting firm. This Draft PEA has undergone extensive review by MMS and other Federal agencies, and by State, non-governmental, and interested private sector parties. The Final EA is expected to be available for release in early 2003 and will be substantially revised from the February 2002 version. However, the technical content of the February 2002 version is sufficient to provide information to support the rulemaking request.

Readers of the Draft G&G PEA should be aware of the following important points:

1. Alternative 1 (the "Proposed Action") as described in the PEA is no longer either the *status quo* or the preferred alternative.
2. For purposes of marine mammals protection, MMS determined that Alternative 3 (Implement a Suite of Mitigation Measures) was preferred over Alternative 1, and communicated this to Federal and State reviewers.
3. As a result of a series of related events, the *status quo* is now represented by the requirements imposed on G&G activities through our Notice to Lessees and Operators (NTL) No. 2002-G07 in August 2002 and as amended in October 2002. These requirements are similar to, but not exactly the same as, Alternative 3 of the PEA.

Background

During the extended period of time that this Draft G&G PEA has been under review, a number of events have occurred and documents have been prepared that have affected the MMS's position on seismic surveys. These include:

1. The St. Petersburg office of NOAA-F prepared and issued the Biological Opinion (BiO) for the Endangered Species Act (ESA) Section 7 Consultation on OCS Sale 184ⁱ. This BiO drew heavily on the Draft G&G PEA and imposed nondiscretionary terms and conditions on MMS that generally reflect Alternative 3 of the Draft G&G PEA, for seismic surveys related to leases issued under Sale 184.
2. The MMS mentioned the NOAA-F nondiscretionary terms and requirements in the Final Sale Notice Package for Sale 184ⁱⁱ and prepared a Notice to Lessees (NTL No. 2002-G07)ⁱⁱⁱ to implement these requirements.
3. During discussions among MMS, NOAA-F, and representatives of the seismic industry regarding the NTL requirements and implementation plans, these representatives requested an opportunity to review and comment on the Draft G&G PEA. The Draft G&G PEA was released for public review and comment in mid-August 2002. Comments were received from the seismic industry^{iv, v}, the oil and gas industry^{vi}, an environmental group^{vii}, a State agency^{viii}, and one interested citizen^{ix}.
4. During the same general time period, NOAA-F prepared the Draft BiO for ESA Section 7 Consultation^x on the MMS proposal for several OCS sales in the Western and Central Gulf of Mexico over a five-year period (commonly called the "Multisale EIS"). A copy of the Draft BiO was provided to MMS and was released to the private sector. The Final BiO was issued by NOAA-F in November 2002^{xi}.
5. Also during this same general time period, a major field study of Gulf sperm whales and other cetaceans sponsored by MMS, with cooperation and support from the seismic industry (the Sperm Whale Seismic Study), was very successfully completed. Major accomplishments included tagging numerous 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 the effectiveness of visual observers. Although no formal reports of findings have yet been published, 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.
6. During discussions among MMS, NOAA-F, and representatives of the seismic and oil and gas industries, the MMS position on requirements to mitigate impacts of seismic surveys to cetaceans continued to evolve, resulting in issuance of Addendum 1^{xii} to NTL No. 2002-G07 in October 2002.

All of these events have caused a continuing evolution of the MMS position on measures that must or should be taken to prevent harm to sperm whales and have rendered certain aspects of the Draft G&G PEA obsolete. Specifically, Alternative 1 as described in the

Draft G&G PEA is no longer the *status quo*. In fact, the *status quo* continues to evolve and is best represented by current NTL's.

1) A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals;

Geophysical seismic surveys are performed to obtain information on surface and near-surface geology and on subsurface geological formations. Typical seismic surveying operations tow an array of airguns (the seismic sound source) and a streamer (signal receiver cable) behind the vessel 5-10 m below the sea surface. The airgun array produces a burst of underwater sound by releasing compressed air into the water column that creates an acoustic energy pulse. The release of compressed air every several seconds creates a regular series of strong acoustic impulses separated by silent periods lasting 7-16 seconds, depending on survey type and depth to the target formations. Airgun arrays are designed to focus the sound energy downward. Acoustic (sound) signals are reflected off the subsurface sedimentary layers and recorded near the water surface by hydrophones spaced within streamer cables. These streamer cables are often 3 mi or greater in length. Vessel speed is typically 4.5-6 knots (about 4-8 mph) with gear deployed.

The 3-D seismic surveying enables a more accurate assessment of potential hydrocarbon reservoirs to optimally locate exploration and development wells and minimize the number wells required to develop a field. State-of-the-art interactive computer mapping systems can handle much denser data coverage than the older 2-D seismic surveys. Multiple-source and multiple-streamer technologies are used for 3-D seismic surveys. A typical 3-D survey might employ a dual array of 18 guns per array. Each array might emit a 3,000-in³ burst of compressed air at 2,000 pounds per square inch (psi), generating approximately 4,500 kilojoule (kJ) of acoustic energy for each burst. At 10 m from the source, the pressure experienced is approximately ambient pressure plus 1 atmosphere (atm). The streamer array might consist of 6-8 parallel cables, each 6,000-8,000 m long, spaced 75 m apart. A series of 3-D surveys collected over time (four-dimensional or 4-D seismic surveying) is used for reservoir monitoring and management (the movement of oil, gas, and water in reservoirs can be observed over time).

(This information is taken from the NOAA Fisheries biological opinion (BiO) dated November 29, 2002, pages 10 and 11. NOAA Fisheries had summarized the seismic surveying technologies and operations as described in the MMS draft EA on geological and geophysical activities. Please refer to that document in Section I and II, and Appendices B and C for a more thorough discussion of seismic operations.)

(2) The date(s) and duration of such activity and the specific geographical region where it will occur;

Oil and gas exploration on the continental shelf of the northern Gulf of Mexico is in a mature state, although large discoveries are expected in deeper waters. From a seismic exploration view, about 1300 blocks in the Western and Central Planning Areas have not yet been surveyed with 3D seismic techniques (R. Brinkman, MMS Gulf of Mexico Region, personal communication, 2002). It is assumed that a lower level of new seismic survey activity will occur in the Eastern Planning Area relative to the remaining two Planning Areas (i.e. the vast majority of survey activities are expected in the Central and Western Planning Areas). Industry interest in the Eastern Gulf has historically been limited to the westernmost portions of the planning area and is usually defined by the 5-Year Leasing Plan.

The different types of seismic survey activity in the northern Gulf can occur on any day of a given year during the scope of the petition (5 years). Seismic surveys may span one day, weeks, or months. Appendix C of the Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf Draft Programmatic Environmental Assessment (draft G & G PEA) characterizes the different types of operations and equipment applicable to seismic surveys employed in the region.

Seismic surveys may be conducted in any federal waters of the Gulf of Mexico. Attached Tables 1, 2, and 3 project the anticipated surveys for vertical seismic profiling, deep seismic, and high resolution seismic operations in the GOMR over the next five years. Estimated survey activity is further partitioned by MMS protraction areas. The upper portion of each of the three tables contains the values with which the MMS Gulf of Mexico Region's Office of Resource Evaluation (RE) regards as most reasonable for anticipated activity. The most likely values (ML) were obtained through calls to various companies active in the GOMR. The minimum (MN) are the low estimates of their anticipated activity while the maximums try to reflect years that have had higher rates of activity. The values in the lower portion of the tables provide a range of values by year for various protraction areas of the GOM; estimates are educated guesses at best for the next several years. Additionally:

- The projected locations for the VSP's reflect the areas where new plays in deep water are developing and where deep gas incentives are available on the shelf.
- The location of the Deep Seismic approximate past activities and the areas that may be due for replacement data based on past activity. The values provided reflect navigation miles not line miles of data.

- The location of the High Resolution surveys generally reflect the scattered distribution of leases in the GOMR. The ultra deepwater protraction areas have zero miles for the MN and ML reflecting the ten year lease term for drilling, new technology (i.e. Autonomous Underwater Vehicles—AUVs), and the sometimes allowed practice of using specially processed 3D surveys in lieu of a High Resolution survey for shallow hazard detection. The MMS has projected the estimated miles to be surveyed by High Resolution surveys in the MX column to reflect changing technologies.

(3) The species and numbers of marine mammals likely to be found within the activity area;

At this time, the petition will deal only with sperm whales, *Physeter macrocephalus*. The most recent population estimate by NOAA Fisheries of sperm whales in the Gulf of Mexico is 1,213 whales. Please see #4. for more information.

(4) A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities;

Sperm whales are the most abundant large cetacean in the Gulf of Mexico, and are the most important Gulf cetacean in terms of collective biomass. Sperm whales have been observed throughout the Gulf of Mexico from the upper continental slope near the 100 m isobath to the seaward extent of the U.S. EEZ and beyond. Sperm whales are present in the northern Gulf year-round. Sightings are more common during the summer and three areas of concentration have been noted for sperm whales in the Gulf; one south of the mouth of the Mississippi River, another off of southern Florida, and a third east of the Texas-Mexico border. It should be noted that both the apparent seasonality and the areas of concentration could be affected by, or artifacts of, geographic and seasonal patterns of existing surveys and, as such, should be considered tentative findings.

NOAA Fisheries considers Gulf of Mexico sperm whales as a distinct stock, based on geographic reporting (not biological evidence). The GOM "stock" is comprised mostly of females and juveniles. Some large males have been observed in the Gulf in recent summer surveys, particularly in the DeSoto Canyon region. Calves are frequently sighted. The Gulf of Mexico sperm whale abundance has recently been estimated at 1,213 whales with a minimum population estimate as 911 whales. The estimated Potential Biological Removal level for the Gulf of Mexico stock is 1.8 whales. (Abundance, minimum population estimate, and estimated Potential Biological Removal level are taken from the NOAA Fisheries biological opinion dated November 29, 2002.)

(5) The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury and/or death) and the method of incidental taking;

Federal waters of the GOM are inhabited by a diverse assemblage of marine mammal species, including the endangered sperm whale. Seismic surveys are conducted in these waters, and acoustic energies introduced into Gulf waters may adversely impact marine mammals in the vicinity of the activity. The potential adverse impacts to Gulf sperm whales are detailed in NOAA Fisheries' Biological Opinion for the proposed Gulf of Mexico Outer Continental Shelf Multi-Lease Sale (185, 187, 190, 192, 194, 196, 198, 200, 201) (dated November 29, 2002 and hereafter referred to as the C&WPA MultiSale BiO). Additional information describing potential impacts are documented in the draft G&G PEA. Because seismic survey activity has the potential to harass, injure, or arguably cause mortality of marine mammals, the MMS is seeking authorization from NOAA Fisheries for the harassment, injury, and/or mortality of sperm whales in GOM that may occur as a result of seismic surveys as described above in items 1 and 2 of this petition. This authorization is being sought by the MMS on the behalf of the offshore oil and gas industry and seismic contractors operating within the GOM.

(6) By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in paragraph (a)(5) of this section, and the number of times such takings by each type of taking are likely to occur;

There are 29 species of marine mammals documented as occurring in federal waters of the GOM. Any of these species may be exposed to acoustic energies introduced into federal waters by seismic survey operations. The MMS is requesting authorization of take for only Gulf sperm whales in this petition; therefore, the remainder of this section addresses this species only. Much of the information summarized in this section is available in detail in the C&WPA MultiSale BiO or G&G PEA.

The GOM stock of sperm whales is comprised of mostly female and juvenile animals, although a few large bulls have been sighted in the northern Gulf. The presence of cow/calf pairs indicates that this is a biologically important nursery area for sperm whales. Based on seasonal aerial surveys, sperm whales are present in the northern GOM in all seasons, but sightings in the northern GOM are more common during the summer months. Based on recent survey efforts, areas of concentration appear to be off the Mississippi River Delta, off Southern Florida, and off South Texas. The GOM sperm whale stock has recently been estimated at 1,213 animals (CV 0.35). The minimum population estimate is 911 sperm whales. The estimated PBR for the GOM sperm whale stock is 1.8 animals (estimates as cited in the NOAA Fisheries biological opinion dated November 29, 2002).

Sperm whales spend large amounts of time at depth and use low frequency sound to communicate and navigate. Therefore, they are sensitive to the acoustic environment and may respond to sound emissions in many ways. Reactions to acoustic emissions may include, but are not limited to, cessation of vocalizations, disruption of feeding and dive behaviors, and physical avoidance. Seismic operations can introduce noise into the sea that may cause temporary or permanent hearing impairment in marine mammals if the noise is strong enough and/or if the animal is in close proximity to the sound source when transmitting. Such impairment could have the potential to diminish the individual's chance for survival. Tolerance of noise is often demonstrated, but this does not prove that the animals are unaffected by noise; aversive levels of noise might interrupt or decrease feeding activity, social interactions, or parenting (e.g. nursing calves, if the interruption is extended). Therefore, behavioral responses causing adverse effect to individuals and cow/calf pairs, reproduction, feeding or temporary or permanent threshold shifts due to seismic activity may negatively impact the GOM sperm whale stock if disruptions are extended. There are no documented data on auditory-induced physical effects of underwater seismic noise on sperm whales. There is observational evidence that sperm whales may be temporarily displaced to areas nearby those where seismic operations are underway. However, sperm whales apparently are not being displaced from the northern Gulf due to seismic surveys; nonetheless, 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. Details of such emissions and potential impacts to sperm whales are characterized in the C&WPA MultiSale BiO) and the draft G&G PEA.

NOAA Fisheries reported in the C&WPA MultiSale BiO that it anticipates an unspecified number of sperm whales within federal waters of the GOMR may be adversely affected by seismic activities, especially in known areas of concentration (primarily off the Mississippi River delta) where cow/calf pairs are frequently sighted. There are insufficient data regarding the demography of the Gulf sperm whale stock to estimate the number of takes of sperm whales by age, sex, and reproductive condition. Most animals potentially exposed to seismic noise are expected to be adult females and immature animals, including young calves. It is understood that all animals comprising the Gulf stock (~1,213 sperm whales) may be exposed to seismic noise during their lifetimes, and repeated exposure is anticipated, particularly in light of the facts that (a) sperm whales are wide-ranging animals, and (b) acoustic energy may travel great distances, depending on a suite of variables. At present, the MMS does not have the means to accurately estimate the anticipated number of exposures for Level A or B takes of sperm whales as a result of seismic activity. In the absence of species-specific data on auditory impacts for sperm whales, a received sound pressure level of 180 dB re 1 μ Pa (rms) or greater will be used as a indication of potential concern about temporary and/or permanent hearing impairment (Level A take, as used by NOAA Fisheries in previous rulemaking and published in the Federal Register).

A spreading loss equation of $20 \log R$ is recommended by Richardson et al. (1995) for calculating underwater transmission loss in deep water, whereas a spreading loss equation of $15 \log R$ is more appropriate for shallow water. Using a spreading equation [$15 \log(R)$], the 180 dB re 1 μ Pa (rms) isopleth in surface and near-surface waters occurs at 295 m (0.18 mi) from the seismic source (airguns). Similarly, the 180 dB re 1 μ Pa (rms) isopleth vertically below the seismic source is calculated to be 6,310 m (3.92 mi). By means of a Gulf-wide Notice to Lessees for all seismic activities (30 CFR 250.103, August 22, 2002), MMS has implemented a 500 m (0.31 mi) impact zone to minimize possible effects to sperm whales. For typical 2-D and 3-D towed array seismic surveys with estimated source levels of 257 dB re 1 μ Pa (-3 dB rms conversion), a 500 m impact zone for a 180 dB isopleth equates to an estimated source level of approximately 232 dB. According to the C&WPA BiO (2002), at source levels of 257 dB (rms), the $20 \log(R)$ model and associated calculation above produce received levels of 203 dB re 1 μ Pa at 500 m from the source in subsurface waters (a conservative estimate) and 183 dB in surface waters due to the array effect. Presently, the impact zone of 500 m closely approximates the received dB levels in surface waters, but may not accurately reflect the 180 dB isopleth and associated impact zone beneath an array. These disparities between dB measurements for surface and sub-surface waters indicate the need for better data to effectively formulate models that can be used to better calculate an impact zone for sperm whales.

In the absence of good sound scientific information for sperm whales in the GOM, a received sound pressure level of 160dB re 1 μ Pa (rms) will be used in this application as the default indicator of or for potential concern to disturb a sperm whale in the wild by causing disruption of behavioral patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B take, as used by NOAA Fisheries in previous rulemaking and published in the Federal Register). Using a spherical spreading equation [$15 \log(R)$, -20 dB for the array effect, and -3 dB for zero-to-peak to RMS conversion], the 160 dB re 1 μ Pa (rms) isopleth in surface and near-surface waters occurs at 6,309 m (3.92 mi) from the seismic source (airguns). Similarly, the 160 dB re 1 μ Pa (rms) isopleth below the seismic source is calculated to extend to the seafloor.

Given that (a) the Level B (harassment) impact zone ranges between 6,309 m and depth below the vessel (3.92 mi and greater), (b) the Level A (injury or mortality) impact zone ranges between 295 m and 6,310 m (0.18 and 3.92 mi), (c) seismic survey operations may be conducted over broad swaths of the Gulf, (d) sperm whales are wide-ranging and inhabit oceanic waters of the northern Gulf, (e) animals may or may not avoid seismic noise sources, and (f) that sperm whales may potentially be repeatedly exposed to seismic noise introduced into the GOM, the MMS expects that an unspecified number of sperm whales (chiefly adult females and immature animals) may be exposed to levels of 160dB or greater if they do not avoid exposure. The MMS anticipates new information in the near future from which it will calculate anticipated take numbers for seismic

activity. These numbers will be included in MMS' NEPA statement and provided to NOAA-F for rulemaking needs.

NOAA Fisheries reported in the C&WPA EIS BiO that they believe that ramp-up procedures and visual monitoring of an impact zone coupled with passive acoustic monitoring systems will more effectively minimize possible adverse effects to sperm whales than ramp-up and visual observations alone, as currently required by MMS NTL No. 2002-G07 and Addendum 1. Conservative estimates should be used to calculate impact zones for sperm whales without the array effect until more appropriate models can be formulated from field measurements that effectively minimize the risk of threshold shift to sperm whales. The use of mitigation measures such as visual and acoustic monitoring of adjacent waters (e.g. delineated by the 160 or 180 dB re 1 μ Pa (rms) isopleths), shut-downs, or ramping up seismic airguns are presumably effective techniques that may reduce the potential number of sperm whales taken as a result of seismic surveys. It is assumed that the likelihood of impacts will be reduced relative to the scope of mitigation measures employed by seismic operators. For example, it is assumed that some animals may experience Level A takes (injury), if only visual monitoring is employed, and animals do not actively avoid noise or are missed during visual monitoring. Similarly, fewer animals will experience Level A takes (injury) if visual and effective acoustics monitoring are conducted in conjunction with shut-downs and ramping up. An acoustic model that incorporates acoustic noise propagation, environmental variables, and ecological and behavioral variables known for marine mammals (e.g. sperm whales) would be necessary for the MMS to quantify the anticipated takes of sperm whales attributable to seismic operations in the GOMR; the MMS presently does not have access to such a model.

(7) The anticipated impact of the activity upon the species or stock;

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 whales avoiding (moving away from) a 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 sperm whales remaining 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 airguns. The environment is deep, open waters. Short of a physically impaired whale or a whale being caught between two seismic sources, no physical constraints to "trap" a whale near a seismic sound source exist.

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 aversive 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 impact zone. These measures are expected to significantly reduce the potential for noise impacts to sperm whales. However, because the potential for acoustic impact cannot be completely eliminated, nor are possible impacts clearly documented or understood, a precautionary approach is to keep impacts as **adverse but not significant**. In the conclusions for the recent biological opinion from NOAA Fisheries, it is the opinion of the Service that, with the current mitigations in place, the proposed action will adversely affect, but is not likely to jeopardize the continued existence of this species. Consistent with the preamble to the Final Rule on Incidental Take of Marine Mammals (Federal Register 1989, 58:188), we find that while impacts are still somewhat speculative and the potential for harm to the species or stock is unlikely that the potential effects are negligible.

That is to say, the impacts to the species or stock is "negligible" in the sense described by MMPA regulations at 50 CFR 216.103.

(This information was largely taken from the draft Programmatic Environmental Assessment on Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf, pages III-24, 25, and 29. For a more thorough discussion of the impacts of G&G activities on sperm whales, see in the same document Section III., Parts A, B, H, and Appendix F.)

(8) The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses;

Not applicable.

(9) The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat;

Seismic exploration will introduce high-energy acoustic pulses into the environment. Beyond the immediate and local effects of this acoustic beam, there is no residual chemical contamination or other lasting physical impact on the habitat. The anticipated impacts include possible localized and ephemeral displacement of pelagic species, such as cetaceans, fish, and squid through avoidance responses, with some limited mortality to zooplankton from physical impact and high-energy pulses in the immediate area of airgun arrays (i.e., within a meter or two). Currently, the continued presence of sperm whales in areas of seismic activity, and the observations of apparent feeding behavior from research platforms and digital recording tags on the whales, would indicate that squid are remaining in the areas and are still available to the whales. Restoration of any affected habitat shortly after the seismic vessel passes is highly likely.

(10) The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved;

The potential for short-term and spatially limited displacement of sperm whales away from an active seismic vessel exists. No lasting loss or modification of habitat is anticipated.

(11) The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance;

The current use of airguns, instead of the explosive sound sources used in the past, does not cause the damage to the habitat that occurred with dynamite and other earlier sound producers. The equipment is state-of-the-art. The use of 3-D seismic, which may in the short term result in prolonging the time that seismic operations are occurring in a given area when compared with the older 2-D technology, will ultimately decrease the number of wells needed and thus reduce potential sources (drilling and production) of impact to whales.

Current mitigations include ramp-up, visual monitoring, establishment of an impact zone (currently 500 m 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 time add more guns until the array is fully operational. This allows whales in the area to move away from the sound source before discomfort or injury might result. Visual observers monitor the area around the sound source for 30 minutes prior to ramp-up and throughout seismic operations. Any time a sperm whale enters or surfaces within 500 m of the sound source, seismic operations are immediately ceased in order to minimize as much as possible the exposure of the whales to potentially damaging levels of sound. An expanded seismic observer program is currently in development that will require trained observers on all seismic vessels. Enhanced monitoring and reporting will also be put in place (please see #13.). For more detail on mitigations currently in effect, please see MMS Notice to Lessees 2002-G07 and 2002-G07 Addendum 1. MMS expects to issue updated guidelines for the seismic observer program in early 2003.

(12) Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock of marine mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation⁹ or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.

Not applicable.

(13) The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting such activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity site(s) including migration and other habitat uses, such as feeding. Guidelines for developing a site-specific monitoring plan may be obtained by writing to the Director, Office of Protected Resources; and

Current monitoring and reporting requirements are set forth in MMS NTL No. 2002-G07 and 2002-G07 (Addendum 1).

Monitoring and Mandatory "Shut-down" and "Ramp-up"

Visual observers must monitor waters (with the assistance of binoculars) for sperm whales within and adjacent to the exclusion zone for 30 minutes prior to initiating the airgun ramp-up procedures. Observers must monitor the exclusion zone and adjacent waters during seismic operations, unless atmospheric conditions reduce visibility to zero or during hours of darkness (i.e., night). When sperm whales are observed entering or within the exclusion zone, observers must call for the shut down of the airgun array; seismic operators must shut down the array when instructed by an observer. Ramp-up (see MMS NTL No. 2002-G07 for specified procedure) and seismic activities may be reinitiated only when the observer has: (a) determined that the sperm whale(s) has departed the exclusion zone, and (b) visually monitored the exclusion zone for at least 30 minutes since the last sperm whale sighting within the exclusion zone.

Marine Mammal Reporting

When sperm whales are sighted prior to or during a seismic survey operation, observers must document the information listed below. This information must be reported to MMS within 8 days of the sighting by email (the e-mail address is: protectedspecies@mms.gov). The following observations are to be included in the reports:

- 1) The date, time, and location (latitude/longitude) of each observation.
- 2) The number of sperm whales sighted.
- 3) Whether or not a sperm whale entered the exclusion zone warranting a shut-down.
- 4) How long the shut-down occurred (i.e., how long the sperm whale was in the exclusion zone).
- 5) The name and contact information for the person submitting the report.

These observations and reporting requirements will identify the takes within the exclusion zone from seismic operations in the Gulf of Mexico.

Future plans

MMS is currently developing the guidelines for an enhanced seismic observer program. MMS is also conducting research, noted in #14, that involves controlled exposure to seismic sound and state-of-the-art recording of any physical, behavioral, or vocal responses by sperm whales.

(14) Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

In 1999, MMS hosted a workshop to identify protected species concerns in the Gulf of Mexico. The expert panel concluded possible acoustic impacts from manmade sources were a valid concern and that information for the marine environment was extremely limited. Recommendations to MMS included initiation of research on acoustic effects on marine mammals. Seismic exploration (airguns) was identified as the sound source of primary concern for offshore industry activities and sperm whales as the primary species of concern. The MMS, with cooperative funding from the Office of Naval Research (ONR), immediately modified an existing research agreement with NOAA-Fisheries to development and test research methods to address this topic. The pilot study successfully developed a multidisciplinary approach and new technology to conduct research. In FY 2002, MMS and ONR initiated a 3-year study, Sperm Whale Seismic Study (SWSS) managed by the Texas A&M Research Foundation, to establish habitat use and normal behavior of sperm whales in the Gulf of Mexico, evaluate physical oceanographic correlates to whale locations and movements, obtain DNA profiling of GOM whales, and look for seasonal movements and breeding behavior. In addition to addressing many aspects of sperm whale biology, the study is unique in looking 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. In FY 2003, MMS/ONR will obtain additional support from the National Science Foundation and the oil industry to expand efforts as described and also begin looking at effects on prey (squid). In addition, Navy acoustic research teams based at Stennis Space Center will begin evaluations of ambient noise and acoustic profiling of all research vessels and sound sources.

MMS is engaged in industry planning to support an international research program on acoustic impacts. We are also coordinating SWSS field efforts with proposed NOAA-Fisheries/Navy sperm whale surveys in the Gulf of Mexico. The total amount of resources from all contributing groups for this 3-year effort exceeds \$7 million. Results should address many of the information gaps that make determinations of any actual impacts difficult to determine at present.

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 whale locations near seismic vessels and for effective tagging. An obvious spin-off will be means both to detect and estimate relative locations of sperm whales using acoustics. Applications for mitigation monitoring are being explored.

The MMS also participates in the Inter-Agency Coordinating Group, a group that informally exchanges information and aids in coordinating Federal research on marine mammal/acoustic research.

VERTICAL SEISMIC PROFILES (VSP)

(Number of Surveys)

	Annual Estimates			5 Year Estimates		
	ML	MN	MX	ML	MN	MX
Deep Water	45	40	50	225	200	250
Shallow Water	75	55	80	375	275	400
Total	120	95	130	600	475	650

Possible Annual Scenarios	YEAR 1			YEAR 2			YEAR 3			YEAR 4			YEAR 5			5 YEAR TOTALS		
	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX
	SHALLOW WATER																	
<i>East of river to ALA/FLA</i>	8	4	10	8	4	10	8	4	10	8	4	10	8	4	10	40	20	50
<i>West of river WD - EI</i>	24	19	25	24	19	25	24	19	25	24	19	25	24	19	25	120	95	125
<i>West of river SMI - WC</i>	24	19	25	24	19	25	24	19	25	24	19	25	24	19	25	120	95	125
<i>Texas - HI - BA</i>	15	10	15	15	10	15	15	10	15	15	10	15	15	10	15	75	50	75
<i>Texas - MI - PS</i>	4	3	5	4	3	5	4	3	5	4	3	5	4	3	5	20	15	25
TOTALS SHALLOW	75	55	80	75	55	80	75	55	80	75	55	80	75	55	80	375	275	400
DEEPWATER																		
<i>EGOM off ALA</i>	2	1	3	2	0	3	1	0	2	1	0	2	1	0	2	7	1	12
<i>VK</i>	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	10	10	11
<i>MC</i>	6	5	6	6	6	6	6	5	6	6	5	6	6	5	6	30	26	30
<i>AT</i>	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3	10	10	15
<i>EW</i>	2	2	2	2	2	2	2	2	3	2	2	2	2	2	3	10	10	12
<i>GC</i>	6	5	6	6	5	6	6	6	6	6	5	6	6	5	6	30	26	30
<i>WR</i>	5	5	6	5	5	6	6	5	6	6	6	6	6	5	6	28	26	30
<i>GB</i>	6	5	6	6	5	6	6	5	6	6	5	6	6	6	6	30	26	30
<i>KC</i>	3	3	4	3	3	4	3	3	4	3	3	4	3	3	4	15	15	20
<i>EB</i>	4	4	5	4	4	5	4	4	5	4	4	5	4	4	5	20	20	25
<i>AC</i>	6	5	6	6	5	6	6	5	6	6	5	6	6	5	6	30	25	30
<i>CC - PI</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5
TOTALS DEEPWATER	45	40	50	45	40	50	45	40	50	45	40	50	45	40	50	225	200	250
ANNUAL TOTALS	120	95	130	120	95	130	120	95	130	120	95	130	120	95	130	600	475	650

ⁱ National Marine Fisheries Service (NOAA Fisheries), Southeast Regional Office. July 11, 2002. Endangered Species Act – Section 7 Consultation Biological Opinion for Gulf of Mexico Outer Continental Shelf Lease Sale 184. 80 pp.

ⁱⁱ MMS Final Sale Notice Package, OCS Oil and Gas Lease Sale 184, Western Gulf of Mexico, August 21, 2002, New Orleans, LA. See “Information to Lessees” section; page 11, “Lease stipulation for protected species...”

[see: <http://www.gomr.mms.gov/homepg/lseale/184stipf.pdf>]

ⁱⁱⁱ MMS Notice to Lessees and Operators (NTL) No. 2002-G07, dated August 22, 2002; titled “Implementation of seismic survey mitigation measures.” [see: <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl02-g07.html>]

^{iv} E-mailed letter, G. C. Gill (IAGC) to MMS dated September 19, 2002; captioned “IAGC comments on a Draft Programmatic EA on G&G Exploration in the Gulf of Mexico.”

^v E-mailed letter, D. Quinn (Baker Atlas) to MMS dated September 19, 2002; responding to the Draft G&G PEA with comments on the regulations with respect to BiOrehole seismic surveys.

^{vi} Letter, K. Harb (National Ocean Industries Association) to MMS dated September 19, 2002; captioned “Draft programmatic environmental assessment on geological and geophysical exploration in the Gulf of Mexico outer continental shelf.”

^{vii} E-mailed comments, C. Sarthou (Gulf Restoration Network) to MMS dated September 19, 2002; headed “Comments submitted by the Gulf Restoration Network on the MMS’s G&G ... PDEA.”

^{viii} Letter, L. F. Griffin (Florida Department of Environmental Protection) to R. Defenbaugh (MMS) dated December 2, 2002; captioned “Draft programmatic environmental assessment – geological & geophysical exploration for mineral resources on the Gulf of Mexico outer continental shelf.”

^{ix} E-mail message, R. Dykstra (Orchids & Egrets, Inc.) to MMS dated September 5, 2002; subject “Programmatic EA of G&G on the Gulf of Mexico’s OCS.”

^x NOAA Fisheries, Southeast Regional Office. Undated draft (ca. September 2002). Endangered Species Act – Section 7 Consultation Biological Opinion for Gulf of Mexico Outer Continental Shelf Lease Multi-sale (185, 187, 190, 192, 194, 196, 198, 200, 201). 107 pp.

^{xi} NOAA Fisheries, Southeast Regional Office. November 29, 2002. Endangered Species Act – Section 7 Consultation Biological Opinion for Gulf of Mexico Outer Continental Shelf Multi-Lease Sale (185, 187, 190, 192, 194, 196, 198, 200, 201). Consultation no. F/SER/2002 00718. 146 pp.

^{xii} MMS Addendum 1 to Notice to Lessees and Operators (NTL) No. 2002-G07, dated October 15, 2002; titled “Implementation of seismic survey mitigation measures.” [see: <http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl02-g07add1.html>]

HIGH RESOLUTION SEISMIC

	Annual Estimates (Line Miles)			5 Year Estimates (Line Miles)		
	ML	MN	MX	ML	MN	MX
Deepwater	2500	2000	4000	12500	10000	20000
Shallow Water	22500	18000	26000	112500	90000	130000
TOTALS	25000	20000	30000	125000	100000	150000

Possible Annual Scenarios																		
	YEAR 1			YEAR 2			YEAR 3			YEAR 4			YEAR 5			5 YEAR TOTALS		
	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX
SHALLOW WATER																0	0	0
<i>East of river to ALA/FLA</i>	4500	3500	5000	4500	3500	5000	4500	3500	5000	4500	3500	5000	4500	3500	5000	22500	17500	25000
<i>West of river WD - EI</i>	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	25000	20000	30000
<i>West of river SMI - WC</i>	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	25000	20000	30000
<i>Texas - HI - BA</i>	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	5000	4000	6000	25000	20000	30000
<i>Texas - MI - PS</i>	3000	2500	3000	3000	2500	3000	3000	2500	3000	3000	2500	3000	3000	2500	3000	15000	12500	15000
TOTALS SHALLOW	22500	18000	26000	22500	18000	26000	22500	18000	26000	22500	18000	26000	22500	18000	26000	112500	90000	130000
DEEPWATER																		
<i>EGOM off ALA</i>	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100	0	0	500
<i>VK</i>	200	100	300	200	100	300	200	100	300	200	100	300	200	100	300	1000	500	1500
<i>MC</i>	500	450	650	500	450	650	500	450	650	500	450	650	500	450	650	2500	2250	3250
<i>AT - LN</i>	100	50	200	100	50	200	100	50	200	100	50	200	100	50	200	500	250	1000
<i>EW</i>	200	100	300	200	100	300	200	100	300	200	100	300	200	100	300	1000	500	1500
<i>GC</i>	500	450	650	500	450	650	500	450	650	500	450	650	500	450	650	2500	2250	3250
<i>WR</i>	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100	0	0	500
<i>GB</i>	500	450	650	500	450	650	500	450	650	500	450	650	500	450	650	2500	2250	3250
<i>KC</i>	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100	0	0	500
<i>EB</i>	400	350	650	400	350	650	400	350	650	400	350	650	400	350	650	2000	1750	3250
<i>AC</i>	0	0	100	0	0	100	0	0	100	0	0	100	0	0	100	0	0	500
<i>CC - PI</i>	100	50	200	100	50	200	100	50	200	100	50	200	100	50	200	500	250	1000
TOTALS DEEPWATER	2500	2000	4000	2500	2000	4000	2500	2000	4000	2500	2000	4000	2500	2000	4000	12500	10000	20000
ANNUAL TOTALS	25000	20000	30000	25000	20000	30000	25000	20000	30000	25000	20000	30000	25000	20000	30000	125000	100000	150000

DEEP SEISMIC

	Annual Estimates (Blks)			5 Year Estimates (Blks)			Annual Estimates (Line Miles)			5 Year Estimates (Line Miles)		
	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX
Deepwater												
3D	1800	1350	2500	9000	6750	12500	90000	67500	125000	450000	337500	625000
2D							20000	15000	25000	100000	75000	125000
Total Deepwater	1800	1350	2500	9000	6750	12500	110000	82500	150000	550000	412500	750000
Shallow Water												
3D	200	150	500	1000	750	2500	10000	7500	25000	50000	37500	125000
2D							10000	7500	25000	50000	37500	125000
Total Shallow Water	200	150	500	1000	750	2500	20000	15000	50000	100000	75000	250000
Total	2000	1500	3000	10000	7500	15000	130000	97500	200000	650000	487500	1000000

Possible Annual Scenarios																		
	YEAR 1			YEAR 2			YEAR 3			YEAR 4			YEAR 5			5 YEAR TOTALS		
	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX	ML	MN	MX
SHALLOW WATER																		
<i>East of river to ALA/FLA</i>																0	0	0
<i>West of river WD - EI</i>	2500	2000	5000	2500	2000	5000	2500	2000	5000	4000	3000	10000	4000	3000	10000	15500	12000	35000
<i>West of river SMI - WC</i>	8000	6000	20000	7000	5000	18000	5000	4000	15000	4000	3000	10000	4000	3000	10000	28000	21000	73000
<i>Texas - HI - BA</i>	5000	4000	15000	6000	5000	17000	8000	6000	20000	4000	3000	10000	4000	3000	10000	27000	21000	72000
<i>Texas - MI - PS</i>	3500	2500	8000	3500	2500	8000	3500	2500	8000	6000	5000	15000	5000	4000	12000	21500	16500	51000
TOTALS	1000	500	2000	1000	500	2000	1000	500	2000	2000	1000	5000	3000	2000	8000	8000	4500	19000
SHALLOW	20000	15000	50000	20000	15000	50000	20000	15000	50000	20000	15000	50000	20000	15000	50000	100000	75000	250000
DEEPWATER																		
<i>EGOM off ALA</i>	1000	500	2000	1000	500	2000	1000	500	4000	3000	2500	5000	3000	2500	5000	9000	6500	18000
<i>VK</i>	3000	1500	5000	3000	1500	5000	4000	3000	6000	5000	3000	8000	5000	3000	8000	20000	12000	32000
<i>MC</i>	5000	3000	7500	5000	3000	7500	6000	3000	10000	16000	12000	20000	16000	12000	20000	48000	33000	65000
<i>AT - LN</i>	7000	5000	12500	7000	5000	12500	7000	5000	14000	14000	12000	17500	14000	12000	17500	49000	39000	74000
<i>EW</i>	4000	3000	6000	4000	3000	6000	4000	3000	6000	5000	3000	8000	5000	3000	8000	22000	15000	34000
<i>GC</i>	6000	4000	8000	6000	4000	8000	6000	4000	8000	16000	12000	20000	16000	12000	20000	50000	36000	64000
<i>WR</i>	10000	8000	20000	10000	8000	20000	15000	13000	20000	14000	12000	17500	14000	12000	17500	63000	53000	95000
<i>GB</i>	20000	15000	22000	20000	15000	22000	6000	4000	8000	8000	6000	12000	8000	6000	12000	62000	46000	76000
<i>KC</i>	15000	13000	20000	15000	13000	20000	20000	15000	22000	7500	5000	10000	7500	5000	10000	65000	51000	82000
<i>EB</i>	15000	13000	20000	15000	13000	20000	20000	15000	22000	7500	5000	10000	7500	5000	10000	65000	51000	82000
<i>AC</i>	20000	15000	22000	20000	15000	22000	15000	13000	20000	8000	6000	12000	8000	6000	12000	71000	55000	88000
<i>CC - PI</i>	4000	1500	5000	4000	1500	5000	6000	4000	10000	6000	4000	10000	6000	4000	10000	26000	15000	40000
TOTALS	110000	82500	150000	110000	82500	150000	110000	82500	150000	110000	82500	150000	110000	82500	150000	550000	412500	750000
DEEPWATER	110000	82500	150000	110000	82500	150000	110000	82500	150000	110000	82500	150000	110000	82500	150000	550000	412500	750000
ANNUAL TOTALS	130000	97500	200000	130000	97500	200000	130000	97500	200000	130000	97500	200000	130000	97500	200000	650000	487500	1000000