

Science Center of NMFS, and who are recommended by the Center. These observers will share surveillance duties during daylight hours, and be responsible for computer entry of their observations while off watch. They will be equipped with binoculars and have access to the 50X "big-eye" binoculars mounted on the *Revelle's* bridge. For estimating the range of marine mammals that are sighted, the observers will use the optical fixed-interval range-finder described by Heinemann (1981); this instrument relies on measuring the angle between the mammal and the visual horizon, by an observer at known height above sea-level. The observers will be in wireless communication with ship officers on the bridge and scientists in the vessel's operations laboratory, so they can advise promptly of the need for avoidance maneuvers or G.I. gun shut-down.

Monitoring of marine mammals by experienced observers will occur during all daylight hours of the 3 legs of the cruise on the *Revelle*, whether or not G.I. guns are in operation. Except in bad weather, when they will occupy the bridge, observers will be stationed outside, forward on the 03 upper deck at a height of 9 m (30 ft) above the waterline; this has proved to be an effective station for marine mammal surveillance during previous mammal and seabird monitoring exercises from the *Revelle*.

#### Reporting

Observers will record their observations and range measurements on tape, for subsequent transcription into NMFS format. When a marine mammal or sea turtle sighting is made, the following information about the sighting will be recorded: (1) Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to seismic vessel (e.g., none, avoidance, approach, paralleling, etc.), and behavioral pace; and (2) time, location, heading, speed, activity of the vessel (seismic activity or not), sea state, visibility, cloud cover, and sun glare. The data listed under (2) above will also be recorded at the start and end of each observation watch and during a watch, and whenever there is a change in one or more of the variables.

Results from the vessel-based observations of marine mammals and sea turtles will provide: (1) the basis for real-time mitigation (airgun shutdown); (2) information needed to estimate the number of animals potentially taken by harassment, which must be reported to

NMFS; (3) data on the occurrence, distribution, and activities of marine mammals and sea turtles in the area where the seismic study is conducted; (4) information to compare the distance and distribution of animals relative to the source vessel at times with and without seismic activity; and (5) data on the behavior and movement patterns of marine mammals and sea turtles seen at times with and without seismic activity.

SIO will submit a report to NMFS within 90 days after the end of the seismic profiling program (June 2004). The report will be submitted to NMFS, providing full documentation of methods, results, and interpretation pertaining to most all monitoring tasks. The 90-day report will summarize the dates and locations of seismic operations, sound measurement data, marine mammal and sea turtle sightings (dates, times, locations, activities, associated seismic survey activities), and estimates of the amount and nature of potential "take" of marine mammals by harassment or in other ways. The draft report will be considered the final report unless comments and suggestions are provided by NMFS within 60 days of its receipt of the draft report.

#### Estimates of Take by Harassment for the ETP Cruise

As described previously (see 68 FR 17909, April 14, 2003), animals subjected to sound levels  $\leq 160$  dB may experience disruption in their behavioral patterns and therefore might be taken by Level B harassment.

The estimates of takes by harassment are based on the number of marine mammals that might be found within the 160-dB isopleth radius and potentially disturbed by operations with the 2 GI-guns planned for the project. Based on summer/fall marine mammal density calculations by Ferguson and Barlow (2001), SIO used their average marine mammal densities from the ETP to compute a "best estimate" of the number of marine mammals that may be exposed to seismic sounds  $\geq 160$  dB re 1  $\mu$ Pa (rms) (NMFS' current criterion for onset of Level B harassment). The average densities were then converted to per-km abundances and multiplied (for the appropriate region) by the area that is planned to be ensonified at levels  $\geq 160$  dB re 1  $\mu$ Pa (rms) during the proposed seismic survey program. Where abundance estimates for certain species (pacific white-sided dolphins, pygmy sperm whales, minke whales, and humpback whales) were not readily available for stocks found within the proposed survey areas, minimum population estimates were taken from individual Marine Mammal Stock

Assessment Reports, which are available online as mentioned previously.

SIO did not estimate numbers of pinnipeds potentially vulnerable to harassment due to insufficient data on distribution, seasonal abundance, and pinniped response. However, NMFS agrees with SIO's determination that it is unlikely to encounter significant numbers of any of the pinniped species that live, at least part of the year, in the area of the proposed activity.

Based on this method, Table 3 in the application gives the best estimates of numbers for each species of cetacean that might be exposed to received levels  $\geq 160$  dB re 1  $\mu$ Pa (rms), and thus potentially taken by Level B harassment, during seismic surveys in the proposed study areas of the ETP.

Eight species of delphinidae would account for 95 percent of the overall estimate for potential taking by harassment. Common dolphins are the most abundant delphinid in the proposed seismic survey areas, representing 71 percent of the total estimate for potential taking by harassment. Most of the remaining 5 percent of the overall estimate for potential taking by harassment consists of pilot whales, dwarf sperm whales, and five species of beaked whales.

#### Conclusions-effects on Cetaceans

Baleen whales have been seen to avoid operating airguns with avoidance radii that are quite variable, while some baleen whales show considerable tolerance of seismic pulses. Whales are often reported to show no overt reactions to airgun pulses at distances beyond a few kilometers, even though the pulses remain well above ambient noise levels out to much longer distances. However, recent studies of humpback and especially bowhead whales in the arctic show that reactions, including avoidance, sometimes extend to greater distances than documented earlier, possibly even exceeding the distances at which boat-based observers can see whales. However, reactions at such long distances appear to be atypical of other species of mysticetes, and even for bowheads may only apply during migration. Moreover, few mysticetes occur in the area where seismic surveys are proposed.

Odontocete reactions to seismic pulses, or at least those of dolphins, are expected to extend to lesser distances than those of mysticetes. Odontocete low-frequency hearing is less sensitive than that of mysticetes, and dolphins are often seen from seismic vessels, occasionally even at close distances. In fact, there are documented instances of dolphins approaching active seismic