

*melas*), North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), minke whale (*Balaenoptera acutorostrata*), Bryde's whale (*Balaenoptera edeni*), sei whale (*Balaenoptera borealis*), fin whale (*Balaenoptera physalus*), and blue whale (*Balaenoptera musculus*). Seven of these species are listed as endangered under the U.S. Endangered Species Act (ESA): sperm, North Atlantic right, humpback, sei, fin, and blue whales, as well as West Indian manatee. Also, one species of pinniped, the hooded seal (*Cystophora cristata*), could potentially be encountered during the proposed seismic surveys. Additional information on most of these species is available at: [http://www.nmfs.noaa.gov/prot\\_res/PR2/Stock\\_Assessment\\_Program/sars.html](http://www.nmfs.noaa.gov/prot_res/PR2/Stock_Assessment_Program/sars.html).

#### Potential Effects on Marine Mammals

NMFS' April 14, 2003, **Federal Register** notice (68 FR 17909) describes generally the anticipated effects of the Ewing's airguns and multibeam bathymetric sonar on marine mammals, including masking, behavioral disturbance, and potential hearing impairment and other physical effects. Possible effects of the sub-bottom profiler used in the projects are

described in the previously mentioned **Federal Register** notices (68 FR 44291, July 28, 2003). The LDEO application for operations in Yucatan also provides information on what is known about the effects of LDEO's planned seismic survey on marine mammals. Past **Federal Register** notices for other LDEO seismic surveys include July 28, 2003 (68 FR 44291), August 26, 2003 (68 FR 51240), September 12, 2003 (68 FR 53714), September 17, 2003 (68 FR 54421), and October 21, 2003 (68 FR 60086).

#### *Estimates of Take for the Northern Yucatan Peninsula Cruise*

NMFS' current criteria for onset of Level A harassment of cetaceans and pinnipeds from impulse sound are, respectively, 180 and 190 re 1  $\mu$ Pa root-mean-squared (rms). The rms pressure is an average over the pulse duration. The rms level of a seismic pulse is typically about 10 dB less than its peak level (Greene 1997; McCauley et al. 1998, 2000a). The criterion for Level B harassment onset is 160 dB.

Given the proposed mitigation (see Mitigation later in this document), all anticipated takes involve a temporary change in behavior that may constitute Level B harassment. The proposed

mitigation measures will minimize the possibility of Level A harassment. LDEO has calculated the "best estimates" for the numbers of animals that could be taken by level B harassment during the proposed seismic survey at the northern Yucatan Peninsula using data on marine mammal abundance from a previous survey region, as shown in the predicted RMS radii table.

These estimates are based on a consideration of the number of marine mammals that might be exposed to sound levels greater than 160 dB, the criterion for the onset of Level B harassment, by operations with the 20-gun array planned to be used for this project. The anticipated radius of influence of the multibeam sonar is less than that for the airgun array, so it is assumed that any marine mammals close enough to be affected by the multibeam sonar would already be affected by the airguns. Therefore, no additional incidental takings are included for animals that might be affected by the multibeam sonar.

The following table explains the corrected density estimates as well as the best estimate of the numbers of each species that would be exposed to seismic sounds greater than 160 dB.

Species	"Best Estimate" of the Number of Exposures to Sound Levels $\geq 160$ dB ( $\geq 170$ dB)	% of North Atlantic Population	"Maximum Estimate" of the Number of Exposures to Sound Levels $\geq 160$ dB ( $\geq 170$ dB)
PHYSETERIDAE			
Sperm whale	0	0	0
Dwarf/Pygmy sperm whale	0	0	0
ZIPHIIDAE	0	0	0
Cuvier's beaked whale	0	0	0
Sowerby's beaked whale	0	0	0
Gervais' beaked whale	0	0	0
Blainville's beaked whale	0	0	0
DELPHINIDAE			
Rough-toothed dolphin	295 (85)	N.A.	443 (128)
Bottlenose dolphin	9107 (2631)	N.A.	13,660 (3946)
Pantropical spotted dolphin	436 (126)	<0.7	654 (189)
Atlantic spotted dolphin	988(285)	<1.8	1481 (428)
Spinner dolphin	26 (7)	<0.2 <sup>a</sup>	38 (11)
Clymene dolphin	0	0	0
Striped dolphin	0	0	0
Short-beaked common dolphin			
Long-beaked common dolphin			
Fraser's dolphin	6 (1)	N.A.	10(2)
Risso's dolphin	6 (1)	0	10(2)
Melon-headed whale	6 (1)	0.1 <sup>a</sup>	10(2)
Pygmy killer whale	0	0	0
False killer whale	359 (104)	N.A.	539 (156)
Killer whale	6 (1)	0.1	10(2)
Short-finned pilot whale	205 (59)	0	308 (89)
Long-finned pilot whale			
MYSTICETES			
North Atlantic right whale	0	0	0
Humpback whale	0	0	0
Minke whale	0	0	0
Bryde's whale	0	0	0
Sei whale	0	0	0