

species, primarily fin (24) and sperm whales (20). During both research cruises, Delphinidae would account for 92 percent of the overall estimate for potential taking by harassment during each of the proposed seismic surveys (i.e., 709 of 772 (TAG) and 943 of 1028 (ADWBC)). While there is no agreement regarding any alternative "take" criterion for dolphins exposed to airgun pulses, if only those dolphins exposed to ≥ 170 dB re 1 μ Pa (rms) were to be affected sufficiently to be considered taken by Level B harassment, then the best estimate for common dolphins (the most abundant dolphin in the area) would be 91 rather than 316 during the TAG cruise, and 144 rather than 419 during the ADWBC cruise. These are based on the predicted 170-dB radius around the 20- and 2-airgun arrays (2600 and 175 m (8530 and 574 ft), respectively), and are considered to be more realistic estimates of the number of each species of delphinid that may be disturbed. Therefore, the total number of animals likely to react behaviorally is considerably lower than the 772 (TAG cruise) or 1028 (ADWBC cruise) animals that LDEO has estimated in Table 3 and 4 (LDEO Mid-Atlantic, 2003).

Conclusions-Effects on Cetaceans

Strong avoidance reactions by several species of mysticetes to seismic vessels have been observed at ranges up to 6 to 8 km (3.2 to 4.3 nm) and occasionally as far as 20–30 km (10.8–16.2 nm) from the source vessel. Some bowhead whales avoided waters within 30 km (16.2 nm) of the seismic operation. However, reactions at such long distances appear to be atypical of other species of mysticetes, and even for bowheads may only apply during migration.

Odontocete reactions to seismic pulses, or at least those of dolphins, are expected to extend to lesser distances than are those of mysticetes. Odontocete low-frequency hearing is less sensitive than that of mysticetes, and dolphins are often seen from seismic vessels. In fact, there are documented instances of dolphins approaching active seismic vessels. However, dolphins as well as some other types of odontocetes sometimes show avoidance responses and/or other changes in behavior when near operating seismic vessels.

Taking account of the mitigation measures that are planned, effects on cetaceans are generally expected to be limited to avoidance of the area around the seismic operation and short-term changes in behavior, falling within the MMPA definition of "Level B harassment." In the cases of mysticetes, these reactions are expected to involve

small numbers of individual cetaceans because few mysticetes occur in the area where seismic surveys are proposed. For Bryde's whales, LDEO's best estimate is that 1 animal during each of the cruises, which translates to 3 percent of the North Atlantic population for this species in the area of the TAG survey, and 1.5 percent of the North Atlantic population for this species in the area of the ADWBC survey, has the potential to be exposed to sound levels ≥ 160 dB re 1 μ Pa (rms) and potentially affected. LDEO's best estimate is that 18 (TAG) and 24 (ADWBC) fin whales, both of which are <0.1 percent of the estimated North Atlantic fin whale population (IWC 2003), will be exposed to sound levels <160 dB re 1 μ Pa (rms) and potentially affected. Similarly, only 15 (TAG) and 20 (ADWBC) sperm whales, or approximately 0.1 and 0.2 percent of the estimated North Atlantic sperm whale population would receive seismic sounds ≥ 160 dB. Therefore, based on the relatively low numbers of marine mammals that will be exposed at levels ≥ 160 dB and the expected impacts at these levels, NMFS has preliminarily determined that this action will have a negligible impact on the affected species or stocks.

Larger numbers of odontocetes may be affected by the proposed activities, but the populations sizes of the main species are large and the numbers potentially affected are small relative to the population sizes. The best estimate of the total number of odontocetes that might be exposed to ≥ 160 dB re 1 μ Pa (rms) in the proposed survey areas in the Mid-Atlantic Ocean is 746 for the TAG cruise, and 991 for the ADWBC cruise. Of these, 709 (TAG cruise) and 943 (ADWBC cruise) are Delphinidae, and of these about 204 (TAG cruise) and 322 (ADWBC cruise) might be exposed to ≥ 170 dB. Only 316 and 419 common dolphins (the most abundant delphinid in the proposed survey areas) are expected to be exposed to seismic sounds ≥ 160 dB in the proposed TAG and ADWBC seismic survey areas, respectively. This represents considerably less than 0.2 and 0.3 percent of the North Atlantic population of common dolphins. Of these, 91 and 144, respectively, might be exposed to ≥ 170 dB. These figures are much less than 0.1 percent of the North Atlantic population and the 170-dB values (91 and 144) are believed to be a more accurate estimate of the number potentially affected. Smaller numbers of other species of dolphins will be exposed to seismic sounds ≥ 160 dB during the proposed surveys, and the numbers for each species represent

considerably less than 0.1 to 0.7 percent of each population. The numbers that might be exposed to ≥ 170 dB are even smaller and represent considerably less than 0.1 to 0.2 percent of each population; these latter percentages are believed to be a more accurate estimate of the numbers potentially affected. Based on the relatively low numbers of marine mammals that will be exposed at levels ≥ 160 dB and the expected impacts at these levels, NMFS has preliminarily determined that this action will have a negligible impact on the affected species or stocks.

Altogether, proposed mitigation measures such as controlled speed, course alteration, look-outs, non-pursuit, ramp-ups, and power-downs when marine mammals are seen within defined ranges (See Mitigation) will reduce short-term reactions to disturbance, and minimize any effects on hearing sensitivity.

Conclusions-Effects on Pinnipeds

Very few if any pinnipeds are expected to be encountered during the proposed seismic surveys in the Mid-Atlantic Ocean. Most have a coastal distribution or are distributed along the pack-ice edge. Therefore, it is unlikely that pinnipeds will be encountered in either study area. However, if pinnipeds are encountered, they are more likely to be seen during the ADWBC cruise in the northern Mid-Atlantic than during the TAG cruise. A few gray seals, which are normally found in coastal areas might be seen during the ADWBC cruise. In addition, a few vagrant harbor seals, harp seals, or hooded seals might be encountered. None of the pinniped species is considered endangered or vulnerable.

Because no seismic surveys will take place in coastal and nearshore areas, the best estimate of the numbers of each of the more common (but unlikely) species that might be taken by Level B harassment is no more than 2 and is most likely 0. For the other less-common species the best estimate is zero. If pinnipeds are encountered, the proposed seismic activities would have, at most, a short-term effect on their behavior and no long-term impacts on individual seals or their populations. Responses of pinnipeds to acoustic disturbance are variable, but usually quite limited. Effects are expected to be limited to short-term and localized behavioral changes falling within the MMPA definition of Level B harassment. Therefore, based on the relatively low numbers of marine mammals that will be exposed, NMFS has preliminarily determined that this