July 23, 2014

Via electronic mail sent to ITP.Goldstein@noaa.gov
Ms. Jolie Harrison
Supervisor, Incidental Take Program
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
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RE: Comments on the National Marine Fisheries Service Incidental Harassment Authorization for the Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to a Marine Geophysical Survey in the Atlantic Ocean off the Eastern Seaboard, August to September 2014 and April to August 2015 (RIN 0648-XD214)

Dear Ms. Harrison:

Clean Ocean Action (COA) submits the following comments in response to the National Marine Fisheries Service (NMFS) request for comments for the proposed incidental harassment authorization (IHA) for the takes of marine mammals incidental to a marine geophysical survey in the Atlantic Ocean off the Eastern Seaboard, August to September 2014 and April to August 2015 (RIN 0648-XD214).[1]

The United States Geological Survey (USGS), Lamont-Doherty Earth Observatory of Columbia University (L-DEO), and the National Science Foundation propose to conduct a 2-D seismic vessel survey in the Atlantic Ocean off the Eastern Seaboard between August and September 2014 and April and August 2015 to identify the outer limits of the United States continental shelf and study potential tsunami-related hazards ("Proposed Project"). The Proposed Project includes the use of an array of 36 airguns with a total volume of approximately 6,600 in^3, in conjunction with a multibeam echosounder and a sub-bottom profiler. The nominal source levels of the airgun arrays range from 236 to 265 decibels (dB) re: 1 µPa (peak-to-peak), and airguns would fire every 20 to 24 seconds, 24 hours a day, for a17 to 18 day period set to commence on August 15, 2014. Similar survey activities will also be conducted in an as yet unconfirmed timeframe between April and August 2015. The area to be surveyed is an irregularly shaped region of the Atlantic Ocean continental shelf that is positioned between 241 km (130 nmi) and 648.2 km (350 nmi) from the coast of the United States.

[1] 79 Fed. Reg. at 35642 (Monday, June 23, 2014) (hereafter "NMFS IHA").

NMFS issued its proposed IHA for takes of 19,497 marine mammals by harassment under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA). The Proposed Project is subject to regulations under the National Environmental Policy Act (NEPA) and must also request a Section 7 Consultation under the Endangered Species Act (ESA)[2] and an Essential Fish Habitat assessment under the Magnuson-Stevens Fishery Conservation and Management Act.[3]

For the reasons detailed herein, Clean Ocean Action urges denial of the NMFS IHA on the grounds that a full Environmental Impact Statement (EIS) should be completed and the potential impacts to marine mammals are incompatible with the goals, mandates, and prohibitions of the MMPA. A full EIS is necessary to remedy issues of incomplete information, inadequate assessment of impacts, and insufficient evaluation of alternatives and mitigation measures. Importantly, the Proposed Project should not be conducted during the spring and summer months, which are the peak of marine mammal (and other marine species) feeding, breeding, and/or calving activity off the mid-Atlantic coast. Moreover, NMFS should ensure that best available science and regulatory review are incorporated into the EIS and IHA, require stronger mitigation measures, and consider different times of year for the Proposed Project.

II. NOAA must prepare a specific EIS because there are significant environmental impacts from the Proposed Project

For the reasons discussed below, we strongly urge NMFS to prepare an EIS for this project prior to the further consideration of the issuance of an IHA. We understand that an EA was drafted in May 2014 for this project; this document tiers to a Programmatic EIS that was finalized in 2011. Given the broad scope of this PEIS and the restricted scope of the May 2014 EA, an updated EIS would provide information necessary to making an informed decision about issuance of the IHA. Specifically, an EIS would include complete scientific substantiation for the project, a thorough analysis of all direct, indirect, and cumulative environmental impacts (including use of the acoustic guidelines that NOAA recently drafted and received comments on, which account for best available science), and in-depth consideration of a full range of alternatives to the project. Moreover, to meet its NEPA obligations, the NEPA document must be made available for public review and comment.[4]

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[2] Section 7 of the ESA (16 U.S.C. 1531 et seq.) outlines the procedures for Federal interagency cooperation to conserve federally-listed species and designated critical habitats.

[3] Public Law (P.L.) 94-265, as amended by the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (P.L. 109-479). EFH Guidelines at 50 CFR 600.05-600.930 outline the process to satisfy EFH consultation under Section 305(b)(2)-(4)) of the MSA.

[4] *See, e.g. Anderson v. Evans*, 314 F.3d 1006, 1016 (9th Cir. 2002) ("the public must be given an opportunity to comment on draft EAs and EISs").

A. Purpose of NEPA and EA and trigger for an EIS

NEPA's fundamental purposes are to guarantee that: (1) agencies take a hard look at the environmental consequences of their actions before these actions occur; and (2) agencies make the relevant information available to the public so that it may also play a role in both the decision-making process and the implementation of that decision.[5] To assure transparency and thoroughness, agencies also must "to the fullest extent possible...[e]ncourage and facilitate public involvement" in decision-making.[6] Despite the fact that a draft Environmental Assessment (EA) was released in May 2014, the public was not offered an opportunity to comment on the Proposed Project until the issuance of the proposed IHA on June 23, 2014, less than two months before the study was scheduled to begin.

The purpose of an EA is to assist the agency in determining whether the project may significantly affect the environment and therefore require a full EIS.[7] An agency may avoid preparing a full EIS if the agency: (1) prepares an environmental assessment identifying and analyzing the action's environmental effects; and (2) makes a finding of no significant impact, which presents the agency's reasons for concluding that the action's environmental effects are not significant.[8] NEPA requires federal agencies to prepare an EIS for all "major federal actions significantly affecting the quality of the human environment."[9] A full EIS is required if "substantial questions are raised as to whether a project...may cause significant degradation of some human environmental factor."[10] To trigger this requirement, the plaintiff "need *not show* that significant effects will *in fact* occur;" but rather, "raising substantial questions whether a project may have a significant environmental effect is sufficient."[11]

Whether an action may have "significant" impacts on the environment is determined by considering the "context" and "intensity" of the action.[12] "Context" means the significance of the project "must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality."[13] Intensity of the action is

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[5] See, e.g. 40 C.F.R. § 1500.1.
[6] 40 C.F.R. §1500.2(d
[7] 42 U.S.C. §4332(2)(C); 40C.F.R. §1508.9.
[8] 40 C.F.R. §§ 150l.4(b), (e); 1508.9; 1508.1.3.
[9] 42 U.S.C. § 4332(2)(C); see also 40 C.F.R. § 1501.4. The Act defines the "human environment" as including "the natural and physical environment and the relationship of people with that environment…This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment." 40 C.F.R. § 1508.14.
[10] *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1149-50 (9th Cir. 1998).
[11] *Id*. (emphases in original).
[12] 40 C.F.R. § 1508.27.
[13] Id. § 1508.27(a).

determined by considering the following factors: (1) impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial; (2) the degree to which the proposed action affects public health or safety; (3) unique characteristics of the geographic area such as proximity to ecologically critical areas; (4) the degree to which the effects on the quality of the human environment are likely to be highly controversial; (5) the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks; (6) the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration; (7) whether the action is related to other actions with individually insignificant but cumulatively significant impacts; (8) the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources; (9) the degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the federal Endangered Species Act; (10) whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.[14] The presence of one or more significant effects can trigger the need for a full EIS.[15] Based on the nature of potential impacts to marine life from the Proposed Project and the incomplete analysis of such impacts in the EA (discussed further below), a full EIS must be prepared for this study and the issuance of an IHA before this process is completed would be premature. Furthermore, given that the EA drafted for the Proposed Project tiers to a Programmatic EIS that was finalized in 2011, an updated EIS would provide information necessary to making an informed decision about issuance of the IHA.

B. Potential impacts from sound-producing sources other than seismic airguns were not evaluated.

Neither the NMFS IHA nor the EA upon which it relies have offered any meaningful evaluation of the potential impacts that other sound-producing sources used in the Proposed Project may have on marine species. Of particular concern, the NMFS IHA indicates that a high-frequency Kongsberg EM 122 multibeam echosounder will operate concurrently with airgun operations. The multibeam echosounder produces sound in the 10.5 to 13.0 kHz frequency range, which is within the optimal hearing spectrum for many odontocete species that may occur in the study area. A 12-kHz multibeam echosounder system operated by an Exxon survey vessel off the

[14] 40 C.F.R. § 1508.27(b)(1)-(10).

[15] S*ee, e.g. Nat'l Parks & Conserv. Ass'n. v. Babbitt*, 241 F.3d 722, 731 (9th Cir. 2001) (either of two significance factors considered by the court "may be sufficient to require preparation of an EIS in appropriate circumstances"); *Anderson v. Evans*, 350 F.3d 815, 835 (9th Cir. 2003) (presence of one or more factors can necessitate preparation of a full EIS).

coast of Madagascar was implicated by an independent scientific review panel (ISRP) in the mass-stranding of approximately 100 melon-headed whales (*Peponocephala electra*) in 2008.[16] The report of the ISRP stated, "all other possible factors considered were determined by the ISRP to be unlikely causes for the initial behavioral response."[17]

Furthermore, a 2002 seismic expedition in the Gulf of California, also lead by L-DEO, employed a similar multibeam sonar system with a center frequency of 15.5 kHz and source levels of 237 dB. Beaked whale strandings observed in the area of the survey in September 2002 may have been linked to the use of this technology – a federal judge responded by ordering the ship to cease operations.[18]

Based on the correlation between these previous stranding events and the use of multibeam sonar technology, it is imperative that NMFS fully assess the potential for this source to impact marine mammals both on its own and in concert with seismic airgun blasts.

C. The analysis of alternatives in the EA was incomplete.

The "heart" of the NEPA process is an agency's duty to consider "alternatives to the proposed action" and to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[19] The CEQ regulations require NMFS to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."[20] "A 'viable but unexamined alternative renders [the] environmental impact statement inadequate.'"[21]

The EA does not devote sufficient discussion to alternatives, including alternative times of year and additional mitigation and monitoring activities. In its discussion of the No Action alternative, the EA does not adequately qualify the benefits of the No Action alternative, in which the Proposed Project would not proceed and 19,497 marine mammals would not be subject to harassment, in relation to the costs. The "Alternative Action" alternative does not

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[16] Southall, B.L., Rowles, T., Gulland, F., Baird, R. W., and Jepson, P.D. 2013. Final report of the Independent Scientific Review Panel investigating potential contributing factors to a 2008 mass stranding of melon-headed whales (*Peponocephala electra*) in Antsohihy, Madagascar.

[17] Id.

[18] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernandez, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D.C., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L. 2006. Understanding the impacts of anthropogenic sound on beaked whales. *Journal of Cetacean Resource Management* **7**: 177-187.

[19] 42 U.S.C. §§ 4332(2)(C)(iii), 4332(2)(E).

[20] 40 C.F.R. § 1502.14(a).

[21] *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir. 1999) (quoting *Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1057 (9th Cir. 1985)).

actually evaluate any alternate times of year to conduct the survey, which are important considerations that deserve full assessment given the magnitude of marine mammal takes during the proposed study periods.

The two legs of the Proposed Project are planned to take place between the spring and late summer (August to September 2014 and April to August 2015). This timeframe is of critical importance to many cetacean species that may occur in the study area, including several endangered species. The critically endangered North Atlantic right whale migrates northward to the waters off New England and the Bay of Fundy in the spring and summer months, and is also feeding and nursing during this time period.[22] Other species known to feed, breed, and/or calve in the area of the Proposed Project during this timeframe include the Minke whale,[23] Bryde's whale,[24] sei whale,[25] fin whale,[26] blue whale,[27] sperm whale,[28] pygmy sperm whale,[29] dwarf sperm whale,[30] northern bottlenose whale,[31] bottlenose dolphin,[32] Atlantic white-sided dolphin, Atlantic spotted dolphin, pantropical spotted dolphin,[33] striped dolphin, spinner dolphin,[34] Clymene dolphin,[35] short-beaked common dolphin,[36] Risso's dolphin,[37] melon-

[22] NOAA Fisheries, Office of Protected Resources. North Atlantic Right Whales (*Eubalaena glacialis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm.
[23] NOAA Fisheries, Office of Protected Resources. Minke Whale (*Balaenoptera acutorostrata*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/minkewhale.htm.
[24] NOAA Fisheries, Office of Protected Resources. Bryde's Whale (*Balaenoptera edeni*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/brydeswhale.htm.
[25] NOAA Fisheries, Office of Protected Resources. Sei Whale (*Balaenoptera borealis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/seiwhale.htm.
[26] NOAA Fisheries, Office of Protected Resources. Fin Whale (*Balaenoptera physalus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm.
[27] NOAA Fisheries, Office of Protected Resources. Blue Whale (*Balaenoptera musculus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bluewhale.htm.
[28] NOAA Fisheries, Office of Protected Resources. Sperm Whales (*Physeter macrocephalus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm.
[29] NOAA Fisheries, Office of Protected Resources. Pygmy Sperm Whale (*Kogia breviceps*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/pygmyspermwhale.htm.
[30] NOAA Fisheries, Office of Protected Resources. Dwarf Sperm Whale (*Kogia sima*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/dwarfspermwhale.htm.
[31] NOAA Fisheries, Office of Protected Resources. Northern Bottlenose Whale (*Hyperoodon ampullatus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/northernbottlenosewhale.htm.
[32] NOAA Fisheries, Office of Protected Resources. Bottlenose Dolphin (*Tursiops truncatus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/bottlenosedolphin.htm.
[33] NOAA Fisheries, Office of Protected Resources. Pantropical Spotted Dolphin (*Stenella attenuata*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spotteddolphin_pantropical.htm.
[34] NOAA Fisheries, Office of Protected Resources. Spinner Dolphin (*Stenella longitrostris*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spinnerdolphin.htm.
[35] NOAA Fisheries, Office of Protected Resources. Clymene Dolphin (*Stenella clymene*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/clymenedolphin.htm.
[36] NOAA Fisheries, Office of Protected Resources. Short-Beaked Common Dolphin (*Delphinus delphis*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/commondolphin_shortbeaked.htm.

headed whale,[38] false killer whale,[39] killer whale,[40] and short-finned pilot whale.[41] Based on the high frequency of vital behaviors that take place in the spring and summer months, it is prudent for NMFS to assess alternate times of year for the Proposed Project, especially during the winter, when many species may be located outside of the survey area.

Should it be determined that the Proposed Project must continue as planned for the summer of 2014 and spring/summer of 2015, we urge NMFS to consider alternatives with stronger mitigation measures including pre-survey observations, aerial surveys, larger exclusion zones and lower sound thresholds, suspension of activities in low light and night conditions (or at the very least, requiring visual observers equipped with night-vision technologies during these conditions), post-survey monitoring, and other methods to detect marine mammals beyond visual observation and acoustic monitoring.

II. NMFS must ensure that its IHA complies with the MMPA.

The MMPA places a "moratorium on the taking" of marine mammals.[42] Any authorization to take marine mammals must result in the incidental take of only "small numbers of marine mammals of a species or population stock," and can have no more than a "negligible impact" on species and stocks. Furthermore, NMFS must provide for the monitoring and reporting of such takings and must prescribe methods and means of affecting the "least practicable adverse impact" on the species or stock and their habitat.[43]

A. Scientific evidence supports marine mammal harassment below the 160-dB Level B threshold and potential for injury below the 180/190-dB Level A threshold

The proposed IHA uses the single sound pressure level of 160 dB re 1 µPa (RMS) as a threshold for behavioral, sub-lethal take in all marine mammal species affected by the proposed survey.[44] This approach does not reflect the best available science, and the choice of threshold is not sufficiently conservative in several important respects. In fact, five of the world's leading biologists and bioacousticians working in this field recently characterized the 160-dB threshold

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[37] NOAA Fisheries, Office of Protected Resources. Risso's Dolphin *(Grampus griseus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rissosdolphin.htm.
[38] NOAA Fisheries, Office of Protected Resources. Melon-headed Whale (*Peponocephala electra*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/melonheadedwhale.htm.
[39] NOAA Fisheries, Office of Protected Resources. False Killer Whale (*Pseudorca crassidens*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/falsekillerwhale.htm.
[40] NOAA Fisheries, Office of Protected Resources. Killer Whale (*Orcinus orca*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/killerwhale.htm.
[41] NOAA Fisheries, Office of Protected Resources. Short-finned Pilot Whale (*Globicephala macrorhynchus*). Available at: http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/pilotwhale_shortfinned.htm.
[42] 16 U.S.C. § 1371(a).
[43] 16 U.S.C. § 1371(a)(5)(A) & (D).
[44] 79 Fed. Reg. at 14801.

as "overly simplified, scientifically outdated, and artificially rigid."[45] Furthermore, NMFS has released draft acoustic guidance that is currently being finalized; these guidelines should be incorporated into take estimations.

Using a single sound pressure level of 160-dB for harassment represents a major step backward from recent programmatic authorizations. For Navy sonar activity, for example, NMFS has incorporated linear risk functions into its analysis, which endeavor to account for risk and individual variability and to reflect the potential for take at relatively low source levels.[46]

Furthermore, current scientific literature establishes that behavioral disruption can occur at substantially lower received levels for some marine mammal species, including these that will be impacted by the Proposed Project. For example, the startup of a seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging.[47] Similarly, a low-frequency, high-amplitude fish shoal imaging device was recently found to silence humpback whales at a distance of up to 200 kilometers, where received levels ranged from 5 to 22 dB above ambient noise levels.[48] Groups of humpback whales in the wild have been observed to exhibit avoidance behaviors at a distance of two kilometers from a small airgun array; the received levels in these trials were 159 dB re: 1 μPa^2 peak-to-peak.[49] Blue whale behavioral changes in response to a small airgun array have also been monitored. Researchers tracked a blue whale traveling and vocalizing in the vicinity of a vessel firing a four-gun array with a source level of 215 dB re: 1 μPa^2 peak-to-peak and noted that at a distance of 10 kilometers from the vessel (where the received level was estimated to be 143 dB re: 1 μPa^2 peak-to-peak), the whale ceased vocalizations for an hour and noticeably changed course.[50] The literature also shows that harbor porpoises are acutely sensitive to a range of anthropogenic sounds, including airguns. They have been observed to engage in avoidance responses 50 miles from a seismic airgun array, a result that is consistent with both captive and wild animal studies showing them abandoning habitat in response to pulsed sounds

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[45] Clark, C., Mann, D., Miller, P., Nowacek, D., and Southall, B., Comments on Arctic Ocean Draft Environmental Impact Statement at 2 (Feb. 28, 2012); *see* 40 C.F.R. § 1502.22.

[46] *See, e.g.*, 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

[47] Clark, C.W., and Gagnon, G.C. 2006. Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales. (IWC Sci. Comm. Doc. IWC/SC/58/E9); *see also* MacLeod, K., Simmonds, M.P., and Murray, E., Abundance of fin (*Balaenoptera physalus*) and sei whales (*B. Borealis*) amid oil exploration and development off northwest Scotland, *Journal of Cetacean Research and Management* 8: 247-254 (2006).

[48] Risch, D., Corkeron, P.J., Ellison, W.T., and van Parijs, S.M., Changes in humpback whale song occurrence in response to an acoustic source 200 km away, PLoS ONE 7(1): e29741. doi:10.1371/journal.pone.0029741 (2012).

[49] McCauley, R.D., Jenner, M.N., Jenner, C., McCabe, K.A., and Murdoch, J. 1998. The response of humpback whales (*Megaptera novaeangliae*) to offshore seismic survey: Preliminary results of observations above a working seismic vessel and experimental exposures. *Appea Journal*: 692-706.

[50] McDonald, M.A., Hildebrand, J.A., and Webb, S.C. 1995. Blue and fin whale observed on a seafloor array in the Northeast Pacific. *Journal of the Acoustical Society of America* **98**: 712-721.

at very low received levels, well below 120 dB.[51] Cuvier's beaked whales exhibited alarming behavioral impacts when exposed to sonar at low received levels of 89-127dB re: 1 µPa.[52]

Furthermore, evidence in the scientific literature has indicated that temporary threshold shifts (TTS) can occur in cetaceans at source levels lower than proposed for this survey. As NMFS itself cites, a recent study involved the exposure of a captive harbour porpoise to one airgun firing on three occasions at an average source level of 201 dB re: 1 μPa^2 peak-to-peak.[53] In addition to avoidance behavior exhibited by the animal during the trials, the researchers estimated through modeling that the onset of TTS that did not fully subside until *55 hours after exposure*.[54] Moreover, NMFS cannot rationally assume that other marine mammals will not incur injury at noise levels below those in the Proposed Project. The Lucke *et al.* study demonstrates that TTS can occur at different levels for different species of cetaceans. Moreover, controlled exposure trials in which harbor seals were exposed to small airguns firing for one hour at source levels ranging from 215 to 224 dB re: 1 μPa^2 peak-to-peak revealed dramatic physiological and behavioral responses, including a fright response evidenced by significant drops in heart rate; decreased stomach temperatures indicating a cessation of feeding; and rapid swimming away from the noise source.[55] Thus, NMFS cannot assume that TTS and even permanent threshold shifts (PTS) would be unlikely for marine mammals in the area of this Proposed Project.

A number of other recent studies indicate that anthropogenic sound can induce PTS at lower levels than anticipated.[56] New data indicate that mid-frequency cetaceans have greater

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[51] *See, e.g.*, Bain, D.E., and Williams, R., Long-range effects of airgun noise on marine mammals: responses as a function of received sound level and distance (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E35).

[52] DeRuiter, S.L., Southall, B.L., Calambokidis, J., Zimmer, W.M.X., Sadykova, D., Falcone, E.A., Friedlaender, A.S., Joseph, J.E., Moretti, D., Schoor, G.S., Thomas, L., and Tyack, P.L. 2013. First direct measurements of behavioural responses by Cuvier's beaked whales to mid-frequency active sonar. *Biology Letters* **9**: 20130223 1 (2013).

[53] Lucke, Klaus, Siebert, U., Lepper, P. a, & Blanchet, M.-A. (2009). Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli. *The Journal of the Acoustical Society of America*, 125(6): 4060-70.

[54] Lucke, K., Siebert, U., Lepper, P.A., and Blanchet, M.-A. 2009. Temporary shift in masked hearing thresholds in a harbor porpoise (*Phocoena phocoena*) after exposure to seismic airgun stimuli. *Journal of the Acoustical Society of America* 125: 4060-4070. Emphasis added.

[55] Thompson, D., Sjoberg, M., Bryant, M.E., Lovell, P., and Bjorge, A. 1998. Behavioral and physiological responses of harbour (*Phoca vitulina*) and grey (*Halichoerus grypus*) seals to seismic surveys. Report to European Commission of BROMMAD Project. MAS2 C7940098.

[56] Kastak, D., Mulsow, J., Ghoul, A., and Reichmuth, C. 2008. Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* **123**: 2986; Kujawa, S.G., and Liberman, M.C. 2009. Adding insult to injury: cochlear nerve degeneration after "temporary" noise-induced hearing loss, *Journal of Neuroscience* **29**: 14077-14085.

sensitivity to sounds within their best hearing range than was previously thought.[57] NMFS must also consider that even behavioral disturbance can amount to a Level A take if it interferes with essential life functions. For example, TTS can impair reproductive success and fitness that would constitute harm or Level A harassment. Beaked whales are sensitive to noise, and it is not necessarily the auditory damage that causes the injury. Sounds cause beaked whales to change their behavior, including panic response and rapid surfacing, which results in an injury similar to decompression sickness ("the bends").[58]

Although the proposed IHA NMFS cites many studies that show low-frequency sounds in general and seismic surveys in particular can have significant behavioral impacts to marine mammals well below 160 dB,[59] NMFS nonetheless continues to rely upon a Level B harassment threshold of 160 dB. Additionally, in light of the best available science, NMFS cannot rationally defend its conclusion that the proposed survey will not lead to any Level A impacts and will have no more than negligible impacts on these species or stocks. As such, NMFS should modify its threshold estimates; this would in turn lead to larger exclusion zones around the survey and may significantly increase the estimated number of marine mammal takes incidental to the Proposed Project.

III. NMFS must take best available science and the precautionary principle into account.

Several experts in marine mammal bioacoustics have underscored our extremely limited understanding of the potential auditory and behavioral impacts to marine mammals from the use of seismic airguns and other sound-producing technologies. Darlene R. Ketten, a marine biologist and neuro-anatomist at the Woods Hole Oceanographic Institution, has written, "[a]t this time we have insufficient data to accurately predetermine the underwater acoustic impact for anthropogenic sources."[60] Other published scientists have noted, "[g]iven the current state of knowledge…the risk of seismic sources causing hearing damage to marine mammals cannot be dismissed as negligible."[61] Scientists have also commented on the variability in how a seismic source could affect a marine mammal based on the orientation of the source relative to

[57] See discussion in Wood, J., Southall, B.L. and Tollit, D.J. 2012. PG&E offshore 3-D Seismic Survey Project EIR – Marine Mammal Technical Draft Report. SMRU Ltd.; Marine Mammal Commission, Marine Mammals and Noise: A Sound Approach to Research Management, Report to Congress, at 46 (March 2007).

[58] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernandez, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D.C., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L. 2006. Understanding the impacts of anthropogenic sound on beaked whales. *Journal of Cetacean Resource Management* **7**: 177-187.

[59] 79 Fed. Reg. at 14787.

[60] Ketten, D.R. Marine Mammal Auditory Systems: A Summary of Audiometric and Anatomical Data and Implications for Underwater Acoustic Impacts. Polarforschung, 72. Jahrgung, Nr. 2/3, pp. 79-92.

[61] Gordon, J.C.D., Gillespie, D., Potter, J., Frantzis, A., Simmonds, M.P., Swift, R., and Thompson, D. 2004. A Review of the Effects of Seismic Survey on Marine Mammals. *Marine Technology Society Journal* **37**: 14-32.

the animal, which is not considered in the Proposed Project. A 2004 review paper on the effects of seismic surveys on marine mammals stated, "[m]arine mammals will be distributed in a variety of positions relative to a seismic array and the signal they receive may have a complicated and variable nature."[62] A study of the environmental implications of marine seismic surveys conducted in Australia published in 2000 concluded, "[i]t was believed slight differences in the orientations of receivers to each array, alignments and depths of array components and of functioning air guns within each array contributed to the measured differences. Again this exemplified the difficulty of predicting the received air gun level for a specific air gun array."[63]

Because of this high degree of uncertainty in our understanding of impacts to marine mammals from airgun sources, compounded by the variability in the level of impact based on the position of the source relative to a marine mammal, NMFS should be precautionary in its assessment of incidental takes. Precaution and use of the best available science are fundamental tenets of the Obama Administration's National Ocean Policy. One of the Principles in the 2010 Final Recommendations of the Interagency Ocean Policy Task Force report urges the use of best available science and the precautionary approach: "Decisions affecting the ocean…should be informed by and consistent with the best available science. Decision-making will also be guided by a precautionary approach as reflected in the Rio Declaration of 1992."[64] Responsible application of the precautionary principle to the NMFS IHA would reasonably have led to the denial of marine mammal takes incidental to the Proposed Project.

IV. NMFS's take estimates for marine mammals for which no population or stock data are available are speculative and may be significant underestimations.

The NMFS IHA acknowledges that "No known current regional population or stock abundance estimates for the northwest Atlantic Ocean are available for…eight…species under NMFS's jurisdiction that could potentially be affected by Level B harassment over the course of the IHA,"[65] and yet still determines that takes of these species will be negligible. These species include the Bryde's whale, Fraser's dolphin, spinner dolphin, Clymene dolphin, melon-headed whale, pygmy killer whale, false killer whale, and killer whale. NMFS has assigned take

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[62] Id.

[63] McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M-N., Penrose, J.P., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K. 2000. Marine seismic surveys – A study of environmental implications. *Appea Journal* 692-708.

[64] The White House Council on Environmental Quality. Final Recommendations Of The Interagency Ocean Policy Principle 15 of the Rio Declaration 1992 reads, "in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation."

[65] 79 Fed. Reg. at 35671.

estimates for these species based on old data or on population or stock abundance from other oceanic regions, without further indication of how these data were applied to the Proposed Project area. In total, takes of over 1,000 individuals from these eight species are authorized. In the absence of any data from the region in which the survey is to take place, it is not clear how these takes were assigned and what, if any, measures would be taken during the survey if it is determined that take numbers for these animals were significantly miscalculated.

V. Conclusion

For the reasons detailed above, Clean Ocean Action urges denial of the NMFS IHA. The Proposed Project threatens serious harm to numerous species of marine mammals and is therefore contrary to the goals, mandates, and prohibitions of the MMPA. Furthermore, a full EIS should be completed prior to the consideration of the IHA, to remedy issues of incomplete information, inadequate assessment of impacts, and insufficient evaluation of alternatives and mitigation measures. Importantly, the Proposed Project should not be conducted during the spring and summer months, which are the peak of marine mammal (and other marine species) feeding, breeding, and/or calving activity off the mid-Atlantic. Moreover, NMFS should ensure that best available science and regulatory review are incorporated into the EIS and IHA, require stronger mitigation measures, and consider different times of year for the Proposed Project.

Sincerely,

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