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Science and technology serving the sea

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Via Electronic Mail

Office of the Executive Secretariat and Regulatory Affairs
U.S. Department of the Interior
1849 C Street, NW
Washington, DC 20240

COMPLAINT OF VIOLATIONS OF THE U.S. DEPARTMENT OF THE INTERIOR'S POLICY ON THE INTEGRITY OF SCIENTIFIC AND SCHOLARLY ACTIVITIES

This Complaint[1] concerns violations of the U.S. Department of the Interior's Integrity of Scientific and Scholarly Activities Policy.[2] The violations are contained in two *Science Notes* articles[3] published by the Bureau of Ocean Energy Management and written by the Bureau's Chief Environmental Officer, Dr. William Yancy Brown. These articles violate the Department's Policy by (1) not communicating the results of scientific activities clearly, honestly, objectively, thoroughly, and accurately, (2) not clearly differentiating among facts, personal opinions, assumptions, hypotheses, and professional judgment, and (3) not fully disclosing the scientific methodology used, all relevant data and information, and the procedures for identifying and

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[1] Oceana and Ocean Conservation Research file this Complaint within sixty days of the publication of the March 9, 2015, *Science Notes* article, which republished and expanded on the August 22, 2014, *Science Notes* article.

[2] Department of the Interior, Department Manual Part 305: Department of Science Efforts, ch. 3 [hereinafter Department's Policy].

[3] William Y. Brown, *A Follow Up to our August 2014 Note: More on the Science Behind the Atlantic G&G Decision*, BOEM Science Notes, Mar. 9, 2015, http://www.boem.gov/BOEM-Science-Note-March-2015 (attached as Exhibit 1) [hereinafter *Science Notes* 2]; William Y. Brown, *The Science Behind the Decision: Answers to Frequently Asked Questions about the Atlantic Geological and Geophysical Activities Programmatic Environmental Impact Statement (PEIS)*, BOEM Science Notes, Aug. 22, 2014, http://www.boem.gov/BOEM-Science-Note-August-2014 (attached as Exhibit 2) [hereinafter *Science Notes* 1].

excluding faulty data. Both articles commit these violations, in part, by purporting to dismiss concerns about harm from seismic exploration activities without objectively and accurately describing what those concerns are and without objectively discussing the way in which the articles statements do, or do not, address those concerns. For example, the first *Science Notes* article on August 22, 2014, states, that "To date, there has been no documented scientific evidence of noise from air guns used in geologic and geophysical (G&G) seismic activities adversely affecting marine animal populations,"[4] without explaining the lack of relevant scientific studies of any sort on this precise question. On March 5, 2015, in a letter to the Bureau, seventy-five scientists state, "Opening the U.S. east coast to seismic airgun exploration poses an unacceptable risk of serious harm to marine life *at the species and population levels*, the full extent of which will not be understood until long after the harm occurs."[5] Ignoring the statements from the scientists' letter, the second March 9, 2015, *Science Notes* article reiterates the arguments from the August 22, 2014, *Science Notes* article.[6] The *Science Notes* articles have been quoted and misquoted by industry to communicate that seismic airguns have no adverse impacts on marine life, a point the articles appear to support, although that point is not supported by scientific evidence.[7] Oceana, Inc., and Ocean Conservation Research file this Complaint to seek withdrawal of the articles and other appropriate remedies to correct the misimpressions created by the articles.

SUMMARY

The Science Notes articles both violate the Department's Policy in a number of ways, which is particularly troubling because (1) both articles are ***Science*** Notes, (2) the author self-identifies as a ***scientist***, and (3) the articles emphasize the "benefits by getting the ***facts*** right."[8] Because of the articles' emphasis on ***science***, it is important that the articles strictly adhere to Department's Policy. The Department's Policy requires employees, scientists, scholars, and decision-makers to (1) "communicate the results of scientific activities clearly, honestly, objectively, thoroughly, [and] accurately"; (2) "clearly differentiate among facts, personal opinions, assumptions, hypotheses, and professional judgment in reporting the results of scientific activities and characterizing associated definable uncertainties, in using those results for decision making and in carrying out public information activities"; and (3) "fully disclose the scientific methodology

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[4] *Science Notes* 1, *supra* note 3.
[5] Letter from Christopher Clark et al. to President Barack Obama (Mar. 15, 2015), *available at* http://docs.nrdc.org/wildlife/files/wil_15030401a.pdf (emphasis added) (attached as Exhibit 3) [hereinafter Scientists' Letter].
[6] *Science Note* 2, *supra* note 3.
[7] *See infra* pages 15–22.
[8] *See, e.g., Science Notes* 1, *supra* note 3 (emphasis added).

used, all relevant data and information, and the procedures for identifying and excluding faulty data except where protected by law."[9]

Rather than stating the *facts*, the articles engage in advocacy, which in key places is artful and misleading. In its Programmatic Environmental Impact Statement for Atlantic Geological and Geophysical Surveying ("PEIS"), the Bureau estimates the annual take of marine mammals caused by acoustic impacts using two different models.[10] The Bureau did not choose between the models. Because the affected species are protected under the Endangered Species Act and the Marine Mammal Protection Act, and the agency must give the "benefit of the doubt"[11] to protected species, it is appropriate to rely on the more protective model, which estimates that, without mitigation,[12] seismic surveying could cause up to 138,000 injuries to marine mammals and up to 13.5 million behavioral disturbances to marine mammals.[13] These estimates include only acoustic harm from seismic surveying and do not include injuries, behavioral disturbances, or deaths from other non-acoustic sources.[14] However, in the PEIS, the Bureau concedes that the proposed seismic surveying activities could cause marine mammal deaths, particularly from ship strikes.[15]

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[9] Department's Policy, *supra* note 2, at 9–10.

[10] BOEM, *Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement, Acoustic Modeling and Marine Mammal Incidental Take Supplemental Tables* tbls. 42, 44 (2014) (attached as Exhibit 4). Unfortunately the PEIS does not present cumulative take figures, but rather fragments its take analyses in a way that conceals from the public the true anticipated impact of sound from the proposed seismic activity. Oceana input the data from the PEIS into a spreadsheet and summed up the total anticipated takes caused by sound from seismic surveying (attached as Exhibit 5).

[11] *See, e.g., Miccosukee Tribe of Indians of Fla. v. United States*, 566 F.3d 1257, 1267 (11th Cir. 2009).

[12] For a discussion of the inadequacy of the Programmatic Environmental Impact Statement's mitigation measures, see Comment from Michael Jasny et al., to Gary D. Goeke, BOEM (July 2, 2012) (attached as Exhibit 6) & Comment from Eric A. Bilsky et al., to Gary D. Goeke, BOEM (May 7, 2014) (attached as Exhibit 7).

[13] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.

[14] BOEM, *Appendix E in* BOEM, *Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement, Vol. 3* 222, E-1 to E-3 (2014), *available at* http://www.boem.gov/BOEM-2014-001-v3.

[15] BOEM, *Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement, Vol. 1* 2-40 (2014) ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").

Instead of relying on the only analysis that the Bureau has completed evaluating the effects of seismic surveying on marine mammals, the *Science Notes* articles state, "To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting animal populations."[16] This statement is incomplete and misleading in a number of ways:

- The statement omits the fact that there are no scientific studies evaluating population-level effects from sound impacts of seismic surveying on marine mammals.

- The statement omits the fact that no scientific studies show a *lack* of population-level effects from sound impacts of seismic surveying on marine mammals.

- The statement ignores the Bureau's own estimates that large numbers of marine mammals could be affected, including up to 138,000 marine mammals that could be injured and up to 13.5 million marine mammals that could experience behavioral disturbances.[17]

- The statement ignores the facts that (1) the death of *even one* North Atlantic right whale could jeopardize the survivability of the population,[18] (2) the Bureau concedes that

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Similarly, the Biological Opinion for Programmatic Geological and Geophysical Activities in the Mid- and South Atlantic Planning Areas from 2013 to 2020 recognizes that Atlantic seismic surveying activities could cause injuries and deaths of marine mammals, including critically endangered right whales, through ship strikes. NMFS, *Programmatic Geological and Geophysical Activities in the Mid- and South Atlantic Planning Areas from 2013 to 2020* at 158, 188 (2013), *available at* http://www.boem.gov/Final-Biological-Opinion-19-July-2013. However, the Programmatic Biological Opinion does not estimate the number of whales that "might be exposed to vessel traffic independent of the number of individuals that might be exposed to seismic and HRG surveys." *See, e.g.*, *id.* at 272 ("We did not estimate the number of blue whales that might be exposed to vessel traffic independent of the number of individuals that might be exposed to seismic and HRG surveys because the data we would have needed to support those analyses were not available."); *id.* at 275 (same for fin whales); *id.* at 277 (same for humpback whales); *id.* at 280 (same for North Atlantic right whales); *id.* at 283 (same for sei whales).

[16] *Science Notes* 1, *supra* note 3; *Science Notes* 2, *supra* note 3.

[17] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.

[18] NMFS, *Marine Mammal Stock Assessment Reports (SARs)* 10 (2013), *available at* http://www.nmfs.noaa.gov/pr/sars/2013/ao2013_rightwhale-west-atl.pdf [hereinafter NMFS, *2013 Stock Assessment*]; NMFS, *Draft Marine Mammal Stock Assessment Reports (SARs)* 8 (2015), *available at* http://www.nmfs.noaa.gov/pr/sars/draft.htm [hereinafter NMFS, *Draft 2015 Stock Assessment*].

seismic surveying activities could cause marine mammal deaths from ship strikes,[19] and (3) right whales are particularly prone to being struck by vessels.[20]

Further, the March 9, 2015, *Science Notes* article is misleading because it omits relevant data and information:

- The article completely ignores the North Atlantic right whale, even though the public has repeatedly expressed concern about right whales because the species is extremely vulnerable.[21] Instead, the article discusses one of the most abundant marine mammals in the Atlantic Ocean.[22]

- The article completely omits arguments from seventy-five scientists who state seismic surveying would likely have "significant, long-lasting and widespread impacts on the reproduction and survival of fish and marine mammal *populations* in the region."[23] In their letter, the scientists maintain, "Opening the U.S. east coast to seismic airgun exploration poses an unacceptable risk of serious harm to marine life *at the species and population levels*, the full extent of which will not be understood until long after the harm occurs."[24]

REQUESTED RELIEF

We request that the Bureau

1. Withdraw the March 9, 2015, and August 22, 2014, *Science Notes* articles;

2. Inform states reviewing geological and geophysical permit applications under the Coastal Zone Management Act that the agency is withdrawing the *Science Notes* articles and provide the reasons that the agency is withdrawing the articles;

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[19] BOEM, *supra* note 15, at 2-40 ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").
[20] NMFS, *Recovery Plan for the North Atlantic Right Whale Revision* IG-1, *available at* http://www.nmfs.noaa.gov/pr/pdfs/recovery/whale_right_northatlantic.pdf (August 2004).
[21] *See, e.g.*, Comment from Dr. Timothy J. Ragen, Executive Director of the Marine Mammal Commission, to Gary D. Goeke, BOEM, July 2, 2012 (attached as Exhibit 8); Comment from Michael Stocker, Director of Ocean Conservation Research, to Gary D. Goeke, BOEM, June 14, 2012 (attached as Exhibit 9); Comment from Michael Jasny et al., to Gary D. Goeke, BOEM (July 2, 2012); Comment from Eric A. Bilsky et al., to Gary D. Goeke, BOEM (May 7, 2014).
[22] *Science Notes* 2, *supra* note 3.
[23] Scientists' Letter, *supra* note 5 (emphasis added).
[24] *Id.* (emphasis added).

3. Inform the applicants for seismic exploration permits that the Bureau is withdrawing the *Science Notes* articles and instruct them not to quote information from the *Science Notes* in any applications, public materials, or documents produced;

4. Transmit to Oceana and Ocean Conservation Research copies of the letters informing the states and the seismic exploration applicants; and

5. Take any other necessary steps to correct the misimpressions created by the *Science Notes* articles.

LEGAL BACKGROUND

In his Presidential Memorandum on Scientific Integrity intended to address the abuses of science that took place in the prior Administration, President Barack Obama directed federal agencies to "ensur[e] the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes."[25] To comply with the President's policy, the Department of the Interior created a department-wide Scientific and Scholarly Integrity Policy.[26] The Department's Policy provides a code of conduct for employees, scientists, scholars, and decision-makers at the Department, including the following standards:

- "communicate the results of scientific activities clearly, honestly, objectively, thoroughly, accurately, and in a timely manner";[27]

- "clearly differentiate among facts, personal opinions, assumptions, hypotheses, and professional judgment in reporting the results of scientific activities and characterizing associated definable uncertainties, in using those results for decision making and in carrying out public information activities";[28] and

- "fully disclose the scientific methodology used, all relevant data and information, and the procedures for identifying and excluding faulty data except where protected by law."[29]

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[25] Memorandum from President Barack Obama to the Heads of Executive Departments and Agencies, Mar. 9, 2009, *available at* http://www.doi.gov/scientificintegrity/upload/Presidential-Memorandum-for-the-Heads-of-Executive-Departments-and-Agencies-3-9-09.pdf.
[26] Department's Policy, *supra* note 2.
[27] *Id.* at 9.
[28] *Id.* at 10.
[29] *Id.* at 11.

The Department's Policy provides a mechanism for the public to seek enforcement of these codes of conduct.[30] The public must file a complaint within sixty days of learning about a potential violation.[31]

PROCEDURAL HISTORY

On March 7, 2014, the Bureau released its PEIS, which includes estimates of annual takes of marine mammals caused by acoustic impacts using two different models.[32] However, the Bureau did not choose between the models. Because the affected species are protected under the Endangered Species Act and the Marine Mammal Protection Act, and the agency must give the "benefit of the doubt"[33] to protected species, it is appropriate to rely on the more protective model, which estimates that, without mitigation, seismic surveying could cause up to 138,000 injuries to marine mammals and up to 13.5 million behavioral disturbances to marine mammals.[34] The PEIS's estimates include injuries and behavioral disturbances only from acoustic harm from seismic surveying and do not include injuries, behavioral disturbances, or deaths caused by other non-acoustic sources.[35] However, in the PEIS, the Bureau concedes that the proposed seismic surveying activities could cause marine mammal mortalities, particularly from ship strikes.[36] On July 23, 2014, the Bureau published its Record of Decision ("ROD") on the PEIS.[37]

Prior to the release of the PEIS and ROD, the National Marine Fisheries Service issued its Biological Opinion on the Programmatic Geological and Geophysical Activities in the Mid- and South Atlantic Planning Area ("Programmatic Biological Opinion").[38] The Programmatic Biological Opinion also recognizes that the Atlantic seismic surveying activities could cause injuries and mortalities to marine mammals, including critically endangered North Atlantic right whales, through non-acoustic sources, such as ship strikes.[39] The Programmatic Biological Opinion states, "When the vulnerability of right whales to ship strikes is combined with the

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[30] *Id.* at 6.
[31] *Id.* at 7.
[32] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[33] *See, e.g.*, *Miccosukee Tribe of Indians of Fla.*, 566 F.3d at 1267.
[34] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[35] BOEM, *supra* note 14, at E-1 to E-3.
[36] BOEM, *supra* note 15, at 2-40 ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").
[37] BOEM, *Record of Decision: Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement (EIS)* 3 (2014); 80 Fed. Reg. 42,815, 42,815.
[38] NMFS, *supra* note 15.
[39] *Id.* at 158, 188.

density of ship traffic within the distribution of right whales, ship strikes seem almost inevitable."[40] But the Programmatic Biological Opinion does not estimate the number of whales that "might be exposed to vessel traffic independent of the number of individuals that might be exposed to seismic and HRG surveys."[41]

On August 22, 2014, the Bureau published a *Science Notes* article written by Dr. Brown, purportedly to address public concerns about the effects of seismic airgun surveying in the Atlantic Ocean. Rather than honestly and objectively addressing these concerns, including concerns about the effects of seismic surveying on critically endangered North Atlantic right whales, the article focuses on the lack of conclusive evidence of population-level effects. And the article disavows the estimates from the PEIS, stating, "We expect survey operators to comply with our requirements and, if they do, seismic surveys should not cause any deaths or injuries to the hearing of marine mammal or sea turtles."[42] Thus, the article undermines the Bureau's and the Fisheries Service's anticipation that survey vessels could strike and kill marine mammals. The article also undermines the Bureau's own estimates that, without mitigation, sound from seismic surveying could result in a large number of takes of marine mammals, comprised of up to 138,000 injuries to marine mammals, including up to nine injuries to right whales, and up to 13.5 million behavioral disturbances to marine mammals, including up to 950 behavioral disturbances to right whales.[43]

The article does not state any scientific basis for the claim that the mitigation measures would completely eliminate mortalities and injuries. Indeed, the article fails to cite any scientific study of the impacts of the mitigation measures. In contrast, comments from the public identified serious deficiencies in the mitigation measures which might keep them from being effective.[44] The article does not acknowledge these concerns.

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[40] *Id.*at 158.
[41] *See, e.g.*, *id.* at 272 ("We did not estimate the number of blue whales that might be exposed to vessel traffic independent of the number of individuals that might be exposed to seismic and HRG surveys because the data we would have needed to support those analyses were not available."); *id.* at 275 (same for fin whales); *id.* at 277 (same for humpback whales); *id.* at 280 (same for North Atlantic right whales); *id.* at 283 (same for sei whales).
[42] *Science Notes* 1, *supra* note 3.
[43] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[44] *See, e.g.*, Comment from Dr. Timothy J. Ragen, Executive Director of the Marine Mammal Commission, to Gary D. Goeke, BOEM, July 2, 2012; Comment from Michael Stocker, Director of Ocean Conservation Research, to Gary D. Goeke, BOEM, June 14, 2012; Comment from Michael Jasny et al., to Gary D. Goeke, BOEM (July 2, 2012); Comment from Eric A. Bilsky et al., to Gary D. Goeke, BOEM (May 7, 2014).

On September 25, 2014, Oceana staff met with Bureau officials, including Dr. Brown, to discuss the pending seismic exploration applications for surveying in the Atlantic Ocean. At this meeting, Oceana voiced its concerns about the *Science Notes* article and asked the Bureau to remove the article from its website.

On March 5, 2015, seventy-five leading marine scientists, including Dr. Andy J. Read, Stephen Toth Professor of Marine Biology for Duke University, and Dr. Chris Clark, Senior Scientist for Cornell University's Bioacoustic Research Program, submitted a letter expressing concern that Atlantic seismic surveys could compromise the health and habitat of marine mammals, fish, and marine invertebrates.[45] The scientists wrote that seismic surveying is likely to have "significant, long-lasting and widespread impacts on the reproduction and survival of fish and marine mammal *populations* in the region."[46] In their letter, the scientists maintain, "Opening the U.S. east coast to seismic airgun exploration poses an unacceptable risk of serious harm to marine life *at the species and population levels*, the full extent of which will not be understood until long after the harm occurs."[47]

On March 9, 2015, the Bureau released an updated *Science Notes* article written by Dr. Brown, again purporting to address public concern over the effects of seismic surveying on marine mammals. Again, the article focuses on the lack of conclusive evidence of population-level effects. The article again undermines the Bureau's anticipation that surveying vessels could strike and kill marine mammals[48] and undermines the estimates in its PEIS of large numbers of injuries and behavioral disturbances, stating, "It is also important to understand that BOEM does not expect that 138,000 individual marine mammals, or anything close to that number, will have their hearing injured by air guns if seismic surveys are permitted on the Atlantic Outer Continental Shelf."[49] The article does not mention the scientists' letter which states that seismic surveying is likely to affect the reproduction and survival of marine mammal populations. Instead, the updated version incorporates and quotes the previous *Science Notes* article, stating, "To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting animal populations."[50]

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[44] NMFS, *North Atlantic Right Whale: Western Atlantic Stock* (Dec. 2012), available at http://www.nmfs.noaa.gov/pr/pdfs/sars/ao2012whnr-w.pdf.
[45] Scientists' letter, *supra* note 5.
[46] *Id.* (emphasis added).
[47] *Id.* (emphasis added).
[48] BOEM, *supra* note 15, at 2-40 ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").
[49] *Science Notes* 2, *supra* note 3.
[50] *Id.*

One day later, Oceana staff again met with Bureau officials, including Dr. Brown, to discuss the pending seismic permit applications for the Atlantic Ocean, as well as the scientists' letter and the most recent version of the *Science Notes*. At this meeting, Oceana again voiced its concern about the *Science Notes* articles and requested that the agency withdraw the articles.

Meanwhile, seismic survey applicants and other supporters of offshore oil and natural gas exploration used the reasoning in the *Science Notes* articles to bolster their position. For example, Spectrum Geo, Inc.'s, application for federal consistency review in South Carolina stated, "[N]o mortalities or injuries of marine mammals or sea turtles are expected."[51] GX Technology, Co.'s, application for federal consistency review in South Carolina similarly concluded, "GXT personnel have observed no negative effects to marine mammals, sea turtles, or fishes."[52] CGG's application for federal consistency review in South Carolina stated there would be "minimal effects on marine mammals and sea turtles."[53] In TGS's application for federal consistency review in Georgia, the company concluded that there would only be minimal impacts through the duration of seismic surveys.[54] Perhaps the most egregious statement came from Ken Wells, the President of the International Association of Geophysical Contractors, at a North Carolina Department of Environment and Natural Resources meeting, where he said there would be "zero Level A takes for seismic surveys."[55]

DETAILED DISCUSSION OF VIOLATIONS

Oceana and Ocean Conservation Research submit this Complaint alleging violations of the Department's Policy in two *Science Notes* articles published by the Bureau and written by Dr. Brown. The articles violate these standards in a number of ways, including the following:

1. The March 9, 2015, *Science Notes* article is misleading, incomplete, and inaccurate because when discussing the take estimates from the PEIS, it fails to disclose all relevant information and fails to clearly differentiate facts from personal opinions and professional judgment.

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[51] Spectrum Geo Inc., *Consistency Certification for Spectrum Geo Inc. Atlantic 2D Geophysical Survey to South Carolina Department of Natural Resources* (Jan. 2015).
[52] GXT, *Coastal Zone Management Act Consistency Certification Necessary Data and Information* (Feb. 2015).
[53] CGG Services, Inc., *Certification of Consistency with the State of South Carolina Coastal Management Program* 3 (Feb. 3015).
[54] TGS, *TGS Consistency Certification and Supporting Information; Georgia OCM*1, 7, 9, 18, 20, 30 (Feb. 2015).
[55] NC DENR Meeting with BOEM, February 4, 2015. Compare this statement with the PEIS, which estimates that there could be up to 138,000 Level A takes. BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.

2. The March 9, 2015, *Science Notes* article is misleading when analyzing impacts because it emphasizes take estimates for an abundant species, the bottlenose dolphin, but fails to consider effects on vulnerable species, such as the North Atlantic right whale.

3. The March 9, 2015, *Science Notes* article is misleading because it ignores the scientists' letter, failing to disclose all relevant data and information.

4. Both *Science Notes* articles are misleading when arguing that there is no documented conclusive scientific evidence of noise from seismic activities adversely affecting animal populations.

A. The March 9, 2015, *Science Notes* Article Violates the Department's Policy by Inaccurately Discussing the Findings of the PEIS.

The March 9, 2015, *Science Notes* article violates the Department's Policy through its misleading, inaccurate, and incomplete discussion of the take estimates from the PEIS, failing to disclose all relevant information and failing to clearly differentiate facts from personal opinions and professional judgment. The Department's Policy requires clear, honest, objective, thorough, and accurate communications of the results of scientific activities; requires differentiation among facts, personal opinions, hypotheses, and professional judgment; and requires the full disclose of the scientific methodology used, all relevant data and information, and the procedures for identifying and excluding faulty data except where protected by law.[56] Here, the article violates these policies by undermining the models presented in the PEIS. The PEIS uses two models to estimate takes, but the Bureau did not choose between the models. Because the species affected are protected under the Endangered Species Act and the Marine Mammal Protection Act, and the agency must give the "benefit of the doubt"[57] to protected species, it is appropriate to rely on the more protective model, which estimates that, without mitigation, seismic activity could result in up to 138,000 marine mammal injuries and up to 13.5 million behavioral disturbances to marine mammals.[58] Rather than relying on the only analysis that the Bureau has conducted to evaluate marine mammal takes, the March 9, 2015, article states, "It is also important to understand that [the Bureau] *does not expect* that 138,000 individual marine mammals, *or anything close to that number*, will have their hearing injured by air guns if seismic surveys are permitted on the Atlantic Outer Continental Shelf."[59] The analysis in the PEIS is the only study that the Bureau has conducted to evaluate the effects of sound from seismic surveying on threatened and

[56] Department's Policy, *supra* note 2, at 11.
[57] *See, e.g., Miccosukee Tribe of Indians of Fla.*, 566 F.3d at 1267.
[58] *See* BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[59] *Science Notes* 2, *supra* note 3 (emphasis added).

endangered species, including marine mammals. The Bureau failed to conduct any studies estimating the degree to which mitigation measures would reduce the takes estimated by the PEIS models. The PEIS includes the only estimates that the public and the Bureau can rely upon to make conclusions about the effects airguns would have on marine mammals. Therefore, the March 9, 2015, *Science Notes* article violates the Department's Policy because it is misleading, inaccurately and incompletely discussing the results of the PEIS, not clearly differentiating among facts, personal opinions, assumptions, and professional judgment, and not fully disclosing all relevant data and information.

B. The March 9, 2015, *Science Notes* Article Violates the Department's Policy by Focusing on Impacts to Abundant Bottlenose Dolphins, Ignoring Impacts to Vulnerable Species.

The March 9, 2015, *Science Notes* article violates the Department's Policy through its misleading, inaccurate, and incomplete analysis of impacts due to its emphasis on takes of an abundant species, the bottlenose dolphin, and its failure to address relevant data and information about effects on vulnerable species, such as the North Atlantic right whale. The Department's Policy requires clear, honest, objective, thorough, and accurate communications of the results of scientific activities and requires the full disclosure of relevant data and information.[60] Here, the March 9, 2015, article fails to comply with both of these requirements.

Marine mammals with depleted populations are in particular danger of suffering population-level effects from seismic airguns. The North Atlantic right whale (*Eubalaena glacialis)* has a minimum population estimate of 455 individuals remaining.[61] There are only about 100–150 breeding-age females left.[62] As the Fisheries Service has repeatedly stated, "the loss of even a single individual [North Atlantic right whale] may contribute to the extinction of the species."[63] The Fisheries Service's 2013 and draft 2015 stock assessments for North Atlantic right whales provide a Potential Biological Removal rate of 0.9.[64] Potential Biological Removal is "the *maximum number* of animals, not including natural mortalities, *that may be removed* from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable

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[60] Department Policy, *supra* note 2, at 9–10.
[61] NMFS, *supra* note 44.
[62] *Id.*
[63] *See* 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. 60,173, 60,173 (Oct. 10, 2008); 72 Fed. Reg. 34,632, 34,632 (June 25, 2007); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001).
[64] NMFS, *2013 Stock Assessment*, *supra* note 18, at 10; NMFS, *Draft 2015 Stock Assessment*, *supra* note 18, at 8.

population."[65] In other words, ***even one*** North Atlantic right whale death caused by humans would have adverse population-level effects and jeopardize the survivability of the entire population. Current activities kill a minimum of 4.75 right whales each year, including 3.85 deaths from fishery entanglement and 0.9 deaths from ship strikes.[66] In the face of this evidence, the Bureau estimates that, without mitigation, sound from seismic activity could cause ***up to nine*** injuries to critically endangered North Atlantic right whales.[67] And as noted above,[68] this estimate does not include injuries or deaths from non-acoustic sources, even though the Bureau anticipates marine mammal deaths from ship strikes.[69] This anticipation is troubling because right whales are particularly susceptible to being struck by vessels.[70] As the Fisheries Service explains in its Programmatic Biological Opinion, "When the vulnerability of right whales to ship strikes is combined with the density of ship traffic within the distribution of right whales, ship strikes seem almost inevitable."[71] Thus, based on the information from the PEIS and the Programmatic Biological Opinion, it is reasonable to predict that seismic surveying vessels could strike and injure or kill at least one right whale. The PEIS also anticipates up to 950 behavioral disturbances—a number of disturbances more than twice the number of individuals in the population.[72] As discussed below[73] and in the scientists' letter,[74] behavioral disturbances can have significant effects on marine mammal species and populations.

Instead of addressing the troubling risk to vulnerable species, such as the right whale, the March 9, 2015, *Science Notes* article focuses on effects of sound from seismic surveying on an abundant species, stating, "[T]he highest numbers estimated for a particular species are those for the bottlenose dolphin, as noted above, and in its case the PEIS estimated potential for Level A takings of up to 11,748 individual bottlenose dolphins a year from air gun surveys and potential for up to 1,151,442 Level B takings."[75] The article completely ignores the most dangerous implications of airgun use in the Atlantic Ocean, the potential effects on vulnerable marine

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[65] NMFS, *Protected Resources Glossary*, *available at* http://www.nmfs.noaa.gov/pr/glossary.htm#p (last visited Apr. 14, 2015) (emphasis added).
[66] Waring et al., *Draft Marine Mammal Stock Assessment Reports* (2014), *available at* http://www.nmfs.noaa.gov/pr/sars/pdf/atl2014_draft.pdf.
[67] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[68] *See supra* page 3.
[69] BOEM, *supra* note 15, at 2-40 ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").
[70] NMFS, *Recovery Plan for the North Atlantic Right Whale* IG-1 (August 2004).
[71] NMFS, *supra* note 15, at 158.
[72] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[73] *See infra* pages 16–19.
[74] Scientists' Letter, *supra* note 5.
[75] *Science Notes* 2, *supra* note 3.

mammal populations, such as the North Atlantic right whale, which has been the subject of public comments.[76] Rather than discussing this relevant information, the article draws the public's attention away from the species with the most serious threat of population-level effects, instead focusing on a more abundant species.

Thus, by neglecting to discuss vulnerable species, such as the right whale, the March 9, 2015, *Science Notes* article is misleading, fails to honestly, objectively, thoroughly, and accurately discuss the effects of seismic surveying, and fails to disclose relevant data and information.

C. The March 9, 2015, *Science Notes* Article Violates the Department's Policy by Ignoring the Scientists' Letter.

The March 9, 2015, *Science Notes* article violates the Department's Policy by deceptively ignoring the letter from seventy-five leading scientists that expressed concern that Atlantic seismic surveys could compromise the health and habitat of marine mammal, fish, and marine invertebrate populations.[77] The Department's Policy requires clear, honest, objective, thorough, and accurate communications of the results of scientific activities; and requires the full disclose of all relevant data and information.[78] The scientists' letter argues that seismic surveying would likely have "significant, long-lasting and widespread impacts on the reproduction and survival of fish and marine mammal *populations* in the region."[79] The scientists explain that the Bureau's conclusion that seismic surveying would have negligible effects on marine species populations "is not supported by the best available science."[80] In their letter, the scientists maintain, "Opening the U.S. east coast to seismic airgun exploration poses an unacceptable risk of serious harm to marine life *at the species and population levels*, the full extent of which will not be understood until long after the harm occurs."[81] But, the article neither mentions nor addresses the arguments from the scientists' letter. The article simply states, "To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting animal populations."[82] It is misleading that the

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[76] *See, e.g.*, Comment from Dr. Timothy J. Ragen, Executive Director of the Marine Mammal Commission, to Gary D. Goeke, BOEM, July 2, 2012; Comment from Michael Stocker, Director of Ocean Conservation Research, to Gary D. Goeke, BOEM, June 14, 2012; Comment from Michael Jasny et al., to Gary D. Goeke, BOEM, July 2, 2012; Comment from Eric A. Bilsky et al., to Gary D. Goeke, BOEM, May 7, 2014.
[77] Scientists' Letter, *supra* note 5.
[78] Department's Policy, *supra* note 2, at 11.
[79] Scientists' Letter, *supra* note 5 (emphasis added).
[80] *Id.*
[81] *Id.* (emphasis added).
[82] *Id.*

article provides this conclusion without addressing seventy-five scientists' statement that seismic surveying would likely affect fish and marine mammal populations. Therefore, the March 9, 2015, *Science Notes* article violates the Department's Policy through its misleading omission of relevant information and its inaccurate and incomplete communication of the results of scientific activities.

D. Both *Science Notes* Articles Violate the Department's Policy When Arguing that There Is No Conclusive Scientific Evidence of Noise from Seismic Activities Adversely Affecting Animal Populations.

Both *Science Notes* articles violate the Department's Policy through their misleading and incomplete argument that "[t]o date, there has been no documented scientific evidence of noise from air guns used in geologic and geophysical (G&G) seismic activities adversely affecting animal populations."[83] The Department's Policy requires clear, honest, objective, thorough, and accurate communications of the results of scientific activities; and requires the full disclose of the scientific methodology used, all relevant data and information, and the procedures for identifying and excluding faulty data except where protected by law.[84] The articles violate these requirements in a number of ways. First, the *Science Notes* articles do not disclose that there are no population-level studies of seismic surveying airguns on marine mammals. Second, both articles inaccurately focus on population-level effects caused by marine mammal injuries and deaths, rather than the population-level effects resulting from behavioral disturbances. Third, the *Science Notes* articles do not explain that there has been no analysis of cumulative effects of seismic surveying on populations. Finally, both articles ignore evidence, including the vulnerability of certain marine mammal populations like the North Atlantic right whale, that suggests there would be population-level effects on marine mammals. Thus, the *Science Notes* articles violate the Department's Policy by failing to honestly, objectively, thoroughly, and accurately communicate the results of scientific activities and failing to disclose relevant data and information.

First, the *Science Notes* articles violate the Department's Policy by failing to mention the lack of scientific studies analyzing the population-level effects of seismic surveys on marine mammals. The articles' main argument is that there is no conclusive scientific evidence of effects from seismic surveying on animal populations. However, the articles do not explain that no population-level studies[85] analyzing the effects of seismic surveying on marine mammal

[83] *Science Notes* 1, *supra* note 3; *Science Notes* 2, *supra* note 3.
[84] Department's Policy, *supra* note 2, at 9–11.
[85] The March 9, 2015, article argues that the Bureau "has invested over $50 million on protected species and noise-related research including marine mammals." *Science Notes* 2, *supra* note 3. This statement implies that there has been intensive study of the effects of underwater noise on

populations exist. Given the absence of population-level studies, one would not expect to find scientific evidence of population-level effects from seismic surveying. The author surely recognized this fact, but did not acknowledge it in the articles. Further, the articles do not explain that no studies find no population-level effects from the sound impacts of seismic surveying. In failing to disclose these facts, while also concluding that the Bureau does not expect population-level effects from airguns, the articles are misleading and fail to fully discuss all relevant data and information.

Second, both articles focus on the population-level effects caused by individual injuries and deaths, ignoring the potential population-level effects caused by the massive number of anticipated behavioral disturbances to marine mammals. As the scientists' letter explains, "[T]he magnitude of the proposed seismic activity is likely to have significant, long-lasting, and widespread impacts on the reproduction and survival of fish and marine mammal *populations* in the region, including the critically endangered North Atlantic right whale."[86] The PEIS anticipates up to 13.5 million behavioral disturbances to marine mammals.[87] And, in their letter, the scientists state that "there are good reasons to consider this number a significant underestimate."[88] The PEIS also anticipates up to 950 behavioral disturbances to right whales—a number of disturbances more than twice the number of individuals in the population.[89] Simply looking at the considerable number of predicted behavioral disturbances, it is reasonable to conclude that the disturbances could cause population-level effects.

One significant effect of sound from seismic surveys is "masking"— that is, where one sound affects the perception of another sound. Even though the March 9, 2015, article concedes, "We know from studies by BOEM and others that marine mammals can react to sound, sometimes moving away and sometimes changing their vocalizations. One prominent concern is whether anthropogenic sounds may 'mask' communications between some marine mammals,"[90] this statement does not convey the potentially life-threatening implications of masking. Collective noise pollution from many sources interferes with marine mammals' ability to recognize or detect important sounds, a trait necessary for foraging, avoiding predators, and communication. For highly social and vocal creatures, such as marine mammals, communication between

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marine mammals. However, the Bureau spent this money over an eighteen-year period. And, the article does not describe any of the studies that the Bureau funded. Thus, this statement misleads the public into believing that relevant studies exist that found no effects from sound from seismic surveying on marine mammal populations.

[86] Scientists' Letter, *supra* note 5.
[87] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[88] Scientists' Letter, *supra* note 5.
[89] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[90] *Science Notes* 2, *supra* note 3.

individuals is necessary for survival. Baleen whales' hearing and vocalizations occur at low frequencies, and in the presence of both continuous and non-continuous low frequency noise pollution, their communication signals are more susceptible to acoustic masking.[91] One study analyzing how sound from airguns influence marine mammal masking demonstrated that "airgun sounds can lead to a significant loss in communication range for blue and fin whales."[92] Another study found, "Acoustic masking from anthropogenic sound sources is recognized as a threat to marine mammals, particularly low-frequency specialists such as the baleen whales, ... [and] rais[es] concerns that noise chronically influences the life histories of individuals and populations."[93] These studies highlight some of the many consequences that interferences with marine mammal communications can have on species and populations. The *Science Notes* articles ignore these studies, generating a misleading, inaccurate, and incomplete discussion of the effects of masking from seismic surveying on marine mammal individuals and populations.

Further, the article omits any discussion of how seismic surveying could disrupt other significant behaviors, including foraging, feeding, conspecific bonding, and migration. Even what the Marine Mammal Protection Act classifies as Level B Harassment, or behavioral disturbance,[94] can have significant effects on marine mammals, sometimes causing death.[95] For example, a

[91] C.W. Clark et al., *Acoustic Masking in Marine Ecosystems: Intuitions, Analysis, and Implication*, 395 Marine Ecology Progress Series 201 , 201–222 (2009).
[92] Ursula Siebert et al., *Assessment of Potential for Masking in Marine Mammals of the Antarctic Exposed to Underwater Sound from Airguns* (2014).
[93] C.W. Clark et al., *Acoustic Masking in Marine Ecosystems as a Function of Anthropogenic Sound Sources* (2009).
[94] The Marine Mammal Protection Act defines Level B Harassment as the "potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild." 16 U.S.C. § 1362; *see* 50 C.F.R. § 216.3.
[95] For example, a 2008 stranding of approximately one hundred melon-headed whales (*Peponocephala electra*) in the Loza Lagoon system off of Madagascar resulted in at least seventy-five mortalities. Brandon Southall et. al, *Final Report of the Independent Scientific Review Panel Investigating the Potential Contributing Factors to a 2008 Mass Stranding of Melon-headed Whales (Peponocephala electra) in Antsohihy*, *Madagascar* (2013), *available at* https://iwc.int/private/downloads/4b0mkc030sg0gogkg8kog4o4w/Madagascar%20ISRP%20FINAL%20REPORT.pdf. One behavioral disturbance, the whales' relocation to avoid the sound, caused the mass standing and mass deaths. *Id.* The "[m]ost plausible and likely initial behavioral trigger for animals stranding and entering lagoon system" was an intense acoustic event caused by sound from another technology for oil and gas exploration, a multibeam echosounder system. *Id.* at 51. This example shows that even one behavioral disturbance can have significant, and sometimes deadly, effects.

number of studies found serious effects from behavioral disturbances which, depending on other impacts and the vulnerability of the particular population, should be taken seriously, but were not addressed in any way in the *Science Notes* articles:

- One study indicated that seismic surveys taking place for only eleven days in the Mediterranean Sea caused behavioral modifications for fin whales (*Balaenoptera physalus*).[96] During the seismic surveys, scientists found a sharp decline in the number of detected and received fin whale song notes, which demonstrates that fin whale singers moved away from the seismic airgun source and were rarely detected again until fourteen days after the end of the seismic survey.[97] The study's results reveal that fin whale songs changed to compensate for the masking effects of increased background noise from airguns, which cost the animals energy.[98] Relocating and potential decreased reproductive and foraging opportunities also cost the animals energy.[99] The studied seismic survey consisted of one relatively small array with only nine airguns, a total capacity of 1395 cubic inches at 120 µBar, that lasted only eleven days.[100] Given that the proposed surveys in the Atlantic Ocean will be much larger[101] and running concurrently with other surveys, it stands to reason that the Atlantic survey plans could create significant acoustic obstacles for North Atlantic right whales and any other baleen whales that would be feeding, migrating, or otherwise inhabiting the surveying area.

- Another study analyzing effects of seismic activities on humpback whales off the coast of Angola found potentially damaging effects on the whales.[102] As the level of seismic survey pulses increased, the number of humpback whale singers significantly decreased, which is particularly troubling because humpback whales use songs for breeding displays, and the songs play a very important role in breeding strategy.[103] The study suggested that a disruption of this breeding display or displacement of breeding males

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[96] M. Castellote et al., *Acoustic and Behavioural Changes in Fin Whales (*Balaenoptera physalus*) in Response to Shipping and Airgun Noise*, 147 Biological Conservation 115, 115–22 (2012).
[97] *Id.*
[98] *Id.*
[99] *Id.*
[100] *Id.*
[101] *E.g.*, TGS with 4,808 cubic inches main array of 40 airguns and a 1202 cubic inches array of 4 airguns operating at 2,000 psi; ION GeoVentures with 6,420 cubic inches main array of 36 airguns and a 1605 cubic inches subarray of 4 airguns operating at 2,000 psi; Spectrum Geo with 4,920 cubic inches main array of 32 airguns operating at 2,000 psi.
[102] S. Cerchioet al., *Seismic Surveys Negatively Affect Humpback Whale Singing Activity off Northern Angola*, 9 PLoS ONE e86464 (2014).
[103] *Id.*

> could have significant adverse impacts on individual males by adversely affecting their chances to breed.[104] The study found that ultimately "this could translate into adverse impacts at the population level."[105]

Given these studies, the *Science Notes* articles' characterization of marine mammal effects from sound is misleading, incomplete, and inaccurate because there is good reason to believe that behavioral disturbances from seismic surveying would have population-level effects on marine mammals.

Third, the *Science Notes* articles do not fully disclose all relevant data and information because they do not explain that the PEIS only analyzed effects from individual seismic surveys, without consideration of other concurrent anthropogenic sound sources that are major marine noise sources, including shipping, concurrent geophysical and geological seismic surveys in overlapping areas, seismic surveys conducted for scientific research purposes, and various military activities.[106] Each sound source can have unique and profound impacts and, when analyzed cumulatively, pose serious harm to marine life and habitat. For example, vessel traffic is the predominant source of human-generated noise in the coastal waters of the eastern United States, creating loud and far-reaching sounds that can harm a variety of marine species.[107] Several species of marine mammals demonstrate behavioral and physiological changes due to increased background noise.[108]

Further, the Bureau's proposed seismic surveying activity would not be the only seismic survey occurring in the Mid- and South Atlantic region. For instance, the U.S. Geological Survey conducted seismic surveys from August to September 2014, and will perform surveys April to

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[104] *Id.*
[105] *Id.* at 9.
[106] M.P. Simmonds et al., *Marine Noise Pollution—Increasing Recognition but Need for More Practical Action*, 9 J. Ocean Technology 71, 71–90 (2014).
[107] L. Hatch et al., *Characterizing the Relative Contributions* of *Large Vessels to Total Ocean Noise Fields: A Case Study using the Gerry E. Studds Stellwagen Bank National Marine Sanctuary*, 42 Envtl. Mgmt. 735, 735–52 (2008).
[108] *See, e.g.*, S.E. Parks et al., *Short- and Long-term Changes in Right Whale Calling Behavior: The Potential Effects of Noise on Acoustic Communication* (2007); R.M. Rolland et al., *Evidence that Ship Noise Increases Stress in Right Whales*, 279 Proceedings of the Royal Society Biological Sciences 2363, 2363–68 (2012); C.W. Clark et al., *Acoustic Masking in Marine Ecosystems: Intuitions, Analysis, and Implication*, 395 Marine Ecology Progress Series 201, 201–22 (2009); R.M. Rolland et al., *Evidence that Ship Noise Increases Stress in Right Whales*, 279 Proceedings of the Royal Society Biological Sciences 2363, 2363–68 (2012).

August 2015.[109] The Fisheries Service estimated that these activities could cause up to 19,428 disruptions of marine mammal behavior, "including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."[110]

Naval sonar activities in the Atlantic Ocean may also cause significant harm to marine life.[111] There are multiple naval sonar activities in the Atlantic Ocean. For example, the U.S. Navy conducts training activities off the East Coast that could lead to "sonar, underwater detonations, and ship strike[s]" which "are the stressors most likely to result in impacts on marine mammals."[112] The Fisheries Service estimates that this Navy sonar activity could cause up to eleven mortalities of small *Odontoceti*, up to 375 marine mammal injuries, and up to 2.4 million marine mammal behavioral disturbances.[113] The U.S. Marine Corps also operates training exercises at the Marine Corps Air Station Cherry Point Range Complex located within Pamlico Sound, North Carolina, which could cause behavioral disturbances for 1,615 and injure 165 Atlantic bottlenose dolphins.[114]

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[109] NMFS, 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, 79 Fed. Reg. 52,122 (Sept. 2, 2014).

[110] *Id.* at 52,157, 52,159–60 (Sept. 2, 2014). The Incidental Harassment Authorization for the U.S. Geological Survey's seismic activities unfortunately does not provide a cumulative number of marine mammal harassments. Oceana computed the total number by imputing the data from the Authorization into an Excel spreadsheet and summing the numbers. *See* attached Exhibit 10.

[111] *See, e.g.*, E.C.M. Parsons et al., *Navy Sonar and Cetaceans: Just How Much Does the Gun Need to Smoke Before We Act?*, 56 *Marine Pollution Bulletin* 1248, 1248–57 (2008); M.P. Simmonds & L.F. Lopez-Jurado, *Whales and the Military*, 351 Nature 448 (1991); P. Van Bree & I. Kristensen, *On the Intriguing Stranding of Four Cuvier's Beaked Whales*, Ziphius cavirostris G. Cuvier, *1823, on the Lesser Antillean Island of Bonaire*, 44 Bijdragen tot de Dierkunde 235, 235–38 (1974); A. Frantzis, *Does Acoustic Testing Strand Whales?*, 392 Nature 29, 29 (1998); K.C. Balcomb III & D.E. Claridge, *A Mass Stranding of Cetaceans Caused by Naval Sonar in the Bahamas*, 8 Bahamas J. Science 2, 2–12 (2001); A. Fernández et al., *Whales: No Mass Strandings Since Sonar Ban*, 497 Nature 317, 317 (2013); International Whaling Commission, *Report of the Scientific Committee*, 6 J. Cetacean Res. Manage.(Suppl.) 1, 1–60 (2004); International Whaling Commission, *Report of the Scientific Committee* (2014).

[112] NMFS, Takes of Marine Mammals Incidental to Specified Activities; U.S. Navy Training and Testing Activities in the Atlantic Fleet Training and Testing Study Area, 78 Fed. Reg. 73,009, 73,011 (Dec. 4, 2013), *available at* https://www.federalregister.gov/articles/2013/12/04/2013-27846/takes-of-marine-mammals-incidental-to-specified-activities-us-navy-training-and-testing-activities.

[113] *Id.* at 73,052.

[114] NMFS, *Letter of Authorization Taking Marine Mammals Incidental to U.S. Marine Corps Training Exercises at Brant Island Bombing Target and Piney Island Bombing Range, USMC*

The *Science Notes* articles do not account for these sound sources and their ability to create additional cumulative effects, which could lead to additional pressures on marine mammal species and populations. The Bureau's PEIS does not include a sufficient analysis of cumulative impacts, which renders its analysis incomplete and inaccurate. The discussion in the *Science Note* articles lacks sufficient analysis of the array of acoustic activities that can harm marine life, specifically marine mammals, and thus fails to fully disclose all relevant data and information.

Finally, both articles ignore the extreme vulnerability of certain marine mammal populations, particularly the North Atlantic right whale. As explained above, the North Atlantic right whale is critically endangered, and the death of ***one*** right whale from human activity could put the population at risk.[115] However, current activities kill a minimum of 4.75 right whales each year, including 3.85 deaths from fishery entanglement and 0.9 deaths from ship strikes.[116] The Programmatic Biological Opinion concedes, "When the vulnerability of right whales to ship strikes is combined with the density of ship traffic within the distribution of right whales, ship strikes seem almost *inevitable*."[117] As noted above,[118] in the PEIS, the Bureau anticipates marine mammal deaths from ship strikes,[119] but provides take estimates only for injuries and behavioral disturbances caused by sound from seismic surveying.[120] The Bureau estimates that, without mitigation, sound from seismic activity could cause ***up to nine*** injuries to critically endangered North Atlantic right whales.[121] Moreover, the PEIS anticipates ***up to 950*** behavioral disturbances caused by sound from seismic surveying—a number of disturbances more than twice the number of individuals in the population.[122] As explained above,[123] behavioral disturbances can cause significant harm to marine mammals. Because of the extreme vulnerability of the right whale population, if seismic surveying activities cause even one right whale death, then the entire population could be jeopardized.

Cherry Point Range Complex, North Carolina (March 2015), *available at* http://www.nmfs.noaa.gov/pr/permits/incidental/military/usmc_pamlico_loa_signed.pdf.
[115] NMFS, *supra* note 44.
[116] Waring et al., *supra* note 66.
[117] NMFS, *supra* note 15, at 158 (emphasis added).
[118] *See supra* pages 3.
[119] BOEM, s*upra* note 15, at 2-40 ("There is a potential risk that survey vessels could strike and injure or kill marine mammals.").
[120] BOEM, *supra* note 14.
[121] *See* BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[122] BOEM, *supra* note 10, at tbls. 42, 44; *see also* note 10.
[123] *See supra* pages 16–19.

Therefore, the *Science Notes* articles violate the Department's Policy by failing to honestly, objectively, thoroughly, and accurately communicate the results of scientific activities and by failing to disclose all relevant data and information.

CONCLUSION

The March 9, 2015, and the August 22, 2014, *Science Notes* articles violate three major pillars of the Department's Policy through their misleading, incomplete, and inaccurate communications about scientific activities, through their failure to differentiate among facts, assumptions, opinions, and professional judgments, and through their omission of relevant data and information. In particular, the *Science Notes* articles violate these standards in the following ways:

1. The March 9, 2015, *Science Notes* article is misleading, incomplete, and inaccurate because when discussing the take estimates from the PEIS, it fails to disclose all relevant information and fails to clearly differentiate facts from personal opinions and professional judgment.

2. The March 9, 2015, *Science Notes* article is misleading when analyzing impacts because it emphasizes take estimates for an abundant species, the bottlenose dolphin, but fails to consider effects on vulnerable species, such as the North Atlantic right whale.

3. The March 9, 2015, *Science Notes* article is misleading because it ignores the scientists' letter, failing to disclose all relevant data and information.

4. Both *Science Notes* articles are misleading when arguing that there is no documented conclusive scientific evidence of noise from seismic activities adversely affecting animal populations.

To comply with the Department's Policy, the Bureau must withdraw the August 22, 2014, and March 9, 2015, *Science Notes* articles and issue a statement explaining its rationale. The Bureau must inform states reviewing geological and geophysical permit applications under the Coastal Zone Management Act that the agency is withdrawing the *Science Notes* articles and provide the reasons that the agency is withdrawing the articles. The agency must inform applicants for seismic exploration permits that the Bureau is withdrawing the *Science Notes* articles and instruct them not to quote information from the articles in any applications, public materials, or documents produced. The Bureau must transmit to Oceana and Ocean Conservation Research copies of the letters informing the states and the seismic exploration applicants. And the agency must take any other necessary steps to correct the misimpressions created by the *Science Notes* articles.

Respectfully submitted,

Claire Douglass
Campaign Director: Climate and Energy
Oceana, Inc.

Michael Stocker
Director
Ocean Conservation Research

EXHIBIT 1

BOEM
Bureau of Ocean Energy Management

SCIENCE NOTES

Applied science for informed decision making

March 9, 2015

Dear Reader:

In August 2014, BOEM published a *Science Note* addressing a few fundamentals about impacts of seismic air gun surveys on marine mammal populations. The surveys are used to characterize sub-seabed geology, including oil and gas resources but are also used for our marine minerals program and renewable energy. One sentence in the *Science Note* has generated some dialogue: "To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting animal populations."

BOEM's conclusion regarding the impact of these surveys is in stark contrast with public statements citing BOEM research and asserting that many thousands of marine mammals will be killed or injured through these surveys. For example, one web posting states that "Seismic air gun testing currently being proposed in the Atlantic will injure 138,000 whales and dolphins and disturb millions more, according to government estimates." This characterization of our conclusion, however, is not accurate; that is actually not what we estimate. I hope that providing background and discussion on BOEM's conclusion and the numbers may help those who follow this issue to understand our position. I'll begin with an overview of a few key legal terms.

Terms of the Marine Mammal Protection Act (MMPA)

Three MMPA terms are key to this conversation. First, a "take" of a marine mammal under the MMPA is defined as follows: "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." The MMPA defines the term "harassment" to mean

> "[A]ny act of pursuit, torment, or annoyance which - (i) has the potential to injure a marine mammal or marine mammal stock in the wild [referred to in the MMPA as 'Level A harassment']; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [referred to in the MMPA as 'Level B harassment']." MMPA Sec. 3 (18).

In other words, a "take" can mean an act that kills or injures a marine mammal, but it can also mean an act that does no more than have the potential to disturb a marine mammal.

Second, it is important to recognize that the MMPA prohibits the take of marine mammals as a result of permitted activities - referred to in the statute as "incidental take" -- unless that take will have no more than "negligible impact." In particular, section 101 (5) of the MMPA prohibits incidental "taking" of a marine mammal, including Level A and Level B harassment, unless the Secretary of Commerce, acting through the National Oceanic and Atmospheric Administration (NOAA), determines that the taking will have no more than "negligible impact" on the species or stocks affected. NOAA regulations define negligible impact to mean "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." By definition, then, the impact analysis is measured on the "species or stock," not on an individual animal.

Our bureau has stated publicly that it will not consider issuing any air gun seismic survey permits in the Atlantic unless applicants have first obtained an MMPA authorization from NOAA, including the required finding of no adverse effect on marine mammal species or stocks.

"Optimum sustainable population" or OSP is a third key MMPA concept. Obtaining optimum sustainable populations is a stated goal of the MMPA, and OSP is defined by the statute to mean, "with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." OSP is about populations, not individuals.

No Documented Scientific Evidence of Adverse Effects on Population Sustainability

With these three terms in mind, it is critically important to understand that BOEM's conclusion in our August 2014 *Science Note, and* its *Programmatic Environmental Impact Statement (PEIS),* refers to effects on population sustainability, rather than effects on individual animals. We know from studies by BOEM and others that marine mammals can react to sound, sometimes moving away and sometimes changing their vocalizations. One prominent concern is whether anthropogenic sounds may "mask" communications between some marine mammals. However, as BOEM concluded in the PEIS, and reiterated in the 2014 *Science Note*, potential links between these effects and the sustainability of species or stocks have not been demonstrated. For example, because of its abundance, the bottlenose dolphin heads the class in number of potential exposures to air gun sound levels with potential effects on behavior. Yet Federal stock assessments for the dolphin do not identify air gun seismic surveys as adversely impacting stock sustainability in the Gulf of Mexico, where air gun surveys are routine.

It is also important to understand that BOEM does not expect that 138,000 individual marine mammals, or anything close to that number, will have their hearing injured by air guns if seismic surveys are permitted on the Atlantic Outer Continental Shelf. BOEM published numbers for potential air gun survey "takings" of marine mammals in its PEIS. The highest numbers estimated for a particular species are for the bottlenose dolphin, as noted above, and in its case the PEIS estimated potential for Level A takings of up to 11,748 individual bottlenose dolphins a year from air gun surveys and potential for up to 1,151,442 Level B takings. But the number of modeled "takes" in the PEIS is by design highly over-estimated to err on the side of protection, and it does not consider key mitigation measures that will be required to prevent "taking." One such requirement, for example, is that seismic survey vessels maintain "exclusion zones" around vessels whose boundaries are set to avoid any injury to marine mammal hearing. If a marine mammal enters the zone, or appears on a course to enter, trained observers call for immediate shut down of the air guns until the animals are clear of the area. Therefore, even those numbers included in the PEIS are far in excess of those takes we anticipate, given the mitigation measures that will be employed.

Need for More Research

A final point warrants mention. BOEM does not and should not assume that lack of evidence for adverse population-level effects of air gun surveys means that those effects may not occur. What we know is a function of the effort and intelligence put into evaluating effects as well as what is actually happening in nature. Since 1998, BOEM has invested over $50 million on protected species and noise-related research, including marine mammals. We have also convened workshops for acoustic experts to help us identify questions for future research. But BOEM needs to keep looking -- hard and well -- for adverse effects of offshore oil and gas activities on the environment, including sound. And we have asked our environmental studies program to make this a priority.

I'll conclude by noting that BOEM's 2014 *Science Note* has been cited publicly by both industry and environmental NGOs alike in presenting their respective positions on seismic surveys. BOEM is responsible for providing environmental safeguards in development of offshore resources, and our Science Note was intended to help the public understand our thinking on that task. I hope this follow-on *Science Note* is a helpful explanation.

As always, your feedback is important to us, so please feel free to contact us.

Sincerely,

William Y. Brown

Chief Environmental Officer, Bureau of Ocean Energy Management

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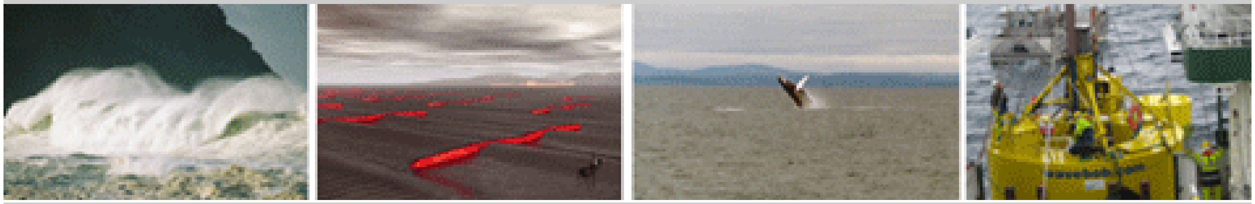
The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection and economic development through responsible, science-based management of offshore conventional and renewable energy resources.

EXHIBIT 2



BOEM
Bureau of Ocean Energy Management

SCIENCE NOTES

Applied science for informed decision making

August 22, 2014

Dear Reader:

It has been just over a month since BOEM released a Record of Decision -- or ROD -- on the Mid- and South Atlantic Geological and Geophysical (G&G) Activities Programmatic Environmental Impact Statement, or PEIS for short. And there's been a lot of attention on both sides of this complex issue. I wanted to take some time to clear up a few misperceptions about the bureau's decision and what it means.

As a scientist who has spent a good part of my career working in non-governmental environmental organizations and in industry, I understand and appreciate advocacy. At the same time, I believe that everyone benefits by getting the facts right.

BOEM has the legal responsibility to protect marine species and ecosystems from harm by the energy exploration and development which we regulate, and that is a responsibility which I embrace without reservation. Since 1998, BOEM has partnered with academia and other experts to invest more than $50 million on protected species and noise-related research. The bureau has provided critical studies on marine mammals, such as researching seismic survey impacts on sperm whales, and BOEM has conducted many expert stakeholder workshops to discuss and identify information needs on acoustic impacts in the ocean.

As noted below, the bureau's decision requires a set of protective measures that will be used in site-specific permits for any future G&G activities in the Atlantic. BOEM will conduct site-specific environmental reviews for any permit applications. These reviews will include coordination and consultation with federal, state and tribal authorities under a variety of additional statutory requirements. In particular, any "taking" of a marine mammal requires authorization from the National Oceanic and Atmospheric Administration, or NOAA, separately from BOEM, and that authorization requires NOAA to find that there is no more than "negligible impact" and no adverse effects on marine mammal species or stocks.

Below, please find our latest edition of *Science Notes* that I hope will help to clarify the facts on BOEM's recent decision and the science behind it. As always, your feedback is important to us, so please feel free to contact us at boempublicaffairs@boem.gov.

Sincerely,

William Y. Brown

Chief Environmental Officer, Bureau of Ocean Energy Management

The Science Behind the Decision

Answers to Frequently Asked Questions about the Atlantic Geological and Geophysical Activities Programmatic Environmental Impact Statement (PEIS)

Will air guns used in seismic surveys kill dolphins, whales and sea turtles and ruin coastal communities?


Bottlenose dolphin from the Atlantic AMAPPS study.

To date, there has been no documented scientific evidence of noise from air guns used in geological and geophysical (G&G) seismic activities adversely affecting marine animal populations or coastal communities. This technology has been used for more than 30 years around the world. It is still used in U.S. waters off of the Gulf of Mexico with no known detrimental impact to marine animal populations or to commercial fishing.

While there is no documented case of a marine mammal or sea turtle being killed by the sound from an air gun, it is possible that at some point where an air gun has been used, an animal could have been injured by getting too close. Make no mistake, airguns are powerful, and protections need to be in place to prevent harm. That is why mitigation measures -- like required distance between surveys and marine mammals and time and area closures for certain species -- are so critical.

Is it true that the air guns are 100,000 times louder than a jet, and if so, won't they kill or deafen marine life?

A large air gun is loud, although it is not 100,000 times louder than a jet. Measured comparably in decibels, an air gun is about as loud as one jet taking off. Scientists who specialize in acoustics confirm that sounds in water and sounds in air that have the same pressures have very different intensities (which is a measure of energy produced by the source) because the density of water is much greater than the density of air, and because the speed of sound in water is much greater than the speed of sound in air. For the same pressure, the higher density and higher speed make sound in water less intense than sound in air.

We do not know what a whale, dolphin, or turtle actually experiences when it hears an air gun. Many marine mammal species -- but not the baleen whales including North Atlantic right whales -- have reduced sensitivity to sound signals that are in the same frequency range as airplanes and air gun arrays. Some whales appear to move away from surveys, indicating that they probably don't like the noise, but bottlenose dolphins have often been observed swimming toward surveying vessels, and ride bow waves along the vessels.

Is it true that the government's own scientists expect 100,000 injuries or deaths of marine life if seismic surveys go forward?

This statement misrepresents the facts. When our scientists began to look at possible impacts of seismic surveys, they first looked at what might happen if no measures were taken to mitigate or avoid possible injury to marine mammals. Next they began to look at what could be done to avoid harm, such as avoiding migration routes and stopping surveys if vessels get close enough to marine mammals to possibly injure their hearing.

After a thorough, public process, the Department selected a preferred alternative that included the most restrictive mitigation measures that would allow surveys to take place. We expect survey operators to comply with our requirements and, if they do, seismic surveys should not cause any deaths or injuries to the hearing of marine mammal or sea turtles.

Another source of confusion is about what a "take" is. As defined by Federal law, a "take" of a marine mammal, unsurprisingly, includes causing its death. However "take" also includes not only injury to hearing but also any disturbance to an animal that may disrupt its behavior. BOEM has published numbers of potential "takes," and the highest numbers are based on potential for behavioral effects, such as temporarily leaving survey areas. These behavioral effects have not been linked to negative impacts on populations. In fact, the same Federal law defining "take" of a marine mammal prohibits all taking unless the NOAA has determined that the taking will have no more than "negligible impact" and no adverse effects on marine mammal species or stocks.

BOEM cannot authorize air gun surveys which "take" marine mammals unless the surveys are also authorized by NOAA and meet this requirement. BOEM also consulted with both NOAA and the U.S. Fish and Wildlife Service under the Endangered Species Act to develop mitigations that would limit any potential impacts to endangered and threatened species, including baleen whales and sea turtles.

Does this decision mean that the federal government is opening the entire Atlantic coast up for offshore oil and gas drilling?

The decision to authorize G&G activities for all three program areas (oil and gas, renewable energy and marine minerals) does not authorize leasing for oil and gas exploration and development in the Atlantic. Those decisions will be addressed through the development of the next Five Year Program for oil and gas leasing. BOEM is at the beginning of the process to develop that program pursuant to the Outer Continental Shelf Lands Act. The planning process will take two-and-a-half to three years to complete and will offer many opportunities for the public to provide input.

Completion of the PEIS and BOEM's selection of the strongest environmental alternative and its documentation in the decision (ROD) do not themselves authorize any specific activities. Nor does this make any decision about future leasing.

The bureau's decision requires a set of protective measures that will be used in site-specific permits for any future G&G activities in the Atlantic. BOEM will conduct site-specific environmental reviews for any permit applications. These reviews will include coordination and consultation with federal, state and tribal authorities under a variety of additional statutory requirements. In particular, any "taking" of a marine mammal requires authorization from NOAA, separately from BOEM, and that authorization requires NOAA to find that there is no more than "negligible impact" and no adverse effects on marine mammal species or stocks.

Click here for the fact sheet on Atlantic G&G Surveys Record of Decision.

- BOEM -

The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection and economic development through responsible, science-based management of offshore conventional and renewable energy resources.

EXHIBIT 3

Dear Mr. President:

We, the undersigned, are marine scientists united in our concern over the introduction of seismic oil and gas exploration along the U.S. mid-Atlantic and south Atlantic coasts. This activity represents a significant threat to marine life throughout the region.

To identify subsea deposits, operators use arrays of high-volume airguns, which fire approximately every 10-12 seconds, often for weeks or months at a time, with sound almost as powerful as that produced by underwater chemical explosives. Already nine survey applications covering the entirety of the region several times over have been submitted within the past six months, including multiple duplicative efforts in the same areas. In all, the activities contemplated by the Interior Department would result in more than 20 million seismic shots.

Airgun surveys have an enormous environmental footprint. For blue and other endangered great whales, for example, such surveys have been shown to disrupt activities essential to foraging and reproduction over vast ocean areas. Additionally, surveys could increase the risk of calves being separated from their mothers, the effects of which can be lethal, and, over time, cause chronic behavioral and physiological stress, suppressing reproduction and increasing mortality and morbidity. The Interior Department itself has estimated that seismic exploration would disrupt vital marine mammal behavior more than 13 million times over the initial six-to-seven years, and there are good reasons to consider this number a significant underestimate.

The impacts of airguns extend beyond marine mammals to all marine life. Many other marine animals respond to sound, and their ability to hear other animals and acoustic cues in their environment are critical to survival. Seismic surveys have been shown to displace commercial species of fish, with the effect in some fisheries of dramatically depressing catch rates. Airguns can also cause mortality in fish eggs and larvae, induce hearing loss and physiological stress, interfere with adult breeding calls, and degrade anti-predator response: raising concerns about potentially massive impacts on fish populations. In some species of invertebrates, such as scallops, airgun shots and other low-frequency noises have been shown to interfere with larval or embryonic development. And threatened and endangered sea turtles, although almost completely unstudied for their vulnerability to noise impacts, have their most sensitive hearing in the same low frequencies in which most airgun energy is concentrated.

The Interior Department's decision to authorize seismic surveys along the Atlantic coast is based on the premise that these activities would have only a negligible impact on marine species and populations. Our expert assessment is that the Department's premise is not supported by the best available science. On the contrary, the magnitude of the proposed seismic activity is likely to have significant, long-lasting, and widespread impacts on the reproduction and survival of fish and marine mammal populations in the region, including the critically endangered North Atlantic right whale, of which only 500 remain.

Opening the U.S. east coast to seismic airgun exploration poses an unacceptable risk of serious harm to marine life at the species and population levels, the full extent of which will not be understood until long after the harm occurs. Mitigating such impacts requires a much better understanding of cumulative effects, which have not properly been assessed, as well as strict, highly precautionary limits on the amounts of annual and concurrent survey activities, which have not been prescribed. To proceed otherwise is simply not sustainable. Accordingly, we respectfully urge you, Mr. President, to reject the Interior Department's analysis and its decision to introduce seismic oil and gas surveys in the Atlantic.

Sincerely,

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EXHIBIT 4

SUPPLEMENT A
SEISMIC TAKE TABLES

Supplemental Table A-1 Seismic Annual Takes

Seismic Level A Takes – Southall Criteria

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.000	0.000	0.083	0.161	0.017	0.067	0.047	0.022	0.024
Sei Whale	0.000	0.000	0.208	0.402	0.047	0.170	0.121	0.061	0.068
Bryde's Whale	0.000	0.000	0.632	1.237	0.144	0.714	0.535	0.364	0.173
Blue Whale	0.000	0.000	0.831	1.622	0.180	0.908	0.672	0.443	0.215
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.036	0.071	0.008	0.045	0.034	0.024	0.009
Humpback Whale	0.000	0.000	3.046	5.931	0.674	3.102	2.279	1.415	0.848
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	0.000	0.000	116.584	225.454	18.848	96.111	64.095	28.714	23.101
Pygmy Killer Whale	0.000	0.000	0.161	0.312	0.061	0.158	0.129	0.082	0.091
Short-Finned Pilot Whale	0.000	0.000	11.616	22.498	74.416	55.161	93.694	123.153	153.571
Long-Finned Pilot Whale	0.000	0.000	59.577	117.528	13.886	79.691	61.042	45.685	14.791
Rissos Dolphin	0.000	0.000	370.550	731.439	87.140	501.580	385.115	290.103	92.466
Northern Bottlenose Whale	0.000	0.000	0.004	0.007	0.001	0.003	0.002	0.001	0.001
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.081	0.041	0.080	0.083	0.138
Dwarf Sperm Whale	0.000	0.000	2.819	5.564	1.326	4.200	3.676	3.169	2.010
Atlantic White-sided Dolphin	0.000	0.000	1.347	2.659	0.522	1.965	1.659	1.415	0.768
Fraser's Dolphin	0.000	0.000	0.208	0.402	0.032	0.161	0.105	0.041	0.040
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.006	0.004	0.007	0.009	0.012
Blainville's Beaked Whale	0.000	0.000	1.459	2.816	0.225	1.126	0.731	0.282	0.282
Gervais' Beaked Whale	0.000	0.000	1.459	2.816	0.225	1.126	0.731	0.282	0.282
True's Beaked Whale	0.000	0.000	1.459	2.816	0.225	1.126	0.731	0.282	0.282
Killer Whale	0.000	0.000	0.052	0.100	0.033	0.054	0.052	0.040	0.056
Melon-Headed Whale	0.000	0.000	0.161	0.312	0.061	0.158	0.129	0.082	0.091
Harbor Porpoise	0.000	0.000	2.064	3.995	0.655	1.913	1.509	0.963	1.012
Sperm Whale	0.000	0.000	0.095	0.184	0.015	0.076	0.050	0.021	0.019
False Killer Whale	0.000	0.000	0.155	0.300	0.126	0.194	0.204	0.186	0.224
Pantropical Spotted Dolphin	0.000	0.000	135.938	263.432	35.378	127.155	96.513	61.914	53.839
Clymene Dolphin	0.000	0.000	64.945	125.855	16.902	60.749	46.109	29.580	25.722
Striped Dolphin	0.000	0.000	527.416	1,020.455	157.930	486.916	383.424	258.754	256.777
Atlantic Spotted Dolphin	0.000	0.000	771.308	1,496.301	201.604	741.310	564.738	369.590	303.440
Spinner Dolphin	0.000	0.000	0.611	1.184	0.159	0.571	0.434	0.278	0.242
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.036	0.023	0.043	0.061	0.075
Bottlenose Dolphin	0.000	0.000	14.775	28.936	21.683	28.545	34.819	39.072	42.117
Cuvier's Beaked Whale	0.000	0.000	10.213	19.709	1.577	7.883	5.119	1.972	1.972
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-2 Seismic Annual Takes

Seismic Level A Takes – Historic Criteria

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.000	0.000	0.342	0.666	0.101	0.364	0.285	0.196	0.144
Sei Whale	0.000	0.000	1.965	3.855	0.648	2.473	2.009	1.567	0.925
Bryde's Whale	0.000	0.000	1.948	3.820	0.642	2.445	1.986	1.548	0.918
Blue Whale	0.000	0.000	2.182	4.274	0.700	2.653	2.139	1.632	1.000
Fin Whale	0.000	0.000	4.400	8.638	1.507	5.679	4.657	3.705	2.180
North Atlantic Right Whale	0.000	0.000	1.162	2.290	0.611	1.757	1.595	1.464	0.858
Humpback Whale	0.000	0.000	5.897	11.542	1.853	7.071	5.671	4.275	2.632
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	0.000	0.000	3,121.383	6,146.553	1,114.258	4,282.933	3,551.165	2,919.887	1,611.226
Pygmy Killer Whale	0.000	0.000	2.253	4.410	0.705	2.708	2.170	1.635	0.997
Short-Finned Pilot Whale	0.000	0.000	2,354.300	4,631.133	840.256	3,170.157	2,627.151	2,145.343	1,224.552
Long-Finned Pilot Whale	0.000	0.000	297.400	582.360	96.845	362.017	292.887	224.439	139.821
Rissos Dolphin	0.000	0.000	1,619.672	3,180.466	551.169	2,095.819	1,717.190	1,367.649	796.896
Northern Bottlenose Whale	0.000	0.000	0.127	0.250	0.043	0.174	0.143	0.116	0.061
Pygmy Sperm Whale	0.000	0.000	2.371	4.592	0.559	2.140	1.562	0.872	0.770
Dwarf Sperm Whale	0.000	0.000	14.844	29.005	4.264	16.952	13.300	9.592	5.939
Atlantic White-sided Dolphin	0.000	0.000	4.668	9.152	1.467	5.795	4.657	3.573	2.063
Fraser's Dolphin	0.000	0.000	0.242	0.468	0.055	0.210	0.151	0.079	0.076
Sowerby's Beaked Whale	0.000	0.000	0.203	0.397	0.060	0.233	0.184	0.134	0.085
Blainville's Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739
Gervais' Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739
True's Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739
Killer Whale	0.000	0.000	1.965	3.843	0.602	2.309	1.839	1.363	0.852
Melon-Headed Whale	0.000	0.000	2.523	4.942	0.818	3.098	2.505	1.924	1.168
Harbor Porpoise	0.000	0.000	7.054	13.798	2.245	8.376	6.733	5.072	3.235
Sperm Whale	0.000	0.000	158.828	309.723	44.502	173.124	134.518	93.561	62.258
False Killer Whale	0.000	0.000	2.801	5.491	0.930	3.501	2.848	2.218	1.334
Pantropical Spotted Dolphin	0.000	0.000	446.741	876.082	145.967	559.932	454.020	352.985	208.113
Clymene Dolphin	0.000	0.000	207.184	406.191	67.382	258.155	209.054	161.919	96.038
Striped Dolphin	0.000	0.000	2,038.848	3,993.224	650.891	2,483.607	2,000.683	1,526.327	928.896
Atlantic Spotted Dolphin	0.000	0.000	2,978.964	5,847.582	988.880	3,813.267	3,105.692	2,446.233	1,406.107
Spinner Dolphin	0.000	0.000	1.949	3.821	0.634	2.429	1.967	1.523	0.903
Rough-Toothed Dolphin	0.000	0.000	13.755	26.888	4.279	16.048	12.821	9.510	6.112
Bottlenose Dolphin	0.000	0.000	5,977.039	11,748.210	2,090.846	7,908.443	6,521.887	5,266.486	3,022.262
Cuvier's Beaked Whale	0.000	0.000	276.973	541.189	82.842	318.247	251.849	183.622	117.174
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-3 Seismic Annual Takes

Seismic Level B Takes – 160 db Criteria

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.000	0.000	33.522	65.282	9.857	35.718	27.956	19.257	14.116
Sei Whale	0.000	0.000	192.625	377.801	63.466	242.395	196.917	153.588	90.689
Bryde's Whale	0.000	0.000	190.896	374.359	62.904	239.608	194.649	151.692	89.980
Blue Whale	0.000	0.000	213.901	418.875	68.622	259.980	209.629	159.949	98.045
Fin Whale	0.000	0.000	431.204	846.583	147.732	556.574	456.478	363.111	213.637
North Atlantic Right Whale	0.000	0.000	113.846	224.490	59.848	172.225	156.298	143.499	84.052
Humpback Whale	0.000	0.000	577.964	1,131.230	181.646	692.987	555.789	419.002	257.919
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	0.000	0.000	305,926.755	602,423.698	109,208.426	419,770.312	348,049.714	286,178.116	157,916.298
Pygmy Killer Whale	0.000	0.000	220.776	432.193	69.105	265.443	212.700	160.267	97.713
Short-Finned Pilot Whale	0.000	0.000	230,744.930	453,897.344	82,353.473	310,707.070	257,487.079	210,265.101	120,018.336
Long-Finned Pilot Whale	0.000	0.000	29,148.152	57,077.138	9,491.739	35,481.323	28,705.807	21,997.239	13,703.882
Rissos Dolphin	0.000	0.000	158,744.009	311,717.478	54,020.063	205,411.212	168,301.811	134,043.314	78,103.785
Northern Bottlenose Whale	0.000	0.000	12.462	24.544	4.259	17.031	13.994	11.395	6.003
Pygmy Sperm Whale	0.000	0.000	232.353	450.073	54.784	209.782	153.072	85.460	75.450
Dwarf Sperm Whale	0.000	0.000	1,454.885	2,842.740	417.949	1,661.508	1,303.577	940.144	582.097
Atlantic White-sided Dolphin	0.000	0.000	457.481	896.987	143.826	567.919	456.474	350.144	202.187
Fraser's Dolphin	0.000	0.000	23.717	45.882	5.427	20.593	14.819	7.782	7.470
Sowerby's Beaked Whale	0.000	0.000	19.910	38.905	5.903	22.874	18.068	13.148	8.286
Blainville's Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602
Gervais' Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602
True's Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602
Killer Whale	0.000	0.000	192.589	376.649	59.002	226.289	180.233	133.567	83.546
Melon-Headed Whale	0.000	0.000	247.240	484.381	80.135	303.674	245.516	188.604	114.448
Harbor Porpoise	0.000	0.000	691.367	1,352.385	219.996	820.894	659.933	497.063	317.088
Sperm Whale	0.000	0.000	15,566.706	30,355.996	4,361.663	16,967.893	13,184.100	9,169.873	6,101.896
False Killer Whale	0.000	0.000	274.527	538.213	91.113	343.104	279.084	217.358	130.741
Pantropical Spotted Dolphin	0.000	0.000	43,785.058	85,864.840	14,306.228	54,878.902	44,498.535	34,596.047	20,397.152
Clymene Dolphin	0.000	0.000	20,306.091	39,810.739	6,604.129	25,301.751	20,489.358	15,869.727	9,412.707
Striped Dolphin	0.000	0.000	199,827.536	391,375.882	63,793.815	243,418.330	196,086.989	149,595.327	91,041.146
Atlantic Spotted Dolphin	0.000	0.000	291,968.246	573,121.475	96,920.094	373,738.318	304,388.840	239,755.284	137,812.574
Spinner Dolphin	0.000	0.000	191.026	374.513	62.127	238.022	192.750	149.292	88.549
Rough-Toothed Dolphin	0.000	0.000	1348.103	2635.268	419.376	1572.892	1256.603	932.059	599.076
Bottlenose Dolphin	0.000	0.000	585,809.587	1,151,442.029	204,923.786	775,106.463	639,210.107	516,168.326	296,211.886
Cuvier's Beaked Whale	0.000	0.000	27,146.110	53,041.902	8,119.316	31,191.403	24,683.766	17,996.764	11,484.217
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-4 Survey LOEs (Blocks/Year) by Year

2D

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	1,795.4	4,461.0	2,398.8	166.5	571.2	2,233.8	4,110.7	1,802.5	842.1	253.8	1,181.1	4,826.6	2,509.1	1,618.1	963.0	1,294.3	1,134.8	2,733.2	2,592.8	497.0	1,231.0
2015	3,465.8	8,626.8	4,738.9	333.0	1,118.8	4,310.9	7,949.8	3,569.4	1,665.4	489.9	2,279.3	9,321.0	4,947.9	3,201.2	1,858.5	2,497.9	2,191.8	5,305.3	5,106.4	974.2	2,430.6
2016	278.9	721.2	571.1	47.1	118.2	344.8	665.4	444.7	204.0	39.2	182.3	756.8	580.9	393.6	148.7	199.8	178.6	477.8	588.5	104.3	290.7
2017	1,398.2	3,677.6	3,297.3	282.6	656.7	1,724.2	3,394.9	2,590.1	1,182.8	195.9	911.7	3,809.7	3,330.4	2,284.7	743.4	999.1	900.7	2,512.1	3,356.9	582.3	1,675.0
2018	911.3	2,452.6	2,539.6	226.0	485.9	1,119.6	2,265.6	2,012.3	914.9	127.2	592.0	2,496.9	2,546.8	1,769.0	482.7	648.7	591.7	1,742.1	2,553.4	432.8	1,287.4
2019	359.1	1,098.7	1,929.0	188.4	329.1	431.2	1,018.6	1,563.5	702.8	49.0	228.0	1,017.0	1,897.5	1,362.5	185.9	249.9	244.2	935.6	1,875.0	297.3	972.5
2020	347.8	883.9	603.5	47.1	131.2	431.2	815.1	464.4	214.3	49.0	228.0	939.9	619.7	412.9	185.9	249.9	221.5	566.7	632.2	115.2	308.0

Supplemental Table A-5 Survey LOEs (Blocks/Year) by Year

3D

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	24.8	65.2	58.4	5.0	11.6	30.6	60.2	45.9	21.0	3.5	16.2	67.5	59.0	40.5	13.2	17.7	16.0	44.5	59.5	10.3	29.7
2017	12.5	33.9	37.0	3.3	7.0	15.3	31.3	29.4	13.4	1.7	8.1	34.2	37.0	25.8	6.6	8.9	8.1	24.4	37.1	6.2	18.8
2018	12.5	33.9	37.0	3.3	7.0	15.3	31.3	29.4	13.4	1.7	8.1	34.2	37.0	25.8	6.6	8.9	8.1	24.4	37.1	6.2	18.8
2019	12.5	33.9	37.0	3.3	7.0	15.3	31.3	29.4	13.4	1.7	8.1	34.2	37.0	25.8	6.6	8.9	8.1	24.4	37.1	6.2	18.8
2020	18.7	50.8	55.6	5.0	10.5	22.9	46.9	44.1	20.0	2.6	12.1	51.3	55.6	38.8	9.9	13.3	12.2	36.7	55.6	9.3	28.1

Supplemental Table A-6 Survey LOEs (Blocks/Year) by Year

WAZ

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	6.2	16.9	18.5	1.7	3.5	7.6	15.6	14.7	6.7	0.9	4.0	17.1	18.5	12.9	3.3	4.4	4.1	12.2	18.5	3.1	9.4
2019	6.4	19.5	34.2	3.3	5.8	7.6	18.0	27.7	12.5	0.9	4.0	18.0	33.6	24.1	3.3	4.4	4.3	16.6	33.2	5.3	17.2
2020	12.5	33.9	37.0	3.3	7.0	15.3	31.3	29.4	13.4	1.7	8.1	34.2	37.0	25.8	6.6	8.9	8.1	24.4	37.1	6.2	18.8

Supplemental Table A-7 Survey LOEs (Blocks/Year) by Year

VSP

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019	0.1	0.3	0.5	0.0	0.1	0.1	0.3	0.4	0.2	0.0	0.1	0.3	0.5	0.3	0.0	0.1	0.1	0.2	0.5	0.1	0.2
2020	0.2	0.5	0.8	0.1	0.1	0.2	0.5	0.6	0.3	0.0	0.1	0.5	0.8	0.5	0.1	0.1	0.1	0.4	0.7	0.1	0.4

Supplemental Table A-8 Seismic Takes per Block

2D Survey – Level A Takes – Southall Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.003	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Long-Finned Pilot Whale	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Rissos Dolphin	0.000	0.000	0.036	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.000	0.000	0.000	0.036	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.000	0.009	0.000	0.000	0.009	0.000	0.000	0.009	0.000	0.009	0.009	0.000	0.009	0.000
Clymene Dolphin	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.004	0.000	0.000	0.004	0.000	0.004	0.004	0.000	0.004	0.000
Striped Dolphin	0.000	0.000	0.000	0.011	0.000	0.000	0.084	0.000	0.011	0.000	0.000	0.022	0.000	0.000	0.020	0.000	0.011	0.011	0.000	0.011	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.117	0.000	0.000	0.063	0.000	0.081	0.000	0.000	0.075	0.000	0.000	0.009	0.000	0.001	0.001	0.000	0.107	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-9 Seismic Takes per Block

2D Survey – Level A Takes – Historic Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Humpback Whale	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.012	0.019	0.245	0.036	0.142	0.011	0.016	0.243	0.300	0.049	0.008	0.012	0.250	0.215	0.010	0.033	0.010	0.018	0.073	0.293	0.046
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.002	0.037	0.247	0.003	0.001	0.001	0.020	0.244	0.033	0.002	0.000	0.017	0.150	0.034	0.019	0.005	0.001	0.029	0.160	0.000	0.001
Long-Finned Pilot Whale	0.001	0.009	0.022	0.000	0.000	0.000	0.006	0.024	0.007	0.001	0.000	0.005	0.015	0.004	0.007	0.001	0.000	0.007	0.011	0.000	0.000
Rissos Dolphin	0.010	0.017	0.103	0.014	0.049	0.001	0.019	0.126	0.025	0.000	0.000	0.033	0.127	0.035	0.000	0.035	0.000	0.008	0.103	0.014	0.035
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.000
Gervais' Beaked Whale	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.000
True's Beaked Whale	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.002	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.005	0.014	0.000	0.000	0.000	0.006	0.007	0.000	0.000	0.000	0.007	0.007	0.000	0.003	0.007	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.005	0.007	0.021	0.020	0.015	0.004	0.006	0.021	0.022	0.021	0.004	0.005	0.022	0.026	0.006	0.006	0.006	0.006	0.021	0.022	0.020
Clymene Dolphin	0.002	0.003	0.010	0.009	0.007	0.002	0.003	0.010	0.011	0.010	0.002	0.002	0.010	0.008	0.003	0.003	0.003	0.003	0.010	0.011	0.010
Striped Dolphin	0.006	0.072	0.221	0.024	0.022	0.005	0.052	0.025	0.027	0.025	0.004	0.012	0.203	0.026	0.013	0.075	0.008	0.007	0.025	0.027	0.025
Atlantic Spotted Dolphin	0.000	0.064	0.179	0.260	0.211	0.000	0.039	0.082	0.203	0.232	0.000	0.040	0.191	0.252	0.006	0.070	0.001	0.001	0.011	0.266	0.176
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Bottlenose Dolphin	0.005	0.017	0.350	0.353	0.049	0.005	0.083	0.356	0.035	0.033	0.004	0.074	0.464	0.274	0.010	0.107	0.007	0.110	0.417	0.217	0.261
Cuvier's Beaked Whale	0.000	0.010	0.019	0.000	0.000	0.000	0.007	0.017	0.000	0.000	0.000	0.006	0.008	0.000	0.007	0.009	0.000	0.006	0.017	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-10 Seismic Takes per Block

2D Survey – Level B Takes – 160 dB Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.001	0.001	0.000	0.000	0.003	0.001	0.001	0.000	0.000	0.004	0.001	0.001	0.000	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.003
Sei Whale	0.002	0.003	0.010	0.009	0.007	0.002	0.002	0.010	0.010	0.010	0.002	0.001	0.010	0.007	0.003	0.003	0.002	0.003	0.010	0.010	0.009
Bryde's Whale	0.002	0.003	0.009	0.010	0.007	0.002	0.002	0.009	0.010	0.010	0.002	0.001	0.010	0.008	0.003	0.003	0.003	0.003	0.009	0.010	0.009
Blue Whale	0.003	0.004	0.009	0.010	0.008	0.003	0.003	0.009	0.010	0.010	0.002	0.003	0.010	0.008	0.003	0.003	0.003	0.004	0.009	0.010	0.010
Fin Whale	0.004	0.004	0.040	0.011	0.010	0.003	0.004	0.008	0.051	0.009	0.003	0.003	0.040	0.010	0.003	0.020	0.004	0.004	0.008	0.016	0.010
North Atlantic Right Whale	0.000	0.000	0.000	0.142	0.039	0.000	0.000	0.003	0.016	0.014	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.059	0.012
Humpback Whale	0.015	0.024	0.058	0.033	0.059	0.012	0.016	0.059	0.052	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	1.182	1.882	24.008	3.566	13.956	1.050	1.568	23.791	29.431	4.814	0.810	1.138	24.514	21.043	0.941	3.216	1.028	1.794	7.199	28.708	4.464
Pygmy Killer Whale	0.003	0.005	0.010	0.009	0.010	0.003	0.003	0.010	0.010	0.012	0.002	0.003	0.009	0.008	0.002	0.004	0.003	0.003	0.010	0.011	0.009
Short-Finned Pilot Whale	0.240	3.668	24.254	0.324	0.125	0.062	1.962	23.899	3.197	0.156	0.025	1.666	14.658	3.365	1.875	0.482	0.076	2.886	15.713	0.047	0.138
Long-Finned Pilot Whale	0.080	0.917	2.144	0.000	0.029	0.021	0.611	2.384	0.677	0.052	0.008	0.519	1.467	0.406	0.716	0.129	0.024	0.666	1.055	0.026	0.009
Rissos Dolphin	0.968	1.678	10.082	1.398	4.778	0.061	1.856	12.365	2.456	0.043	0.023	3.203	12.472	3.470	0.047	3.421	0.028	0.818	10.099	1.343	3.452
Northern Bottlenose Whale	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Pygmy Sperm Whale	0.008	0.010	0.000	0.000	0.014	0.008	0.011	0.000	0.000	0.015	0.008	0.010	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.014
Dwarf Sperm Whale	0.025	0.030	0.061	0.025	0.042	0.025	0.034	0.061	0.017	0.045	0.023	0.029	0.061	0.049	0.027	0.027	0.020	0.025	0.061	0.018	0.041
Atlantic White-sided Dolphin	0.035	0.000	0.062	0.000	0.000	0.008	0.000	0.020	0.006	0.000	0.007	0.000	0.020	0.019	0.018	0.018	0.013	0.000	0.014	0.012	0.000
Fraser's Dolphin	0.003	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Blainville's Beaked Whale	0.001	0.138	0.260	0.000	0.001	0.001	0.100	0.231	0.000	0.001	0.001	0.084	0.115	0.001	0.097	0.124	0.000	0.090	0.237	0.000	0.001
Gervais' Beaked Whale	0.001	0.138	0.260	0.000	0.001	0.001	0.100	0.231	0.000	0.001	0.001	0.084	0.115	0.001	0.097	0.124	0.000	0.090	0.237	0.000	0.001
True's Beaked Whale	0.001	0.138	0.260	0.000	0.001	0.001	0.100	0.231	0.000	0.001	0.001	0.084	0.115	0.001	0.097	0.124	0.000	0.090	0.237	0.000	0.001
Killer Whale	0.003	0.004	0.008	0.003	0.008	0.003	0.003	0.008	0.003	0.011	0.002	0.003	0.008	0.005	0.005	0.004	0.004	0.003	0.008	0.002	0.012
Melon-Headed Whale	0.003	0.005	0.012	0.012	0.010	0.003	0.003	0.012	0.012	0.012	0.002	0.003	0.011	0.010	0.004	0.004	0.003	0.003	0.012	0.013	0.009
Harbor Porpoise	0.022	0.021	0.073	0.000	0.016	0.009	0.010	0.040	0.009	0.053	0.002	0.002	0.008	0.007	0.018	0.024	0.016	0.007	0.028	0.017	0.011
Sperm Whale	0.008	0.502	1.384	0.003	0.005	0.006	0.553	0.708	0.002	0.005	0.005	0.696	0.696	0.003	0.340	0.700	0.008	0.009	0.014	0.002	0.005
False Killer Whale	0.003	0.005	0.016	0.018	0.010	0.003	0.003	0.016	0.004	0.012	0.002	0.003	0.016	0.006	0.004	0.005	0.003	0.003	0.016	0.003	0.009
Pantropical Spotted Dolphin	0.498	0.676	2.083	1.940	1.451	0.383	0.543	2.038	2.198	2.011	0.347	0.472	2.118	2.528	0.587	0.614	0.632	0.587	2.038	2.172	2.003
Clymene Dolphin	0.238	0.323	0.995	0.927	0.693	0.183	0.259	0.974	1.050	0.961	0.166	0.225	1.012	0.829	0.281	0.293	0.302	0.281	0.974	1.037	0.957
Striped Dolphin	0.603	7.028	21.640	2.346	2.164	0.463	5.105	2.464	2.658	2.432	0.420	1.170	19.917	2.589	1.307	7.335	0.764	0.710	2.464	2.625	2.421
Atlantic Spotted Dolphin	0.047	6.291	17.501	25.444	20.654	0.036	3.830	8.064	19.944	22.762	0.033	3.964	18.751	24.709	0.583	6.814	0.060	0.055	1.107	26.046	17.263
Spinner Dolphin	0.002	0.003	0.009	0.009	0.007	0.002	0.002	0.009	0.010	0.009	0.002	0.002	0.010	0.008	0.003	0.003	0.003	0.003	0.009	0.010	0.009
Rough-Toothed Dolphin	0.021	0.029	0.049	0.054	0.067	0.021	0.026	0.049	0.086	0.056	0.019	0.024	0.047	0.037	0.022	0.026	0.027	0.020	0.049	0.088	0.047
Bottlenose Dolphin	0.501	1.684	34.290	34.629	4.811	0.473	8.098	34.882	3.385	3.267	0.394	7.267	45.474	26.882	0.982	10.488	0.680	10.751	40.828	21.279	25.572
Cuvier's Beaked Whale	0.005	0.965	1.818	0.002	0.004	0.005	0.698	1.620	0.002	0.004	0.005	0.588	0.804	0.004	0.677	0.868	0.003	0.629	1.657	0.002	0.004
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-11 Seismic Takes per Block

3D Survey – Level A Takes – Southall Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.376	0.000	0.000	0.000	0.000	0.372	0.000	0.000	0.000	0.000	0.228	0.000	0.395	0.000	0.000	0.000	0.246	0.000	0.004
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.056	0.000	0.000
Clymene Dolphin	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.027	0.000	0.000
Striped Dolphin	0.000	0.000	0.578	0.000	0.000	0.000	0.000	0.067	0.000	0.000	0.000	0.000	0.523	0.000	0.000	0.000	0.000	0.000	0.067	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.467	0.000	0.000	0.000	0.000	0.220	0.000	0.000	0.000	0.000	0.492	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.074	0.000	0.045	0.000	0.000	0.000	0.571
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-12 Seismic Takes per Block

3D Survey – Level A Takes – Historic Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Bryde's Whale	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Blue Whale	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Fin Whale	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001
North Atlantic Right Whale	0.000	0.000	0.000	0.025	0.007	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001
Humpback Whale	0.001	0.001	0.003	0.001	0.003	0.001	0.001	0.003	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.080	0.110	1.383	0.177	0.839	0.075	0.100	1.379	1.655	0.260	0.060	0.077	1.406	1.314	0.066	0.151	0.047	0.096	0.417	1.655	0.230
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Short-Finned Pilot Whale	0.016	0.217	1.504	0.020	0.007	0.004	0.108	1.490	0.022	0.008	0.002	0.096	0.930	0.187	0.132	0.026	0.005	0.193	0.977	0.000	0.007
Long-Finned Pilot Whale	0.005	0.054	0.132	0.000	0.002	0.001	0.034	0.146	0.025	0.003	0.001	0.030	0.089	0.023	0.045	0.007	0.002	0.044	0.065	0.001	0.000
Rissos Dolphin	0.040	0.092	0.622	0.024	0.296	0.003	0.101	0.755	0.092	0.002	0.001	0.168	0.759	0.195	0.003	0.196	0.002	0.044	0.621	0.051	0.141
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Dwarf Sperm Whale	0.001	0.002	0.003	0.000	0.002	0.001	0.001	0.003	0.000	0.002	0.001	0.001	0.003	0.002	0.001	0.001	0.001	0.001	0.003	0.000	0.002
Atlantic White-sided Dolphin	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.008	0.014	0.000	0.000	0.000	0.005	0.012	0.000	0.000	0.000	0.004	0.006	0.000	0.004	0.007	0.000	0.005	0.012	0.000	0.000
Gervais' Beaked Whale	0.000	0.008	0.014	0.000	0.000	0.000	0.005	0.012	0.000	0.000	0.000	0.004	0.006	0.000	0.004	0.007	0.000	0.005	0.012	0.000	0.000
True's Beaked Whale	0.000	0.008	0.014	0.000	0.000	0.000	0.005	0.012	0.000	0.000	0.000	0.004	0.006	0.000	0.004	0.007	0.000	0.005	0.012	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Harbor Porpoise	0.001	0.001	0.004	0.000	0.002	0.000	0.001	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.002	0.000	0.001
Sperm Whale	0.000	0.025	0.069	0.000	0.000	0.000	0.026	0.036	0.000	0.000	0.000	0.034	0.035	0.000	0.017	0.030	0.000	0.000	0.001	0.000	0.000
False Killer Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Pantropical Spotted Dolphin	0.030	0.041	0.116	0.110	0.079	0.024	0.030	0.115	0.117	0.108	0.023	0.027	0.117	0.140	0.037	0.036	0.031	0.034	0.115	0.121	0.106
Clymene Dolphin	0.014	0.020	0.055	0.053	0.038	0.012	0.014	0.055	0.056	0.052	0.011	0.013	0.056	0.046	0.018	0.017	0.015	0.016	0.055	0.058	0.051
Striped Dolphin	0.036	0.425	1.203	0.133	0.119	0.030	0.278	0.139	0.141	0.130	0.027	0.068	1.099	0.145	0.083	0.434	0.037	0.041	0.139	0.147	0.128
Atlantic Spotted Dolphin	0.003	0.380	0.973	1.444	1.131	0.002	0.208	0.456	1.061	1.220	0.002	0.229	1.035	1.382	0.037	0.403	0.003	0.003	0.063	1.457	0.915
Spinner Dolphin	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Rough-Toothed Dolphin	0.001	0.002	0.003	0.003	0.004	0.001	0.001	0.003	0.005	0.003	0.001	0.001	0.003	0.002	0.002	0.002	0.002	0.001	0.003	0.005	0.003
Bottlenose Dolphin	0.027	0.099	2.028	2.086	0.317	0.024	0.497	2.074	0.198	0.202	0.019	0.410	2.708	1.679	0.078	0.721	0.038	0.678	2.438	1.218	1.642
Cuvier's Beaked Whale	0.000	0.058	0.098	0.000	0.000	0.000	0.035	0.085	0.000	0.000	0.000	0.028	0.043	0.000	0.029	0.048	0.000	0.034	0.086	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-13 Seismic Takes per Block

3D Survey – Level B Takes – 160 dB Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.007	0.008	0.000	0.000	0.017	0.006	0.005	0.000	0.000	0.022	0.005	0.005	0.000	0.022	0.000	0.000	0.000	0.006	0.000	0.000	0.019
Sei Whale	0.012	0.018	0.054	0.046	0.042	0.010	0.013	0.052	0.056	0.059	0.009	0.011	0.052	0.045	0.016	0.017	0.017	0.015	0.053	0.057	0.054
Bryde's Whale	0.012	0.018	0.051	0.052	0.042	0.010	0.013	0.051	0.056	0.059	0.009	0.011	0.051	0.052	0.017	0.017	0.014	0.015	0.051	0.054	0.054
Blue Whale	0.019	0.022	0.051	0.052	0.048	0.019	0.018	0.051	0.056	0.059	0.015	0.014	0.051	0.052	0.017	0.017	0.014	0.025	0.051	0.054	0.058
Fin Whale	0.022	0.024	0.238	0.061	0.061	0.021	0.023	0.047	0.294	0.052	0.019	0.020	0.233	0.062	0.020	0.120	0.022	0.024	0.047	0.089	0.059
North Atlantic Right Whale	0.000	0.000	0.000	2.489	0.644	0.000	0.000	0.020	0.303	0.202	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.343	0.067
Humpback Whale	0.087	0.137	0.314	0.141	0.332	0.068	0.093	0.309	0.282	0.492	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	7.795	10.780	135.587	17.367	82.256	7.385	9.800	135.135	162.253	25.436	5.880	7.521	137.847	128.808	6.427	14.835	4.650	9.436	40.888	162.253	22.564
Pygmy Killer Whale	0.023	0.035	0.048	0.046	0.054	0.017	0.016	0.048	0.051	0.063	0.014	0.014	0.047	0.045	0.016	0.020	0.016	0.023	0.048	0.053	0.045
Short-Finned Pilot Whale	1.540	21.272	147.449	2.006	0.719	0.367	10.547	146.015	2.195	0.813	0.159	9.360	91.157	18.289	12.905	2.567	0.457	18.877	95.753	0.034	0.638
Long-Finned Pilot Whale	0.513	5.318	12.969	0.000	0.166	0.122	3.285	14.261	2.478	0.271	0.053	2.916	8.747	2.234	4.389	0.723	0.156	4.356	6.357	0.096	0.043
Rissos Dolphin	3.957	9.020	60.996	2.393	29.033	0.252	9.879	73.968	8.982	0.196	0.094	16.500	74.343	19.118	0.288	19.179	0.178	4.311	60.865	5.024	13.863
Northern Bottlenose Whale	0.000	0.000	0.005	0.006	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.005	0.004	0.002	0.002	0.002	0.000	0.005	0.001	0.000
Pygmy Sperm Whale	0.038	0.049	0.000	0.000	0.066	0.037	0.046	0.000	0.000	0.064	0.033	0.040	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.058
Dwarf Sperm Whale	0.114	0.148	0.303	0.002	0.197	0.112	0.138	0.299	0.008	0.191	0.098	0.119	0.292	0.233	0.121	0.121	0.097	0.127	0.301	0.013	0.174
Atlantic White-sided Dolphin	0.217	0.000	0.306	0.000	0.000	0.053	0.000	0.099	0.003	0.000	0.048	0.000	0.096	0.092	0.080	0.080	0.064	0.000	0.070	0.009	0.000
Fraser's Dolphin	0.013	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000
Sowerby's Beaked Whale	0.002	0.003	0.004	0.005	0.003	0.002	0.002	0.004	0.004	0.003	0.002	0.002	0.004	0.000	0.000	0.000	0.001	0.002	0.004	0.005	0.002
Blainville's Beaked Whale	0.003	0.814	1.370	0.000	0.003	0.003	0.488	1.192	0.000	0.003	0.003	0.398	0.604	0.002	0.403	0.676	0.002	0.472	1.205	0.000	0.002
Gervais' Beaked Whale	0.003	0.814	1.370	0.000	0.003	0.003	0.488	1.192	0.000	0.003	0.003	0.398	0.604	0.002	0.403	0.676	0.002	0.472	1.205	0.000	0.002
True's Beaked Whale	0.003	0.814	1.370	0.000	0.003	0.003	0.488	1.192	0.000	0.003	0.003	0.398	0.604	0.002	0.403	0.676	0.002	0.472	1.205	0.000	0.002
Killer Whale	0.020	0.021	0.043	0.000	0.056	0.018	0.019	0.042	0.002	0.064	0.015	0.016	0.043	0.023	0.019	0.024	0.019	0.019	0.043	0.002	0.069
Melon-Headed Whale	0.023	0.035	0.064	0.073	0.054	0.017	0.016	0.064	0.064	0.063	0.014	0.014	0.063	0.062	0.022	0.022	0.018	0.023	0.064	0.066	0.045
Harbor Porpoise	0.105	0.122	0.441	0.000	0.171	0.039	0.050	0.245	0.006	0.269	0.007	0.008	0.050	0.037	0.123	0.129	0.095	0.057	0.171	0.013	0.063
Sperm Whale	0.038	2.447	6.783	0.000	0.025	0.030	2.558	3.495	0.001	0.025	0.023	3.342	3.431	0.027	1.638	2.949	0.035	0.036	0.066	0.001	0.017
False Killer Whale	0.023	0.035	0.098	0.111	0.054	0.017	0.016	0.098	0.003	0.063	0.014	0.014	0.100	0.025	0.025	0.026	0.019	0.023	0.098	0.003	0.045
Pantropical Spotted Dolphin	2.948	4.005	11.348	10.791	7.788	2.392	2.893	11.292	11.459	10.569	2.225	2.670	11.459	13.739	3.671	3.560	3.004	3.338	11.292	11.904	10.402
Clymene Dolphin	1.408	1.913	5.421	5.156	3.721	1.143	1.382	5.395	5.474	5.049	1.063	1.276	5.474	4.544	1.754	1.701	1.435	1.595	5.395	5.687	4.970
Striped Dolphin	3.564	41.615	117.910	13.047	11.617	2.892	27.198	13.652	13.854	12.778	2.690	6.620	107.747	14.189	8.170	42.521	3.632	4.035	13.652	14.392	12.576
Atlantic Spotted Dolphin	0.278	37.251	95.360	141.519	110.875	0.226	20.405	44.677	103.959	119.599	0.210	22.438	101.437	135.426	3.642	39.502	0.284	0.315	6.133	142.770	89.674
Spinner Dolphin	0.013	0.018	0.051	0.049	0.035	0.011	0.013	0.051	0.052	0.048	0.010	0.012	0.052	0.043	0.017	0.016	0.014	0.015	0.051	0.054	0.047
Rough-Toothed Dolphin	0.125	0.152	0.278	0.307	0.418	0.127	0.143	0.268	0.524	0.322	0.109	0.127	0.266	0.205	0.150	0.162	0.156	0.121	0.268	0.528	0.290
Bottlenose Dolphin	2.685	9.701	198.751	204.410	31.037	2.327	48.664	203.281	19.381	19.751	1.880	40.229	265.390	164.586	7.619	70.706	3.759	66.486	238.959	119.376	160.966
Cuvier's Beaked Whale	0.023	5.701	9.588	0.000	0.018	0.023	3.413	8.346	0.001	0.019	0.023	2.783	4.230	0.016	2.820	4.734	0.013	3.302	8.433	0.001	0.014
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-14 Seismic Takes per Block

WAZ Survey – Level A Takes – Southall Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.696	0.000	0.000	0.000	0.000	0.689	0.000	0.000	0.000	0.000	0.423	0.000	0.731	0.000	0.000	0.000	0.454	0.000	0.008
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.004	0.000	0.000	0.000	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.004	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.001	0.000	0.001
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.103	0.000	0.000	0.000	0.000	0.103	0.000	0.000	0.000	0.000	0.103	0.000	0.000	0.000	0.000	0.000	0.103	0.000	0.000
Clymene Dolphin	0.000	0.000	0.049	0.000	0.000	0.000	0.000	0.049	0.000	0.000	0.000	0.000	0.049	0.000	0.000	0.000	0.000	0.000	0.049	0.000	0.000
Striped Dolphin	0.000	0.000	1.069	0.000	0.000	0.000	0.000	0.124	0.000	0.000	0.000	0.000	0.968	0.000	0.000	0.000	0.000	0.000	0.124	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.865	0.000	0.000	0.000	0.000	0.407	0.000	0.000	0.000	0.000	0.911	0.000	0.000	0.000	0.000	0.000	0.056	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.137	0.000	0.083	0.000	0.000	0.000	1.056
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-15 Seismic Takes per Block

WAZ Survey – Level A Takes – Historic Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Bryde's Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Blue Whale	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Fin Whale	0.000	0.000	0.004	0.001	0.001	0.000	0.000	0.001	0.006	0.001	0.000	0.000	0.004	0.001	0.000	0.002	0.000	0.000	0.001	0.002	0.001
North Atlantic Right Whale	0.000	0.000	0.000	0.047	0.012	0.000	0.000	0.000	0.006	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.001
Humpback Whale	0.002	0.003	0.006	0.003	0.006	0.001	0.002	0.006	0.005	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.147	0.203	2.559	0.328	1.553	0.139	0.185	2.551	3.063	0.480	0.111	0.142	2.602	2.431	0.121	0.280	0.088	0.178	0.772	3.063	0.426
Pygmy Killer Whale	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Short-Finned Pilot Whale	0.029	0.402	2.783	0.038	0.014	0.007	0.199	2.756	0.041	0.015	0.003	0.177	1.721	0.345	0.244	0.048	0.009	0.356	1.807	0.001	0.012
Long-Finned Pilot Whale	0.010	0.100	0.245	0.000	0.003	0.002	0.062	0.269	0.047	0.005	0.001	0.055	0.165	0.042	0.083	0.014	0.003	0.082	0.120	0.002	0.001
Rissos Dolphin	0.075	0.170	1.151	0.045	0.548	0.005	0.186	1.396	0.170	0.004	0.002	0.311	1.403	0.361	0.005	0.362	0.003	0.081	1.149	0.095	0.262
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001
Dwarf Sperm Whale	0.002	0.003	0.006	0.000	0.004	0.002	0.003	0.006	0.000	0.004	0.002	0.002	0.006	0.004	0.002	0.002	0.002	0.002	0.006	0.000	0.003
Atlantic White-sided Dolphin	0.004	0.000	0.006	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.001	0.000	0.002	0.002	0.002	0.002	0.001	0.000	0.001	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.015	0.026	0.000	0.000	0.000	0.009	0.023	0.000	0.000	0.000	0.008	0.011	0.000	0.008	0.013	0.000	0.009	0.023	0.000	0.000
Gervais' Beaked Whale	0.000	0.015	0.026	0.000	0.000	0.000	0.009	0.023	0.000	0.000	0.000	0.008	0.011	0.000	0.008	0.013	0.000	0.009	0.023	0.000	0.000
True's Beaked Whale	0.000	0.015	0.026	0.000	0.000	0.000	0.009	0.023	0.000	0.000	0.000	0.008	0.011	0.000	0.008	0.013	0.000	0.009	0.023	0.000	0.000
Killer Whale	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Melon-Headed Whale	0.000	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Harbor Porpoise	0.002	0.002	0.008	0.000	0.003	0.001	0.001	0.005	0.000	0.005	0.000	0.000	0.001	0.001	0.002	0.002	0.002	0.001	0.003	0.000	0.001
Sperm Whale	0.001	0.046	0.128	0.000	0.000	0.001	0.048	0.066	0.000	0.000	0.000	0.063	0.065	0.001	0.031	0.056	0.001	0.001	0.001	0.000	0.000
False Killer Whale	0.000	0.001	0.002	0.002	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001
Pantropical Spotted Dolphin	0.056	0.076	0.214	0.204	0.147	0.045	0.055	0.213	0.216	0.199	0.042	0.050	0.216	0.259	0.069	0.067	0.057	0.063	0.213	0.225	0.196
Clymene Dolphin	0.027	0.036	0.102	0.097	0.070	0.022	0.026	0.102	0.103	0.095	0.020	0.024	0.103	0.086	0.033	0.032	0.027	0.030	0.102	0.107	0.094
Striped Dolphin	0.067	0.786	2.226	0.246	0.219	0.055	0.513	0.258	0.261	0.241	0.051	0.125	2.034	0.268	0.154	0.803	0.069	0.076	0.258	0.272	0.237
Atlantic Spotted Dolphin	0.005	0.703	1.800	2.671	2.093	0.004	0.385	0.843	1.962	2.258	0.004	0.424	1.915	2.556	0.069	0.746	0.005	0.006	0.116	2.695	1.693
Spinner Dolphin	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Rough-Toothed Dolphin	0.002	0.003	0.005	0.006	0.008	0.002	0.003	0.005	0.010	0.006	0.002	0.002	0.005	0.004	0.003	0.003	0.003	0.002	0.005	0.010	0.005
Bottlenose Dolphin	0.051	0.183	3.752	3.858	0.586	0.044	0.919	3.837	0.366	0.373	0.035	0.759	5.009	3.107	0.144	1.335	0.071	1.255	4.511	2.253	3.038
Cuvier's Beaked Whale	0.000	0.108	0.181	0.000	0.000	0.000	0.064	0.158	0.000	0.000	0.000	0.053	0.080	0.000	0.053	0.089	0.000	0.062	0.159	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-16 Seismic Takes per Block

WAZ Survey – Level B Takes – 160 dB Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.013	0.014	0.000	0.000	0.031	0.011	0.010	0.000	0.000	0.041	0.010	0.009	0.000	0.041	0.000	0.000	0.000	0.011	0.000	0.000	0.034
Sei Whale	0.022	0.033	0.099	0.085	0.077	0.019	0.024	0.095	0.103	0.109	0.016	0.020	0.095	0.084	0.029	0.031	0.031	0.028	0.098	0.105	0.099
Bryde's Whale	0.022	0.033	0.093	0.095	0.077	0.019	0.024	0.095	0.103	0.109	0.016	0.020	0.094	0.096	0.031	0.032	0.026	0.028	0.094	0.100	0.099
Blue Whale	0.036	0.040	0.093	0.095	0.088	0.035	0.034	0.095	0.103	0.108	0.028	0.025	0.094	0.096	0.031	0.032	0.026	0.046	0.094	0.100	0.107
Fin Whale	0.040	0.045	0.440	0.113	0.112	0.038	0.043	0.086	0.543	0.096	0.035	0.038	0.430	0.115	0.036	0.222	0.040	0.044	0.087	0.165	0.109
North Atlantic Right Whale	0.000	0.000	0.000	4.605	1.191	0.000	0.000	0.036	0.560	0.374	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.635	0.124
Humpback Whale	0.161	0.253	0.580	0.261	0.613	0.125	0.172	0.572	0.522	0.910	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	14.420	19.944	250.836	32.129	152.174	13.661	18.130	250.000	300.168	47.056	10.878	13.914	255.017	238.295	11.890	27.445	8.602	17.456	75.643	300.168	41.743
Pygmy Killer Whale	0.042	0.064	0.089	0.084	0.100	0.031	0.030	0.088	0.093	0.116	0.026	0.026	0.087	0.083	0.029	0.037	0.030	0.043	0.089	0.098	0.083
Short-Finned Pilot Whale	2.849	39.352	272.780	3.710	1.330	0.678	19.512	270.128	4.062	1.504	0.294	17.317	168.640	33.835	23.874	4.749	0.846	34.923	177.142	0.063	1.180
Long-Finned Pilot Whale	0.950	9.838	23.993	0.000	0.307	0.226	6.077	26.383	4.584	0.501	0.098	5.394	16.182	4.134	8.120	1.337	0.290	8.059	11.760	0.178	0.079
Rissos Dolphin	7.320	16.687	112.843	4.427	53.710	0.466	18.277	136.841	16.617	0.363	0.175	30.525	137.535	35.368	0.532	35.481	0.329	7.975	112.600	9.293	25.647
Northern Bottlenose Whale	0.000	0.000	0.009	0.010	0.000	0.000	0.000	0.009	0.001	0.000	0.000	0.000	0.009	0.007	0.004	0.003	0.004	0.000	0.009	0.002	0.000
Pygmy Sperm Whale	0.070	0.091	0.000	0.000	0.121	0.069	0.085	0.000	0.000	0.118	0.061	0.074	0.000	0.000	0.000	0.000	0.000	0.078	0.000	0.000	0.107
Dwarf Sperm Whale	0.210	0.273	0.561	0.004	0.364	0.207	0.256	0.554	0.014	0.354	0.182	0.221	0.540	0.431	0.224	0.224	0.179	0.235	0.557	0.025	0.322
Atlantic White-sided Dolphin	0.401	0.000	0.566	0.000	0.000	0.097	0.000	0.183	0.005	0.000	0.088	0.000	0.178	0.171	0.148	0.148	0.118	0.000	0.129	0.016	0.000
Fraser's Dolphin	0.024	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.000	0.000	0.000
Sowerby's Beaked Whale	0.004	0.005	0.008	0.008	0.005	0.004	0.004	0.008	0.008	0.005	0.004	0.003	0.008	0.000	0.000	0.000	0.002	0.004	0.008	0.009	0.004
Blainville's Beaked Whale	0.006	1.507	2.534	0.000	0.005	0.006	0.902	2.206	0.000	0.005	0.006	0.735	1.118	0.004	0.745	1.251	0.004	0.873	2.229	0.000	0.004
Gervais' Beaked Whale	0.006	1.507	2.534	0.000	0.005	0.006	0.902	2.206	0.000	0.005	0.006	0.735	1.118	0.004	0.745	1.251	0.004	0.873	2.229	0.000	0.004
True's Beaked Whale	0.006	1.507	2.534	0.000	0.005	0.006	0.902	2.206	0.000	0.005	0.006	0.735	1.118	0.004	0.745	1.251	0.004	0.873	2.229	0.000	0.004
Killer Whale	0.037	0.039	0.080	0.000	0.104	0.033	0.035	0.078	0.003	0.118	0.027	0.029	0.079	0.043	0.035	0.044	0.035	0.036	0.079	0.004	0.128
Melon-Headed Whale	0.042	0.064	0.117	0.134	0.100	0.031	0.030	0.119	0.118	0.116	0.026	0.026	0.116	0.114	0.041	0.040	0.032	0.043	0.118	0.122	0.083
Harbor Porpoise	0.194	0.226	0.816	0.000	0.316	0.072	0.092	0.453	0.012	0.497	0.013	0.015	0.092	0.069	0.227	0.238	0.176	0.106	0.316	0.023	0.116
Sperm Whale	0.070	4.527	12.549	0.000	0.047	0.056	4.732	6.466	0.001	0.045	0.043	6.182	6.347	0.050	3.031	5.455	0.064	0.066	0.121	0.001	0.032
False Killer Whale	0.042	0.064	0.181	0.204	0.100	0.031	0.030	0.181	0.005	0.116	0.026	0.026	0.185	0.045	0.045	0.048	0.035	0.043	0.180	0.005	0.083
Pantropical Spotted Dolphin	5.454	7.409	20.993	19.964	14.407	4.425	5.351	20.890	21.199	19.552	4.116	4.940	21.199	25.418	6.792	6.586	5.557	6.174	20.890	22.022	19.243
Clymene Dolphin	2.606	3.540	10.029	9.538	6.883	2.114	2.557	9.980	10.128	9.341	1.967	2.360	10.128	8.407	3.245	3.146	2.655	2.950	9.980	10.521	9.194
Striped Dolphin	6.594	76.989	218.134	24.136	21.491	5.350	50.317	25.256	25.629	23.638	4.977	12.248	199.331	26.249	15.115	78.664	6.718	7.465	25.256	26.624	23.265
Atlantic Spotted Dolphin	0.515	68.914	176.416	261.809	205.118	0.418	37.749	82.653	192.325	221.259	0.389	41.510	187.658	250.537	6.737	73.079	0.524	0.583	11.346	264.125	165.896
Spinner Dolphin	0.025	0.033	0.094	0.090	0.065	0.020	0.024	0.094	0.095	0.088	0.019	0.022	0.095	0.079	0.031	0.030	0.025	0.028	0.094	0.099	0.086
Rough-Toothed Dolphin	0.231	0.282	0.515	0.568	0.773	0.235	0.264	0.495	0.970	0.595	0.202	0.235	0.493	0.380	0.278	0.300	0.289	0.224	0.495	0.977	0.537
Bottlenose Dolphin	4.967	17.946	367.690	378.158	57.418	4.305	90.028	376.070	35.856	36.540	3.477	74.423	490.972	304.484	14.096	130.807	6.954	122.999	442.074	220.845	297.786
Cuvier's Beaked Whale	0.042	10.547	17.738	0.000	0.033	0.042	6.315	15.440	0.002	0.036	0.042	5.148	7.826	0.030	5.216	8.758	0.025	6.109	15.601	0.003	0.027
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-17 Seismic Takes per Block

VSP Survey – Level A Takes – Southall Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-18 Seismic Takes per Block

VSP Survey – Level A Takes – Historic Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.014	0.004	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Humpback Whale	0.000	0.001	0.002	0.001	0.002	0.000	0.001	0.002	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	0.054	0.065	0.775	0.096	0.475	0.052	0.075	0.761	0.807	0.123	0.046	0.056	0.789	0.599	0.040	0.122	0.031	0.075	0.227	0.858	0.160
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.009	0.126	0.837	0.010	0.005	0.003	0.073	0.821	0.002	0.006	0.001	0.069	0.506	0.119	0.070	0.014	0.003	0.111	0.536	0.000	0.005
Long-Finned Pilot Whale	0.003	0.032	0.082	0.000	0.001	0.001	0.023	0.090	0.006	0.002	0.000	0.021	0.056	0.012	0.030	0.005	0.001	0.026	0.040	0.000	0.000
Rissos Dolphin	0.031	0.054	0.384	0.001	0.166	0.002	0.070	0.467	0.022	0.001	0.001	0.130	0.475	0.102	0.002	0.126	0.001	0.031	0.380	0.014	0.105
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.000	0.001
Atlantic White-sided Dolphin	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.006	0.008	0.000	0.000	0.000	0.004	0.007	0.000	0.000	0.000	0.003	0.004	0.000	0.003	0.004	0.000	0.004	0.007	0.000	0.000
Gervais' Beaked Whale	0.000	0.006	0.008	0.000	0.000	0.000	0.004	0.007	0.000	0.000	0.000	0.003	0.004	0.000	0.003	0.004	0.000	0.004	0.007	0.000	0.000
True's Beaked Whale	0.000	0.006	0.008	0.000	0.000	0.000	0.004	0.007	0.000	0.000	0.000	0.003	0.004	0.000	0.003	0.004	0.000	0.004	0.007	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.001	0.001	0.003	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.000
Sperm Whale	0.000	0.018	0.042	0.000	0.000	0.000	0.021	0.021	0.000	0.000	0.000	0.027	0.021	0.000	0.013	0.023	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Pantropical Spotted Dolphin	0.022	0.020	0.068	0.049	0.045	0.020	0.019	0.067	0.054	0.048	0.018	0.017	0.068	0.089	0.026	0.023	0.019	0.020	0.066	0.062	0.076
Clymene Dolphin	0.010	0.009	0.033	0.023	0.022	0.010	0.009	0.032	0.026	0.023	0.008	0.008	0.032	0.024	0.012	0.011	0.009	0.009	0.031	0.030	0.036
Striped Dolphin	0.026	0.206	0.708	0.059	0.068	0.025	0.181	0.081	0.066	0.058	0.021	0.042	0.635	0.076	0.057	0.278	0.023	0.024	0.080	0.075	0.092
Atlantic Spotted Dolphin	0.002	0.185	0.572	0.640	0.646	0.002	0.136	0.265	0.494	0.546	0.002	0.143	0.598	0.727	0.025	0.258	0.002	0.002	0.036	0.742	0.656
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.001	0.001	0.002	0.002	0.003	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.003	0.002
Bottlenose Dolphin	0.016	0.057	1.054	1.039	0.167	0.016	0.305	1.097	0.090	0.095	0.015	0.265	1.431	0.889	0.047	0.466	0.026	0.440	1.271	0.621	1.118
Cuvier's Beaked Whale	0.000	0.041	0.057	0.000	0.000	0.000	0.025	0.051	0.000	0.000	0.000	0.022	0.025	0.000	0.020	0.031	0.000	0.025	0.051	0.000	0.000
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-19 Seismic Takes per Block

VSP Survey – Level B Takes – 160 dB Threshold

	Site																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
ORDER CETACEA																					
Suborder Mysticeti (Baleen Whales)																					
Common Minke Whale	0.005	0.004	0.000	0.000	0.010	0.004	0.004	0.000	0.000	0.011	0.004	0.003	0.000	0.010	0.000	0.000	0.000	0.003	0.000	0.000	0.013
Sei Whale	0.007	0.007	0.032	0.023	0.026	0.007	0.009	0.030	0.032	0.032	0.007	0.008	0.032	0.021	0.012	0.011	0.012	0.010	0.030	0.033	0.039
Bryde's Whale	0.007	0.007	0.026	0.027	0.026	0.007	0.009	0.026	0.030	0.032	0.007	0.008	0.026	0.029	0.009	0.011	0.009	0.010	0.026	0.032	0.039
Blue Whale	0.015	0.014	0.026	0.027	0.026	0.014	0.011	0.026	0.030	0.030	0.014	0.011	0.026	0.029	0.009	0.011	0.009	0.014	0.026	0.032	0.044
Fin Whale	0.017	0.014	0.149	0.031	0.034	0.017	0.015	0.029	0.143	0.028	0.015	0.015	0.148	0.032	0.011	0.080	0.015	0.017	0.029	0.049	0.041
North Atlantic Right Whale	0.000	0.000	0.000	1.368	0.390	0.000	0.000	0.011	0.156	0.109	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.197	0.049
Humpback Whale	0.047	0.050	0.200	0.077	0.192	0.041	0.054	0.194	0.147	0.246	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)																					
Short-beaked Common Dolphin	5.333	6.370	75.929	9.436	46.552	5.060	7.350	74.573	79.093	12.034	4.513	5.470	77.285	58.754	3.966	11.964	3.009	7.385	22.290	84.064	15.726
Pygmy Killer Whale	0.013	0.012	0.026	0.022	0.038	0.010	0.008	0.026	0.026	0.032	0.009	0.008	0.025	0.021	0.012	0.013	0.012	0.013	0.026	0.030	0.025
Short-Finned Pilot Whale	0.907	12.391	82.000	1.021	0.479	0.249	7.119	80.457	0.220	0.543	0.102	6.724	49.576	11.625	6.847	1.346	0.283	10.907	52.541	0.003	0.468
Long-Finned Pilot Whale	0.302	3.098	8.010	0.000	0.111	0.083	2.217	8.833	0.596	0.181	0.034	2.094	5.483	1.163	2.941	0.465	0.100	2.517	3.885	0.026	0.031
Rissos Dolphin	3.052	5.299	37.674	0.060	16.258	0.194	6.893	45.816	2.160	0.095	0.080	12.760	46.603	9.950	0.193	12.345	0.114	3.046	37.195	1.359	10.286
Northern Bottlenose Whale	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003	0.002	0.002	0.001	0.001	0.000	0.003	0.000	0.000
Pygmy Sperm Whale	0.023	0.038	0.000	0.000	0.038	0.023	0.033	0.000	0.000	0.039	0.023	0.032	0.000	0.000	0.000	0.000	0.000	0.028	0.000	0.000	0.039
Dwarf Sperm Whale	0.070	0.114	0.174	0.000	0.114	0.070	0.100	0.172	0.000	0.117	0.068	0.097	0.178	0.117	0.097	0.074	0.072	0.083	0.172	0.000	0.117
Atlantic White-sided Dolphin	0.153	0.000	0.176	0.000	0.000	0.041	0.000	0.057	0.000	0.000	0.035	0.000	0.059	0.047	0.064	0.049	0.048	0.000	0.040	0.000	0.000
Fraser's Dolphin	0.010	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
Sowerby's Beaked Whale	0.002	0.002	0.002	0.002	0.001	0.002	0.001	0.002	0.002	0.001	0.002	0.001	0.003	0.000	0.000	0.000	0.001	0.002	0.002	0.003	0.001
Blainville's Beaked Whale	0.002	0.577	0.792	0.000	0.001	0.002	0.346	0.713	0.000	0.001	0.002	0.302	0.352	0.001	0.276	0.437	0.001	0.345	0.712	0.000	0.001
Gervais' Beaked Whale	0.002	0.577	0.792	0.000	0.001	0.002	0.346	0.713	0.000	0.001	0.002	0.302	0.352	0.001	0.276	0.437	0.001	0.345	0.712	0.000	0.001
True's Beaked Whale	0.002	0.577	0.792	0.000	0.001	0.002	0.346	0.713	0.000	0.001	0.002	0.302	0.352	0.001	0.276	0.437	0.001	0.345	0.712	0.000	0.001
Killer Whale	0.013	0.009	0.025	0.000	0.030	0.012	0.013	0.025	0.000	0.033	0.010	0.011	0.025	0.013	0.013	0.016	0.012	0.010	0.025	0.001	0.050
Melon-Headed Whale	0.013	0.012	0.035	0.037	0.038	0.010	0.008	0.035	0.030	0.032	0.009	0.008	0.035	0.027	0.017	0.014	0.011	0.013	0.034	0.036	0.025
Harbor Porpoise	0.063	0.054	0.245	0.000	0.114	0.029	0.024	0.135	0.001	0.131	0.005	0.005	0.027	0.024	0.065	0.068	0.059	0.037	0.094	0.001	0.044
Sperm Whale	0.028	1.792	4.097	0.000	0.013	0.022	2.039	2.097	0.000	0.013	0.017	2.655	2.049	0.017	1.246	2.258	0.026	0.024	0.040	0.000	0.012
False Killer Whale	0.013	0.012	0.055	0.056	0.038	0.010	0.008	0.054	0.000	0.032	0.009	0.008	0.054	0.013	0.013	0.014	0.012	0.013	0.054	0.000	0.025
Pantropical Spotted Dolphin	2.114	1.947	6.675	4.784	4.450	2.003	1.891	6.564	5.340	4.728	1.724	1.669	6.619	8.733	2.503	2.281	1.836	1.947	6.453	6.063	7.454
Clymene Dolphin	1.010	0.930	3.189	2.285	2.126	0.957	0.904	3.136	2.551	2.259	0.824	0.797	3.162	2.392	1.196	1.090	0.877	0.930	3.083	2.897	3.561
Striped Dolphin	2.556	20.230	69.359	5.784	6.638	2.421	17.783	7.936	6.456	5.716	2.085	4.138	62.242	7.468	5.571	27.240	2.219	2.354	7.801	7.330	9.012
Atlantic Spotted Dolphin	0.200	18.108	56.094	62.735	63.357	0.189	13.342	25.970	48.447	53.505	0.163	14.024	58.597	71.277	2.483	25.306	0.173	0.184	3.505	72.719	64.258
Spinner Dolphin	0.010	0.009	0.030	0.022	0.020	0.009	0.009	0.030	0.024	0.021	0.008	0.008	0.030	0.023	0.011	0.010	0.008	0.009	0.029	0.027	0.034
Rough-Toothed Dolphin	0.079	0.097	0.169	0.158	0.252	0.079	0.112	0.170	0.245	0.162	0.076	0.108	0.169	0.108	0.097	0.115	0.110	0.077	0.170	0.258	0.198
Bottlenose Dolphin	1.611	5.573	103.266	101.851	16.327	1.566	29.847	107.533	8.803	9.321	1.432	25.954	140.224	87.093	4.586	45.665	2.551	43.145	124.600	60.823	109.594
Cuvier's Beaked Whale	0.017	4.041	5.542	0.000	0.010	0.017	2.420	4.988	0.000	0.010	0.017	2.115	2.464	0.009	1.929	3.058	0.008	2.412	4.981	0.001	0.010
ORDER SIRENIA																					
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA																					
Suborder Pinnipedia																					
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table A-20 2D

2012 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-21 2D

2013 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-22 2D

2014 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.083	0.342	33.522
Sei Whale	0.208	1.965	192.625
Bryde's Whale	0.632	1.948	190.896
Blue Whale	0.831	2.182	213.901
Fin Whale	0.000	4.400	431.204
North Atlantic Right Whale	0.036	1.162	113.846
Humpback Whale	3.046	5.897	577.964
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	116.584	3,121.383	305,926.755
Pygmy Killer Whale	0.161	2.253	220.776
Short-Finned Pilot Whale	11.616	2,354.300	230,744.930
Long-Finned Pilot Whale	59.577	297.400	29,148.152
Rissos Dolphin	370.550	1,619.672	158,744.009
Northern Bottlenose Whale	0.004	0.127	12.462
Pygmy Sperm Whale	0.000	2.371	232.353
Dwarf Sperm Whale	2.819	14.844	1,454.885
Atlantic White-sided Dolphin	1.347	4.668	457.481
Fraser's Dolphin	0.208	0.242	23.717
Sowerby's Beaked Whale	0.000	0.203	19.910
Blainville's Beaked Whale	1.459	39.568	3,878.016
Gervais' Beaked Whale	1.459	39.568	3,878.016
True's Beaked Whale	1.459	39.568	3,878.016
Killer Whale	0.052	1.965	192.589
Melon-Headed Whale	0.161	2.523	247.240
Harbor Porpoise	2.064	7.054	691.367
Sperm Whale	0.095	158.828	15,566.706
False Killer Whale	0.155	2.801	274.527
Pantropical Spotted Dolphin	135.938	446.741	43,785.058
Clymene Dolphin	64.945	207.184	20,306.091
Striped Dolphin	527.416	2,038.848	199,827.536
Atlantic Spotted Dolphin	771.308	2,978.964	291,968.246
Spinner Dolphin	0.611	1.949	191.026
Rough-Toothed Dolphin	0.000	13.755	1,348.103
Bottlenose Dolphin	14.775	5,977.039	585,809.587
Cuvier's Beaked Whale	10.213	276.973	27,146.110
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-23 2D

2015 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.161	0.666	65.282
Sei Whale	0.402	3.855	377.801
Bryde's Whale	1.237	3.820	374.359
Blue Whale	1.622	4.274	418.875
Fin Whale	0.000	8.638	846.583
North Atlantic Right Whale	0.071	2.290	224.490
Humpback Whale	5.931	11.542	1,131.230
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	225.454	6,146.553	602,423.698
Pygmy Killer Whale	0.312	4.410	432.193
Short-Finned Pilot Whale	22.498	4,631.133	453,897.344
Long-Finned Pilot Whale	117.528	582.360	57,077.138
Rissos Dolphin	731.439	3,180.466	311,717.478
Northern Bottlenose Whale	0.007	0.250	24.544
Pygmy Sperm Whale	0.000	4.592	450.073
Dwarf Sperm Whale	5.564	29.005	2,842.740
Atlantic White-sided Dolphin	2.659	9.152	896.987
Fraser's Dolphin	0.402	0.468	45.882
Sowerby's Beaked Whale	0.000	0.397	38.905
Blainville's Beaked Whale	2.816	77.313	7,577.415
Gervais' Beaked Whale	2.816	77.313	7,577.415
True's Beaked Whale	2.816	77.313	7,577.415
Killer Whale	0.100	3.843	376.649
Melon-Headed Whale	0.312	4.942	484.381
Harbor Porpoise	3.995	13.798	1,352.385
Sperm Whale	0.184	309.723	30,355.996
False Killer Whale	0.300	5.491	538.213
Pantropical Spotted Dolphin	263.432	876.082	85,864.840
Clymene Dolphin	125.855	406.191	39,810.739
Striped Dolphin	1,020.455	3,993.224	391,375.882
Atlantic Spotted Dolphin	1,496.301	5,847.582	573,121.475
Spinner Dolphin	1.184	3.821	374.513
Rough-Toothed Dolphin	0.000	26.888	2,635.268
Bottlenose Dolphin	28.936	11,748.210	1,151,442.029
Cuvier's Beaked Whale	19.709	541.189	53,041.902
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-24 2D

2016 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.013	0.064	6.257
Sei Whale	0.032	0.417	40.850
Bryde's Whale	0.128	0.412	40.389
Blue Whale	0.164	0.451	44.161
Fin Whale	0.000	0.949	93.001
North Atlantic Right Whale	0.008	0.269	26.343
Humpback Whale	0.567	1.207	118.264
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	18.848	706.842	69,277.598
Pygmy Killer Whale	0.027	0.462	45.316
Short-Finned Pilot Whale	1.939	524.156	51,372.535
Long-Finned Pilot Whale	13.877	61.349	6,012.771
Rissos Dolphin	87.140	350.367	34,339.430
Northern Bottlenose Whale	0.001	0.029	2.829
Pygmy Sperm Whale	0.000	0.397	38.920
Dwarf Sperm Whale	0.662	2.947	288.795
Atlantic White-sided Dolphin	0.319	0.985	96.497
Fraser's Dolphin	0.032	0.039	3.865
Sowerby's Beaked Whale	0.000	0.040	3.957
Blainville's Beaked Whale	0.225	7.855	769.884
Gervais' Beaked Whale	0.225	7.855	769.884
True's Beaked Whale	0.225	7.855	769.884
Killer Whale	0.008	0.396	38.861
Melon-Headed Whale	0.027	0.525	51.446
Harbor Porpoise	0.338	1.428	139.995
Sperm Whale	0.015	30.401	2,979.611
False Killer Whale	0.026	0.590	57.806
Pantropical Spotted Dolphin	22.986	94.513	9,263.266
Clymene Dolphin	10.982	43.634	4,276.589
Striped Dolphin	86.220	422.056	41,365.683
Atlantic Spotted Dolphin	133.348	640.637	62,788.875
Spinner Dolphin	0.103	0.410	40.231
Rough-Toothed Dolphin	0.000	2.752	269.746
Bottlenose Dolphin	3.056	1,313.855	128,770.944
Cuvier's Beaked Whale	1.577	54.986	5,389.186
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-25 2D

2017 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.065	0.344	33.668
Sei Whale	0.161	2.333	228.706
Bryde's Whale	0.704	2.306	225.977
Blue Whale	0.898	2.503	245.316
Fin Whale	0.000	5.338	523.174
North Atlantic Right Whale	0.045	1.541	151.011
Humpback Whale	3.045	6.685	655.228
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	96.111	4,029.303	394,911.941
Pygmy Killer Whale	0.140	2.564	251.300
Short-Finned Pilot Whale	10.019	2,974.443	291,525.188
Long-Finned Pilot Whale	79.686	340.714	33,393.420
Rissos Dolphin	501.580	1,972.620	193,336.458
Northern Bottlenose Whale	0.003	0.165	16.139
Pygmy Sperm Whale	0.000	2.054	201.314
Dwarf Sperm Whale	3.810	16.174	1,585.245
Atlantic White-sided Dolphin	1.836	5.504	539.425
Fraser's Dolphin	0.161	0.202	19.775
Sowerby's Beaked Whale	0.000	0.222	21.728
Blainville's Beaked Whale	1.126	43.120	4,226.192
Gervais' Beaked Whale	1.126	43.120	4,226.192
True's Beaked Whale	1.126	43.120	4,226.192
Killer Whale	0.040	2.187	214.394
Melon-Headed Whale	0.140	2.923	286.447
Harbor Porpoise	1.734	7.889	773.175
Sperm Whale	0.076	164.949	16,166.688
False Killer Whale	0.137	3.295	322.975
Pantropical Spotted Dolphin	119.335	528.788	51,826.530
Clymene Dolphin	57.013	243.809	23,895.672
Striped Dolphin	441.661	2,346.422	229,972.807
Atlantic Spotted Dolphin	698.158	3,600.969	352,930.969
Spinner Dolphin	0.536	2.294	224.795
Rough-Toothed Dolphin	0.000	15.145	1,484.356
Bottlenose Dolphin	16.986	7,430.045	728,218.696
Cuvier's Beaked Whale	7.883	301.840	29,583.347
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-26 2D

2018 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.042	0.245	24.010
Sei Whale	0.105	1.740	170.565
Bryde's Whale	0.517	1.718	168.409
Blue Whale	0.654	1.851	181.402
Fin Whale	0.000	4.001	392.182
North Atlantic Right Whale	0.034	1.178	115.461
Humpback Whale	2.168	4.929	483.103
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	64.095	3,062.926	300,197.350
Pygmy Killer Whale	0.096	1.892	185.475
Short-Finned Pilot Whale	6.795	2,250.403	220,561.957
Long-Finned Pilot Whale	61.032	251.878	24,686.594
Rissos Dolphin	385.115	1,480.032	145,057.909
Northern Bottlenose Whale	0.002	0.125	12.277
Pygmy Sperm Whale	0.000	1.396	136.773
Dwarf Sperm Whale	2.925	11.803	1,156.771
Atlantic White-sided Dolphin	1.412	4.098	401.623
Fraser's Dolphin	0.105	0.135	13.245
Sowerby's Beaked Whale	0.000	0.162	15.862
Blainville's Beaked Whale	0.731	31.467	3,084.037
Gervais' Beaked Whale	0.731	31.467	3,084.037
True's Beaked Whale	0.731	31.467	3,084.037
Killer Whale	0.026	1.605	157.334
Melon-Headed Whale	0.096	2.167	212.355
Harbor Porpoise	1.164	5.796	568.073
Sperm Whale	0.050	118.782	11,641.781
False Killer Whale	0.093	2.452	240.336
Pantropical Spotted Dolphin	81.458	394.069	38,622.719
Clymene Dolphin	38.917	181.437	17,782.655
Striped Dolphin	296.307	1,736.602	170,204.357
Atlantic Spotted Dolphin	481.670	2,697.018	264,334.692
Spinner Dolphin	0.366	1.707	167.287
Rough-Toothed Dolphin	0.000	11.082	1,086.171
Bottlenose Dolphin	12.568	5,600.971	548,951.155
Cuvier's Beaked Whale	5.119	220.266	21,588.258
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-27 2D

2019 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.016	0.147	14.374
Sei Whale	0.041	1.207	118.325
Bryde's Whale	0.341	1.189	116.578
Blue Whale	0.421	1.251	122.623
Fin Whale	0.000	2.818	276.236
North Atlantic Right Whale	0.024	0.877	85.995
Humpback Whale	1.292	3.302	323.601
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	28.714	2,245.158	220,047.936
Pygmy Killer Whale	0.047	1.272	124.637
Short-Finned Pilot Whale	3.309	1,627.851	159,545.689
Long-Finned Pilot Whale	45.671	170.121	16,673.564
Rissos Dolphin	290.103	1,045.185	102,438.548
Northern Bottlenose Whale	0.001	0.092	9.017
Pygmy Sperm Whale	0.000	0.685	67.126
Dwarf Sperm Whale	2.201	7.648	749.560
Atlantic White-sided Dolphin	1.068	2.828	277.221
Fraser's Dolphin	0.041	0.062	6.067
Sowerby's Beaked Whale	0.000	0.105	10.292
Blainville's Beaked Whale	0.282	20.393	1,998.674
Gervais' Beaked Whale	0.282	20.393	1,998.674
True's Beaked Whale	0.282	20.393	1,998.674
Killer Whale	0.010	1.059	103.835
Melon-Headed Whale	0.047	1.476	144.671
Harbor Porpoise	0.541	3.840	376.332
Sperm Whale	0.021	73.606	7,214.084
False Killer Whale	0.047	1.690	165.620
Pantropical Spotted Dolphin	40.850	272.768	26,733.955
Clymene Dolphin	19.516	125.055	12,256.596
Striped Dolphin	136.856	1,177.054	115,363.022
Atlantic Spotted Dolphin	253.133	1,894.815	185,710.777
Spinner Dolphin	0.184	1.176	115.302
Rough-Toothed Dolphin	0.000	7.246	710.223
Bottlenose Dolphin	8.511	4,009.654	392,986.176
Cuvier's Beaked Whale	1.972	142.748	13,990.715
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-28 2D

2020 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.016	0.074	7.228
Sei Whale	0.040	0.459	44.956
Bryde's Whale	0.143	0.454	44.487
Blue Whale	0.185	0.501	49.082
Fin Whale	0.000	1.038	101.725
North Atlantic Right Whale	0.009	0.287	28.109
Humpback Whale	0.655	1.346	131.880
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	23.101	759.883	74,476.085
Pygmy Killer Whale	0.033	0.515	50.475
Short-Finned Pilot Whale	2.345	566.862	55,558.153
Long-Finned Pilot Whale	14.774	68.206	6,684.876
Rissos Dolphin	92.466	382.824	37,520.626
Northern Bottlenose Whale	0.001	0.031	3.039
Pygmy Sperm Whale	0.000	0.479	46.988
Dwarf Sperm Whale	0.703	3.324	325.747
Atlantic White-sided Dolphin	0.337	1.086	106.406
Fraser's Dolphin	0.040	0.048	4.721
Sowerby's Beaked Whale	0.000	0.046	4.461
Blainville's Beaked Whale	0.282	8.860	868.352
Gervais' Beaked Whale	0.282	8.860	868.352
True's Beaked Whale	0.282	8.860	868.352
Killer Whale	0.010	0.444	43.562
Melon-Headed Whale	0.033	0.582	57.013
Harbor Porpoise	0.412	1.599	156.725
Sperm Whale	0.019	34.774	3,408.186
False Killer Whale	0.032	0.651	63.782
Pantropical Spotted Dolphin	27.641	104.105	10,203.354
Clymene Dolphin	13.206	48.142	4,718.410
Striped Dolphin	105.171	468.624	45,929.852
Atlantic Spotted Dolphin	158.880	701.469	68,751.001
Spinner Dolphin	0.124	0.453	44.388
Rough-Toothed Dolphin	0.000	3.095	303.340
Bottlenose Dolphin	3.394	1,427.347	139,894.242
Cuvier's Beaked Whale	1.972	62.019	6,078.464
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-29 3D

2012 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-30 3D

2013 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-31 3D

2014 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-32 3D

2015 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-33 3D

2016 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.004	0.037	3.599
Sei Whale	0.015	0.231	22.616
Bryde's Whale	0.016	0.230	22.515
Blue Whale	0.016	0.250	24.461
Fin Whale	0.000	0.558	54.731
North Atlantic Right Whale	0.000	0.342	33.505
Humpback Whale	0.108	0.647	63.382
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	407.416	39,930.828
Pygmy Killer Whale	0.034	0.243	23.789
Short-Finned Pilot Whale	72.476	316.100	30,980.938
Long-Finned Pilot Whale	0.008	35.496	3,478.968
Rissos Dolphin	0.000	200.802	19,680.633
Northern Bottlenose Whale	0.000	0.015	1.429
Pygmy Sperm Whale	0.081	0.162	15.864
Dwarf Sperm Whale	0.664	1.318	129.154
Atlantic White-sided Dolphin	0.203	0.483	47.329
Fraser's Dolphin	0.000	0.016	1.562
Sowerby's Beaked Whale	0.006	0.020	1.946
Blainville's Beaked Whale	0.000	3.979	390.018
Gervais' Beaked Whale	0.000	3.979	390.018
True's Beaked Whale	0.000	3.979	390.018
Killer Whale	0.025	0.206	20.141
Melon-Headed Whale	0.034	0.293	28.690
Harbor Porpoise	0.317	0.816	80.002
Sperm Whale	0.000	14.101	1,382.052
False Killer Whale	0.100	0.340	33.307
Pantropical Spotted Dolphin	12.392	51.454	5,042.963
Clymene Dolphin	5.920	23.748	2,327.541
Striped Dolphin	71.710	228.835	22,428.132
Atlantic Spotted Dolphin	68.256	348.242	34,131.219
Spinner Dolphin	0.056	0.223	21.896
Rough-Toothed Dolphin	0.036	1.527	149.631
Bottlenose Dolphin	18.627	776.991	76,152.843
Cuvier's Beaked Whale	0.000	27.856	2,730.129
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-34 3D

2017 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.002	0.021	2.050
Sei Whale	0.008	0.140	13.689
Bryde's Whale	0.009	0.139	13.631
Blue Whale	0.009	0.150	14.663
Fin Whale	0.000	0.341	33.400
North Atlantic Right Whale	0.000	0.216	21.214
Humpback Whale	0.057	0.385	37.759
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	253.631	24,858.371
Pygmy Killer Whale	0.017	0.144	14.143
Short-Finned Pilot Whale	45.142	195.714	19,181.882
Long-Finned Pilot Whale	0.005	21.303	2,087.903
Rissos Dolphin	0.000	123.199	12,074.754
Northern Bottlenose Whale	0.000	0.009	0.892
Pygmy Sperm Whale	0.041	0.086	8.467
Dwarf Sperm Whale	0.390	0.778	76.263
Atlantic White-sided Dolphin	0.129	0.291	28.494
Fraser's Dolphin	0.000	0.008	0.818
Sowerby's Beaked Whale	0.004	0.012	1.146
Blainville's Beaked Whale	0.000	2.344	229.722
Gervais' Beaked Whale	0.000	2.344	229.722
True's Beaked Whale	0.000	2.344	229.722
Killer Whale	0.014	0.121	11.895
Melon-Headed Whale	0.017	0.176	17.227
Harbor Porpoise	0.179	0.487	47.719
Sperm Whale	0.000	8.175	801.204
False Killer Whale	0.058	0.205	20.129
Pantropical Spotted Dolphin	7.820	31.143	3,052.372
Clymene Dolphin	3.736	14.346	1,406.080
Striped Dolphin	45.256	137.185	13,445.523
Atlantic Spotted Dolphin	43.152	212.298	20,807.349
Spinner Dolphin	0.035	0.135	13.227
Rough-Toothed Dolphin	0.023	0.903	88.536
Bottlenose Dolphin	11.559	478.398	46,887.767
Cuvier's Beaked Whale	0.000	16.407	1,608.056
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-35 3D

2018 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.002	0.021	2.050
Sei Whale	0.008	0.140	13.689
Bryde's Whale	0.009	0.139	13.631
Blue Whale	0.009	0.150	14.663
Fin Whale	0.000	0.341	33.400
North Atlantic Right Whale	0.000	0.216	21.214
Humpback Whale	0.057	0.385	37.759
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	253.631	24,858.371
Pygmy Killer Whale	0.017	0.144	14.143
Short-Finned Pilot Whale	45.142	195.714	19,181.882
Long-Finned Pilot Whale	0.005	21.303	2,087.903
Rissos Dolphin	0.000	123.199	12,074.754
Northern Bottlenose Whale	0.000	0.009	0.892
Pygmy Sperm Whale	0.041	0.086	8.467
Dwarf Sperm Whale	0.390	0.778	76.263
Atlantic White-sided Dolphin	0.129	0.291	28.494
Fraser's Dolphin	0.000	0.008	0.818
Sowerby's Beaked Whale	0.004	0.012	1.146
Blainville's Beaked Whale	0.000	2.344	229.722
Gervais' Beaked Whale	0.000	2.344	229.722
True's Beaked Whale	0.000	2.344	229.722
Killer Whale	0.014	0.121	11.895
Melon-Headed Whale	0.017	0.176	17.227
Harbor Porpoise	0.179	0.487	47.719
Sperm Whale	0.000	8.175	801.204
False Killer Whale	0.058	0.205	20.129
Pantropical Spotted Dolphin	7.820	31.143	3,052.372
Clymene Dolphin	3.736	14.346	1,406.080
Striped Dolphin	45.256	137.185	13,445.523
Atlantic Spotted Dolphin	43.152	212.298	20,807.349
Spinner Dolphin	0.035	0.135	13.227
Rough-Toothed Dolphin	0.023	0.903	88.536
Bottlenose Dolphin	11.559	478.398	46,887.767
Cuvier's Beaked Whale	0.000	16.407	1,608.056
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-36 3D

2019 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.002	0.021	2.050
Sei Whale	0.008	0.140	13.689
Bryde's Whale	0.009	0.139	13.631
Blue Whale	0.009	0.150	14.663
Fin Whale	0.000	0.341	33.400
North Atlantic Right Whale	0.000	0.216	21.214
Humpback Whale	0.057	0.385	37.759
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	253.631	24,858.371
Pygmy Killer Whale	0.017	0.144	14.143
Short-Finned Pilot Whale	45.142	195.714	19,181.882
Long-Finned Pilot Whale	0.005	21.303	2,087.903
Rissos Dolphin	0.000	123.199	12,074.754
Northern Bottlenose Whale	0.000	0.009	0.892
Pygmy Sperm Whale	0.041	0.086	8.467
Dwarf Sperm Whale	0.390	0.778	76.263
Atlantic White-sided Dolphin	0.129	0.291	28.494
Fraser's Dolphin	0.000	0.008	0.818
Sowerby's Beaked Whale	0.004	0.012	1.146
Blainville's Beaked Whale	0.000	2.344	229.722
Gervais' Beaked Whale	0.000	2.344	229.722
True's Beaked Whale	0.000	2.344	229.722
Killer Whale	0.014	0.121	11.895
Melon-Headed Whale	0.017	0.176	17.227
Harbor Porpoise	0.179	0.487	47.719
Sperm Whale	0.000	8.175	801.204
False Killer Whale	0.058	0.205	20.129
Pantropical Spotted Dolphin	7.820	31.143	3,052.372
Clymene Dolphin	3.736	14.346	1,406.080
Striped Dolphin	45.256	137.185	13,445.523
Atlantic Spotted Dolphin	43.152	212.298	20,807.349
Spinner Dolphin	0.035	0.135	13.227
Rough-Toothed Dolphin	0.023	0.903	88.536
Bottlenose Dolphin	11.559	478.398	46,887.767
Cuvier's Beaked Whale	0.000	16.407	1,608.056
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-37 3D

2020 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.004	0.031	3.074
Sei Whale	0.013	0.210	20.534
Bryde's Whale	0.014	0.209	20.447
Blue Whale	0.014	0.224	21.995
Fin Whale	0.000	0.511	50.100
North Atlantic Right Whale	0.000	0.325	31.821
Humpback Whale	0.086	0.578	56.639
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	380.446	37,287.556
Pygmy Killer Whale	0.026	0.216	21.214
Short-Finned Pilot Whale	67.713	293.570	28,772.822
Long-Finned Pilot Whale	0.008	31.954	3,131.855
Rissos Dolphin	0.000	184.799	18,112.131
Northern Bottlenose Whale	0.000	0.014	1.338
Pygmy Sperm Whale	0.062	0.130	12.701
Dwarf Sperm Whale	0.585	1.167	114.395
Atlantic White-sided Dolphin	0.193	0.436	42.741
Fraser's Dolphin	0.000	0.013	1.227
Sowerby's Beaked Whale	0.005	0.018	1.719
Blainville's Beaked Whale	0.000	3.516	344.583
Gervais' Beaked Whale	0.000	3.516	344.583
True's Beaked Whale	0.000	3.516	344.583
Killer Whale	0.020	0.182	17.843
Melon-Headed Whale	0.026	0.264	25.840
Harbor Porpoise	0.269	0.730	71.579
Sperm Whale	0.000	12.262	1,201.807
False Killer Whale	0.086	0.308	30.193
Pantropical Spotted Dolphin	11.730	46.715	4,578.557
Clymene Dolphin	5.604	21.519	2,109.119
Striped Dolphin	67.883	205.778	20,168.284
Atlantic Spotted Dolphin	64.728	318.447	31,211.024
Spinner Dolphin	0.053	0.202	19.841
Rough-Toothed Dolphin	0.034	1.355	132.804
Bottlenose Dolphin	17.339	717.597	70,331.650
Cuvier's Beaked Whale	0.000	24.611	2,412.084
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-38 WAZ

2012 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-39 WAZ

2013 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-40 WAZ

2014 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-41 WAZ

2015 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-42 WAZ

2016 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-43 WAZ

2017 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-44 WAZ

2018 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.002	0.019	1.896
Sei Whale	0.008	0.129	12.663
Bryde's Whale	0.009	0.129	12.609
Blue Whale	0.009	0.138	13.564
Fin Whale	0.000	0.315	30.895
North Atlantic Right Whale	0.000	0.200	19.623
Humpback Whale	0.053	0.356	34.927
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	234.609	22,993.993
Pygmy Killer Whale	0.016	0.133	13.082
Short-Finned Pilot Whale	41.757	181.035	17,743.241
Long-Finned Pilot Whale	0.005	19.705	1,931.310
Rissos Dolphin	0.000	113.959	11,169.148
Northern Bottlenose Whale	0.000	0.008	0.825
Pygmy Sperm Whale	0.038	0.080	7.832
Dwarf Sperm Whale	0.361	0.720	70.543
Atlantic White-sided Dolphin	0.119	0.269	26.357
Fraser's Dolphin	0.000	0.008	0.756
Sowerby's Beaked Whale	0.003	0.011	1.060
Blainville's Beaked Whale	0.000	2.168	212.493
Gervais' Beaked Whale	0.000	2.168	212.493
True's Beaked Whale	0.000	2.168	212.493
Killer Whale	0.013	0.112	11.003
Melon-Headed Whale	0.016	0.163	15.935
Harbor Porpoise	0.166	0.450	44.140
Sperm Whale	0.000	7.562	741.114
False Killer Whale	0.053	0.190	18.619
Pantropical Spotted Dolphin	7.234	28.808	2,823.444
Clymene Dolphin	3.456	13.270	1,300.624
Striped Dolphin	41.861	126.896	12,437.109
Atlantic Spotted Dolphin	39.916	196.376	19,246.798
Spinner Dolphin	0.033	0.125	12.235
Rough-Toothed Dolphin	0.021	0.836	81.896
Bottlenose Dolphin	10.692	442.518	43,371.184
Cuvier's Beaked Whale	0.000	15.177	1,487.452
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-45 WAZ

2019 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.003	0.029	2.821
Sei Whale	0.011	0.219	21.475
Bryde's Whale	0.013	0.218	21.392
Blue Whale	0.013	0.230	22.564
Fin Whale	0.000	0.543	53.223
North Atlantic Right Whale	0.000	0.369	36.131
Humpback Whale	0.066	0.585	57.380
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	419.324	41,097.934
Pygmy Killer Whale	0.017	0.218	21.399
Short-Finned Pilot Whale	74.701	320.390	31,401.468
Long-Finned Pilot Whale	0.009	32.858	3,220.461
Rissos Dolphin	0.000	198.312	19,436.567
Northern Bottlenose Whale	0.000	0.015	1.480
Pygmy Sperm Whale	0.042	0.100	9.812
Dwarf Sperm Whale	0.577	1.161	113.782
Atlantic White-sided Dolphin	0.219	0.451	44.227
Fraser's Dolphin	0.000	0.009	0.893
Sowerby's Beaked Whale	0.006	0.017	1.702
Blainville's Beaked Whale	0.000	3.479	340.931
Gervais' Beaked Whale	0.000	3.479	340.931
True's Beaked Whale	0.000	3.479	340.931
Killer Whale	0.016	0.181	17.754
Melon-Headed Whale	0.017	0.271	26.597
Harbor Porpoise	0.243	0.742	72.697
Sperm Whale	0.000	11.721	1,148.774
False Killer Whale	0.081	0.321	31.477
Pantropical Spotted Dolphin	13.244	48.849	4,787.738
Clymene Dolphin	6.327	22.418	2,197.168
Striped Dolphin	76.643	211.137	20,693.499
Atlantic Spotted Dolphin	73.305	337.631	33,091.235
Spinner Dolphin	0.060	0.211	20.670
Rough-Toothed Dolphin	0.038	1.354	132.663
Bottlenose Dolphin	19.002	775.157	75,973.164
Cuvier's Beaked Whale	0.000	24.350	2,386.520
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-46 WAZ

2020 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.005	0.039	3.792
Sei Whale	0.015	0.255	25.041
Bryde's Whale	0.016	0.254	24.900
Blue Whale	0.016	0.274	26.809
Fin Whale	0.000	0.627	61.412
North Atlantic Right Whale	0.000	0.244	23.876
Humpback Whale	0.106	0.704	68.984
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	468.123	45,880.739
Pygmy Killer Whale	0.032	0.264	25.883
Short-Finned Pilot Whale	83.513	361.944	35,474.096
Long-Finned Pilot Whale	0.010	39.410	3,862.621
Rissos Dolphin	0.000	227.768	22,323.518
Northern Bottlenose Whale	0.000	0.016	1.616
Pygmy Sperm Whale	0.076	0.160	15.664
Dwarf Sperm Whale	0.722	1.439	141.075
Atlantic White-sided Dolphin	0.238	0.538	52.714
Fraser's Dolphin	0.000	0.015	1.513
Sowerby's Beaked Whale	0.007	0.021	2.092
Blainville's Beaked Whale	0.000	4.336	424.986
Gervais' Beaked Whale	0.000	4.336	424.986
True's Beaked Whale	0.000	4.336	424.986
Killer Whale	0.025	0.225	22.006
Melon-Headed Whale	0.032	0.321	31.421
Harbor Porpoise	0.331	0.901	88.280
Sperm Whale	0.000	15.123	1,482.228
False Killer Whale	0.106	0.373	36.556
Pantropical Spotted Dolphin	14.468	56.936	5,580.249
Clymene Dolphin	6.912	26.216	2,569.410
Striped Dolphin	83.723	252.971	24,793.652
Atlantic Spotted Dolphin	79.831	383.835	37,619.682
Spinner Dolphin	0.065	0.247	24.171
Rough-Toothed Dolphin	0.042	1.652	161.895
Bottlenose Dolphin	21.384	872.157	85,480.086
Cuvier's Beaked Whale	0.000	30.353	2,974.904
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-47 VSP

2012 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-48 VSP

2013 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-49 VSP

2014 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-50 VSP

2015 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-51 VSP

2016 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-52 VSP

2017 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-53 VSP

2018 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-54 VSP

2019 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.013
Sei Whale	0.000	0.001	0.099
Bryde's Whale	0.000	0.001	0.092
Blue Whale	0.000	0.001	0.099
Fin Whale	0.000	0.003	0.252
North Atlantic Right Whale	0.000	0.002	0.159
Humpback Whale	0.000	0.003	0.261
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	1.774	173.875
Pygmy Killer Whale	0.000	0.001	0.088
Short-Finned Pilot Whale	0.000	1.388	136.062
Long-Finned Pilot Whale	0.000	0.156	15.310
Rissos Dolphin	0.000	0.953	93.444
Northern Bottlenose Whale	0.000	0.000	0.007
Pygmy Sperm Whale	0.000	0.001	0.054
Dwarf Sperm Whale	0.000	0.005	0.539
Atlantic White-sided Dolphin	0.000	0.002	0.203
Fraser's Dolphin	0.000	0.000	0.005
Sowerby's Beaked Whale	0.000	0.000	0.008
Blainville's Beaked Whale	0.000	0.017	1.639
Gervais' Beaked Whale	0.000	0.017	1.639
True's Beaked Whale	0.000	0.017	1.639
Killer Whale	0.000	0.001	0.083
Melon-Headed Whale	0.000	0.001	0.109
Harbor Porpoise	0.000	0.003	0.314
Sperm Whale	0.000	0.059	5.810
False Killer Whale	0.000	0.001	0.133
Pantropical Spotted Dolphin	0.000	0.224	21.983
Clymene Dolphin	0.000	0.101	9.883
Striped Dolphin	0.000	0.952	93.284
Atlantic Spotted Dolphin	0.000	1.489	145.922
Spinner Dolphin	0.000	0.001	0.093
Rough-Toothed Dolphin	0.000	0.007	0.637
Bottlenose Dolphin	0.000	3.277	321.220
Cuvier's Beaked Whale	0.000	0.117	11.474
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table A-55 VSP

2020 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.022
Sei Whale	0.000	0.002	0.158
Bryde's Whale	0.000	0.001	0.146
Blue Whale	0.000	0.002	0.159
Fin Whale	0.000	0.004	0.399
North Atlantic Right Whale	0.000	0.003	0.246
Humpback Whale	0.000	0.004	0.417
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	2.774	271.918
Pygmy Killer Whale	0.000	0.001	0.141
Short-Finned Pilot Whale	0.000	2.176	213.265
Long-Finned Pilot Whale	0.000	0.250	24.530
Rissos Dolphin	0.000	1.505	147.510
Northern Bottlenose Whale	0.000	0.000	0.010
Pygmy Sperm Whale	0.000	0.001	0.097
Dwarf Sperm Whale	0.000	0.009	0.880
Atlantic White-sided Dolphin	0.000	0.003	0.326
Fraser's Dolphin	0.000	0.000	0.009
Sowerby's Beaked Whale	0.000	0.000	0.013
Blainville's Beaked Whale	0.000	0.027	2.681
Gervais' Beaked Whale	0.000	0.027	2.681
True's Beaked Whale	0.000	0.027	2.681
Killer Whale	0.000	0.001	0.135
Melon-Headed Whale	0.000	0.002	0.174
Harbor Porpoise	0.000	0.005	0.504
Sperm Whale	0.000	0.099	9.675
False Killer Whale	0.000	0.002	0.211
Pantropical Spotted Dolphin	0.000	0.357	34.992
Clymene Dolphin	0.000	0.161	15.767
Striped Dolphin	0.000	1.524	149.358
Atlantic Spotted Dolphin	0.000	2.356	230.868
Spinner Dolphin	0.000	0.002	0.148
Rough-Toothed Dolphin	0.000	0.011	1.037
Bottlenose Dolphin	0.000	5.162	505.908
Cuvier's Beaked Whale	0.000	0.191	18.765
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

SUPPLEMENT B
NON-SEISMIC TAKE TABLES

Supplemental Table B-1 Non-Seismic Annual Takes

Total Annual Level A Takes – Southall Criteria

	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.0003	0.0004	0.0004	0.0004	0.0004	0.0003	0.0000	0.0000	0.0000
Sei Whale	0.0020	0.0024	0.0024	0.0024	0.0024	0.0021	0.0004	0.0000	0.0000
Bryde's Whale	0.0023	0.0030	0.0030	0.0030	0.0030	0.0027	0.0007	0.0000	0.0000
Blue Whale	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0.0000	0.0000
Fin Whale	0.0155	0.0208	0.0208	0.0208	0.0208	0.0185	0.0053	0.0000	0.0000
North Atlantic Right Whale	0.0021	0.0026	0.0026	0.0026	0.0026	0.0022	0.0005	0.0000	0.0000
Humpback Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	4.0936	5.2235	5.2235	5.2235	5.2235	4.5460	1.1299	0.0000	0.0000
Pygmy Killer Whale	0.0004	0.0010	0.0010	0.0010	0.0010	0.0009	0.0006	0.0000	0.0000
Short-Finned Pilot Whale	0.0053	0.0106	0.0106	0.0106	0.0106	0.0106	0.0053	0.0000	0.0000
Long-Finned Pilot Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Rissos Dolphin	1.8630	2.2287	2.2287	2.2287	2.2287	2.0205	0.3658	0.0000	0.0000
Northern Bottlenose Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pygmy Sperm Whale	0.0048	0.0064	0.0064	0.0064	0.0064	0.0059	0.0016	0.0000	0.0000
Dwarf Sperm Whale	0.0145	0.0192	0.0192	0.0192	0.0192	0.0178	0.0047	0.0000	0.0000
Atlantic White-sided Dolphin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fraser's Dolphin	0.0001	0.0003	0.0004	0.0004	0.0004	0.0003	0.0003	0.0000	0.0000
Sowerby's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000
Blainville's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000
Gervais' Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000
True's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000
Killer Whale	0.0025	0.0061	0.0061	0.0061	0.0061	0.0058	0.0036	0.0000	0.0000
Melon-Headed Whale	0.0001	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0000	0.0000
Harbor Porpoise	0.0005	0.0007	0.0007	0.0007	0.0007	0.0006	0.0002	0.0000	0.0000
Sperm Whale	0.0008	0.0009	0.0009	0.0009	0.0009	0.0008	0.0001	0.0000	0.0000
False Killer Whale	0.0001	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0000	0.0000
Pantropical Spotted Dolphin	0.4477	0.5868	0.6200	0.6200	0.6200	0.5432	0.1677	0.0287	0.0287
Clymene Dolphin	0.2139	0.2803	0.2962	0.2962	0.2962	0.2595	0.0801	0.0137	0.0137
Striped Dolphin	0.5954	0.7674	0.8121	0.8121	0.8121	0.7114	0.2107	0.0386	0.0386
Atlantic Spotted Dolphin	5.3991	6.9574	7.3614	7.3614	7.3614	6.4414	1.8980	0.3397	0.3397
Spinner Dolphin	0.0020	0.0026	0.0028	0.0028	0.0028	0.0024	0.0008	0.0001	0.0001
Rough-Toothed Dolphin	0.0099	0.0145	0.0145	0.0145	0.0145	0.0134	0.0047	0.0000	0.0000
Bottlenose Dolphin	1.2977	2.1422	2.3608	2.3608	2.3608	1.9922	1.0400	0.1955	0.1955
Cuvier's Beaked Whale	0.0013	0.0015	0.0015	0.0015	0.0015	0.0013	0.0003	0.0000	0.0000
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-2 Non-Seismic Annual Takes

Total Annual Level A Takes – Historic Criteria

	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0001	0.0004
Sei Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0012	0.0008	0.0024
Bryde's Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0012	0.0008	0.0024
Blue Whale	0.0007	0.0010	0.0011	0.0011	0.0011	0.0011	0.0015	0.0009	0.0026
Fin Whale	0.0012	0.0016	0.0017	0.0017	0.0017	0.0018	0.0031	0.0019	0.0055
North Atlantic Right Whale	0.0020	0.0025	0.0025	0.0025	0.0025	0.0027	0.0051	0.0031	0.0089
Humpback Whale	0.0025	0.0034	0.0035	0.0035	0.0035	0.0034	0.0037	0.0022	0.0066
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	1.2187	1.4589	1.4946	1.4946	1.4946	1.5087	2.0876	1.3143	3.8682
Pygmy Killer Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0011	0.0008	0.0024
Short-Finned Pilot Whale	0.0132	0.0166	0.0171	0.0171	0.0171	0.1358	1.2475	0.8050	2.3163
Long-Finned Pilot Whale	0.0027	0.0033	0.0033	0.0033	0.0033	0.0153	0.1295	0.0932	0.2808
Rissos Dolphin	0.0913	0.1118	0.1118	0.1118	0.1118	0.1826	0.8666	0.5861	1.7367
Northern Bottlenose Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001
Pygmy Sperm Whale	0.0011	0.0015	0.0015	0.0015	0.0015	0.0014	0.0007	0.0005	0.0017
Dwarf Sperm Whale	0.0034	0.0046	0.0046	0.0046	0.0046	0.0046	0.0057	0.0038	0.0119
Atlantic White-sided Dolphin	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0017	0.0014	0.0044
Fraser's Dolphin	0.0004	0.0006	0.0007	0.0007	0.0007	0.0006	0.0003	0.0001	0.0002
Sowerby's Beaked Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002
Blainville's Beaked Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0134	0.0104	0.0320
Gervais' Beaked Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0134	0.0104	0.0320
True's Beaked Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0134	0.0104	0.0320
Killer Whale	0.0005	0.0007	0.0007	0.0007	0.0007	0.0007	0.0010	0.0007	0.0021
Melon-Headed Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0014	0.0009	0.0029
Harbor Porpoise	0.0016	0.0018	0.0018	0.0018	0.0018	0.0019	0.0031	0.0023	0.0068
Sperm Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0041	0.0430	0.0377	0.1213
False Killer Whale	0.0004	0.0006	0.0006	0.0006	0.0006	0.0007	0.0016	0.0010	0.0029
Pantropical Spotted Dolphin	0.3036	0.4453	0.4509	0.4509	0.4509	0.4381	0.3559	0.1610	0.4798
Clymene Dolphin	0.1450	0.2127	0.2154	0.2154	0.2154	0.2088	0.1643	0.0729	0.2170
Striped Dolphin	0.3964	0.5755	0.5831	0.5831	0.5831	0.6088	0.9086	0.5299	1.5825
Atlantic Spotted Dolphin	3.4607	4.9269	4.9955	4.9955	4.9955	4.7511	3.0827	1.2151	3.5657
Spinner Dolphin	0.0013	0.0019	0.0020	0.0020	0.0020	0.0019	0.0015	0.0007	0.0020
Rough-Toothed Dolphin	0.0057	0.0074	0.0075	0.0075	0.0075	0.0073	0.0080	0.0052	0.0164
Bottlenose Dolphin	0.9382	1.4056	1.4650	1.4650	1.4650	1.6672	3.8323	2.2521	6.4434
Cuvier's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0090	0.0939	0.0726	0.2243
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-3 Non-Seismic Annual Takes

Total Annual Level B Takes – 160 dB Criteria

	Year								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
ORDER CETACEA									
Suborder Mysticeti (Baleen Whales)									
Common Minke Whale	0.0225	0.0287	0.0300	0.0300	0.0300	0.0282	0.0200	0.0135	0.0419
Sei Whale	0.0358	0.0476	0.0511	0.0511	0.0511	0.0557	0.1152	0.0784	0.2328
Bryde's Whale	0.0355	0.0470	0.0505	0.0505	0.0505	0.0553	0.1169	0.0790	0.2338
Blue Whale	0.0659	0.0980	0.1037	0.1037	0.1037	0.1048	0.1448	0.0871	0.2568
Fin Whale	0.1153	0.1598	0.1665	0.1665	0.1665	0.1722	0.3083	0.1847	0.5384
North Atlantic Right Whale	0.1945	0.2461	0.2491	0.2491	0.2491	0.2690	0.5016	0.3002	0.8702
Humpback Whale	0.2454	0.3285	0.3444	0.3444	0.3444	0.3313	0.3597	0.2189	0.6492
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)									
Short-beaked Common Dolphin	119.4440	142.9833	146.4839	146.4839	146.4839	147.8699	204.6009	128.8144	379.1270
Pygmy Killer Whale	0.0345	0.0494	0.0494	0.0494	0.0494	0.0549	0.1097	0.0759	0.2370
Short-Finned Pilot Whale	1.2920	1.6287	1.6711	1.6711	1.6711	13.3054	122.2637	78.8942	227.0254
Long-Finned Pilot Whale	0.2621	0.3201	0.3267	0.3267	0.3267	1.4975	12.6893	9.1359	27.5252
Rissos Dolphin	8.9444	10.9577	10.9577	10.9577	10.9577	17.8981	84.9354	57.4417	170.2112
Northern Bottlenose Whale	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0063	0.0041	0.0118
Pygmy Sperm Whale	0.1119	0.1503	0.1503	0.1503	0.1503	0.1410	0.0732	0.0472	0.1675
Dwarf Sperm Whale	0.3358	0.4508	0.4508	0.4508	0.4508	0.4557	0.5592	0.3686	1.1655
Atlantic White-sided Dolphin	0.0027	0.0055	0.0055	0.0055	0.0055	0.0208	0.1680	0.1357	0.4275
Fraser's Dolphin	0.0345	0.0568	0.0637	0.0637	0.0637	0.0575	0.0304	0.0098	0.0183
Sowerby's Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.0030	0.0073	0.0056	0.0175
Blainville's Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.1259	1.3153	1.0167	3.1400
Gervais' Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.1259	1.3153	1.0167	3.1400
True's Beaked Whale	0.0026	0.0032	0.0032	0.0032	0.0032	0.1265	1.3156	1.0167	3.1400
Killer Whale	0.0509	0.0642	0.0678	0.0678	0.0678	0.0680	0.0952	0.0667	0.2021
Melon-Headed Whale	0.0361	0.0525	0.0525	0.0525	0.0525	0.0604	0.1362	0.0921	0.2839
Harbor Porpoise	0.1543	0.1717	0.1812	0.1812	0.1812	0.1894	0.2990	0.2206	0.6643
Sperm Whale	0.0182	0.0215	0.0215	0.0215	0.0215	0.4051	4.2127	3.6965	11.8913
False Killer Whale	0.0389	0.0582	0.0582	0.0582	0.0582	0.0674	0.1524	0.0959	0.2885
Pantropical Spotted Dolphin	29.7529	43.6445	44.1968	44.1968	44.1968	42.9366	34.8805	15.7818	47.0220
Clymene Dolphin	14.2145	20.8513	21.1152	21.1152	21.1152	20.4600	16.1068	7.1416	21.2706
Striped Dolphin	38.8529	56.4013	57.1529	57.1529	57.1529	59.6638	89.0555	51.9312	155.0979
Atlantic Spotted Dolphin	339.1818	482.8880	489.6133	489.6133	489.6133	465.6510	302.1377	119.0890	349.4761
Spinner Dolphin	0.1306	0.1899	0.1924	0.1924	0.1924	0.1862	0.1484	0.0672	0.2001
Rough-Toothed Dolphin	0.5554	0.7281	0.7355	0.7355	0.7355	0.7138	0.7853	0.5128	1.6114
Bottlenose Dolphin	91.9501	137.7600	143.5851	143.5851	143.5851	163.3981	375.6071	220.7238	631.5169
Cuvier's Beaked Whale	0.0158	0.0181	0.0181	0.0181	0.0181	0.8810	9.2072	7.1172	21.9798
ORDER SIRENIA									
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
ORDER CARNIVORA									
Suborder Pinnipedia									
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002

Supplemental Table B-4 Survey LOEs (Blocks/Year) by Year

MM LOE

Year	4w	5w	9spr	10spr	14sum	20f	21f	4w	5w	9spr	10spr	14sum	20f	21f
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
2012	119.4440	142.9833	146.4839	146.4839	146.4839	147.8699	204.6009	128.8144	379.1270	119.4440	142.9833	146.4839	146.4839	146.4839
2013	0.0345	0.0494	0.0494	0.0494	0.0494	0.0549	0.1097	0.0759	0.2370	0.0345	0.0494	0.0494	0.0494	0.0494
2014	1.2920	1.6287	1.6711	1.6711	1.6711	13.3054	122.2637	78.8942	227.0254	1.2920	1.6287	1.6711	1.6711	1.6711
2015	0.2621	0.3201	0.3267	0.3267	0.3267	1.4975	12.6893	9.1359	27.5252	0.2621	0.3201	0.3267	0.3267	0.3267
2016	8.9444	10.9577	10.9577	10.9577	10.9577	17.8981	84.9354	57.4417	170.2112	8.9444	10.9577	10.9577	10.9577	10.9577
2017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0063	0.0041	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000
2018	0.1119	0.1503	0.1503	0.1503	0.1503	0.1410	0.0732	0.0472	0.1675	0.1119	0.1503	0.1503	0.1503	0.1503
2019	0.3358	0.4508	0.4508	0.4508	0.4508	0.4557	0.5592	0.3686	1.1655	0.3358	0.4508	0.4508	0.4508	0.4508
2020	0.0027	0.0055	0.0055	0.0055	0.0055	0.0208	0.1680	0.1357	0.4275	0.0027	0.0055	0.0055	0.0055	0.0055

Supplemental Table B-5 Survey LOEs (Blocks/Year) by Year

Renew Energy LOE

Year	4w	5w	9spr	10spr	14sum	20f	21f	4w	5w	9spr	10spr	14sum	20f	21f
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
2012	0.000	6.708	4.833	1.875	6.708	4.208	2.500	0.000	6.708	4.833	1.875	6.708	4.208	2.500
2013	2.000	7.208	7.333	1.875	9.208	4.208	5.000	2.000	7.208	7.333	1.875	9.208	4.208	5.000
2014	2.000	7.208	7.333	1.875	9.208	4.208	5.000	2.000	7.208	7.333	1.875	9.208	4.208	5.000
2015	2.000	7.208	7.333	1.875	9.208	4.208	5.000	2.000	7.208	7.333	1.875	9.208	4.208	5.000
2016	2.000	7.208	7.333	1.875	9.208	4.208	5.000	2.000	7.208	7.333	1.875	9.208	4.208	5.000
2017	2.000	6.458	6.583	1.875	8.458	3.458	5.000	2.000	6.458	6.583	1.875	8.458	3.458	5.000
2018	2.000	0.500	2.500	0.000	2.500	0.000	2.500	2.000	0.500	2.500	0.000	2.500	0.000	2.500
2019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-6 Survey LOEs (Blocks/Year) by Year

90 in^3 Airgun

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.2	1.1	0.5	0.3	0.0	0.1	1.0	1.0	0.0	0.0	0.3	1.0	0.9	0.0	0.0	0.0	0.2	1.1	0.0	0.9
2018	0.7	2.4	11.3	5.2	4.0	0.7	1.5	10.8	10.5	0.2	0.4	3.7	10.5	9.0	0.4	0.6	0.3	1.9	11.2	0.4	8.8
2019	3.4	4.3	6.4	2.6	4.7	3.4	3.4	7.7	6.0	0.9	2.1	6.9	6.0	6.4	2.1	3.0	1.3	1.7	6.0	2.1	5.2
2020	13.7	15.9	17.4	6.4	16.3	13.7	13.1	23.2	16.3	3.4	8.6	25.5	16.3	19.3	8.6	12.0	5.2	5.6	15.7	8.6	14.2

Supplemental Table B-7 Non-Seismic Takes per Block

Boomer MM Survey – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-8 Non-Seismic Takes per Block

Boomer Renew Energy – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-9 Non-Seismic Takes per Block

Chirp MM – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.034	0.041	0.034	0.034	0.041	0.034	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.365	0.396	0.252	0.315	0.396	0.334	0.240	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.354	0.081	0.037	0.037	0.343	0.227	0.285	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-10 Non-Seismic Takes per Block

Chirp Renew Energy – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Fin Whale	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.452	0.000	0.000	0.452	0.000	0.000	0.226	0.226	0.068	0.000	0.226	0.226
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.074	0.000	0.002
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013	0.000	0.001
Rissos Dolphin	0.000	0.166	0.000	0.000	0.112	0.000	0.000	0.000	0.166	0.000	0.001	0.112	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.028	0.028	0.028	0.000	0.000	0.028	0.000	0.028	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.013	0.013	0.013	0.000	0.000	0.013	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.034	0.041	0.034	0.000	0.000	0.034	0.000	0.034	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.365	0.396	0.252	0.000	0.000	0.334	0.000	0.365	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.002	0.001	0.000
Bottlenose Dolphin	0.354	0.000	0.037	0.000	0.000	0.227	0.000	0.000	0.000	0.037	0.037	0.000	0.227	0.227
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-11 Non-Seismic Takes per Block

Sidescan MM – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	36	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-12 Non-Seismic Takes per Block

Sidescan Renew Energy – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.002	0.000	0.000	0.013	0.016	0.020	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-13 Non-Seismic Takes per Block

Multibeam MM – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-14 Non-Seismic Takes per Block

Multibeam Renew Energy – Level A Takes – Southall Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-15 Non-Seismic Takes per Block

Boomer MM – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.009	0.029	0.029	0.009	0.029	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.004	0.004	0.004	0.004	0.004	0.000	0.004	0.004	0.004	0.004	0.004	0.004	0.000	0.004
Clymene Dolphin	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002
Striped Dolphin	0.004	0.005	0.004	0.004	0.005	0.000	0.004	0.004	0.005	0.004	0.004	0.005	0.000	0.004
Atlantic Spotted Dolphin	0.047	0.051	0.032	0.040	0.051	0.000	0.031	0.047	0.051	0.032	0.040	0.051	0.000	0.031
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.045	0.010	0.005	0.005	0.044	0.000	0.036	0.045	0.010	0.005	0.005	0.044	0.000	0.036
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-16 Non-Seismic Takes per Block

Boomer Renew Energy – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.017	0.086	0.000	0.009	0.000	0.000	0.009	0.000	0.029	0.058	0.017	0.029	0.058	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.007	0.004	0.011	0.007	0.007	0.011	0.021	0.004	0.000	0.000	0.000	0.007	0.000	0.000
Clymene Dolphin	0.003	0.002	0.005	0.003	0.003	0.005	0.010	0.002	0.000	0.000	0.000	0.003	0.000	0.000
Striped Dolphin	0.009	0.005	0.013	0.009	0.011	0.013	0.026	0.004	0.000	0.000	0.000	0.011	0.000	0.000
Atlantic Spotted Dolphin	0.093	0.051	0.097	0.080	0.101	0.128	0.183	0.047	0.000	0.000	0.000	0.101	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.045	0.010	0.005	0.000	0.044	0.029	0.036	0.045	0.010	0.005	0.014	0.000	0.029	0.109
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-17 Non-Seismic Takes per Block

Chirp MM – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.003	0.009	0.009	0.003	0.009	0.009	0.003	0.001	0.002	0.002	0.001	0.002	0.002	0.001
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Clymene Dolphin	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.002	0.003	0.002	0.002	0.003	0.002	0.002	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Atlantic Spotted Dolphin	0.022	0.024	0.015	0.019	0.024	0.020	0.015	0.007	0.008	0.003	0.006	0.008	0.007	0.005
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.051	0.014	0.006	0.006	0.056	0.039	0.050	0.022	0.005	0.002	0.002	0.021	0.014	0.017
Cuvier's Beaked Whale	0.003	0.009	0.009	0.003	0.009	0.009	0.003	0.001	0.002	0.002	0.001	0.002	0.002	0.001
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-18 Non-Seismic Takes per Block

Chirp Renew Energy – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.005	0.030	0.023	0.005	0.021	0.025	0.000	0.003	0.016	0.025	0.006	0.025	0.028	0.012
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Rissos Dolphin	0.002	0.008	0.000	0.000	0.005	0.000	0.000	0.001	0.011	0.000	0.000	0.007	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.001	0.002	0.002	0.002	0.003	0.002	0.005	0.003	0.003	0.001	0.001	0.003	0.001	0.001
Clymene Dolphin	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.000	0.000	0.001	0.000	0.001
Striped Dolphin	0.002	0.003	0.002	0.002	0.004	0.003	0.006	0.003	0.005	0.001	0.001	0.004	0.001	0.001
Atlantic Spotted Dolphin	0.019	0.028	0.018	0.022	0.036	0.027	0.042	0.033	0.044	0.008	0.010	0.040	0.010	0.014
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.018	0.007	0.002	0.003	0.017	0.016	0.026	0.043	0.008	0.002	0.005	0.017	0.012	0.023
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-19 Non-Seismic Takes per Block

Sidescan MM – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-20 Non-Seismic Takes per Block

Sidescan Renew Energy – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.000	0.001	0.002	0.001	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.001	0.000	0.001
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-21 Non-Seismic Takes per Block

Multibeam MM – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-22 Non-Seismic Takes per Block

Multibeam Renew Energy Survey – Level A Takes – Historic Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-23 Non-Seismic Takes per Block

Boomer MM – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002
Bryde's Whale	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002
Blue Whale	0.002	0.003	0.003	0.002	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.002	0.002	0.008	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.019	0.019	0.019	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.855	2.825	2.825	0.855	2.825	0.000	0.855	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.002	0.002	0.002	0.002	0.002	0.000	0.002
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.012	0.004	0.008	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.348	0.348	0.348	0.348	0.348	0.000	0.348	0.348	0.348	0.348	0.348	0.348	0.000	0.348
Clymene Dolphin	0.166	0.166	0.166	0.166	0.166	0.000	0.166	0.166	0.166	0.166	0.166	0.166	0.000	0.166
Striped Dolphin	0.420	0.519	0.420	0.420	0.519	0.000	0.420	0.420	0.519	0.420	0.420	0.519	0.000	0.420
Atlantic Spotted Dolphin	4.559	4.950	3.154	3.934	4.950	0.000	2.997	4.559	4.950	3.154	3.934	4.950	0.000	2.997
Spinner Dolphin	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	4.421	1.010	0.462	0.462	4.286	0.000	3.568	4.421	1.010	0.462	0.462	4.286	0.000	3.568
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-24 Non-Seismic Takes per Block

Boomer Renew Energy – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.005	0.000	0.000	0.005	0.003
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.005	0.000	0.000	0.005	0.003
Blue Whale	0.003	0.000	0.000	0.000	0.003	0.000	0.002	0.002	0.000	0.002	0.000	0.000	0.002	0.002
Fin Whale	0.002	0.002	0.000	0.000	0.002	0.000	0.000	0.002	0.002	0.008	0.000	0.002	0.002	0.000
North Atlantic Right Whale	0.000	0.011	0.003	0.005	0.000	0.003	0.001	0.020	0.022	0.003	0.000	0.000	0.003	0.001
Humpback Whale	0.000	0.009	0.019	0.000	0.000	0.000	0.000	0.019	0.000	0.019	0.019	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	1.709	8.474	0.000	0.855	0.000	0.000	0.855	0.000	2.825	5.649	1.709	2.825	5.649	0.000
Pygmy Killer Whale	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.003	0.002	0.000	0.000
Short-Finned Pilot Whale	0.000	0.033	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.008	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	1.037	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.003	0.000	0.002	0.000	0.000	0.002	0.003	0.000	0.000	0.002	0.000	0.000	0.002	0.003
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.003
Melon-Headed Whale	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.003	0.002	0.000	0.000
Harbor Porpoise	0.000	0.012	0.000	0.000	0.001	0.000	0.002	0.000	0.023	0.000	0.000	0.001	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000
False Killer Whale	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.003	0.002	0.000	0.000
Pantropical Spotted Dolphin	0.695	0.348	1.043	0.695	0.695	1.043	2.086	0.348	0.000	0.000	0.000	0.695	0.000	0.000
Clymene Dolphin	0.332	0.166	0.498	0.332	0.332	0.498	0.997	0.166	0.000	0.000	0.000	0.332	0.000	0.000
Striped Dolphin	0.841	0.519	1.261	0.841	1.037	1.261	2.522	0.420	0.000	0.000	0.000	1.037	0.000	0.000
Atlantic Spotted Dolphin	9.118	4.950	9.462	7.868	9.900	12.509	17.983	4.559	0.000	0.000	0.000	9.900	0.000	0.000
Spinner Dolphin	0.003	0.002	0.005	0.003	0.003	0.005	0.009	0.002	0.000	0.000	0.000	0.003	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.023	0.000	0.015	0.023	0.000	0.015	0.008	0.015	0.000	0.000	0.015	0.000
Bottlenose Dolphin	4.421	1.010	0.462	0.000	4.286	2.837	3.568	4.421	1.010	0.462	1.387	0.000	2.837	10.703
Cuvier's Beaked Whale	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-25 Non-Seismic Takes per Block

Chirp MM – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.001	0.002	0.007	0.001	0.002	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.011	0.007	0.001	0.001	0.000	0.002	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.008	0.008	0.007	0.008	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.274	0.904	0.904	0.274	0.904	0.904	0.274	0.068	0.226	0.226	0.068	0.226	0.226	0.068
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.002	0.003	0.110	0.002	0.037	0.002	0.002	0.002	0.003	0.110	0.002	0.037	0.002	0.002
Long-Finned Pilot Whale	0.000	0.001	0.016	0.001	0.007	0.001	0.000	0.000	0.001	0.016	0.001	0.007	0.001	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.002	0.002	0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.008	0.003	0.006	0.001	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.167	0.167	0.167	0.167	0.167	0.167	0.167	0.056	0.056	0.028	0.056	0.056	0.056	0.056
Clymene Dolphin	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.027	0.027	0.013	0.027	0.027	0.027	0.027
Striped Dolphin	0.202	0.249	0.202	0.202	0.249	0.202	0.202	0.067	0.083	0.034	0.067	0.083	0.067	0.067
Atlantic Spotted Dolphin	2.188	2.376	1.514	1.888	2.376	2.001	1.439	0.729	0.792	0.252	0.629	0.792	0.667	0.480
Spinner Dolphin	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.007	0.006	0.006	0.004	0.006	0.006	0.006	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Bottlenose Dolphin	4.951	1.374	0.592	0.629	5.486	3.858	4.852	2.122	0.485	0.185	0.222	2.057	1.362	1.712
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-26 Non-Seismic Takes per Block

Chirp Renew Energy – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001
Sei Whale	0.001	0.002	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.002
Bryde's Whale	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.001	0.001	0.002
Blue Whale	0.002	0.002	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.001
Fin Whale	0.002	0.002	0.009	0.001	0.002	0.003	0.001	0.001	0.002	0.007	0.001	0.001	0.002	0.002
North Atlantic Right Whale	0.013	0.009	0.001	0.002	0.000	0.002	0.001	0.013	0.012	0.001	0.001	0.000	0.001	0.002
Humpback Whale	0.005	0.005	0.008	0.007	0.000	0.000	0.000	0.005	0.010	0.010	0.008	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.479	2.938	2.260	0.479	2.034	2.486	0.000	0.342	1.582	2.486	0.547	2.486	2.712	1.130
Pygmy Killer Whale	0.001	0.001	0.000	0.002	0.002	0.000	0.000	0.002	0.001	0.000	0.002	0.001	0.000	0.000
Short-Finned Pilot Whale	0.000	0.021	0.000	0.029	0.111	0.000	0.006	0.000	0.031	0.000	0.024	0.370	0.000	0.002
Long-Finned Pilot Whale	0.000	0.005	0.000	0.010	0.020	0.000	0.000	0.000	0.007	0.000	0.008	0.065	0.000	0.001
Rissos Dolphin	0.209	0.830	0.000	0.008	0.447	0.000	0.000	0.120	1.078	0.000	0.007	0.671	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.000	0.002	0.003	0.000	0.000	0.000	0.003	0.000	0.003	0.002	0.000	0.000
Dwarf Sperm Whale	0.000	0.003	0.000	0.006	0.009	0.000	0.000	0.000	0.010	0.000	0.009	0.006	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.001	0.002	0.001	0.002	0.001	0.001	0.000	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Melon-Headed Whale	0.001	0.001	0.000	0.002	0.002	0.000	0.001	0.002	0.001	0.000	0.002	0.001	0.000	0.000
Harbor Porpoise	0.000	0.005	0.000	0.013	0.001	0.000	0.000	0.000	0.009	0.000	0.008	0.000	0.000	0.005
Sperm Whale	0.000	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000
False Killer Whale	0.001	0.001	0.000	0.002	0.002	0.000	0.002	0.002	0.001	0.000	0.002	0.001	0.000	0.000
Pantropical Spotted Dolphin	0.139	0.195	0.195	0.195	0.250	0.223	0.473	0.250	0.306	0.083	0.083	0.278	0.083	0.111
Clymene Dolphin	0.066	0.093	0.093	0.093	0.120	0.106	0.226	0.120	0.146	0.040	0.040	0.133	0.040	0.053
Striped Dolphin	0.168	0.290	0.235	0.235	0.373	0.269	0.572	0.303	0.456	0.101	0.101	0.415	0.101	0.135
Atlantic Spotted Dolphin	1.824	2.772	1.766	2.203	3.564	2.669	4.076	3.283	4.356	0.757	0.944	3.960	1.001	1.334
Spinner Dolphin	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.001
Rough-Toothed Dolphin	0.005	0.009	0.007	0.005	0.014	0.008	0.004	0.005	0.012	0.008	0.004	0.009	0.008	0.007
Bottlenose Dolphin	1.768	0.647	0.222	0.259	1.714	1.589	2.569	4.244	0.808	0.185	0.444	1.714	1.135	2.270
Cuvier's Beaked Whale	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-27 Non-Seismic Takes per Block

Sidescan MM – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.015	0.050	0.050	0.011	0.050	0.050	0.015	0.004	0.013	0.013	0.004	0.013	0.013	0.004
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.006	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Clymene Dolphin	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Striped Dolphin	0.006	0.007	0.006	0.006	0.007	0.006	0.006	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Atlantic Spotted Dolphin	0.061	0.066	0.042	0.052	0.066	0.056	0.040	0.020	0.022	0.014	0.017	0.022	0.019	0.013
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.118	0.027	0.010	0.010	0.114	0.076	0.095	0.020	0.004	0.002	0.002	0.038	0.025	0.016
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-28 Non-Seismic Takes per Block

Sidescan Renew Energy – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.034	0.126	0.063	0.019	0.100	0.063	0.019	0.015	0.063	0.113	0.011	0.088	0.126	0.008
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.001	0.000	0.001	0.006	0.000	0.000	0.000	0.001	0.000	0.001	0.012	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Rissos Dolphin	0.012	0.046	0.000	0.000	0.006	0.000	0.000	0.003	0.028	0.000	0.000	0.016	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.008	0.008	0.008	0.008	0.011	0.009	0.012	0.011	0.015	0.002	0.008	0.017	0.005	0.005
Clymene Dolphin	0.004	0.004	0.004	0.004	0.005	0.004	0.006	0.005	0.007	0.001	0.004	0.008	0.002	0.002
Striped Dolphin	0.009	0.012	0.009	0.009	0.016	0.011	0.015	0.013	0.023	0.002	0.009	0.025	0.006	0.006
Atlantic Spotted Dolphin	0.101	0.110	0.070	0.087	0.154	0.111	0.107	0.142	0.220	0.014	0.087	0.242	0.056	0.040
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.059	0.022	0.010	0.004	0.095	0.063	0.063	0.216	0.009	0.006	0.012	0.095	0.038	0.127
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-29 Non-Seismic Takes per Block

Multibeam MM – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-30 Non-Seismic Takes per Block

Multibeam Renew Energy Survey – Level B Takes – 160 dB Threshold

	Site													
	22	23	24	25	26	27	28	29	30	31	32	33	34	35
ORDER CETACEA														
Suborder Mysticeti (Baleen Whales)														
Common Minke Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)														
Short-beaked Common Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER SIRENIA														
West Indian Manatee	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ORDER CARNIVORA														
Suborder Pinnipedia														
Hooded Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Supplemental Table B-31 90 in^3 Airgun

2012 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-32 90 in^3 Airgun

2013 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-33 90 in^3 Airgun

2014 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-34 90 in^3 Airgun

2015 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-35 90 in^3 Airgun

2016 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-36 90 in^3 Airgun

2017 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.009
Bryde's Whale	0.000	0.000	0.010
Blue Whale	0.000	0.000	0.010
Fin Whale	0.000	0.000	0.025
North Atlantic Right Whale	0.000	0.000	0.043
Humpback Whale	0.000	0.000	0.025
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.173	17.002
Pygmy Killer Whale	0.000	0.000	0.009
Short-Finned Pilot Whale	0.000	0.120	11.792
Long-Finned Pilot Whale	0.000	0.012	1.200
Rissos Dolphin	0.000	0.081	7.937
Northern Bottlenose Whale	0.000	0.000	0.001
Pygmy Sperm Whale	0.000	0.000	0.003
Dwarf Sperm Whale	0.000	0.000	0.041
Atlantic White-sided Dolphin	0.000	0.000	0.015
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.001	0.124
Gervais' Beaked Whale	0.000	0.001	0.124
True's Beaked Whale	0.000	0.001	0.124
Killer Whale	0.000	0.000	0.007
Melon-Headed Whale	0.000	0.000	0.011
Harbor Porpoise	0.000	0.000	0.026
Sperm Whale	0.000	0.004	0.386
False Killer Whale	0.000	0.000	0.013
Pantropical Spotted Dolphin	0.000	0.020	1.934
Clymene Dolphin	0.000	0.009	0.871
Striped Dolphin	0.000	0.069	6.728
Atlantic Spotted Dolphin	0.000	0.147	14.399
Spinner Dolphin	0.000	0.000	0.008
Rough-Toothed Dolphin	0.000	0.001	0.056
Bottlenose Dolphin	0.000	0.319	31.235
Cuvier's Beaked Whale	0.000	0.009	0.865
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-37 90 in^3 Airgun

2018 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.013
Sei Whale	0.000	0.001	0.100
Bryde's Whale	0.000	0.001	0.102
Blue Whale	0.000	0.001	0.107
Fin Whale	0.000	0.003	0.259
North Atlantic Right Whale	0.000	0.005	0.448
Humpback Whale	0.000	0.003	0.263
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	1.818	178.211
Pygmy Killer Whale	0.000	0.001	0.095
Short-Finned Pilot Whale	0.000	1.244	121.900
Long-Finned Pilot Whale	0.000	0.129	12.627
Rissos Dolphin	0.000	0.846	82.922
Northern Bottlenose Whale	0.000	0.000	0.006
Pygmy Sperm Whale	0.000	0.000	0.035
Dwarf Sperm Whale	0.000	0.005	0.444
Atlantic White-sided Dolphin	0.000	0.002	0.165
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.007
Blainville's Beaked Whale	0.000	0.013	1.315
Gervais' Beaked Whale	0.000	0.013	1.315
True's Beaked Whale	0.000	0.013	1.315
Killer Whale	0.000	0.001	0.079
Melon-Headed Whale	0.000	0.001	0.120
Harbor Porpoise	0.000	0.003	0.273
Sperm Whale	0.000	0.043	4.209
False Killer Whale	0.000	0.001	0.133
Pantropical Spotted Dolphin	0.000	0.209	20.459
Clymene Dolphin	0.000	0.094	9.217
Striped Dolphin	0.000	0.722	70.793
Atlantic Spotted Dolphin	0.000	1.552	152.158
Spinner Dolphin	0.000	0.001	0.087
Rough-Toothed Dolphin	0.000	0.006	0.606
Bottlenose Dolphin	0.000	3.307	324.122
Cuvier's Beaked Whale	0.000	0.094	9.205
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-38 90 in^3 Airgun

2019 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.012
Sei Whale	0.000	0.001	0.075
Bryde's Whale	0.000	0.001	0.076
Blue Whale	0.000	0.001	0.082
Fin Whale	0.000	0.002	0.180
North Atlantic Right Whale	0.000	0.003	0.298
Humpback Whale	0.000	0.002	0.205
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	1.285	125.964
Pygmy Killer Whale	0.000	0.001	0.076
Short-Finned Pilot Whale	0.000	0.805	78.867
Long-Finned Pilot Whale	0.000	0.093	9.132
Rissos Dolphin	0.000	0.586	57.442
Northern Bottlenose Whale	0.000	0.000	0.004
Pygmy Sperm Whale	0.000	0.000	0.047
Dwarf Sperm Whale	0.000	0.004	0.369
Atlantic White-sided Dolphin	0.000	0.001	0.136
Fraser's Dolphin	0.000	0.000	0.003
Sowerby's Beaked Whale	0.000	0.000	0.006
Blainville's Beaked Whale	0.000	0.010	1.017
Gervais' Beaked Whale	0.000	0.010	1.017
True's Beaked Whale	0.000	0.010	1.017
Killer Whale	0.000	0.001	0.063
Melon-Headed Whale	0.000	0.001	0.092
Harbor Porpoise	0.000	0.002	0.212
Sperm Whale	0.000	0.038	3.696
False Killer Whale	0.000	0.001	0.096
Pantropical Spotted Dolphin	0.000	0.156	15.252
Clymene Dolphin	0.000	0.070	6.889
Striped Dolphin	0.000	0.523	51.217
Atlantic Spotted Dolphin	0.000	1.151	112.815
Spinner Dolphin	0.000	0.001	0.065
Rough-Toothed Dolphin	0.000	0.005	0.507
Bottlenose Dolphin	0.000	2.194	215.048
Cuvier's Beaked Whale	0.000	0.073	7.117
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-39 90 in^3 Airgun

2020 Level A Southall, Level A Historic, Level B

	Level A Southall	Level A Historic	Level B
ORDER CETACEA			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.041
Sei Whale	0.000	0.002	0.230
Bryde's Whale	0.000	0.002	0.231
Blue Whale	0.000	0.003	0.252
Fin Whale	0.000	0.005	0.534
North Atlantic Right Whale	0.000	0.009	0.868
Humpback Whale	0.000	0.006	0.635
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	3.839	376.276
Pygmy Killer Whale	0.000	0.002	0.237
Short-Finned Pilot Whale	0.000	2.316	226.998
Long-Finned Pilot Whale	0.000	0.281	27.521
Rissos Dolphin	0.000	1.737	170.211
Northern Bottlenose Whale	0.000	0.000	0.012
Pygmy Sperm Whale	0.000	0.002	0.167
Dwarf Sperm Whale	0.000	0.012	1.166
Atlantic White-sided Dolphin	0.000	0.004	0.427
Fraser's Dolphin	0.000	0.000	0.012
Sowerby's Beaked Whale	0.000	0.000	0.017
Blainville's Beaked Whale	0.000	0.032	3.140
Gervais' Beaked Whale	0.000	0.032	3.140
True's Beaked Whale	0.000	0.032	3.140
Killer Whale	0.000	0.002	0.199
Melon-Headed Whale	0.000	0.003	0.284
Harbor Porpoise	0.000	0.007	0.656
Sperm Whale	0.000	0.121	11.891
False Killer Whale	0.000	0.003	0.288
Pantropical Spotted Dolphin	0.000	0.474	46.492
Clymene Dolphin	0.000	0.214	21.018
Striped Dolphin	0.000	1.575	154.384
Atlantic Spotted Dolphin	0.000	3.502	343.203
Spinner Dolphin	0.000	0.002	0.198
Rough-Toothed Dolphin	0.000	0.016	1.605
Bottlenose Dolphin	0.000	6.385	625.841
Cuvier's Beaked Whale	0.000	0.224	21.980
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-40 Boom MM

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.001
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.003
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.733
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.001
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.001	0.092
Clymene Dolphin	0.000	0.000	0.044
Striped Dolphin	0.000	0.001	0.128
Atlantic Spotted Dolphin	0.000	0.012	1.147
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.005	0.530
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-41 Boom MM

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.001
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.003
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.733
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.001
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.001	0.092
Clymene Dolphin	0.000	0.000	0.044
Striped Dolphin	0.000	0.001	0.128
Atlantic Spotted Dolphin	0.000	0.012	1.147
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.005	0.530
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-42 Boom MM

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.004
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.014
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.033	3.210
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.006
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.440
Clymene Dolphin	0.000	0.002	0.210
Striped Dolphin	0.000	0.006	0.604
Atlantic Spotted Dolphin	0.000	0.055	5.380
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.028	2.707
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-43 Boom MM

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.004
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.014
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.033	3.210
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.006
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.440
Clymene Dolphin	0.000	0.002	0.210
Striped Dolphin	0.000	0.006	0.604
Atlantic Spotted Dolphin	0.000	0.055	5.380
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.028	2.707
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-44 Boom MM

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.004
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.014
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.033	3.210
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.006
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.440
Clymene Dolphin	0.000	0.002	0.210
Striped Dolphin	0.000	0.006	0.604
Atlantic Spotted Dolphin	0.000	0.055	5.380
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.028	2.707
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-45 Boom MM

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.010
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.022	2.120
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.005
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.005
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.353
Clymene Dolphin	0.000	0.002	0.169
Striped Dolphin	0.000	0.005	0.476
Atlantic Spotted Dolphin	0.000	0.043	4.178
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.024	2.397
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-46 Boom MM

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.010
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.022	2.120
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.005
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.005
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.353
Clymene Dolphin	0.000	0.002	0.169
Striped Dolphin	0.000	0.005	0.476
Atlantic Spotted Dolphin	0.000	0.043	4.178
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.024	2.397
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-47 Boom MM

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.010
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.022	2.120
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.005
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.005
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.353
Clymene Dolphin	0.000	0.002	0.169
Striped Dolphin	0.000	0.005	0.476
Atlantic Spotted Dolphin	0.000	0.043	4.178
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.024	2.397
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-48 Boom MM

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.010
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.022	2.120
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.005
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.005
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.004	0.353
Clymene Dolphin	0.000	0.002	0.169
Striped Dolphin	0.000	0.005	0.476
Atlantic Spotted Dolphin	0.000	0.043	4.178
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.024	2.397
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-49 Boom RenEn

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.008
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.025
Fin Whale	0.000	0.000	0.025
North Atlantic Right Whale	0.000	0.001	0.112
Humpback Whale	0.000	0.002	0.154
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.618	60.587
Pygmy Killer Whale	0.000	0.000	0.010
Short-Finned Pilot Whale	0.000	0.003	0.275
Long-Finned Pilot Whale	0.000	0.001	0.069
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.079
Dwarf Sperm Whale	0.000	0.002	0.238
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.022
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.000	0.000	0.010
Melon-Headed Whale	0.000	0.000	0.010
Harbor Porpoise	0.000	0.001	0.090
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.010
Pantropical Spotted Dolphin	0.000	0.234	22.945
Clymene Dolphin	0.000	0.112	10.962
Striped Dolphin	0.000	0.303	29.719
Atlantic Spotted Dolphin	0.000	2.629	257.701
Spinner Dolphin	0.000	0.001	0.103
Rough-Toothed Dolphin	0.000	0.003	0.304
Bottlenose Dolphin	0.000	0.598	58.622
Cuvier's Beaked Whale	0.000	0.000	0.007
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-50 Boom RenEn

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.010
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.043
Fin Whale	0.000	0.000	0.034
North Atlantic Right Whale	0.000	0.001	0.127
Humpback Whale	0.000	0.002	0.205
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.718	70.380
Pygmy Killer Whale	0.000	0.000	0.018
Short-Finned Pilot Whale	0.000	0.003	0.291
Long-Finned Pilot Whale	0.000	0.001	0.073
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.109
Dwarf Sperm Whale	0.000	0.003	0.327
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.040
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.014
Melon-Headed Whale	0.000	0.000	0.018
Harbor Porpoise	0.000	0.001	0.103
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.018
Pantropical Spotted Dolphin	0.000	0.348	34.070
Clymene Dolphin	0.000	0.166	16.277
Striped Dolphin	0.000	0.446	43.709
Atlantic Spotted Dolphin	0.000	3.793	371.774
Spinner Dolphin	0.000	0.002	0.153
Rough-Toothed Dolphin	0.000	0.004	0.398
Bottlenose Dolphin	0.000	0.906	88.758
Cuvier's Beaked Whale	0.000	0.000	0.008
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-51 Boom RenEn

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.010
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.043
Fin Whale	0.000	0.000	0.034
North Atlantic Right Whale	0.000	0.001	0.127
Humpback Whale	0.000	0.002	0.205
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.718	70.380
Pygmy Killer Whale	0.000	0.000	0.018
Short-Finned Pilot Whale	0.000	0.003	0.291
Long-Finned Pilot Whale	0.000	0.001	0.073
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.109
Dwarf Sperm Whale	0.000	0.003	0.327
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.040
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.014
Melon-Headed Whale	0.000	0.000	0.018
Harbor Porpoise	0.000	0.001	0.103
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.018
Pantropical Spotted Dolphin	0.000	0.348	34.070
Clymene Dolphin	0.000	0.166	16.277
Striped Dolphin	0.000	0.446	43.709
Atlantic Spotted Dolphin	0.000	3.793	371.774
Spinner Dolphin	0.000	0.002	0.153
Rough-Toothed Dolphin	0.000	0.004	0.398
Bottlenose Dolphin	0.000	0.906	88.758
Cuvier's Beaked Whale	0.000	0.000	0.008
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-52 Boom RenEn

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.010
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.043
Fin Whale	0.000	0.000	0.034
North Atlantic Right Whale	0.000	0.001	0.127
Humpback Whale	0.000	0.002	0.205
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.718	70.380
Pygmy Killer Whale	0.000	0.000	0.018
Short-Finned Pilot Whale	0.000	0.003	0.291
Long-Finned Pilot Whale	0.000	0.001	0.073
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.109
Dwarf Sperm Whale	0.000	0.003	0.327
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.040
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.014
Melon-Headed Whale	0.000	0.000	0.018
Harbor Porpoise	0.000	0.001	0.103
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.018
Pantropical Spotted Dolphin	0.000	0.348	34.070
Clymene Dolphin	0.000	0.166	16.277
Striped Dolphin	0.000	0.446	43.709
Atlantic Spotted Dolphin	0.000	3.793	371.774
Spinner Dolphin	0.000	0.002	0.153
Rough-Toothed Dolphin	0.000	0.004	0.398
Bottlenose Dolphin	0.000	0.906	88.758
Cuvier's Beaked Whale	0.000	0.000	0.008
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-53 Boom RenEn

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.010
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.043
Fin Whale	0.000	0.000	0.034
North Atlantic Right Whale	0.000	0.001	0.127
Humpback Whale	0.000	0.002	0.205
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.718	70.380
Pygmy Killer Whale	0.000	0.000	0.018
Short-Finned Pilot Whale	0.000	0.003	0.291
Long-Finned Pilot Whale	0.000	0.001	0.073
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.109
Dwarf Sperm Whale	0.000	0.003	0.327
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.040
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.014
Melon-Headed Whale	0.000	0.000	0.018
Harbor Porpoise	0.000	0.001	0.103
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.018
Pantropical Spotted Dolphin	0.000	0.348	34.070
Clymene Dolphin	0.000	0.166	16.277
Striped Dolphin	0.000	0.446	43.709
Atlantic Spotted Dolphin	0.000	3.793	371.774
Spinner Dolphin	0.000	0.002	0.153
Rough-Toothed Dolphin	0.000	0.004	0.398
Bottlenose Dolphin	0.000	0.906	88.758
Cuvier's Beaked Whale	0.000	0.000	0.008
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-54 Boom RenEn

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.009
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.040
Fin Whale	0.000	0.000	0.031
North Atlantic Right Whale	0.000	0.001	0.115
Humpback Whale	0.000	0.002	0.184
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.653	64.024
Pygmy Killer Whale	0.000	0.000	0.016
Short-Finned Pilot Whale	0.000	0.003	0.267
Long-Finned Pilot Whale	0.000	0.001	0.067
Rissos Dolphin	0.000	0.000	0.015
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.001	0.100
Dwarf Sperm Whale	0.000	0.003	0.300
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.038
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.013
Melon-Headed Whale	0.000	0.000	0.016
Harbor Porpoise	0.000	0.001	0.093
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.016
Pantropical Spotted Dolphin	0.000	0.324	31.724
Clymene Dolphin	0.000	0.155	15.156
Striped Dolphin	0.000	0.415	40.651
Atlantic Spotted Dolphin	0.000	3.511	344.158
Spinner Dolphin	0.000	0.001	0.143
Rough-Toothed Dolphin	0.000	0.004	0.353
Bottlenose Dolphin	0.000	0.840	82.312
Cuvier's Beaked Whale	0.000	0.000	0.007
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-55 Boom RenEn

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.002
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.018
Fin Whale	0.000	0.000	0.009
North Atlantic Right Whale	0.000	0.000	0.016
Humpback Whale	0.000	0.001	0.052
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.100	9.793
Pygmy Killer Whale	0.000	0.000	0.007
Short-Finned Pilot Whale	0.000	0.000	0.016
Long-Finned Pilot Whale	0.000	0.000	0.004
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.030
Dwarf Sperm Whale	0.000	0.001	0.089
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.018
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.003	0.000	0.004
Melon-Headed Whale	0.000	0.000	0.007
Harbor Porpoise	0.000	0.000	0.013
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.007
Pantropical Spotted Dolphin	0.000	0.114	11.125
Clymene Dolphin	0.000	0.054	5.315
Striped Dolphin	0.000	0.143	13.991
Atlantic Spotted Dolphin	0.000	1.164	114.073
Spinner Dolphin	0.000	0.001	0.050
Rough-Toothed Dolphin	0.000	0.001	0.094
Bottlenose Dolphin	0.000	0.307	30.136
Cuvier's Beaked Whale	0.000	0.000	0.001
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-56 Boom RenEn

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-57 Boom RenEn

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-58 Chirp MM

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.001
Bryde's Whale	0.000	0.000	0.001
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.001
North Atlantic Right Whale	0.000	0.000	0.001
Humpback Whale	0.000	0.000	0.001
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.003	0.309
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.013
Long-Finned Pilot Whale	0.000	0.000	0.002
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.001
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.010	0.001	0.058
Clymene Dolphin	0.005	0.000	0.028
Striped Dolphin	0.013	0.001	0.078
Atlantic Spotted Dolphin	0.119	0.007	0.716
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.002
Bottlenose Dolphin	0.061	0.010	1.003
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-59 Chirp MM

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.001
Bryde's Whale	0.000	0.000	0.001
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.001
North Atlantic Right Whale	0.000	0.000	0.001
Humpback Whale	0.000	0.000	0.001
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.003	0.309
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.013
Long-Finned Pilot Whale	0.000	0.000	0.002
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.001
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.010	0.001	0.058
Clymene Dolphin	0.005	0.000	0.028
Striped Dolphin	0.013	0.001	0.078
Atlantic Spotted Dolphin	0.119	0.007	0.716
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.002
Bottlenose Dolphin	0.061	0.010	1.003
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-60 Chirp MM

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.004
Humpback Whale	0.000	0.000	0.006
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.013	1.279
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.001	0.053
Long-Finned Pilot Whale	0.000	0.000	0.008
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.003
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.003
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.043	0.003	0.257
Clymene Dolphin	0.021	0.001	0.123
Striped Dolphin	0.058	0.004	0.346
Atlantic Spotted Dolphin	0.523	0.032	3.140
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.009
Bottlenose Dolphin	0.280	0.047	4.579
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-61 Chirp MM

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.004
Humpback Whale	0.000	0.000	0.006
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.013	1.279
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.001	0.053
Long-Finned Pilot Whale	0.000	0.000	0.008
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.003
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.003
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.043	0.003	0.257
Clymene Dolphin	0.021	0.001	0.123
Striped Dolphin	0.058	0.004	0.346
Atlantic Spotted Dolphin	0.523	0.032	3.140
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.009
Bottlenose Dolphin	0.280	0.047	4.579
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-62 Chirp MM

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.003
Fin Whale	0.000	0.000	0.004
North Atlantic Right Whale	0.000	0.000	0.004
Humpback Whale	0.000	0.000	0.006
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.013	1.279
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.001	0.053
Long-Finned Pilot Whale	0.000	0.000	0.008
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.003
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.003
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.006
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.043	0.003	0.257
Clymene Dolphin	0.021	0.001	0.123
Striped Dolphin	0.058	0.004	0.346
Atlantic Spotted Dolphin	0.523	0.032	3.140
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.009
Bottlenose Dolphin	0.280	0.047	4.579
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-63 Chirp MM

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.002
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.002
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.693
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.026
Long-Finned Pilot Whale	0.000	0.000	0.004
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.002
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.029	0.002	0.172
Clymene Dolphin	0.014	0.001	0.082
Striped Dolphin	0.039	0.002	0.232
Atlantic Spotted Dolphin	0.340	0.021	2.038
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.006
Bottlenose Dolphin	0.195	0.033	3.214
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-64 Chirp MM

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.002
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.002
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.693
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.026
Long-Finned Pilot Whale	0.000	0.000	0.004
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.002
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.029	0.002	0.172
Clymene Dolphin	0.014	0.001	0.082
Striped Dolphin	0.039	0.002	0.232
Atlantic Spotted Dolphin	0.340	0.021	2.038
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.006
Bottlenose Dolphin	0.195	0.033	3.214
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-65 Chirp MM

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.002
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.002
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.693
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.026
Long-Finned Pilot Whale	0.000	0.000	0.004
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.002
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.029	0.002	0.172
Clymene Dolphin	0.014	0.001	0.082
Striped Dolphin	0.039	0.002	0.232
Atlantic Spotted Dolphin	0.340	0.021	2.038
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.006
Bottlenose Dolphin	0.195	0.033	3.214
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-66 Chirp MM

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.002
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.002
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.007	0.693
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.026
Long-Finned Pilot Whale	0.000	0.000	0.004
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.002
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.029	0.002	0.172
Clymene Dolphin	0.014	0.001	0.082
Striped Dolphin	0.039	0.002	0.232
Atlantic Spotted Dolphin	0.340	0.021	2.038
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.006
Bottlenose Dolphin	0.195	0.033	3.214
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-67 Chirp RenEN

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.013
Sei Whale	0.002	0.000	0.033
Bryde's Whale	0.002	0.000	0.033
Blue Whale	0.000	0.000	0.038
Fin Whale	0.015	0.001	0.086
North Atlantic Right Whale	0.002	0.001	0.078
Humpback Whale	0.000	0.001	0.084
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	4.086	0.568	55.631
Pygmy Killer Whale	0.000	0.000	0.024
Short-Finned Pilot Whale	0.005	0.010	0.955
Long-Finned Pilot Whale	0.000	0.002	0.182
Rissos Dolphin	1.863	0.088	8.579
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.005	0.000	0.031
Dwarf Sperm Whale	0.014	0.001	0.093
Atlantic White-sided Dolphin	0.000	0.000	0.003
Fraser's Dolphin	0.000	0.000	0.010
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.003	0.000	0.038
Melon-Headed Whale	0.000	0.000	0.025
Harbor Porpoise	0.001	0.001	0.059
Sperm Whale	0.001	0.000	0.018
False Killer Whale	0.000	0.000	0.028
Pantropical Spotted Dolphin	0.438	0.065	6.410
Clymene Dolphin	0.209	0.031	3.062
Striped Dolphin	0.582	0.088	8.593
Atlantic Spotted Dolphin	5.280	0.781	76.591
Spinner Dolphin	0.002	0.000	0.026
Rough-Toothed Dolphin	0.010	0.002	0.244
Bottlenose Dolphin	1.134	0.311	30.504
Cuvier's Beaked Whale	0.001	0.000	0.008
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-68 Chirp RenEN

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.017
Sei Whale	0.002	0.000	0.045
Bryde's Whale	0.003	0.000	0.044
Blue Whale	0.000	0.001	0.052
Fin Whale	0.021	0.001	0.121
North Atlantic Right Whale	0.002	0.001	0.113
Humpback Whale	0.000	0.001	0.115
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	5.216	0.702	68.791
Pygmy Killer Whale	0.001	0.000	0.031
Short-Finned Pilot Whale	0.011	0.013	1.259
Long-Finned Pilot Whale	0.000	0.002	0.233
Rissos Dolphin	2.225	0.107	10.530
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.006	0.000	0.039
Dwarf Sperm Whale	0.019	0.001	0.118
Atlantic White-sided Dolphin	0.000	0.000	0.005
Fraser's Dolphin	0.000	0.000	0.014
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.002
Killer Whale	0.003	0.000	0.047
Melon-Headed Whale	0.000	0.000	0.034
Harbor Porpoise	0.001	0.001	0.063
Sperm Whale	0.001	0.000	0.021
False Killer Whale	0.000	0.000	0.040
Pantropical Spotted Dolphin	0.577	0.093	9.080
Clymene Dolphin	0.276	0.044	4.338
Striped Dolphin	0.754	0.123	12.025
Atlantic Spotted Dolphin	6.838	1.073	105.139
Spinner Dolphin	0.003	0.000	0.035
Rough-Toothed Dolphin	0.014	0.003	0.321
Bottlenose Dolphin	1.934	0.466	45.626
Cuvier's Beaked Whale	0.001	0.000	0.010
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-69 Chirp RenEN

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.017
Sei Whale	0.002	0.000	0.045
Bryde's Whale	0.003	0.000	0.044
Blue Whale	0.000	0.001	0.052
Fin Whale	0.021	0.001	0.121
North Atlantic Right Whale	0.002	0.001	0.113
Humpback Whale	0.000	0.001	0.115
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	5.216	0.702	68.791
Pygmy Killer Whale	0.001	0.000	0.031
Short-Finned Pilot Whale	0.011	0.013	1.259
Long-Finned Pilot Whale	0.000	0.002	0.233
Rissos Dolphin	2.225	0.107	10.530
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.006	0.000	0.039
Dwarf Sperm Whale	0.019	0.001	0.118
Atlantic White-sided Dolphin	0.000	0.000	0.005
Fraser's Dolphin	0.000	0.000	0.014
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.002
Killer Whale	0.003	0.000	0.047
Melon-Headed Whale	0.000	0.000	0.034
Harbor Porpoise	0.001	0.001	0.063
Sperm Whale	0.001	0.000	0.021
False Killer Whale	0.000	0.000	0.040
Pantropical Spotted Dolphin	0.577	0.093	9.080
Clymene Dolphin	0.276	0.044	4.338
Striped Dolphin	0.754	0.123	12.025
Atlantic Spotted Dolphin	6.838	1.073	105.139
Spinner Dolphin	0.003	0.000	0.035
Rough-Toothed Dolphin	0.014	0.003	0.321
Bottlenose Dolphin	1.934	0.466	45.626
Cuvier's Beaked Whale	0.001	0.000	0.010
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-70 Chirp RenEN

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.017
Sei Whale	0.002	0.000	0.045
Bryde's Whale	0.003	0.000	0.044
Blue Whale	0.000	0.001	0.052
Fin Whale	0.021	0.001	0.121
North Atlantic Right Whale	0.002	0.001	0.113
Humpback Whale	0.000	0.001	0.115
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	5.216	0.702	68.791
Pygmy Killer Whale	0.001	0.000	0.031
Short-Finned Pilot Whale	0.011	0.013	1.259
Long-Finned Pilot Whale	0.000	0.002	0.233
Rissos Dolphin	2.225	0.107	10.530
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.006	0.000	0.039
Dwarf Sperm Whale	0.019	0.001	0.118
Atlantic White-sided Dolphin	0.000	0.000	0.005
Fraser's Dolphin	0.000	0.000	0.014
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.002
Killer Whale	0.003	0.000	0.047
Melon-Headed Whale	0.000	0.000	0.034
Harbor Porpoise	0.001	0.001	0.063
Sperm Whale	0.001	0.000	0.021
False Killer Whale	0.000	0.000	0.040
Pantropical Spotted Dolphin	0.577	0.093	9.080
Clymene Dolphin	0.276	0.044	4.338
Striped Dolphin	0.754	0.123	12.025
Atlantic Spotted Dolphin	6.838	1.073	105.139
Spinner Dolphin	0.003	0.000	0.035
Rough-Toothed Dolphin	0.014	0.003	0.321
Bottlenose Dolphin	1.934	0.466	45.626
Cuvier's Beaked Whale	0.001	0.000	0.010
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-71 Chirp RenEN

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.017
Sei Whale	0.002	0.000	0.045
Bryde's Whale	0.003	0.000	0.044
Blue Whale	0.000	0.001	0.052
Fin Whale	0.021	0.001	0.121
North Atlantic Right Whale	0.002	0.001	0.113
Humpback Whale	0.000	0.001	0.115
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	5.216	0.702	68.791
Pygmy Killer Whale	0.001	0.000	0.031
Short-Finned Pilot Whale	0.011	0.013	1.259
Long-Finned Pilot Whale	0.000	0.002	0.233
Rissos Dolphin	2.225	0.107	10.530
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.006	0.000	0.039
Dwarf Sperm Whale	0.019	0.001	0.118
Atlantic White-sided Dolphin	0.000	0.000	0.005
Fraser's Dolphin	0.000	0.000	0.014
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.002
Killer Whale	0.003	0.000	0.047
Melon-Headed Whale	0.000	0.000	0.034
Harbor Porpoise	0.001	0.001	0.063
Sperm Whale	0.001	0.000	0.021
False Killer Whale	0.000	0.000	0.040
Pantropical Spotted Dolphin	0.577	0.093	9.080
Clymene Dolphin	0.276	0.044	4.338
Striped Dolphin	0.754	0.123	12.025
Atlantic Spotted Dolphin	6.838	1.073	105.139
Spinner Dolphin	0.003	0.000	0.035
Rough-Toothed Dolphin	0.014	0.003	0.321
Bottlenose Dolphin	1.934	0.466	45.626
Cuvier's Beaked Whale	0.001	0.000	0.010
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-72 Chirp RenEN

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.016
Sei Whale	0.002	0.000	0.041
Bryde's Whale	0.003	0.000	0.041
Blue Whale	0.000	0.000	0.048
Fin Whale	0.018	0.001	0.109
North Atlantic Right Whale	0.002	0.001	0.104
Humpback Whale	0.000	0.001	0.105
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	4.538	0.628	61.504
Pygmy Killer Whale	0.001	0.000	0.029
Short-Finned Pilot Whale	0.011	0.012	1.160
Long-Finned Pilot Whale	0.000	0.002	0.215
Rissos Dolphin	2.017	0.098	9.573
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.006	0.000	0.036
Dwarf Sperm Whale	0.018	0.001	0.109
Atlantic White-sided Dolphin	0.000	0.000	0.005
Fraser's Dolphin	0.000	0.000	0.012
Sowerby's Beaked Whale	0.000	0.000	0.001
Blainville's Beaked Whale	0.000	0.000	0.001
Gervais' Beaked Whale	0.000	0.000	0.001
True's Beaked Whale	0.000	0.000	0.002
Killer Whale	0.003	0.000	0.043
Melon-Headed Whale	0.000	0.000	0.032
Harbor Porpoise	0.001	0.001	0.059
Sperm Whale	0.001	0.000	0.019
False Killer Whale	0.000	0.000	0.038
Pantropical Spotted Dolphin	0.515	0.086	8.433
Clymene Dolphin	0.246	0.041	4.029
Striped Dolphin	0.673	0.114	11.149
Atlantic Spotted Dolphin	6.102	0.990	97.061
Spinner Dolphin	0.002	0.000	0.032
Rough-Toothed Dolphin	0.013	0.003	0.292
Bottlenose Dolphin	1.736	0.434	42.497
Cuvier's Beaked Whale	0.001	0.000	0.009
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-73 Chirp RenEN

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.004
Sei Whale	0.000	0.000	0.011
Bryde's Whale	0.001	0.000	0.011
Blue Whale	0.000	0.000	0.014
Fin Whale	0.005	0.000	0.035
North Atlantic Right Whale	0.001	0.000	0.035
Humpback Whale	0.000	0.000	0.030
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	1.130	0.134	13.160
Pygmy Killer Whale	0.001	0.000	0.008
Short-Finned Pilot Whale	0.005	0.003	0.304
Long-Finned Pilot Whale	0.000	0.001	0.051
Rissos Dolphin	0.362	0.020	1.952
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.002	0.000	0.008
Dwarf Sperm Whale	0.005	0.000	0.025
Atlantic White-sided Dolphin	0.000	0.000	0.003
Fraser's Dolphin	0.000	0.000	0.004
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.001
Killer Whale	0.000	0.000	0.009
Melon-Headed Whale	0.000	0.000	0.009
Harbor Porpoise	0.000	0.000	0.004
Sperm Whale	0.000	0.000	0.003
False Killer Whale	0.000	0.000	0.012
Pantropical Spotted Dolphin	0.139	0.027	2.670
Clymene Dolphin	0.066	0.013	1.276
Striped Dolphin	0.172	0.035	3.432
Atlantic Spotted Dolphin	1.558	0.291	28.549
Spinner Dolphin	0.001	0.000	0.009
Rough-Toothed Dolphin	0.005	0.001	0.077
Bottlenose Dolphin	0.800	0.154	15.122
Cuvier's Beaked Whale	0.000	0.000	0.002
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-74 Chirp RenEN

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-75 Chirp RenEN

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-76 Sidescan MM

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.017
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.002
Clymene Dolphin	0.000	0.000	0.001
Striped Dolphin	0.000	0.000	0.002
Atlantic Spotted Dolphin	0.000	0.000	0.020
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.020
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-77 Sidescan MM

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.017
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.002
Clymene Dolphin	0.000	0.000	0.001
Striped Dolphin	0.000	0.000	0.002
Atlantic Spotted Dolphin	0.000	0.000	0.020
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.020
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-78 Sidescan MM

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.001	0.071
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.003
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.007
Clymene Dolphin	0.000	0.000	0.003
Striped Dolphin	0.000	0.000	0.010
Atlantic Spotted Dolphin	0.000	0.001	0.087
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.092
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-79 Sidescan MM

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.001	0.071
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.003
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.007
Clymene Dolphin	0.000	0.000	0.003
Striped Dolphin	0.000	0.000	0.010
Atlantic Spotted Dolphin	0.000	0.001	0.087
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.092
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-80 Sidescan MM

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.001	0.071
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.003
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.007
Clymene Dolphin	0.000	0.000	0.003
Striped Dolphin	0.000	0.000	0.010
Atlantic Spotted Dolphin	0.000	0.001	0.087
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.092
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-81 Sidescan MM

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.038
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.005
Clymene Dolphin	0.000	0.000	0.002
Striped Dolphin	0.000	0.000	0.006
Atlantic Spotted Dolphin	0.000	0.001	0.057
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.065
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-82 Sidescan MM

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.038
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.005
Clymene Dolphin	0.000	0.000	0.002
Striped Dolphin	0.000	0.000	0.006
Atlantic Spotted Dolphin	0.000	0.001	0.057
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.065
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-83 Sidescan MM

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.038
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.005
Clymene Dolphin	0.000	0.000	0.002
Striped Dolphin	0.000	0.000	0.006
Atlantic Spotted Dolphin	0.000	0.001	0.057
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.065
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-84 Sidescan MM

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.038
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.001
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.005
Clymene Dolphin	0.000	0.000	0.002
Striped Dolphin	0.000	0.000	0.006
Atlantic Spotted Dolphin	0.000	0.001	0.057
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.001	0.065
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-85 Sidescan RenEn

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.001
Bryde's Whale	0.000	0.000	0.001
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.004
Humpback Whale	0.000	0.000	0.003
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.007	0.022	2.167
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.000	0.048
Long-Finned Pilot Whale	0.000	0.000	0.009
Rissos Dolphin	0.000	0.004	0.351
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.001
Dwarf Sperm Whale	0.000	0.000	0.004
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.002
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.246
Clymene Dolphin	0.000	0.001	0.118
Striped Dolphin	0.000	0.003	0.333
Atlantic Spotted Dolphin	0.000	0.031	3.008
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.005
Bottlenose Dolphin	0.103	0.013	1.271
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-86 Sidescan RenEn

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.003
North Atlantic Right Whale	0.000	0.000	0.005
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.007	0.028	2.753
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.001	0.065
Long-Finned Pilot Whale	0.000	0.000	0.012
Rissos Dolphin	0.003	0.004	0.413
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.002
Dwarf Sperm Whale	0.000	0.000	0.006
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.001
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.343
Clymene Dolphin	0.000	0.002	0.164
Striped Dolphin	0.000	0.005	0.458
Atlantic Spotted Dolphin	0.000	0.042	4.092
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.007
Bottlenose Dolphin	0.147	0.019	1.822
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-87 Sidescan RenEn

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.003
North Atlantic Right Whale	0.000	0.000	0.005
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.007	0.028	2.753
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.001	0.065
Long-Finned Pilot Whale	0.000	0.000	0.012
Rissos Dolphin	0.003	0.004	0.413
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.002
Dwarf Sperm Whale	0.000	0.000	0.006
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.001
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.343
Clymene Dolphin	0.000	0.002	0.164
Striped Dolphin	0.000	0.005	0.458
Atlantic Spotted Dolphin	0.000	0.042	4.092
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.007
Bottlenose Dolphin	0.147	0.019	1.822
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-88 Sidescan RenEn

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.003
North Atlantic Right Whale	0.000	0.000	0.005
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.007	0.028	2.753
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.001	0.065
Long-Finned Pilot Whale	0.000	0.000	0.012
Rissos Dolphin	0.003	0.004	0.413
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.002
Dwarf Sperm Whale	0.000	0.000	0.006
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.001
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.343
Clymene Dolphin	0.000	0.002	0.164
Striped Dolphin	0.000	0.005	0.458
Atlantic Spotted Dolphin	0.000	0.042	4.092
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.007
Bottlenose Dolphin	0.147	0.019	1.822
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-89 Sidescan RenEn

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.003
North Atlantic Right Whale	0.000	0.000	0.005
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.007	0.028	2.753
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.001	0.065
Long-Finned Pilot Whale	0.000	0.000	0.012
Rissos Dolphin	0.003	0.004	0.413
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.002
Dwarf Sperm Whale	0.000	0.000	0.006
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.002
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.003
Sperm Whale	0.000	0.000	0.001
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.343
Clymene Dolphin	0.000	0.002	0.164
Striped Dolphin	0.000	0.005	0.458
Atlantic Spotted Dolphin	0.000	0.042	4.092
Spinner Dolphin	0.000	0.000	0.002
Rough-Toothed Dolphin	0.000	0.000	0.007
Bottlenose Dolphin	0.147	0.019	1.822
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-90 Sidescan RenEn

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.001
Sei Whale	0.000	0.000	0.002
Bryde's Whale	0.000	0.000	0.002
Blue Whale	0.000	0.000	0.001
Fin Whale	0.000	0.000	0.002
North Atlantic Right Whale	0.000	0.000	0.005
Humpback Whale	0.000	0.000	0.004
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.008	0.025	2.490
Pygmy Killer Whale	0.000	0.000	0.001
Short-Finned Pilot Whale	0.000	0.001	0.060
Long-Finned Pilot Whale	0.000	0.000	0.011
Rissos Dolphin	0.003	0.004	0.374
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.002
Dwarf Sperm Whale	0.000	0.000	0.005
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.001
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.001
Melon-Headed Whale	0.000	0.000	0.001
Harbor Porpoise	0.000	0.000	0.002
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.001
Pantropical Spotted Dolphin	0.000	0.003	0.316
Clymene Dolphin	0.000	0.002	0.151
Striped Dolphin	0.000	0.004	0.422
Atlantic Spotted Dolphin	0.000	0.038	3.758
Spinner Dolphin	0.000	0.000	0.001
Rough-Toothed Dolphin	0.000	0.000	0.007
Bottlenose Dolphin	0.061	0.017	1.679
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-91 Sidescan RenEn

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.001
North Atlantic Right Whale	0.000	0.000	0.001
Humpback Whale	0.000	0.000	0.001
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.006	0.587
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.016
Long-Finned Pilot Whale	0.000	0.000	0.003
Rissos Dolphin	0.003	0.001	0.062
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.001
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.001	0.097
Clymene Dolphin	0.000	0.000	0.046
Striped Dolphin	0.000	0.001	0.125
Atlantic Spotted Dolphin	0.000	0.011	1.084
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.002
Bottlenose Dolphin	0.045	0.006	0.551
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-92 Sidescan RenEn

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-93 Sidescan RenEn

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-94 Multibeam MM

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemenal Table B-95 Multibeam MM

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-96 Multibeam MM

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-97 Multibeam MM

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-98 Multibeam MM

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-99 Multibeam MM

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-100 Multibeam MM

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-101 Multibeam MM

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-102 Multibeam MM

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-103 Multibeam RenEn

2012 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-104 Multibeam RenEn

2013 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-105 Multibeam RenEn

2014 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-106 Multibeam RenEn

2015 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-107 Multibeam RenEn

2016 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-108 Multibeam RenEn

2017 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-109 Multibeam RenEn

2018 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-110 Multibeam RenEn

2019 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

Supplemental Table B-111 Multibeam RenEn

2020 Level A Southall, Level A Historic, and Level B

	Level A Southall	Level A Historic	Level B
Order Cetacea			
Suborder Mysticeti (Baleen Whales)			
Common Minke Whale	0.000	0.000	0.000
Sei Whale	0.000	0.000	0.000
Bryde's Whale	0.000	0.000	0.000
Blue Whale	0.000	0.000	0.000
Fin Whale	0.000	0.000	0.000
North Atlantic Right Whale	0.000	0.000	0.000
Humpback Whale	0.000	0.000	0.000
Suborder Odontoceti (Toothed Whales, Dolphins, and Porpoises)			
Short-beaked Common Dolphin	0.000	0.000	0.000
Pygmy Killer Whale	0.000	0.000	0.000
Short-Finned Pilot Whale	0.000	0.000	0.000
Long-Finned Pilot Whale	0.000	0.000	0.000
Rissos Dolphin	0.000	0.000	0.000
Northern Bottlenose Whale	0.000	0.000	0.000
Pygmy Sperm Whale	0.000	0.000	0.000
Dwarf Sperm Whale	0.000	0.000	0.000
Atlantic White-sided Dolphin	0.000	0.000	0.000
Fraser's Dolphin	0.000	0.000	0.000
Sowerby's Beaked Whale	0.000	0.000	0.000
Blainville's Beaked Whale	0.000	0.000	0.000
Gervais' Beaked Whale	0.000	0.000	0.000
True's Beaked Whale	0.000	0.000	0.000
Killer Whale	0.000	0.000	0.000
Melon-Headed Whale	0.000	0.000	0.000
Harbor Porpoise	0.000	0.000	0.000
Sperm Whale	0.000	0.000	0.000
False Killer Whale	0.000	0.000	0.000
Pantropical Spotted Dolphin	0.000	0.000	0.000
Clymene Dolphin	0.000	0.000	0.000
Striped Dolphin	0.000	0.000	0.000
Atlantic Spotted Dolphin	0.000	0.000	0.000
Spinner Dolphin	0.000	0.000	0.000
Rough-Toothed Dolphin	0.000	0.000	0.000
Bottlenose Dolphin	0.000	0.000	0.000
Cuvier's Beaked Whale	0.000	0.000	0.000
ORDER SIRENIA			
West Indian Manatee	0.000	0.000	0.000
ORDER CARNIVORA			
Suborder Pinnipedia			
Hooded Seal	0.000	0.000	0.000
Gray Seal	0.000	0.000	0.000
Harbor Seal	0.000	0.000	0.000

EXHIBIT 5

Annual Level A Take Estimates from Seismic Airgun Sources Using Southall et al. (2007) Criteria for Marine Mammal Species during the Project Period

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by Species**
Baleen Whales										
Common Minke Whale	0	0	0.083	0.161	0.017	0.067	0.047	0.022	0.024	0.421
Sei Whale	0	0	0.208	0.402	0.047	0.17	0.121	0.061	0.068	1.077
Bryde's Whale	0	0	0.632	1.237	0.144	0.714	0.535	0.364	0.173	3.799
Blue Whale	0	0	0.831	1.622	0.18	0.908	0.672	0.443	0.215	4.871
Fin Whale	0	0	0	0	0	0	0	0	0	0
North Atlantic Right Whale	0	0	0.036	0.071	0.008	0.045	0.034	0.024	0.009	0.227
Humpback Whale	0	0	3.046	5.931	0.674	3.102	2.279	1.415	0.848	17.295
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	0	0	116.584	225.454	18.848	96.111	64.095	28.714	23.101	572.907
Pygmy Killer Whale	0	0	0.161	0.312	0.061	0.158	0.129	0.082	0.091	0.994
Short-Finned Pilot Whale	0	0	11.616	22.498	74.416	55.161	93.694	123.153	153.571	534.109
Long-Finned Pilot Whale	0	0	59.577	117.528	13.886	79.691	61.042	45.685	14.791	392.2
Risso's Dolphin	0	0	370.55	731.439	87.14	501.58	385.115	290.103	92.466	2458.393
Northern Bottlenose Whale	0	0	0.004	0.007	0.001	0.003	0.002	0.001	0.001	0.019
Pygmy Sperm Whale	0	0	0	0	0.081	0.041	0.08	0.083	0.138	0.423
Dwarf Sperm Whale	0	0	2.819	5.564	1.326	4.2	3.676	3.169	2.01	22.764
Atlantic White-sided Dolphin	0	0	1.347	2.659	0.522	1.965	1.659	1.415	0.768	10.335
Fraser's Dolphin	0	0	0.208	0.402	0.032	0.161	0.105	0.041	0.04	0.989
Sowerby's Beaked Whale	0	0	0	0	0.006	0.004	0.007	0.009	0.012	0.038
Blainville's Beaked Whale	0	0	1.459	2.816	0.225	1.126	0.731	0.282	0.282	6.921
Gervais' Beaked Whale	0	0	1.459	2.816	0.225	1.126	0.731	0.282	0.282	6.921
True's Beaked Whale	0	0	1.459	2.816	0.225	1.126	0.731	0.282	0.282	6.921
Killer Whale	0	0	0.052	0.1	0.033	0.054	0.052	0.04	0.056	0.387
Melon-Headed Whale	0	0	0.161	0.312	0.061	0.158	0.129	0.082	0.091	0.994
Harbor Porpoise	0	0	2.064	3.995	0.655	1.913	1.509	0.963	1.012	12.111
Sperm Whale	0	0	0.095	0.184	0.015	0.076	0.05	0.021	0.019	0.46
False Killer Whale	0	0	0.155	0.3	0.126	0.194	0.204	0.186	0.224	1.389
Pantropical Spotted Dolphin	0	0	135.938	263.432	35.378	127.155	96.513	61.914	53.839	774.169
Clymene Dolphin	0	0	64.945	125.855	16.902	60.749	46.109	29.58	25.722	369.862
Striped Dolphin	0	0	527.416	1020.455	157.93	486.916	383.424	258.754	256.777	3091.672
Atlantic Spotted Dolphin	0	0	771.308	1496.301	201.604	741.31	564.738	369.59	303.44	4448.291
Spinner Dolphin	0	0	0.611	1.184	0.159	0.571	0.434	0.278	0.242	3.479
Rough-Toothed Dolphin	0	0	0	0	0.036	0.023	0.043	0.061	0.075	0.238
Bottlenose Dolphin	0	0	14.775	28.936	21.683	28.545	34.819	39.072	42.117	209.947
Cuvier's Beaked Whale	0	0	10.213	19.709	1.577	7.883	5.119	1.972	1.972	48.445
TOTAL	**0**	**0**	**2099.812**	**4084.498**	**634.223**	**2203.006**	**1748.628**	**1258.143**	**974.758**	13003.07
									13003.07	

Annual Level A Takes Estimates from Seismic Airgun Sources Uing 180-dB Criteria for Marine Mammal Species during the Porject Period

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by species**
Baleen Whales										
Common Minke Whale	0.000	0.000	0.342	0.666	0.101	0.364	0.285	0.196	0.144	**2.098**
Sei Whale	0.000	0.000	1.965	3.855	0.648	2.473	2.009	1.567	0.925	**13.442**
Bryde's Whale	0.000	0.000	1.948	3.820	0.642	2.445	1.986	1.548	0.918	**13.307**
Blue Whale	0.000	0.000	2.182	4.274	0.700	2.653	2.139	1.632	1.000	**14.580**
Fin Whale	0.000	0.000	4.400	8.638	1.507	5.679	4.657	3.705	2.180	**30.766**
North Atlantic Right Whale	0.000	0.000	1.162	2.290	0.611	1.757	1.595	1.464	0.858	**9.737**
Humpback Whale	0.000	0.000	5.897	11.542	1.853	7.071	5.671	4.275	2.632	**38.941**
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	0.000	0.000	3,121.383	6,146.553	1,114.258	4,282.933	3,551.165	2,919.887	1,611.226	**22,747.405**
Pygmy Killer Whale	0.000	0.000	2.253	4.410	0.705	2.708	2.170	1.635	0.997	**14.878**
Short-Finned Pilot Whale	0.000	0.000	2,354.300	4,631.133	840.256	3,170.157	2,627.151	2,145.343	1,224.552	**16,992.892**
Long-Finned Pilot Whale	0.000	0.000	297.400	582.360	96.845	362.017	292.887	224.439	139.821	**1,995.769**
Risso's Dolphin	0.000	0.000	1,619.672	3,180.466	551.169	2,095.819	1,717.190	1,367.649	796.896	**11,328.861**
Northern Bottlenose Whale	0.000	0.000	0.127	0.250	0.043	0.174	0.143	0.116	0.061	**0.914**
Pygmy Sperm Whale	0.000	0.000	2.371	4.592	0.559	2.140	1.562	0.872	0.770	**12.866**
Dwarf Sperm Whale	0.000	0.000	14.844	29.005	4.264	16.955	13.300	9.592	5.939	**93.899**
Atlantic White-sided Dolphin	0.000	0.000	4.668	9.152	1.467	5.795	4.657	3.573	2.063	**31.375**
Fraser's Dolphin	0.000	0.000	0.242	0.468	0.055	0.210	0.151	0.079	0.076	**1.281**
Sowerby's Beaked Whale	0.000	0.000	0.203	0.397	0.060	0.233	0.184	0.134	0.085	**1.296**
Blainville's Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739	**253.129**
Gervais' Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739	**253.129**
True's Beaked Whale	0.000	0.000	39.568	77.313	11.835	45.464	35.978	26.232	16.739	**253.129**
Killer Whale	0.000	0.000	1.965	3.843	0.602	2.309	1.839	1.363	0.852	**12.773**
Melon-Headed Whale	0.000	0.000	2.523	4.942	0.818	3.098	2.505	1.924	1.168	**16.978**
Harbor Porpoise	0.000	0.000	7.054	13.798	2.245	8.376	6.733	5.072	3.235	**46.513**
Sperm Whale	0.000	0.000	158.828	309.723	44.502	173.124	134.518	93.561	62.258	**976.514**
False Killer Whale	0.000	0.000	2.801	5.491	0.930	3.501	2.848	2.218	1.334	**19.123**
Pantropical Spotted Dolphin	0.000	0.000	446.741	876.082	145.967	559.932	454.020	352.985	208.113	**3,043.840**
Clymene Dolphin	0.000	0.000	207.184	406.191	67.382	258.155	209.054	161.919	96.038	**1,405.923**
Striped Dolphin	0.000	0.000	2,038.848	3,993.224	650.891	2,483.607	2,000.683	1,526.327	928.896	**13,622.476**
Atlantic Spotted Dolphin	0.000	0.000	2,978.964	5,847.582	988.880	3,813.267	3,105.692	2,446.233	1,406.107	**20,586.725**
Spinner Dolphin	0.000	0.000	1.949	3.821	0.634	2.429	1.967	1.523	0.903	**13.226**
Rough-Toothed Dolphin	0.000	0.000	13.755	26.888	4.279	16.048	12.821	9.510	6.112	**89.413**
Bottlenose Dolphin	0.000	0.000	5,977.039	11,748.210	2,090.846	7,908.443	6,521.887	5,266.486	3,022.262	**42,535.173**
Cuvier's Beaked Whale	0.000	0.000	276.973	541.189	82.842	318.247	251.849	183.622	117.174	**1,771.896**
TOTAL	**0.000**	**0.000**	**19,668.687**	**38,636.794**	**6,732.066**	**25,648.511**	**21,043.252**	**16,819.145**	**9,695.812**	**138,244.267**
									138,244.267	

Annual Level B Take Estimates (160-dB criteria) from Airgun Surveys for Marine Mammal Species during the Project Period

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by species**
Baleen Whales										
Common Minke Whale	0.000	0.000	33.522	65.282	9.857	35.718	27.956	19.257	14.116	**205.708**
Sei Whale	0.000	0.000	192.625	377.801	63.466	242.395	196.917	153.588	90.689	**1,317.481**
Bryde's Whale	0.000	0.000	190.896	374.359	62.904	239.608	194.649	151.692	89.980	**1,304.088**
Blue Whale	0.000	0.000	213.901	418.875	68.622	259.980	209.629	159.949	98.045	**1,429.001**
Fin Whale	0.000	0.000	431.204	846.583	147.732	556.574	456.478	363.111	213.637	**3,015.319**
North Atlantic Right Whale	0.000	0.000	113.846	224.490	59.848	172.225	156.298	143.499	84.052	**954.258**
Humpback Whale	0.000	0.000	577.964	1,131.230	181.646	692.987	555.789	419.002	257.919	**3,816.537**
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	0.000	0.000	305,926.755	602,423.698	109,208.426	419,770.312	348,049.714	286,178.116	157,916.298	**2,229,473.319**
Pygmy Killer Whale	0.000	0.000	220.776	432.193	69.105	265.443	212.700	160.267	97.713	**1,458.197**
Short-Finned Pilot Whale	0.000	0.000	230,744.930	453,897.344	82,353.473	310,707.070	257,487.079	210,265.101	120,018.336	**1,665,473.333**
Long-Finned Pilot Whale	0.000	0.000	29,148.152	57,077.138	9,491.739	35,481.323	28,705.807	21,997.239	13,703.882	**195,605.280**
Risso's Dolphin	0.000	0.000	158,744.009	311,717.478	54,020.063	205,411.212	168,301.811	134,043.314	78,103.785	**1,110,341.672**
Northern Bottlenose Whale	0.000	0.000	12.462	24.544	4.259	17.031	13.994	11.395	6.003	**89.688**
Pygmy Sperm Whale	0.000	0.000	232.353	450.073	54.784	209.782	153.072	85.460	75.450	**1,260.974**
Dwarf Sperm Whale	0.000	0.000	1,454.885	2,842.740	417.949	1,661.508	1,303.577	940.144	582.097	**9,202.900**
Atlantic White-sided Dolphin	0.000	0.000	457.481	896.987	143.826	567.919	456.474	350.144	202.187	**3,075.018**
Fraser's Dolphin	0.000	0.000	23.717	45.882	5.427	20.593	14.819	7.782	7.470	**125.690**
Sowerby's Beaked Whale	0.000	0.000	19.910	38.905	5.903	22.874	18.068	13.148	8.286	**127.094**
Blainville's Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602	**24,809.068**
Gervais' Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602	**24,809.068**
True's Beaked Whale	0.000	0.000	3,878.016	7,577.415	1,159.902	4,455.915	3,526.252	2,570.966	1,640.602	**24,809.068**
Killer Whale	0.000	0.000	192.589	376.649	59.002	226.289	180.233	133.567	83.546	**1,251.875**
Melon-Headed Whale	0.000	0.000	247.240	484.381	80.135	303.674	245.516	188.604	114.448	**1,663.998**
Harbor Porpoise	0.000	0.000	691.367	1,352.385	219.996	820.894	659.933	497.063	317.088	**4,558.726**
Sperm Whale	0.000	0.000	15,566.706	30,355.996	4,361.663	16,967.893	13,184.100	9,169.873	6,101.896	**95,708.127**
False Killer Whale	0.000	0.000	274.527	538.213	91.113	343.104	279.084	217.358	130.741	**1,874.140**
Pantropical Spotted Dolphin	0.000	0.000	43,785.058	85,864.840	14,306.228	54,878.902	44,498.535	34,596.047	20,397.152	**298,326.762**
Clymene Dolphin	0.000	0.000	20,306.091	39,810.739	6,604.129	25,301.751	20,489.358	15,869.727	9,412.707	**137,794.502**
Striped Dolphin	0.000	0.000	199,827.536	391,375.882	63,793.815	243,418.330	196,086.989	149,595.327	91,041.146	**1,335,139.025**
Atlantic Spotted Dolphin	0.000	0.000	291,968.246	573,121.475	96,920.094	373,738.318	304,388.840	239,755.284	137,812.574	**2,017,704.831**
Spinner Dolphin	0.000	0.000	191.026	374.513	62.127	238.022	192.750	149.292	88.549	**1,296.279**
Rough-Toothed Dolphin	0.000	0.000	1,348.103	2,635.268	419.376	1,572.892	1,256.603	932.059	599.076	**8,763.377**
Bottlenose Dolphin	0.000	0.000	585,809.587	1,151,442.029	204,923.786	775,106.463	639,210.107	516,168.326	296,211.886	**4,168,872.184**
Cuvier's Beaked Whale	0.000	0.000	27,146.110	53,041.902	8,119.316	31,191.403	24,683.766	17,996.764	11,484.217	**173,663.478**
TOTAL	**0.000**	**0.000**	**1,927,727.622**	**3,786,792.119**	**659,809.515**	**2,513,810.234**	**2,062,449.401**	**1,648,444.397**	**950,286.777**	**13,549,320.065**
									13,549,320.065	

Annual Level A Take Estimtes from All Non-Airgun High-Resolution Geophysical Surveys Using Southall et al. (2007) Criteria for Marine Mammal Species during the Project Perio

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by Species**
Baleen Whales										
Common Minke Whale	0.0003	0.0004	0.0004	0.0004	0.0004	0.0003	0	0	0	**0.0022**
Sei Whale	0.002	0.0024	0.0024	0.0024	0.0024	0.0021	0.0004	0	0	**0.0141**
Bryde's Whale	0.0023	0.003	0.003	0.003	0.003	0.0027	0.0007	0	0	**0.0177**
Blue Whale	0.0002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0003	0	0	**0.003**
Fin Whale	0.0155	0.0208	0.0208	0.0208	0.0208	0.0185	0.0053	0	0	**0.1225**
North Atlantic Right Whale	0.0021	0.0026	0.0026	0.0026	0.0026	0.0022	0.0005	0	0	**0.0152**
Humpback Whale	0	0	0	0	0	0	0	0	0	**0**
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	4.0936	5.2235	5.2235	5.2235	5.2235	4.546	1.1299	0	0	**30.6635**
Pygmy Killer Whale	0.0004	0.001	0.001	0.001	0.001	0.0009	0.0006	0	0	**0.0059**
Short-Finned Pilot Whale	0.0053	0.0106	0.0106	0.0106	0.0106	0.0106	0.0053	0	0	**0.0636**
Long-Finned Pilot Whale	0	0	0	0	0	0	0	0	0	**0**
Risso's Dolphin	1.863	2.2287	2.2287	2.2287	2.2287	2.0205	0.3658	0	0	**13.1641**
Northern Bottlenose Whale	0	0	0	0	0	0	0	0	0	**0**
Pygmy Sperm Whale	0.0048	0.0064	0.0064	0.0064	0.0064	0.0059	0.0016	0	0	**0.0379**
Dwarf Sperm Whale	0.0145	0.0192	0.0192	0.0192	0.0192	0.0178	0.0047	0	0	**0.1138**
Atlantic White-sided Dolphin	0	0	0	0	0	0	0	0	0	**0**
Fraser's Dolphin	0.0001	0.0003	0.0004	0.0004	0.0004	0.0003	0.0003	0	0	**0.0022**
Sowerby's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0	0	0	**0.0012**
Blainville's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0	0	0	**0.0012**
Gervais' Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0	0	0	**0.0012**
True's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0	0	0	**0.0012**
Killer Whale	0.0025	0.0061	0.0061	0.0061	0.0061	0.0058	0.0036	0	0	**0.0363**
Melon-Headed Whale	0.0001	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0	0	**0.0023**
Harbor Porpoise	0.0005	0.0007	0.0007	0.0007	0.0007	0.0006	0.0002	0	0	**0.0041**
Sperm Whale	0.0008	0.0009	0.0009	0.0009	0.0009	0.0008	0.0001	0	0	**0.0053**
False Killer Whale	0.0001	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0	0	**0.0023**
Pantropical Spotted Dolphin	0.4477	0.5868	0.62	0.62	0.62	0.5432	0.1677	0.0287	0.0287	**3.6628**
Clymene Dolphin	0.2139	0.2803	0.2962	0.2962	0.2962	0.2595	0.0801	0.0137	0.0137	**1.7498**
Striped Dolphin	0.5954	0.7674	0.8121	0.8121	0.8121	0.7114	0.2107	0.0386	0.0386	**4.7984**
Atlantic Spotted Dolphin	5.3991	6.9574	7.3614	7.3614	7.3614	6.4414	1.898	0.3397	0.3397	**43.4595**
Spinner Dolphin	0.002	0.0026	0.0028	0.0028	0.0028	0.0024	0.0008	0.0001	0.0001	**0.0164**
Rough-Toothed Dolphin	0.0099	0.0145	0.0145	0.0145	0.0145	0.0134	0.0047	26.1283	0	**26.2143**
Bottlenose Dolphin	1.2977	2.1422	2.3608	2.3608	2.3608	1.9922	1.04	0.1955	0.1955	**13.9455**
Cuvier's Beaked Whale	0.0013	0.0015	0.0015	0.0015	0.0015	0.0013	0.0003	0	0	**0.0089**
TOTAL	**13.9759**	**18.2814**	**18.9981**	**18.9981**	**18.9981**	**16.6017**	**4.9222**	**26.7446**	**0.6163**	**138.1364**
									138.1364	

Annual Level A Take Estimates from All Non-Airgun High-Resolution Geophysical Surveys Using 180-dB Criteria for Marine Mammal Species during the Project Period

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by Species**
Baleen Whales										
Common Minke Whale	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0001	0.0004	**0.0024**
Sei Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0012	0.0008	0.0024	**0.0074**
Bryde's Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0012	0.0008	0.0024	**0.0074**
Blue Whale	0.0007	0.001	0.0011	0.0011	0.0011	0.0011	0.0015	0.0009	0.0026	**0.0111**
Fin Whale	0.0012	0.0016	0.0017	0.0017	0.0017	0.0018	0.0031	0.0019	0.0055	**0.0202**
North Atlantic Right Whale	0.002	0.0025	0.0025	0.0025	0.0025	0.0027	0.0051	0.0031	0.0089	**0.0318**
Humpback Whale	0.0025	0.0034	0.0035	0.0035	0.0035	0.0034	0.0037	0.0022	0.0066	**0.0323**
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	1.2187	1.4589	1.4946	1.4946	1.4946	1.5087	2.0876	1.3143	3.8682	**15.9402**
Pygmy Killer Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0011	0.0008	0.0024	**0.0073**
Short-Finned Pilot Whale	0.0132	0.0166	0.0171	0.0171	0.0171	0.1358	1.2475	0.805	2.3163	**4.5857**
Long-Finned Pilot Whale	0.0027	0.0033	0.0033	0.0033	0.0033	0.0153	0.1295	0.0932	0.2808	**0.5347**
Risso's Dolphin	0.0913	0.1118	0.1118	0.1118	0.1118	0.1826	0.8666	0.5861	1.7367	**3.9105**
Northern Bottlenose Whale	0	0	0	0	0	0	0.0001	0	0.0001	**0.0002**
Pygmy Sperm Whale	0.0011	0.0015	0.0015	0.0015	0.0015	0.0014	0.0007	0.0005	0.0017	**0.0114**
Dwarf Sperm Whale	0.0034	0.0046	0.0046	0.0046	0.0046	0.0046	0.0057	0.0038	0.0119	**0.0478**
Atlantic White-sided Dolphin	0	0.0001	0.0001	0.0001	0.0001	0.0002	0.0017	0.0014	0.0044	**0.0081**
Fraser's Dolphin	0.0004	0.0006	0.0007	0.0007	0.0007	0.0006	0.0003	0.0001	0.0002	**0.0043**
Sowerby's Beaked Whale	0	0	0	0	0	0	0.0001	0.0001	0.0002	**0.0004**
Blainville's Beaked Whale	0	0	0	0	0	0.0013	0.0134	0.0104	0.032	**0.0571**
Gervais' Beaked Whale	0	0	0	0	0	0.0013	0.0134	0.0104	0.032	**0.0571**
True's Beaked Whale	0	0	0	0	0	0.0013	0.0134	0.0104	0.032	**0.0571**
Killer Whale	0.0005	0.0007	0.0007	0.0007	0.0007	0.0007	0.001	0.0007	0.0021	**0.0078**
Melon-Headed Whale	0.0004	0.0005	0.0005	0.0005	0.0005	0.0006	0.0014	0.0009	0.0029	**0.0082**
Harbor Porpoise	0.0016	0.0018	0.0018	0.0018	0.0018	0.0019	0.0031	0.0023	0.0068	**0.0229**
Sperm Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.0041	0.043	0.0377	0.1213	**0.2071**
False Killer Whale	0.0004	0.0006	0.0006	0.0006	0.0006	0.0007	0.0016	0.001	0.0029	**0.009**
Pantropical Spotted Dolphin	0.3036	0.4453	0.4509	0.4509	0.4509	0.4381	0.3559	0.161	0.4798	**3.5364**
Clymene Dolphin	0.145	0.2127	0.2154	0.2154	0.2154	0.2088	0.1643	0.0729	0.217	**1.6669**
Striped Dolphin	0.3964	0.5755	0.5831	0.5831	0.5831	0.6088	0.9086	0.5299	1.5825	**6.351**
Atlantic Spotted Dolphin	3.4607	4.9269	4.9955	4.9955	4.9955	4.7511	3.0827	1.2151	3.5657	**35.9887**
Spinner Dolphin	0.0013	0.0019	0.002	0.002	0.002	0.0019	0.0015	0.0007	0.002	**0.0153**
Rough-Toothed Dolphin	0.0057	0.0074	0.0075	0.0075	0.0075	0.0073	0.008	0.0052	0.0164	**0.0725**
Bottlenose Dolphin	0.9382	1.4056	1.465	1.465	1.465	1.6672	3.8323	2.2521	6.4434	**20.9338**
Cuvier's Beaked Whale	0.0002	0.0002	0.0002	0.0002	0.0002	0.009	0.0939	0.0726	0.2243	**0.4008**
TOTAL	**6.5928**	**9.187**	**9.3677**	**9.3677**	**9.3677**	**9.5644**	**12.8944**	**7.1984**	**21.0148**	**94.5549**
									94.5549	

Annual Level A Take Estiamtes from All Non-Airgun High-Resolution Geophysical Surveys Using 160-dB Criteria for Marine Mammal Species during the Project Period

Order Cetacea	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	**Total by Species**
Baleen Whales										
Common Minke Whale	0.0225	0.0287	0.03	0.03	0.03	0.0282	0.02	0.0135	0.0419	**0.2448**
Sei Whale	0.0358	0.0476	0.0511	0.0511	0.0511	0.0557	0.1152	0.0784	0.2328	**0.7188**
Bryde's Whale	0.0355	0.047	0.0505	0.0505	0.0505	0.0553	0.1169	0.079	0.2338	**0.719**
Blue Whale	0.0659	0.098	0.1037	0.1037	0.1037	0.1048	0.1448	0.0871	0.2568	**1.0685**
Fin Whale	0.1153	0.1598	0.1665	0.1665	0.1665	0.1722	0.3083	0.1847	0.5384	**1.9782**
North Atlantic Right Whale	0.1945	0.2461	0.2491	0.2491	0.2491	0.269	0.5016	0.3002	0.8702	**3.1289**
Humpback Whale	0.2454	0.3285	0.3444	0.3444	0.3444	0.3313	0.3597	0.2189	0.6492	**3.1662**
Toothed Whales, Dolphins, Porpoises										
Short-beaked Common Dolphin	119.444	142.9833	146.4839	146.4839	146.4839	147.8699	204.6009	128.8144	379.127	**1562.291**
Pygmy Killer Whale	0.0345	0.0494	0.0494	0.0494	0.0494	0.0549	0.1097	0.0759	0.237	**0.7096**
Short-Finned Pilot Whale	1.292	1.6287	1.6711	1.6711	1.6711	13.3054	122.2637	78.8942	227.0254	**449.4227**
Long-Finned Pilot Whale	0.2621	0.3201	0.3267	0.3267	0.3267	1.4975	12.6893	9.1359	27.5252	**52.4102**
Risso's Dolphin	8.9444	10.9577	10.9577	10.9577	10.9577	17.8981	84.9354	57.4417	170.2112	**383.2616**
Northern Bottlenose Whale	0	0	0	0	0	0.0006	0.0063	0.0041	0.0118	**0.0228**
Pygmy Sperm Whale	0.1119	0.1503	0.1503	0.1503	0.1503	0.141	0.0732	0.0472	0.1675	**1.142**
Dwarf Sperm Whale	0.3358	0.4508	0.4508	0.4508	0.4508	0.4557	0.5592	0.3686	1.1655	**4.688**
Atlantic White-sided Dolphin	0.0027	0.0055	0.0055	0.0055	0.0055	0.0208	0.168	0.1357	0.4275	**0.7767**
Fraser's Dolphin	0.0345	0.0568	0.0637	0.0637	0.0637	0.0575	0.0304	0.0098	0.0183	**0.3984**
Sowerby's Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.003	0.0073	0.0056	0.0175	**0.0461**
Blainville's Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.1259	1.3153	1.0167	3.14	**5.6106**
Gervais' Beaked Whale	0.0023	0.0026	0.0026	0.0026	0.0026	0.1259	1.3153	1.0167	3.14	**5.6106**
True's Beaked Whale	0.0026	0.0032	0.0032	0.0032	0.0032	0.1265	1.3156	1.0167	3.14	**5.6142**
Killer Whale	0.0509	0.0642	0.0678	0.0678	0.0678	0.068	0.0952	0.0667	0.2021	**0.7505**
Melon-Headed Whale	0.0361	0.0525	0.0525	0.0525	0.0525	0.0604	0.1362	0.0921	0.2839	**0.8187**
Harbor Porpoise	0.1543	0.1717	0.1812	0.1812	0.1812	0.1894	0.299	0.2206	0.6643	**2.2429**
Sperm Whale	0.0182	0.0215	0.0215	0.0215	0.0215	0.4051	4.2127	3.6965	11.8913	**20.3098**
False Killer Whale	0.0389	0.0582	0.0582	0.0582	0.0582	0.0674	0.1524	0.0959	0.2885	**0.8759**
Pantropical Spotted Dolphin	29.7529	43.6445	44.1968	44.1968	44.1968	42.9366	34.8805	15.7818	47.022	**346.6087**
Clymene Dolphin	14.2145	20.8513	21.1152	21.1152	21.1152	20.46	16.1068	7.1416	21.2706	**163.3904**
Striped Dolphin	38.8529	56.4013	57.1529	57.1529	57.1529	59.6638	89.0555	51.9312	155.0979	**622.4613**
Atlantic Spotted Dolphin	339.1818	482.888	489.6133	489.6133	489.6133	465.651	302.1377	119.089	349.4761	**3527.264**
Spinner Dolphin	0.1306	0.1899	0.1924	0.1924	0.1924	0.1862	0.1484	0.0672	0.2001	**1.4996**
Rough-Toothed Dolphin	0.5554	0.7281	0.7355	0.7355	0.7355	0.7138	0.7853	0.5128	1.6114	**7.1133**
Bottlenose Dolphin	91.9501	137.76	143.5851	143.5851	143.5851	163.3981	375.6071	220.7238	631.5169	**2051.711**
Cuvier's Beaked Whale	0.0158	0.0181	0.0181	0.0181	0.0181	0.881	9.2072	7.1172	21.9798	**39.2734**
TOTAL	**646.1387**	**900.4186**	**918.1559**	**918.1559**	**918.1559**	**937.38**	**1263.78**	**705.4814**	**2059.682**	**9267.348**
									9267.348	

EXHIBIT 6

Center for Biological Diversity • Center for Water Advocacy • Clean Ocean Action • Defenders of Wildlife • Earthjustice • Natural Resources Defense Council • Ocean Conservation Research • Oceana • South Carolina Coastal Conservation League • Sierra Club • Southern Environmental Law Center • Surfrider Foundation • The Humane Society of the United States • Whale and Dolphin Conservation Society

By Regular and Electronic Mail

July 2, 2012

Mr. Gary D. Goeke
Chief, Regional Assessment Section
Office of Environment (MS 5410)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
GGEIS@boem.gov

Re: **Comments on the Draft PEIS for Atlantic G&G Activities**

Dear Mr. Goeke:

On behalf of our organizations and our millions of members, we write to submit comments on the Draft Programmatic Environmental Impact Statement ("DPEIS") for geological and geophysical ("G&G") activities off the mid-Atlantic and southeast coasts. 77 Fed. Reg. 19321 (Mar. 30, 2012). For the reasons discussed in detail below, we believe that the DPEIS not only fails to meet the environmental review standards prescribed by the National Environmental Policy Act ("NEPA"), but fails to an extent that cannot be remedied through the issuance of a final EIS. Accordingly, if BOEM intends to allow oil and gas exploration in the Atlantic, we believe that the document must be thoroughly revised and reissued as a draft for further public review and comment.

We are profoundly concerned about BOEM's intention to permit high-intensity seismic surveys in the Atlantic region, not only because of the potentially catastrophic impacts of OCS drilling, but because of the significant environmental harm represented by airgun exploration itself.

It is undisputed that sound is a fundamental element of the marine environment. Whales, fish, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators – in short, for their survival and reproduction – and it is no exaggeration to say that BOEM's proposed action would dramatically degrade the acoustic environment along most of the east coast. To prospect for oil and gas, the industry typically tows arrays of high-volume airguns behind ships, firing intense impulses of compressed air – often as loud as explosives – about every 12 seconds, 24 hours per day, for days, weeks, or months on end. Increasingly, the available science demonstrates that these blasts disrupt baleen whale behavior and impair their communication on a vast scale; that they harm a diverse range of other marine mammals; and that they can significantly impact fish and fisheries, with unknown but potentially substantial effects on coastal communities. Given the scales involved, surveys taking place off the coast of Virginia could well affect endangered species off southern New England down through the Carolinas, impacting the endangered right whale's entire migratory range. And the degree of activity contemplated under this EIS is enormous, with BOEM having already received permit applications to run hundreds of thousands of miles of survey lines during the pre-leasing phase alone.

Even according to BOEM's estimates – which significantly understate the harm – oil and gas activity would injure up to 138,500 marine mammals and disrupt marine mammal feeding, calving, breeding, and other vital activities more than 13.5 million times over the next eight years alone.

NEPA dictates that, before opening the floodgates to this action, BOEM must employ rigorous standards of environmental review, including a fair and objective description of potential impacts, a comprehensive analysis of all reasonable alternatives, and a thorough delineation of measures to mitigate harm. Unfortunately, the DPEIS falls far short of these standards. Instead, it provides an analysis that on almost every crucial point is disconnected from the relevant science, in a way that consistently tends to understate impacts and, consequently, to rationalize BOEM's proposed action. To cite just a few examples:

- BOEM relies on a 13-year-old, cookie-cutter threshold for harm that was recently castigated by some of the world's leading experts in this field as "overly simplified, scientifically outdated, and artificially rigid" – leading to a serious misconception of the scale of the impact area and a massive underestimate of marine mammal take.

- It fails to assess the far-reaching cumulative impacts of airgun blasting on marine mammal communication, despite the availability of Cornell and NOAA models, simply stating without any discernible support (and contrary to the literature) that masking effects on marine mammals would be "minor."

- It fails to incorporate new studies, accepted by the Navy and other state and federal agencies and incorporated into their recent impact statements, demonstrating that marine mammals are more susceptible to hearing loss than previously believed.

- In lieu of a serious analysis of cumulative impacts, it strings together a few unsupported and indeed baseless statements, ignoring not only its own marine mammal take numbers but also failing to consider such patently foreseeable impacts as the Navy's substantial takes of the same populations over the same period (just analyzed in the Navy's Draft EIS for the Atlantic Fleet).

- Despite acknowledging that airguns can cause wide-scale displacement of fish species – disrupting spawning and reproduction, altering migration routes, and impairing feeding, and dramatically reducing catch rates – it assumes without support that effects on both fish and fisheries would be localized and "minor."

Nor is BOEM's analysis of alternatives any more credible. **The fundamental problem is that the agency simply does not take the problem of cumulative, sublethal impacts seriously; and misprising the scale and potential significance of the impacts, it fails to consider alternatives and mitigation adequate to address it.** It does not even attempt to identify biologically important areas within the enormous activity area, aside from critical habitat for the right whale and loggerhead sea turtles. It does not attempt to reduce the extraordinary amount of activity by restricting exploration from areas that are unlikely to be leased, beginning with important Navy training areas, or to reduce the environmental footprint of the activity that does occur. It fails even to devise a long-term monitoring plan, which is a staple of Navy mitigation and essential to any meaningful adaptive management program. Instead, other than an insufficiently small time-area closure for the critically endangered right whale, BOEM's preferred alternative relies on mitigation that the Courts have rightly described in other contexts as "woefully inadequate and ineffectual." These faults are all the more serious given BOEM's decision to avoid programmatic review under the Marine Mammal Protection Act.

Our organizations strongly support Alternative C, which would bar oil and gas exploration activity from the region, but allow G&G activity for renewable energy development and minerals exploration on a case-by-case basis, preserving the status quo. It makes no sense on either economic or ecological grounds to open the greater portion of the east coast to oil and gas development. If, however, BOEM proceeds with this poorly conceived policy, it must correct the fundamental errors in the present DPEIS. Merely revising the draft into a final EIS is not sufficient, because its pervasive flaws and omissions have effectively deprived federal and state agencies, the scientific community, and the general public of their statutory right to an objective description of the activity and a meaningful opportunity to comment.

These comments (1) provide background on NEPA and the science of ocean noise; (2) assess BOEM's scant alternatives analysis and recommend additional alternatives and mitigation measures for consideration; (3) critique the document's analysis of impacts on marine species; and (4) discuss what BOEM must do to satisfy its obligations under other statutes. Our recommendations for BOEM's alternatives analysis, mitigation, and monitoring are summarized as follows.[1]

(1) BOEM should assess alternatives that place meaningful caps or limits on offshore activities, to reduce disruptions of marine mammal behavior.

(2) BOEM should eliminate duplication of survey effort by prescribing or incentivizing the use of common surveyors, particularly for the extensive 2-D surveys expected within the first five years of activity.

[1] Except as indicated, these recommendations are intended to apply to seismic airgun activities, rather than to G&G activities more generally.

(3) BOEM should develop alternatives for the development and implementation of "greener" exploration technology, of which several possibilities are described below.

(4) BOEM should exclude from G&G exploration areas that are unlikely to be leased in the near future, whether for biological, political, or economic reasons, such as waters within 50 miles of the Virginia shore or waters important to the Navy's national security mission.

(5) BOEM should consider establishing buffer zones around all of its time-area closures, to prevent ensonification of important habitat at disruptive levels.

(6) BOEM should develop time-area closures for marine mammals based on a systematic analysis of their density, distribution, and habitat use within the area of interest. To begin with, it should expand the time-area closure for North Atlantic right whales to fully capture the calving grounds and migration corridor, and put the Cape Hatteras Special Research Area off limits on a year-round basis.

(7) BOEM should extend the seasonal Brevard County time-area closure for sea turtles to near-coastal areas through North Carolina, and should consult with NMFS to ensure inclusion of all loggerhead critical habitat in any closure provision.

(8) BOEM should consider alternatives that exclude key fish habitat and fisheries, including submarine canyons in the mid-Atlantic, and Habitat Areas of Particular Concern designated by the Mid-Atlantic and South Atlantic Fishery Management Councils.

(9) BOEM should exclude airgun surveys within a 145 dB isopleth around established dive sites.

(10) BOEM should require that airgun survey vessels use the lowest practicable source levels, minimize horizontal propagation of the sound signal, and minimize the density of track lines consistent with the purposes of the survey, and, to this end, should consider establishing an expert panel within the agency to review survey designs with the aim of reducing their wildlife impacts.

(11) BOEM should require operators to validate *in situ* the assumptions about propagation distances used to establish safety zones and calculate take, as is required in the Arctic.

(12) BOEM should therefore require that all vessels associated with G&G activities, including support vessels and vessels used in HRG surveys, adhere to a 10 knot speed limit when operating or transiting at all times.

(13) BOEM should require that vessels avoid important habitat, such as right whale calving grounds, when transiting to G&G activities.

(14) BOEM should require that all vessels used in oil and gas G&G activities undergo measurement for their underwater noise output per American National Standards Institute/ Acoustical Society of America standards (S12.64); that all such vessels undergo regular maintenance to minimize propeller cavitation; and that all new industry vessels be required to employ the best ship-quieting designs and technologies available for their class of ship.

(15) BOEM should consider prescribing larger, more conservative separation distances, since marine mammals can experience displacement and other impacts well beyond the 160 dB isopleth, on which the current proposed separation distance is based.

(16) BOEM should require that operators working close to shore design their tracklines to minimize the potential for embayments and strandings.

(17) BOEM should reconsider the size of the safety zones it would prescribe as part of its nominal protocol for seismic airgun surveys, taking into account new data on the threshold shift in marine mammals; and should consider establishing larger shutdown zones for certain target species, such as right whales.

(18) BOEM should improve its real-time monitoring requirements, by reducing the length of time a marine mammal observer can continuously work; requiring that observers used on airgun surveys have meaningful field experience; mandating, or at least presumptively requiring, the use of passive acoustic monitoring; prescribing aerial surveillance on a case-by-case basis; and, for HRG surveys, requiring two trained observers in order to maintain coverage on both sides of the survey vessel.

(19) BOEM should commit to consider limiting activities in low-visibility conditions on a case-by-case basis, and describe the conditions under which it might be required.

(20) BOEM should immediately develop a long-term monitoring program, to establish environmental baselines, to determine long-term impacts on populations of target species, and to test whether the biological assumptions underlying the DPEIS are correct.

(21) BOEM should incorporate an adaptive management plan into its alternatives, and should also set forth a protocol for emergency review or suspension of activities, if serious unanticipated impacts are found to occur.

I. BACKGROUND: ENVIRONMENTAL IMPACTS AND NEPA COMPLIANCE

A. Impacts of Airgun Surveys and Other G&G Activities

For offshore exploration, the oil and gas industry typically relies on arrays of airguns, which are towed behind ships and release intense impulses of compressed air into the water about once every 10-12 seconds.[2] A large seismic airgun array can produce effective peak pressures of sound higher than those of virtually any other man-made source save explosives;[3] and although airguns are vertically oriented within the water column, horizontal propagation is so significant as to make them, even under present use, one of the leading contributors to low-frequency ambient noise thousands of miles from any given survey.[4] Indeed, the enormous scale of this acoustic footprint has now been confirmed by studies of seismic in numerous regions around the

[2] Airguns are not used in surveys for renewable energy projects.

[3] National Research Council, *Ocean Noise and Marine Mammals* (2003).

[4] Nieukirk, S.L., Stafford, K.M., Mellinger, D.K., Dziak, R.P., and Fox, C.G., Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean, *Journal of the Acoustical Society of America* 115: 1832-1843 (2004).

globe, including the Arctic, the northeast Atlantic, Greenland, and Australia (see *infra* at § IV.B.1).

It is well established that the high-intensity pulses produced by airguns can cause a range of impacts on marine mammals, fish, and other marine life, including broad habitat displacement, disruption of vital behaviors essential to foraging and breeding, loss of biological diversity, and, in some circumstances, injuries and mortalities.[5] Consistent with their acoustic footprint, most of these impacts are felt on an extraordinarily wide geographic scale – especially on endangered baleen whales, whose vocalizations and acoustic sensitivities overlap with the enormous low-frequency energy that airguns put in the water. For example, a single seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging – over an area at least 100,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.[6]

Similarly, airgun noise can also mask the calls of vocalizing baleen whales over vast distances, substantially compromising their ability to communicate, feed, find mates, and engage in other vital behavior.[7] The intermittency of airgun pulses hardly mitigates this effect since their acoustic energy spreads over time and can sound virtually continuous at distances from the array.[8] According to recent modeling from Cornell and NOAA, the highly endangered North Atlantic right whale is particularly vulnerable to masking effects from airguns and other sources given the acoustic and behavioral characteristics of its calls.[9] As discussed further below, the exposure levels implicated in all of these studies are lower – indeed orders of magnitude lower on a decibel scale – than the threshold used to evaluate airgun behavioral impacts in the DPEIS. Repeated insult from airgun surveys, over months and seasons, would come on top of already urbanized levels of background noise and, cumulatively and individually, would pose a significant threat to populations of marine mammals.

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[5] *See, e.g.*, Hildebrand, J.A., Impacts of anthropogenic sound, *in* Reynolds, J.E. III, Perrin, W.F., Reeves, R.R., Montgomery, S., and Ragen, T.J. (eds), *Marine Mammal Research: Conservation beyond Crisis* (2006); Weilgart, L., The impacts of anthropogenic ocean noise on cetaceans and implications for management. *Canadian Journal of Zoology* 85: 1091-1116 (2007).

[6] Clark, C.W., and Gagnon, G.C., Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E9); Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010); *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).

[7] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10).

[8] *Id.*; Weilgart, L. (ed.), Report of the workshop on alternative technologies to seismic airgun surveys for oil and gas exploration and their potential for reducing impacts on marine mammals, 31 Aug. – 1 Sept., 2009, Monterey, Calif. (2010) (available at www.okeanos-stiftung.org/okeanos/download.php?id=19).

[9] Clark et al., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources; Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009).

Airguns are known to affect a broad range of other marine mammal species beyond the endangered great whales. For example, sperm whale foraging appears to decline significantly on exposure to even moderate levels of airgun noise, with potentially serious long-term consequences;[10] and harbor porpoises have been seen to engage in strong avoidance responses fifty miles from an array.[11] Seismic surveys have been implicated in the long-term loss of marine mammal biodiversity off the coast of Brazil.[12] Broader work on other sources of undersea noise, including noise with predominantly low-frequency components, indicates that beaked whale species would be highly sensitive to seismic noise as well.[13]

Airgun surveys also have important consequences for the health of fisheries. For example, airguns have been shown to dramatically depress catch rates of various commercial species (by 40-80%) over thousands of square kilometers around a single array,[14] leading fishermen in some parts of the world to seek industry compensation for their losses. Other impacts on commercially harvested fish include habitat abandonment – one hypothesized explanation for the fallen catch rates – reduced reproductive performance, and hearing loss.[15] Even brief playbacks of predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[16] Recent data suggest that loud, low-frequency sound also disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial

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[10] Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009).

[11] 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).

[12] Parente, C.L., Pauline de Araújo, J., and Elisabeth de Araújo, M., Diversity of cetaceans as tool in monitoring environmental impacts of seismic surveys, *Biota Neotropica* 7(1) (2007).

[13] Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D'Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L. (2011), Beaked whales respond to simulated and actual Navy sonar, PLoS ONE 6(3): e17009. Doi:10.1371/journal.pone.0017009; Soto, N.A., Johnson, M., Madsen, P.T., Tyack, P.L., Bocconcelli, A., and Borsani, J.F. (2006), Does intense ship noise disrupt foraging in deep-diving Cuvier's beaked whales (Ziphius cavirostris)? Mar. Mamm. Sci. 22: 690-699.

[14] Engås, A., Løkkeborg, S., Ona, E., and Soldal, A.V., Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), *Canadian Journal of Fisheries and Aquatic Sciences* 53: 2238-2249 (1996); *see also* Skalski, J.R., Pearson, W.H., and Malme, C.I., Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes ssp.*), *Canadian Journal of Fisheries and Aquatic Sciences* 49: 1357-1365 (1992).

[15] McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K., Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure on humpback whales, sea turtles, fishes, and squid (2000) (report by Curtin U. of Technology); McCauley, R., Fewtrell, J., and Popper, A.N., High intensity anthropogenic sound damages fish ears, *Journal of the Acoustical Society of America* 113: 638-642 (2003); Scholik, A.R., and Yan, H.Y., Effects of boat engine noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*, *Environmental Biology of Fishes* 63: 203-209 (2002).

[16] Purser, J., and Radford, A.N., Acoustic noise induces attention shifts and reduces foraging performance in three-spined sticklebacks (Gasterosteus aculeatus), PLoS One, 28 Feb. 2011, DOI: 10.1371/journal.pone.0017478 (2011).

species.[17] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.[18]

The amount of disruptive activity under consideration in this PEIS is enormous. Since MMS issued its Notice of Intent in 2010, it has received roughly 10 applications for G&G activity in the Atlantic region. 75 Fed. Reg. 16830, 16832. Most of these applications involve extensive airgun surveys in the Mid-Atlantic and South Atlantic planning regions: for example, Spectrum Geo has proposed shooting 112,500 line miles of surveys from Massachusetts down to Florida, Western Geco another 54,900 miles between New Jersey and Georgia, and CGG Veritas more than 42,000 miles running northwards from Florida.[19] As you know, industry will conduct more surveys as areas are opened for leasing, and will send ships back again and again to certain areas of interest to see how geologic features there change over time.

In all, the PEIS estimates more than 617,000 kilometers of 2D surveys, 2500 blocks of 3D/ 4D surveys (each block being about 9 square miles), and 900 blocks of wide-azimuth surveys in the Mid-Atlantic and South Atlantic Planning Areas through 2020, plus hundreds of thousands of additional kilometers of high-resolution surveys, vertical seismic profiling, and electromagnetic exploration, plus disturbance from vessel noise, node and cable installation, and other activities. PEIS at Table 3-3. The 2D surveys alone equate to about 8.8 years of continuous airgun activity, running 24 hours per day, 365 days per year, assuming vessel speeds of 4.5 knots. The 3D surveys, which according to BOEM's assumptions would not even begin until 2016, amount to 4 to 10.8 years of continuous activity assuming (per recent 3D surveys in the Arctic) 7 to 19 miles of trackline for every square mile of lease block. There is no indication that these estimates represent a worst-case scenario for G&G activity in the region, nor does the PEIS provide any projections for G&G activity beyond the 2013-2020 study period. In any case, BOEM is contemplating an enormous amount of activity with a vast environmental footprint.

B. Compliance with NEPA

Enacted by Congress in 1969, NEPA establishes a national policy to "encourage productive and enjoyable harmony between man and his environment" and "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man." 42 U.S.C. § 4321. In order to achieve its broad goals, NEPA mandates that "to the fullest extent possible" the "policies, regulations, and public laws of the United States shall be

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[17] Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010).

[18] Booman, C., Dalen, J., Leivestad, H., Levsen, A., van der Meeren, T., and Toklum, K., Effecter av luftkanonskyting på egg, larver og yngel (Effects from airgun shooting on eggs, larvae, and fry), *Fisken og Havet* 3:1-83 (1996) (Norwegian with English summary); Dalen, J., and Knutsen, G.M., Scaring effects on fish and harmful effects on eggs, larvae and fry by offshore seismic explorations, *in* Merklinger, H.M., *Progress in Underwater Acoustics* 93-102 (1987); Banner, A., and Hyatt, M., Effects of noise on eggs and larvae of two estuarine fishes, *Transactions of the American Fisheries Society* 1:134-36 (1973); L.P. Kostyuchenko, Effect of elastic waves generated in marine seismic prospecting on fish eggs on the Black Sea, *Hydrobiology Journal* 9:45-48 (1973).

[19] MMS, Atlantic Geological and Geophysical (G&G) Activities Programmatic Environmental Impact Statement (PEIS), *available at* www.gomr.mms.gov/hompg/offshore/atlocs/gandg.html (accessed May 12, 2010).

interpreted and administered in accordance with [NEPA]." 42 U.S.C. § 4332. As the Supreme Court explained,

> NEPA's instruction that all federal agencies comply with the impact statement requirement – and with all the requirements of § 102 – "to the fullest extent possible" [cit. omit.] is neither accidental nor hyperbolic. Rather the phrase is a deliberate command that the duty NEPA imposes upon the agencies to consider environmental factors not be shunted aside in the bureaucratic shuffle.

Flint Ridge Development Co. v. Scenic Rivers Ass'n, 426 U.S. 776, 787 (1976). Central to NEPA is its requirement that, before any federal action that "may significantly degrade some human environmental factor" can be undertaken, agencies must prepare an environmental impact statement. *Steamboaters v. F.E.R.C.*, 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original).

The fundamental purpose of an EIS is to force the decision-maker to take a "hard look" at a particular action – at the agency's need for it, at the environmental consequences it will have, and at more environmentally benign alternatives that may substitute for it – before the decision to proceed is made. 40 C.F.R. §§ 1500.1(b), 1502.1; *Baltimore Gas & Electric v. NRDC*, 462 U.S. 87, 97 (1983). This "hard look" requires agencies to obtain high quality information and accurate scientific analysis. 40 C.F.R. § 1500.1(b). "General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." *Klamath-Siskiyou Wilderness Center v. Bureau of Land Management*, 387 F.3d 989, 994 (9th Cir. 2004) (*quoting Neighbors of Cuddy Mountain v. United States Forest Service*, 137 F.3d 1372, 1380 (9th Cir. 1998)). The law is clear that the EIS must be a pre-decisional, objective, rigorous, and neutral document, not a work of advocacy to justify an outcome that has been foreordained.

To comply with NEPA, an EIS must *inter alia* include a "full and fair discussion" of direct and indirect environmental impacts (40 C.F.R. § 1502.1), consider the cumulative effects of reasonably foreseeable activities in combination with the proposed action (*id.* § 1508.7), analyze all reasonable alternatives that would avoid or minimize the action's adverse impacts (*id.* § 1502.1), address measures to mitigate those adverse effects (*id.* § 1502.14(f)), and assess possible conflicts with other federal, regional, state, and local authorities (*id.* § 1502.16(c)). We offer the following comments to ensure MMS' compliance with these important mandates.

III. ALTERNATIVES AND MITIGATION

According to NEPA's implementing regulations, the alternatives analysis is "the heart of the environmental impact statement" and is intended to "provid[e] a clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. The alternatives analysis should "serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made." *Id.* § 1502.2(g). Additionally, agencies are required to disclose and analyze measures to mitigate the impacts of proposed actions. *Id.* §§ 1502.14(f), 1502.16(h). This analysis must be "reasonably complete" in order to properly evaluate the severity of the adverse effects of an agency's proposed action prior to the agency making a final decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989). Unfortunately, the PDEIS' alternatives and mitigation analyses are incomplete and do not satisfy the regulatory standards.

A. Failure to Develop Reasonable Alternatives

The purpose of an EIS is to "rigorously explore and objectively evaluate all reasonable alternatives" to the proposed action. 40 C.F.R. § 1502.14(a). That discussion of alternatives "is the heart of the [EIS]" (*id.* at § 1502.14), and it "guarantee[s] that agency decision-makers have before them and take into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance." *Alaska Wilderness Recreation & Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995) (quoting *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1228 (9th Cir. 1988)); *see also Angoon v. Hodel*, 803 F.2d 1016, 1020 (9th Cir. 1986) ("[T]he touchstone for our inquiry is whether an EIS's selection and discussion of alternatives fosters informed decision-making and informed public participation.") (quoting *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982)). These standards have not been met.

1. Failure to develop alternatives based on different permissible levels of activity

BOEM should place meaningful caps or limits on offshore activities that disrupt marine mammal behavior. As NOAA has found, "[t]here is currently a great deal of concern that a variety of human sources of marine sound (e.g., vessel traffic, seismic activity, sonar, and construction activities) are acting in a cumulative way to degrade the environment in which sound-sensitive animals communicate."[20] Airguns in particular can cause low-frequency background noise to rise significantly over very large areas of ocean (see *infra* at § IV.B.1), and the best available evidence indicates that such noise can interfere with foraging in some species at moderate levels of exposure,[21] and substantially interfere with the communication abilities of marine mammals, particularly baleen whales, at very considerable distances.[22] These effects cannot be eliminated through the use of area closures alone, especially given the long distances at which masking can occur. Yet the DPEIS declines even to consider an alternative limiting the amount of activity that can be conducted in the Atlantic, or part of the Atlantic, over a given period.

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[20] Memorandum from Dr. Jane Lubchenco, Undersecretary of Commerce for Oceans and Atmosphere, to Nancy Sutley, Chair, Council on Environmental Quality at 2 (Jan. 19, 2010).

[21] *E.g.*, Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009).

[22] *E.g.*, Clark, C.W., and Gagnon, G.C., Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E9); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10).

The DPEIS does not provide any reason for BOEM's lack of consideration of activity limits. In their recent DPEIS for Arctic geophysical exploration, however, the agencies based their tentative rejection of this alternative not on the grounds that it exceeded their legal authority, but that it did not meet the purpose and need of the proposed action.[23]

In fact, determining the legally acceptable limits of activity is essential to NMFS' issuance of take authorizations in the Atlantic – which, presumably, would be that agency's purpose and need.[24] Pursuant to NMFS' own general regulations, an incidental harassment authorization must be revoked if the authorized takings "individually or in combination with other authorizations" are having more than a negligible impact on the population or an unmitigable adverse impact on subsistence.[25] Unfortunately, the DPEIS makes no attempt to assess whether the scope of activities it contemplates satisfies the negligible impact standard. Similarly, considering limits on activities is essential to BOEM's permitting and other requirements under OCSLA.

In the Arctic, instead of developing a suitable alternative for the EIS, the agencies proposed, in effect, to consider overall limits on activities when evaluating individual applications under OCSLA and the MMPA.[26] It would, however, be much more difficult for NMFS or BOEM to undertake that kind of analysis in an individual IHA application or OCSLA exploration plan because the agencies often lack sufficient information to take an overarching view of the activities occurring that year. Determining limits at the outset would also presumably reduce uncertainty for industry. In short, excluding any consideration of activity limits from the alternatives analysis in this EIS frustrates the purpose of programmatic review, contrary to NEPA.[27]

2. Failure to develop alternative based on eliminating duplicative survey effort

It seems obvious that BOEM should eliminate duplication of survey effort and should not permit multiple surveys, or parts of surveys, in the same locations for the same or similar purposes. NMFS' expert Open Water Panel has twice called for the elimination of unnecessary, duplicative surveys, whether through required data sharing or some other means.[28] In the Atlantic, data

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[23] National Marine Fisheries Service, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 2-45 (Dec. 2011).

[24] *Id.* at 1-3 to 1-4.

[25] 50 C.F.R. § 216.107(f)(2). Additionally, NMFS must ensure that the activity does not take more than "small numbers" of marine mammal species and stocks – another standard that the agency improperly fails to evaluate in the DPEIS.

[26] National Marine Fisheries Service, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 2-45 (Dec. 2011).

[27] *See also* 40 C.F.R. § 1500.2(e) (stating that agencies should identify and assess alternatives that would "avoid or minimize adverse effects of [proposed] actions upon the quality of the human environment").

[28] Burns, J., Clark, C., Ferguson, M., Moore, S., Ragen, T., Southall, B., and Suydam, R., Expert panel review of monitoring and mitigation protocols in applications for incidental harassment authorizations related to oil and gas exploration, including seismic surveys, in the Chukchi and Beaufort Seas at 10 (2010) (Expert Panel Review 2010); Brower, H., Clark, C.W., Ferguson, M., Gedamke, J., Southall, B., and Suydam, R., Expert panel review of

sharing through the use of common surveyors seems particularly appropriate given the large number of wide-ranging 2-D surveys for which applications have already been received.

The DPEIS does not analyze this alternative "because its main benefit (a limit on concurrent surveys) is already addressed by Alternative B." DPEIS at 2-49. Putting aside the fact that Alternative B may not be adopted, BOEM has obviously mischaracterized the effects and benefits of a consolidation measure. Consolidating surveys would reduce concurrence by the standards of BOEM's Alternative B only if the surveys in question happened to come within 40 km of one another *while operating* – a scenario that seems likely to represent a relatively small number of instances. On the contrary, the plain benefit of consolidation is to reduce the cumulative, not necessarily simultaneous, impacts of seismic activity on marine species. As NMFS' expert Open Water Panel observed: "Although the risks to marine mammals and marine ecosystems are still somewhat poorly described, unnecessarily duplicative surveys must increase those risks."[29] BOEM's stated rationale for not considering this alternative does not make sense.

Additionally, BOEM avers that consolidating and coordinating surveys "does not clearly fall under the mandates of this Agency," or its sister agencies the Department of Energy and U.S. Geological Survey. DPEIS at 2-49. This argument seems similar to one advanced in the Arctic DPEIS, wherein the agencies suggested that BOEM could not adopt a data sharing measure, on the grounds that it cannot "require companies to share proprietary data, combine seismic programs, change lease terms, or prevent companies from acquiring data in the same geographic area."[30] Yet this analysis overlooks BOEM's statutory duty under OCSLA to approve only those permits whose exploration activities are not "unduly harmful" to marine life. 43 U.S.C. § 1340(a); *see also* 30 C.F.R. § 550.202. While OCSLA does not define the standard, it is difficult to imagine an activity more expressive of "undue harm" than a duplicative survey, which obtains data that the government and industry already possess and therefore is not necessary to the "expeditious and orderly development, subject to environmental safeguards" of the outer continental shelf. 30 U.S.C. § 1332(3). It is thus within BOEM's authority to decline individual permit applications that it finds are unnecessarily duplicative, in whole or part, of existing or proposed surveys or data.

Additionally, nothing in OCSLA bars BOEM from incentivizing the use of common surveyors or data sharing, as already occurs in the Gulf of Mexico, to reduce the total survey effort. Certainly the Gulf of Mexico business model has led to the "expeditious and orderly development" of that region. 30 U.S.C. § 1332(3). The DPEIS fails to consider this latter alternative, even though it could substantially reduce the quantity of 2-D survey effort expected in the region over the next several years. BOEM must consider an alternative that eliminates duplicative effort.

3. Failure to develop a viable technology-based alternative

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monitoring protocols in applications for incidental harassment authorizations related to oil and gas exploration in the Chukchi and Beaufort Seas, 2011: Statoil and ION Geophysical at 9 (2011) (Expert Panel Review 2011).

[29] Burns et al., Expert panel review at 10 (2010).

[30] National Marine Fisheries Service, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 2-46 (Dec. 2011).

The DPEIS, despite acknowledging the potential for alternative technology to reduce potential impacts on marine wildlife, has failed to develop and consider any alternatives for the development and implementation of that technology. DPEIS at 2-54.

New technology represents a promising means of reducing the environmental footprint of seismic exploration. Industry experts and biologists participating in a September 2009 workshop on airgun alternatives reached the following conclusions: that airguns produce a great deal of "waste" sound and generate peak levels substantially higher than needed for offshore exploration; that a number of quieter technologies are either available now for commercial use or can be made available within the next five years; and that, given the natural resistance of industry, governments should accelerate development and use of these technologies through both research and development funding and regulatory engagement.[31] Among the technologies discussed in the 2009 workshop report are engineering modifications to airguns, which can cut emissions at frequencies not needed for exploration; controlled sources, such as marine vibroseis, which can dramatically lower the peak sound currently generated by airguns by spreading it over time; various non-acoustic sources, such as electromagnetic and passive seismic devices, which in certain contexts can eliminate the need for sound entirely; and fiber-optic receivers, which can reduce the need for intense sound at the source by improving acquisition at the receiver.[32] An industry-sponsored report by Noise Control Engineering made similar findings about the availability of greener alternatives to seismic airguns, as well as alternatives to a variety of other noise sources used in oil and gas exploration.[33]

The draft EIS instead relies on out-of-date information in characterizing the availability of certain technologies. For example, marine vibroseis – which has the potential to reduce peak sound levels by 30 decibels or more and virtually eliminate output above 100 Hz – is on the verge of commercial availability, with useable arrays produced by Geo-Kinetics and PGS now being tested for their environmental impacts on fish, and other models in development through the Canadian government and a Joint Industry Program.[34] Yet the DPEIS uses a 2010 personal communication with PGS for the proposition that a commercial electric vibroseis array is not "available for data collection at this time" (DPEIS at 2-50) – an outdated observation that does

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[31] Weilgart, L. ed., Report of the workshop on alternative technologies to seismic airgun surveys for oil and gas exploration and their potential for reducing impacts on marine mammals, 31 Aug. – 1 Sept., 2009, Monterey, Calif. (2010), *available at* www.okeanos-stiftung.org/okeanos/download.php?id=19.

[32] *Id.*

[33] Spence, J., Fischer, R., Bahtiarian, M., Boroditsky, L., Jones, N., and Dempsey, R., Review of existing and future potential treatments for reducing underwater sound from oil and gas industry activities (2007) (NCE Report 07-001) (prepared by Noise Control Engineering for Joint Industry Programme on E&P Sound and Marine Life). Despite the promise indicated in the 2007 and 2010 reports, neither NMFS nor BOEM has attempted to develop noise-reduction technology for seismic or any other noise source, aside from BOEM's failed investigation of mobile bubble curtains.

[34] Tenghamn, R., An electrical marine vibrator with a flextensional shell, *Exploration Geophysics* 37:286-291 (2006); LGL and Marine Acoustics, Environmental assessment of marine vibroseis (2011) (Joint Industry Programme contract 22 07-12).

not reflect current fact. Nor does the DPEIS consider the specific airgun modifications discussed in Weilgart (2010). *See* DPEIS at 2-53.

Critically, the DPEIS fails to include any actionable alternatives to require, incentivize, or test the use of new technologies in the Atlantic, or indeed in any other region. Such alternatives include: (1) mandating the use of marine vibroseis or other technologies in pilot areas, with an obligation to accrue data on environmental impacts; (2) creating an adaptive process by which marine vibroseis or other technologies can be required as they become available; (3) deferring the permitting of surveys in particular areas or for particular applications where effective mitigative technologies, such as marine vibroseis, could reasonably be expected to become available within the life of the EIS; (4) providing incentives for use of these technologies as was done for passive acoustic monitoring systems in NTL 2007-G02; and (5) exacting funds from applicants to support accelerated mitigation research in this area. The final EIS must consider these alternatives.

B. Failure to Consider Additional Time-Place Restrictions

Time and place restrictions designed to protect high-value habitat are one of the most effective means to reduce the potential impacts of noise and disturbance, including noise from oil and gas exploration.[35] It was for this express reason that NOAA, in 2011, established a working group on Cetacean Density and Distribution Mapping, to define marine mammal hotspots for management purposes.[36] Unfortunately, the PDEIS, while identifying two possible time-area closures for North Atlantic right whales and one possible closure for sea turtles, does not consider any other areas for any other species. Nor, as discussed below, are its proposed right whale closures adequate to protect right whales.

As a general matter, the PDEIS does not give any consideration to year-round area closures, for reasons that are unclear. It makes no sense to open up areas for geophysical exploration – adding to the cumulative noise burden, impairing the communication space of the right whale and other species – that are unlikely to be leased, whether for biological, political, or economic reasons. For example, the lease sale area off Virginia that Interior included in its 2012-2017 leasing program (but aborted after the BP spill) stood more than 50 miles offshore, in order to reduce

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[35] *See, e.g.*, Agardy, T., Aguilar Soto, N., Cañadas, A., Engel, M., Frantzis, A., Hatch, L., Hoyt, E., Kaschner, K., LaBrecque, E., Martin, V., Notarbartolo di Sciara, G., Pavan, G., Servidio, A., Smith, B., Wang, J., Weilgart, L., Wintle, B., and Wright, A, A global scientific workshop on spatio-temporal management of noise, Report of workshop held in Puerto Calero, Lanzarote, June 4-6, 2007 (2007); Dolman, S., Aguilar Soto, N., Notabartolo di Sciara, G., Andre, M., Evans, P., Frisch, H., Gannier, A., Gordon, J., Jasny, M., Johnson, M., Papanicolopulu, I., Panigada, S., Tyack, P., and Wright, A., Technical report on effective mitigation for active sonar and beaked whales (2009) (working group convened by European Cetacean Society); OSPAR Commission, Assessment of the environmental impact of underwater noise (2009) (report issued as part of OSPAR Biodiversity Series, London, UK); Convention on Biological Diversity, Scientific synthesis on the impacts of underwater noise on marine and coastal biodiversity and habitats (2012) (UNEP/CBD/SBSTTA/16/INF/12).

[36] Memorandum from Dr. Jane Lubchenco, Undersecretary of Commerce for Oceans and Atmosphere, to Nancy Sutley, Chair, Council on Environmental Quality at 2 (Jan. 19, 2010).

conflict with military, fishing, and other uses. 73 Fed. Reg. 67201, 67205 (Nov. 13, 2008).[37] If lease sales are unlikely within 50 miles of the Virginia shore, seismic exploration can be excluded from these areas while meeting the stated purpose and need. BOEM should identify areas within the mid- and southeast Atlantic that are unlikely to be opened to lease sales within the 2017-2022 period due to conflict of use, political opposition, and other factors, and consider an alternative (or alternatives) that restricts oil and gas exploration in these areas.

Recently, in their DEIS for oil and gas exploration in the Arctic, BOEM and NMFS argued that they lack authority under the MMPA and OCSLA to prescribe year-round closures.[38] Instead, they suggest that the proper time for consideration of permanent closures is during the offshore leasing program and lease sale processes.[39] Yet BOEM's relegation of this alternative to the leasing process is not consistent with its obligation, at the exploration and permit approval stage, to reject applications that would cause "serious harm" or "undue harm." *E.g.*, 43 U.S.C. § 1340(a); 30 C.F.R. § 550.202. It is reasonable for BOEM to define areas where exploration activities would exceed these legal thresholds regardless of time of year, just as it defines areas for seasonal avoidance pursuant to other OCSLA and MMPA standards. Moreover, the lease sale stage is not a proper vehicle for considering permanent exclusions for strictly off-lease activities, such as the off-lease seismic surveys that would account for all of the oil and gas exploration activity during the first five years of the study period. The DPEIS must consider establishing year-round exclusion areas as well as seasonally-based closures.

Finally, as a general matter, the PDEIS does not consider establishing buffer zones around areas of biological importance, aside from a "setback distance" to prevent seafloor disturbance within the Monitor and Gray's Reef National Marine Sanctuaries and such other buffer zones as may be warranted to protect benthic communities. DPEIS at C-18.[40] Buffer zones are a standard feature of biosphere reserves; have been recommended by numerous experts for use in mitigation of undersea noise around reserves, exclusion areas, and National Marine Sanctuaries; and are regularly prescribed by NMFS around exclusion areas for Navy sonar training.[41] NMFS has established a list of objectives for habitat avoidance and other mitigation measures, including reduction in the total number of marine mammal takes and the reduction in the severity, intensity, or number of exposures, particularly (but not exclusively) for vulnerable species. *See*,

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[37] BOEMRE, Virginia Lease Sale 220 Information (2010), *available at* www.gomr.boemre.gov/homepg/lsesale/220/matl220.html (accessed June 2012) (confirming lease sale area is at least 50 miles offshore).

[38] National Marine Fisheries Service, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 2-44 (Dec. 2011).

[39] *Id.*

[40] The DPEIS does incorrectly mischaracterize its proposed seasonal exclusion for right whales, as set forth in Alternative B, as a "continuous buffer… from active acoustic sources" (DPEIS at 4-213) but this exclusion area represents part of the right whale's migratory corridor and calving grounds, not a buffer zone.

[41] *E.g.*, Agardy et al., A global scientific workshop on spatio-temporal management of noise; Hatch, L.T., and Fristup, K.M., No barrier at the boundaries: Implementing regional frameworks for noise management in protected natural areas, *Marine Ecology Progress Series* 395: 223-244 (2009); Hoyt, E., Marine Protected Areas for Whales, Dolphins, and Porpoises: A World Handbook for Cetacean Habitat Conservation and Planning,2nd Edition (2011); 72 Fed. Reg. 46846, 46846-46893 (Apr. 21, 2007).

e.g., 74 Fed. Reg. 3886 (Jan. 21, 2009). On this basis, BOEM should consider and adopt meaningful buffer zones around its exclusion areas.

More specifically:

1. Time-place restrictions for marine mammals

The DPEIS study area includes important marine mammal habitat that was not considered for time-place restrictions. For example:

(a) North Atlantic right whale habitat

The cetacean species of greatest concern in the region is the North Atlantic right whale, a species that has a minimum population of only about 361 whales and is considered the most imperiled large whale on the planet. In order to protect this species and comply with its obligations under the Endangered Species Act, BOEM must seasonally exclude all North Atlantic right whale habitat areas from seismic and other proposed activities. These areas include both the designated critical habitat identified in the PDEIS' Alternative A as well as areas that have not yet been designated as critical habitat but are known to be important migratory habitat.

Notably, NMFS is considering whether to expand right whale critical habitat in response to a Sept. 16, 2009 petition filed by the Center for Biological Diversity, Humane Society of the United States, Whale and Dolphin Conservation Society, Defenders of Wildlife, and Ocean Conservancy. That petition identified additional areas that are critical for breeding, raising calves, migrating, and feeding, and which should be included as designated critical habitat for the species. In relevant part, the petitioners requested that NMFS:

> …
>
> (2) expand right whale critical habitat in the waters off the Southeast United States to include coastal waters from the shore out to 35 nautical miles off the coast of South Carolina, and waters off the coast of Georgia and Florida from approximately 32.0° N latitude, 80.35° W southward to approximately 28° N latitude, 80.35° W longitude…; and
>
> (3) designate as right whale critical habitat coastal waters all waters along the migratory corridor of the mid-Atlantic from the shore out to 30 nautical miles, between the northern border of South Carolina (approximately 33.85° N latitude and 78.53° W longitude) northward to the southeastern corner of Cape Cod, Massachusetts (approximately 41.55° N latitude, 70.0° W longitude), southeastward to the southern

> corner of the current Great South Channel Critical Habitat (41.0° N latitude and 69.1° W longitude).[42]

It is worth noting that a 30 nm coastal exclusion (along the lines defined above) does not include a buffer zone as the DPEIS suggests (DPEIS at 4-213), but reflects the extent of the right whale migratory corridor itself.[43] Regardless of their status as critical habitat, these areas should be avoided, and added to the DPEIS' alternatives analysis as an extension to the 20 nm coastal time-area closure of Alternative B.

Additionally, contrary to the present Alternatives A and B (*see* DPEIS at 2-4), a seasonal exclusion for right whales should also apply to HRG surveys, including for renewables. During the migration, any substantial deflection of mothers and calves around a low- to mid-frequency sound source such a sub-bottom profiler – a result that is particularly likely for activities occurring landward of the animals –[44] could put the animals at greater risk of killer whale predation or exposure to rougher seas. In the calving grounds as well as the migration corridor, any behavioral response similar to that observed in Nowacek et al. (2004) – in which right whales, responding to an acoustic alarm, positioned themselves directly below the water surface – would put them at substantially greater risk of vessel collision. Right whales were demonstrated to respond significantly to alarm signals, which occupied the same frequencies as the sub-bottom profilers intended for HRG surveys, at received levels of 133-148 dB re 1 µPa (RMS).[45] If anything, these levels could underestimate the response threshold for many of the whales, given the heightened reactions to other sound sources that have been observed in baleen whale mothers and calves.[46]

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[42] Center for Biological Diversity, The Humane Society of the United States, Whale and Dolphin Conservation Society, Defenders of Wildlife, and Ocean Conservancy, Petition to Revise Critical Habitat Designation for the North Atlantic Right Whale at 1-2 (2009).

[43] Knowlton, A.R., Ring, J.B., and Russell, B., Right whale sightings and survey effort in the mid-Atlantic region: Migratory corridor, time frame, and proximity to port entrances (2002) (report submitted to NMFS ship-strike working group); Kraus, S., New England Aquarium, pers. comm. with Michael Jasny, NRDC (Apr. 2012). *See also* Fujiwara, M., and Caswell, H., Demography of the endangered North Atlantic right whale, *Nature* 414: 537-541 (2001); Kraus, S.D., Prescott, J.H, Knowlton, A.R., and Stone, G.S., Migration and calving of right whales (*Eubalaena glacialis*) in the western North Atlantic, *Reports of the International Whaling Commission* 10: 139-144 (1986); Ward-Geiger, L.I., Silber, G.K., Baumstark, R.D., and Pulfer, T.L., Characterization of ship traffic in right whale critical habitat, *Coastal Management* 33: 263-278 (2005).

[44] Buck, J.R., and Tyack, P.L., Reponses of gray whales to low frequency sounds, *Journal of the Acoustical Society of America* 107: 2774 (2000).

[45] Nowacek, D.P., Johnson, M.P., and Tyack, P.L., Right whales ignore ships but respond to alarm stimuli, *Proc. Royal Soc. London, Pt. B: Biol. Sci.* 271: 227-231 (2004).

[46] *E.g.*, McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid (2000) (report from Curtin University of Technology). It is also worth noting that, under some conditions, migrating bowheads avoid airgun pulses out to the 120 dB isopleths and gray whales avoid industrial noise and low-frequency sounds out to 120 dB or 140 dB. Buck and Tyack, Responses of gray whales, *supra*; Malme, C.I., Miles, P.R., Clark, C.W., Tyack, P., and Bird, J.E., Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior: Phase II: January 1984 migration (1984) (NTIS PB86-218377); Richardson, W.J., Miller, G.W.,

Received levels of 130 dB and above could easily occur more than 10 kilometers from the chirpers, boomers, and pile drivers at issue here. Real-time visual monitoring is very difficult for right whales, especially during high sea states, nighttime operations, and other low-visibility conditions, and is further complicated by the size of the impact zone that the monitoring effort would have to cover.[47]

As NRDC observed in our comments on BOEM's recent EA on mid-Atlantic Wind Energy Areas, we would support allowing some small amount of sub-bottom profiling activity to occur during the winter exclusion period provided (1) that the operators have conscientiously planned to complete their HRG surveys outside the seasonal exclusion months, (2) that their inability to complete the surveys is due to unforeseen circumstances, and (3) that permitting some small amount of HRG activity to occur during the winter months would allow them to avoid extending their survey effort into the following calendar year. That said, given the conservation status of this species, we recommend extension of the right whale time-area closure to HRG activity.

(b) Cape Hatteras Special Research Area

The area of interest also includes habitat known to be important for multiple cetacean species. For example, the continental shelf break off Cape Hatteras features a major oceanic front created by the Gulf Stream, which veers off into the Atlantic and merges with Labrador Current, creating conditions for warm-core rings and high abundance of marine mammals and fish.[48] Among the many species that are drawn to this area in high abundance are long- and short-finned pilot whales and Risso's dolphin, whose interactions with the pelagic longline fishery have exceeded the insignificance threshold for potential biological removal and triggered the formation

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and Greene, C.R., Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea, *Journal of the Acoustical Society of America* 106: 2281 (1999).

[47] *E.g.*, Barlow, J., and Gisiner, R., Mitigation and monitoring of beaked whales during acoustic events, *Journal of Cetacean Research and Management* 7: 239-249 (2006); 72 Fed. Reg. 46846, 46875 (Aug. 21, 2007) (SURTASS LFA rulemaking); Dolman, S., Aguilar de Soto, N., Notabartolo di Sciara, G., Andre, M., Evans, P., Frisch, H., Gannier, A., Gordon, J., Jasny, M., Johnson, M., Papanicolopulu, I., Panigada, S., Tyack, P., and Wright, A., Technical report on effective mitigation for active sonar and beaked whales (2009) (report from European Cetacean Society); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

[48] Churchill, J., Levine, E., Connors, D., and Cornillon, P., Mixing of shelf, slope and Gulf Stream water over the continental slope of the Middle Atlantic Bight, *Deep Sea Research Part I: Oceanographic Research Papers*, 40: 1063-1085 (1993); Hare, J., Churchill, J., Cowen, R., Berger, T., Cornillon, P., Dragos, P., Glenn, S.M., Govoni, J.J., and Lee, T.N., Routes and rates of larval fish transport from the southeast to the northeast United States continental shelf, *Limnology and Oceanography* 47: 1774-1789 (2002); Garrison, L., Swartz, S., Martinez, A., Burks, C., and Stamates, J., A marine mammal assessment survey of the southeast US continental shelf: February-April 2002 (2003) (NOAA Technical Memorandum NMFS-SEFSC-492); Waring, G., Josephson, E., Fairfield-Walsh, C., and Maze-Foley, K., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments—2008 (2009) (NOAA Tech Memo NMFS NE 210); 74 Fed. Reg. 23349, 23349-23358 (May 19, 2009).

of a take reduction team under the MMPA.[49] The Cape Hatteras Special Research Area, designated by NMFS as a tool to manage the marine mammal-fishery interactions, captures most of the crucial habitat, having some of the highest densities of cetaceans in the entire region and being one of the most important sites for charter, commercial, and recreational pelagic fisheries.[50] BOEM must consider excluding – and, indeed, under any meaningful management plan, must exclude – this area.

(c) Other areas identifiable through habitat mapping

Remarkably, BOEM has not attempted any systematic analysis of marine mammal habitat for purposes of establishing time-area closures within the area of interest. This stands in obvious counter-distinction to the Navy's 2008 programmatic EIS for sonar activities in the region, which formulated several alternatives based on predictive modeling of marine mammal habitat. There is no reason why a similar analysis should not be done here. Indeed, given the importance of time-area closures in mitigating acoustic impacts, such an analysis (and the gathering of any needed data in support of that analysis) is essential to a reasoned choice among alternatives. 40 C.F.R. § 1502.22.

(1) Predictive mapping.— Over the past few years, researchers have developed at least two predictive models to characterize densities of marine mammals in the area of interest: the NODE model produced by the Naval Facilities Engineering Command Atlantic, and the Duke Marine Lab model produced under contract with the Strategic Environmental Research and Development Program, both to fulfill the Navy's responsibilities for offshore activities under NEPA and other statutes.[51] Indeed, the Navy employed the NODE model in developing three habitat-based alternatives, in its own programmatic EIS, for sonar training off the U.S. east coast from 2009 to 2014.[52] Further, NOAA has convened a Cetacean Density and Distribution Mapping Group with the purpose of evaluating, compiling, supplementing, and enhancing available density information for marine mammals within the U.S. EEZ.[53] Its product, which includes habitat-based density maps and other data for nearly all of BOEM's area of interest, broken down by species and month, was

[49] 74 Fed. Reg. 23349, 23350.

[50] 74 Fed. Reg. 23349; NMFS, Environmental Assessment, Regulatory Impact Review, and Final Regulatory Flexibility Analysis for the Final Pelagic Longline Take Reduction Plan (Jan. 2009) (produced by NMFS Southeast Regional Office).

[51] U.S. Navy, Final Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement (2008); Read, A., and Halpin, P., Final report: Predictive spatial analysis of marine mammal habitats (2010) (SI-1390, report prepared for SERDP); Duke Marine Lab, Marine Animal Model Mapper, *available at* http://seamap.env.duke.edu/serdp/serdp_map.php (accessed June 2012).

[52] Navy, Final Atlantic Fleet Active Sonar Training EIS.

[53] Memorandum from Dr. Jane Lubchenco, Undersecretary of Commerce for Oceans and Atmosphere, to Nancy Sutley, Chair, Council on Environmental Quality (Jan. 19, 2010).

shared in late May at an expert workshop that was partly funded by BOEM, and is slated for public release in early July.[54]

BOEM must use these sources, which represent best available science and, indeed, have partly been used in prior Navy NEPA analyses and rulemakings, to identify important marine mammal habitat and develop reasonable alternatives to the proposed action. *See* 40 C.F.R. § 1502.22. Species of particular importance, aside from the North Atlantic right whale, include the five other large whale species listed under the Endangered Species Act, *i.e.*, blue, fin, sei, humpback, and sperm whales; and beaked whales and harbor porpoises, whose vulnerability to anthropogenic noise is well recognized.

(2) Persistent oceanographic features.— Marine mammal densities are correlated over medium to large scales with persistent ocean features, such as ocean currents, productivity, and surface temperature, as well as with concentrations in other marine species, such as other apex predators and fish.[55] The occurrence of these features is often predictable enough to define core areas of biological importance on a year-round or seasonal basis.[56] In the area of interest, the most important of these features is the Gulf Stream; warm-core rings that develop off the Gulf Stream are likely to provide particularly important habitat for beaked whales, which are considered especially sensitive and vulnerable to anthropogenic sound. Analysis of these features should figure in predictive mapping, but can be used to supplement maps that do not take dynamic features into account.

2. Time-place restrictions for sea turtles

The single time-area closure included in Alternative B, a seasonal avoidance of coastal waters off Brevard County, Florida, is not sufficient to protect endangered and threatened species of sea turtles from harm due to proposed G&G activities off the mid- and south Atlantic.

BOEM's area of interest overlaps with populations of sea turtles, including green, leatherback, loggerhead, hawksbill, and Kemp's Ridley, and contains thousands of nesting locations of particular importance to loggerhead sea turtles. Indeed, the U.S. and Oman represent the majority of nesting sites for loggerhead sea turtles worldwide;[57] limiting anthropogenic disturbances to these nesting locations is paramount for the global conservation of this species. The DPEIS observes that "…breeding adults, nesting adult females, and hatchlings could be

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[54] NOAA, Cetecean and Sound Mapping, *available at* www.st.nmfs.noaa.gov/cetsound (accessed June 2012).

[55] Hyrenbach, K.D., Forney, K.A., and Dayton, P.K. (2000), Marine protected areas and ocean basin management, *Aquatic Conservation: Marine and Freshwater Ecosystems* 10:437-458.

[56] *Id.* ("Design Recommendations for Pelagic MPAs" include the use of persistent oceanographic features like sea temperature to define core areas for protection).

[57] FWS and NMFS, Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (*Caretta caretta*) Second Revision (2008) (*available at* www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf).

exposed to airgun seismic survey-related sound exposures at levels of 180 dB re 1 μPa or greater. Potential impacts could include auditory injuries or behavioral avoidance that interferes with nesting activities." DPEIS at 2-17. The recovery plan for the Northwest Atlantic population of loggerhead sea turtles also notes that several aspects of oil and gas activities, including seismic surveying, threaten these populations.[58] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, which much of the energy produced by airguns is concentrated.[59] Given these findings, as well as the global significance of the region for loggerheads, all important habitats for endangered and threatened sea turtles in the area of interest should be avoided.

Although Brevard County, Florida represents vital loggerhead nesting habitat and must be protected, many additional sea turtle nesting sites are found each year within the mid- and south Atlantic planning areas, in Georgia, South Carolina, North Carolina, and other parts of Florida, as displayed in Figures 4-14 and 4-16 of the DPEIS. Volusia County, Florida, for instance, has had an average of 1,865 loggerhead sea turtles nests reported between 2007-2011.[60] In 2010 on Georgia beaches 1,761 loggerhead nests were found.[61] South Carolina sea turtle nests in 2011 included 4,018 loggerheads, 3 greens and 4 leatherbacks.[62] North Carolina sea turtle nests in 2011 included 948 loggerheads, 16 greens and 1 Kemp's Ridley.[63] Long-term datasets show nesting declines for loggerheads in North Carolina, South Carolina, Georgia, and southeast Florida, [64] and it is critical to their recovery to protect females heading to and from their nesting beaches as well as hatchlings that enter the neritic zone. Nesting females and hatchlings could be disturbed or injured by the proposed G&G activities in any of these locations through an increase in vessel traffic, accidental oil discharges, and noise propagation from the use of airguns. For these reasons, BOEM should exclude from seismic airgun activity all near-coastal waters from Florida through North Carolina, from May 1 through October 31, to protect both nesting females and hatchlings.

Important foraging and migrating habitat should also receive consideration for time-area closure. Loggerheads that were tracked after nesting at Archie Carr National Wildlife Refuge, in Brevard County, headed north and followed three main foraging and migratory patterns between Virginia

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[58] *Id.*

[59] Piniak, W.E.D., Mann, D.A., Eckert, S.A., and Harms, C.A., Amphibious hearing in sea turtles, *in* Popper, A.N., and Hawkins, A., eds., *The Effects of Noise on Aquatic Life* at 83-88 (2012).

[60] FWC/FWRI Statewide Nesting Beach Survey Program Database as of 8 Feb. 2012, Loggerhead Nesting Data 2007-2011, *available at* http://myfwc.com/media/2078432/LoggerheadNestingData.pdf.

[61] Georgia Department of Natural Resources. Sea Turtle Conservation and Research, *available at* http://www.georgiawildlife.com/node/1804 (accessed May 2012).

[62] South Carolina Department of Natural Resources, SC Marine Turtle Conservation Program, *available at* http://www.dnr.sc.gov/seaturtle/ (accessed May 2012).

[63] North Carolina Wildlife Commission, Sea Turtle Nest Monitoring System: North Carolina loggerhead, *available at* http://www.seaturtle.org/nestdb/index.shtml?view=1&year=2011.

[64] NMFS, Loggerhead Sea Turtle (*Caretta caretta*), *available at* http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed May 2012).

and North Carolina.[65] These foraging and migratory areas for loggerheads conflict with the mid- and south Atlantic planning areas, and the impacts to loggerheads could occur outside of nesting beaches.

Finally, BOEM must create time-area closures to avoid future conflicts with loggerhead critical habitat. NOAA has established Distinct Population Segments ("DPSs") for loggerheads, including in the Northwest Atlantic, and has until September 2012 to designate critical habitat for them. 76 Fed. Reg. 58868 (Sept. 22, 2011). The Final PEIS should reflect the current development of this rulemaking. BOEM should consult with NOAA on the designation and incorporate time-area closures within the Final PEIS to avoid conflicts with these areas.

In sum, BOEM should extend its proposed Brevard County exclusion to coastal areas from Florida up through North Carolina during the sea turtle nesting season, from May 1 through October 31; should identify and exclude important foraging and migrating habitat outside the nesting areas; and should establish time-area closures for all loggerhead critical habitat, which NMFS is required to designate, under the Endangered Species Act, by September 2012.

3. Time-place restrictions for fish and fisheries

The DPEIS does not consider any alternative that would exclude important fish habitat areas from G&G and other detrimental activities. While the document describes a number of areas in the mid-Atlantic and southeast Atlantic that provide especially important fish habitat and fishery resources, it simply dismisses effects on these areas.

Similarly, the Draft PEIS does not give serious consideration to space and use conflicts with commercial and recreational fisheries. The document considers such conflicts only in the context of permanent structures that physically block access to fishing sites, which it asserts will be rare. However, lethal and sublethal impacts to targeted fish species, including changes in their behavior or movements, as well as habitat degradation stemming from the proposed action would also adversely impact – and therefore conflicts with – commercial and recreational fishing uses.

The Final PEIS must consider alternatives that exclude key fish habitat and fisheries from the proposed action. These areas include:

(a) Charleston Bump and gyre complex.— Charleston Bump and the gyre surrounding it as a result of rapidly moving Gulf Stream waters provide a highly productive, nutrient-rich area that contributes significantly to primary and secondary production in the region. In addition, this area provides essential nursery habitat for numerous offshore fish species. The importance and sensitive nature of this seafloor and gyre habitat make it incompatible with the proposed seismic activities.

[65] Evans, D., Cariani, S., Ehrhart, L.M., Identifying migratory pathways and foraging habitat use by loggerhead turtles (*Caretta caretta*) nesting on Florida's east coast, *Sea Turtle Conservancy and UCF* (2011).

(b) The Point (also known as Hatteras Corner).— This area is formed at the confluence of the Gulf of Mexico with other water bodies, creating a highly productive open-water habitat. Adults of many highly migratory species such as tuna and swordfish congregate in this area. In addition, a wide diversity of larval fishes is found here.

(c) Ten Fathom Ledge and Big Rock.— These areas feature complex and valuable bottom habitat that is known to be used by some 150 reef-associated species. Ten Fathom Ledge encompasses numerous patch reefs consisting of coral, algae, and sponges on rock outcroppings covering 352 km^2 of ocean floor. Big Rock encompasses 93 km^2 of deep reef. Both areas are highly vulnerable to damage from bottom disturbances, sedimentation, and contamination associated with the proposed activities.

(d) Submarine canyons and canyon heads.— These structurally complex ecosystems provide critically important benthic and pelagic habitats for numerous fish species, sharks, sea birds, and marine mammals. The canyons plummet down several miles and their solid undersea walls provide a hard substrate foundation for bottom-dwelling species.[66] Among these is the golden tilefish, which create unique habitat for co-evolved species by burrowing extensively into the canyon walls, giving them the appearance of miniature, underwater versions of the pueblo villages of the American Southwest.[67] And the canyons represent high-value habitat for many other species, include monkfish, hakes, skates, American lobster, and red crab, as well as such lesser-known species as cod-like grenadiers and bioluminescent lanternfish.[68] Endangered sperm whales, beaked whales, dolphins, and other marine mammals come to the canyons and seamounts to feed on the schools of squid and fish that congregate there.[69] More than 200 species of invertebrates have been identified in the

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[66] Natural Resources Defense Council. Priority Ocean Areas for Protection in the Mid-Atlantic: Findings of NRDC's Marine Habitat Workshop at 25, 27 (Jan. 2001).

[67] *Id.*; Lumsden, S.E., T.F. Hourigan, A.W. Bruckner, & G. Dorr, eds., The state of deep coral ecosystems of the United States at 211 (2007) (NOAA Technical Memorandum CRCP-3, *available at* http://coris.noaa.gov/activities/deepcoral_rpt/pdfs/DeepCoralRpt2007.pdf).

[68] NRDC, Priority Ocean Areas; NMFS, Resource Survey Report: Bottom Trawl Survey. March 7 – April 28, 2007 (2009) (available at http://www.nefsc.noaa.gov/esb/rsr/sbts/sbts_2007/large_file.pdf); NMFS & NEFMC. Protecting Sensitive Deep-Sea Canyon Habitats through Fisheries Management: A Case Study in the Northeastern United States (2009) (available at http://www.nefmc.org/habitat/managing_fisheries_poster.pdf); Marine Conservation Biology Institute, Places in the Sea: Hudson Canyon (2009) (available at http://www.mcbi.org/shining_sea/place_atlantic_hudson.htm); NOAA Ocean Explorer. Mission Plan: Mountains in the Sea" (2009) (available at http://oceanexplorer.noaa.gov/explorations/03mountains/background/plan/plan.html); Lumsden et al., The state of deep coral ecosystems at 211; NOAA, Explorations: Deep East: Logs: Summary of the Expedition (2009) (*available at,* http://oceanexplorer.noaa.gov/explorations/deepeast01/logs/oct1/oct1.html).

[69] Waring, G.T., Hamazaki, T., Sheehan, D., Wood, G., and Baker, S., Characterization of beaked whale (*Ziphiidae*) and sperm whale (*Physeter macrocephalus*) summer habitat in shelf-edge and deeper waters off the northeast U.S." *Marine Mammal Science* 17: 703-717 (2001); Waring, G.T., Josephson, E., Maze-Foley, K., and Rosel, P.E., eds., U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2011 (2011).

Atlantic submarine canyons and seamounts, including species of black corals, boreal red corals, sponges, and feather-like sea pens.[70]

Submarine canyon and canyon head habitats are highly vulnerable to damage associated with bottom disturbances, sedimentation, and contamination from the proposed activities; and fish and other canyon species are particularly vulnerable to acoustic impacts from seismic surveys, which may be exacerbated by reverberation from the canyon walls. For these reasons, the Atlantic canyons, including such highly productive areas such as Norfolk Canyon and Georgetown Hole, should be excluded from all such activities, as should all Gear Restricted Areas for golden tilefish.

(e) Areas designated as Habitat Areas of Particular Concern ("HAPCs") by the Mid-Atlantic or South Atlantic Fishery Management Councils.— BOEM should consider excluding the following designated areas:

- HAPCs for coral, coral reefs, and live/hard bottom habitats
  - North Carolina: 10-Fathom Ledge, Big Rock, The Point
  - South Carolina: Charleston Bump, Hurl Rock
  - Georgia: Gray's Reef National Marine Sanctuary
  - Florida: Tube worm (*Lophelia*) reefs off FL's central east coast, *Oculina* Bank off coast from Fort Pierce to Cape Canaveral, nearshore (0-12 ft.) hard bottom off coast from Cape Canaveral to Broward County
- HAPCs for penaeid, rock, and royal red shrimps
- HAPCs for reef fish/snapper-grouper management unit, and areas that meet the criteria for Essential Fish Habitat-HAPCs for these species
  - medium- to high-profile offshore hard bottoms where spawning normally occurs
  - localities of known or likely periodic spawning aggregations
  - nearshore hard bottom areas
  - The Point, Ten Fathom Ledge, and Big Rock
  - Charleston Bump
  - mangrove habitat
  - seagrass habitat
  - oyster/shell habitat
  - all coastal inlets
  - all State-designated nursery habitats of particular importance to snappers-groupers (e.g., primary and secondary nursery areas designated in North Carolina)
  - pelagic and benthic *Sargassum*
  - Hoyt Hills for wreckfish
  - the *Oculina* Bank HAPC
  - all hermatypic coral habitats and reefs

[70] Oceana. There's No Place Like Home at 9; Lumsden et al., The state of deep-coral ecosystems, at 200, 203; NRDC, Priority Ocean Areas.

    - manganese outcroppings on the Blake Plateau
    - Council-designated Artificial Reef Special Management Zones
- HAPCs for coastal pelagic species
    - Sandy shoals of Cape Lookout, Cape Fear, and mid-Cape Hatteras; The Point, Ten-Fathom Ledge, Big Rock (North Carolina)
    - Charleston Bump, Hurl Rocks (South Carolina)
    - Nearshore hardbottom (Florida)

(f) South Atlantic Deepwater MPAs.— These areas, established in 2009 by the South Atlantic Fishery Management Council, support various snapper and grouper species, including snowy grouper, speckled hind, and blue tilefish. Many of the deep-dwelling species the area supports are slow-growing and already struggling to recover from overfishing and habitat damage.

(g) Gray's Reef National Marine Sanctuary.

(h) Areas known to be inhabited by and/or proposed as critical habitat for Atlantic sturgeon.

In addition, BOEM must analyze an alternative that would require any entity carrying out the proposed activities to identify aggregations of forage species and prohibit operations within the vicinity of such aggregations that might disturb them. Similarly, BOEM must analyze an alternative that would prohibit the proposed activities from being carried out in the vicinity of spawning aggregations of grouper and snapper species, as well as concentrations of *Sargassum*, which provides vital nursery habitat to numerous species in Atlantic shelf waters and the Gulf Stream.

C. Failure to Adequately Consider Reasonable Mitigation and Monitoring Measures

The DPEIS does not adequately consider, or fails to consider at all, a number of other reasonable measures that would reduce environmental risk from the proposed activities. These measures include:

(1) Exclusion of airgun surveys around established dive sites.— It is well established that intense undersea noise can jeopardize the health and safety of human divers. For this reason, the Navy has established a significant acoustic stand-off zone around established dive sites, for training and operations of its SURTASS LFA system as well as for other acoustic sources.[71] The Navy's 145 dB stand-off for SURTASS

[71] Navy, Final Overseas Environmental Impact Statement and Environmental Impact Statement for Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar (2001) (notes that standard was endorsed by Navy's Bureau of Medicine and Surgery and the Naval Sea Systems Command); Navy, Final Supplemental Environmental Impact Statement for Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar (2007).

LFA is based on research showing severe discomfort in a portion of experienced civilian divers, on exposure to low-frequency noise at that level.[72] Given the lack of any analogous studies on airgun noise, BOEM should adopt the Navy's 145 dB threshold as the best available standard for high-intensity, low-frequency airguns. The stand-off zone should apply to Monitor and Gray's Reef National Marine Sanctuaries as well as to other established dive sites.

(2) Survey design standards and review.— BOEM should require that airgun survey vessels use the lowest practicable source levels, minimize horizontal propagation of the sound signal, and minimize the density of track lines consistent with the purposes of the survey.[73] None of these measures is considered in the DPEIS. We would note that, in the past, the California Coastal Commission has required the U.S. Geological Survey to reduce the size of its array for seismic hazards work, and to use alternative seismic technologies (such as a minisparker), to reduce acoustic intensities during earthquake hazard surveys to their lowest practicable level.[74] Additionally, BOEM should consider establishing an expert panel, within the agency, to review survey designs with the aim of reducing their wildlife impacts. These requirements are consistent with both the MMPA's "least practicable impact" requirement for authorizing marine mammal take and OCSLA's "undue harm" requirement for permitting of offshore exploration.

(3) Sound source validation.— Relatedly, BOEM should require operators to validate the assumptions about propagation distances used to establish safety zones and calculate take (*i.e.*, at minimum, the 160 dB and 180 dB isopleths). Sound source validation has been required of Arctic operators for several years, as part of their IHA compliance requirements, and has proven useful for establishing more accurate, *in situ* measurements of safety zones and for acquiring information on noise propagation.[75] It should be clarified that safety zone distances would initially be established in site-specific EAs and applications for MMPA authorization, to ensure opportunity for agency review and analysis.

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[72] Navy, Final Overseas Environmental Impact Statement and Environmental Impact Statement for Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) Sonar: Technical Report 3 (1999).

[73] Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009); Burns, J., Clark, C., Ferguson, M., Moore, S., Ragen, T., Southall, B., and Suydam, R., Expert panel review of monitoring and mitigation protocols in applications for incidental harassment authorizations related to oil and gas exploration, including seismic surveys, in the Chukchi and Beaufort Seas (2010) (NMFS Expert Panel Review 2010); Brower, H., Clark, C.W., Ferguson, M., Gedamke, J., Southall, B., and Suydam, R., Expert panel review of monitoring protocols in applications for incidental harassment authorizations related to oil and gas exploration in the Chukchi and Beaufort Seas, 2011: Statoil and ION Geophysical (2011) (NMFS Expert Panel Review 2011).

[74] *See, e.g.*, California Coastal Commission, Staff Recommendation on Consistency Determination No. CD-16-00 (2000) (review of USGS survey off southern California).

[75] *See, e.g.*, Burns et al., Expert Panel Review (2010), *supra*; Brower et al., Expert Panel Review (2011), *supra*.

(4) Expansion of the speed-reduction requirement for vessels engaged in G&G activities.— As it stands, BOEM would require G&G ships to maintain a 10 knot speed restriction only when "mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel," or where the conditions specified in the existing right whale ship-strike rule (50 C.F.R. § 224.105) apply. DPEIS at 2-7. This requirement should be expanded.

Ship strikes represent one of the leading threats to the critically endangered North Atlantic right whale. More than half (n=10 of 14) of all North Atlantic right whales that died from significant trauma between 1970 and 2002, and were recovered for pathological examination, had vessel collision as a contributing cause of death (in cases where presumed cause of death could be determined);[76] and these data are likely to grossly underestimate the actual number of animals struck, as animals struck but not recovered, or not thoroughly examined, cannot be accounted for.[77] Each fatal strike could constitute jeopardy under the Endangered Species Act. As NMFS has repeatedly stated, "the loss of even a single individual [North Atlantic right whale] may contribute to the extinction of the species" and "preventing the mortality of one adult female a year" may alter this outcome.[78]

For these reasons, significant steps have been taken over the last several years to reduce the threat of right whale collisions by (1) shifting and narrowing Traffic Separation Schemes ("TSS"), (2) designating "areas to be avoided" ("ATBA"), and (3) establishing seasonal speed reductions for vessels in known right whale habitat. With respect to speed reductions, the best available science indicates that limiting ship speed to 10 knots reduces both the collision risk for right whales and the risk of mortality should a collision occur.[79] NMFS has therefore set a 10 knot limit on ships greater than 65 feet in length transiting certain waters along the eastern seaboard, including areas off the Mid-Atlantic.[80] The agencies have separately extended this requirement to all construction vessels associated with the Cape Wind project, as well as to both construction *and* support ships associated with the Neptune liquid natural

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[76] Moore, M. J., Knowlton, A.R., Kraus, S.D., McLellan, W.A., and Bonde, R.K., Morphometry, gross morphology and available histopathology in North Atlantic right whale (*Eubalena glacialis*) mortalities (1970-2002), *Journal of Cetacean Research and Management* 6:199-214 (2004).

[77] Reeves, R.R., Read, A., Lowry, L., Katona, S.K., and Boness, D.J., *Report of the North Atlantic right whale program review*, 13–17 March 2006, Woods Hole, Massachusetts (2007) (prepared for the Marine Mammal Commission).

[78] *See* 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. 60,173, 60,173 (Oct. 10, 2008); 72 Fed. Reg. 34,632, 34,632 (June 25, 2007); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001).

[79] Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S., and Podesta, M., Collisions between ships and whales, *Marine Mammal Science* 17: 35-75 (2001); Pace, R.M., and Silber, G.K., Simple analyses of ship and large whale collisions: Does speed kill? Biennial Conference on the Biology of Marine Mammals, December 2005, San Diego, CA. (2005) (abstract); Vanderlaan, A.S.M., and Taggart, C.T., Vessel collisions with whales: The probability of lethal injury based on vessel speed, Marine Mammal Science 23: 144-156 (2007); NMFS, 2010 Large Whale Ship Strikes Relative to Vessel Speed (2010) (*available at* http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/ss_speed.pdf).

[80] 73 Fed. Reg. 60173, 60173-60191 (Oct. 10, 2008).

gas ("LNG") facility regardless of vessel length. Notably, both the Cape Wind and Neptune LNG speed limits apply to waters beyond those covered by NMFS' ship-strike rule.[81] A speed reduction measure in this case would, of course, also reduce the risk of fatal ship strikes on other endangered baleen whales, such as fin and humpback whales, which also occur within the WEAs and shoreward.

BOEM should therefore require that all vessels associated with G&G activities, including support vessels, adhere to a 10 knot speed limit when operating or transiting: i.e., at all times. This measure is easily practicable for most vessels involved in G&G activities: seismic boats proceed at a nominal 4.5 knots when operating and at generally slow speeds (below 13-14 knots) when transiting. But specific language on this point is needed, as in the case of the Neptune LNG facility, to ensure that all vessels (and not just those vessels over 65 feet in length) and all affected waters (beyond the areas immediately surrounding the major Mid-Atlantic ports) are covered by the speed limit, and that the requirement persists beyond the original 5-year term of the existing right whale ship-strike rule. Because this measure would likewise reduce the risk of vessel collisions with other species, including other endangered baleen whales, and because it would significantly reduce cavitation noise,[82] it should apply throughout the year and not only during periods of right whale occurrence.

Finally, as per requirements for the Neptune LNG facility,[83] the EA should specify that designated crew members must receive National Oceanic and Atmospheric Administration ("NOAA") certified training regarding marine mammal and sea turtle presence and collision avoidance procedures, prior to the commencement of construction and support activities.

(5) Vessel avoidance of important habitat.— It is well established that vessel routing can significantly reduce both cumulative noise exposure and the risk of ship-strikes.[84] Indeed, the agencies admit in their DPEIS for Arctic exploration that routing ships around important habitat would benefit species in that region, including bowheads,

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[81] Cape Wind Associates, Construction and Operations Plan: Cape Wind Energy Project, Nantucket Sound, Massachusetts (Feb. 2011); NMFS, Biological Opinion: Issuance of license to Neptune LNG to MARAD to construct, own, and operate an LNG deepwater port, at 15-16 (2007) (license number F/NEr/2006/04000).

[82] Renilson, M., Reducing underwater noise pollution from large commercial vessels (2009) *available at* www.ifaw.org/oceannoise/reports; Southall, B.L., and Scholik-Schlomer, A. eds. Final Report of the National Oceanic and Atmospheric Administration (NOAA) International Symposium: Potential Application of Vessel-Quieting Technology on Large Commercial Vessels, 1-2 May 2007, at Silver Springs, Maryland (2008) (*available at* http://www.nmfs.noaa.gov/pr/pdfs/acoustics/vessel_symposium_report.pdf).

[83] NMFS, Biological Opinion at 15. By contrast, the mitigation set forth in Appendix C of the Draft EA merely requires that vessel and aircraft operators receive a "briefing." *See* Draft EA at 226.

[84] *E.g.*, Hatch, L., Clark, C., Merrick, R., Van Parijs, S., Ponirakis, D., Schwehr, K., Thompson, M., and Wiley, D., Characterizing the relative contributions of large vessels to total ocean noise fields: a case study using the Gerry E. Studds Stellwagen Bank National Marine Sanctuary, *Environmental Management* 42:735-752 (2008).

belugas, gray whales, and walruses.[85] Accordingly, the draft EIS should require avoidance of such areas, including right whale calving grounds, as a standard mitigation measure.

(6) Reduction of noise from vessels used in oil and gas G&G activities.— To further reduce undersea noise, BOEM should require that all vessels used in oil and gas G&G activities undergo measurement for their underwater noise output per American National Standards Institute/ Acoustical Society of America standards (S12.64); that all such vessels undergo regular maintenance to minimize propeller cavitation, which is the primary contributor to underwater ship noise; and that all new industry vessels be required to employ the best ship-quieting designs and technologies available for their class of ship.[86]

(7) Separation distances— As part of Alternative B, BOEM would require operators to maintain a 40 km separation distance between concurrent airgun surveys. DPEIS at C-21. While we agree with BOEM about the benefits of reducing simultaneous exposure of the same area, we believe the proposed separation distance is too small to accomplish the objective. Forty kilometers represents a doubling of the 160 dB isopleth around a large array, plus an additional 10 km buffer needed for marine species to freely transit through the area or otherwise escape disruptive levels of exposure. But marine mammals experience take at much lower levels of exposure, as discussed below at § IV.B. To take just one example, migrating bowhead whales experience displacement well beyond the 160 dB isopleths, out to 25-30 km; the proposed 40 km separation would do little to mitigate the displacement and allow transit of the animal.[87] BOEM should consider larger, more conservative separation distances including, but not limited to, 90 km, which is the distance considered in the Arctic DPEIS.

(8) Designing tracklines to minimize the potential for strandings.— Biologists have expressed concern, based on correlations of airgun surveys with some marine mammal stranding events as well as the traditional use of sound in cetacean drive fisheries, that seismic operations (and other intense noise sources) could cause marine mammals to strand, particularly if used near shore.[88] To reduce analogous risk in

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[85] NMFS, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 4-160 to 4-161 (Dec. 2011).

[86] Renilson, Reducing underwater noise pollution from large commercial vessels; Southall and Scholik-Schlomer, eds., Final Report of the National Oceanic and Atmospheric Administration (NOAA) International Symposium: Potential Application of Vessel-Quieting Technology on Large Commercial Vessels.

[87] Richardson, W.J., Miller, G.W., and Greene Jr., C.R., Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea, *Journal of the Acoustical Society of America* 106: 2281 (1999).

[88] Brownell, R.L., Jr., Nowacek, D.P., and Ralls, K., Hunting cetaceans with sound: a worldwide review, *J. Cetacean Res. Manage.* 10: 81-88 (2008); Hildebrand, J., Impacts of anthropogenic sound, *in* Ragen, T.J., Reynolds III, J.E., Perrin, W.F., Reeves, R.R., and Montgomery, S. (eds.), *Marine Mammal Research: Conservation beyond*

other contexts, Australia and the NATO Undersea Research Program have required planners of mid-frequency sonar exercises to design their tracklines to minimize the potential for embayments and strandings, such as by avoiding tracks that could herd animals into bays and estuaries or keeping transmissions in bays to a minimum.[89] The potential location of deep-penetration airgun surveys close to shore recommend the use of the same measure in this case.

(9) Adequate safety zone distances.— BOEM should reconsider the size of the safety zones it would prescribe as part of its nominal protocol for seismic airgun surveys.

The DPEIS proposes establishing a safety zone of 180 dB re 1 µPa (with a 500 m minimum) around individual seismic arrays, correctly observing that this standard is generally consistent with NMFS' requirements for other acoustic sources. DPEIS at 2-5. It is not clear, however, whether BOEM took recent research into account when calculating nominal safety zone distances in the document. For example, Gedamke et al. (2011), whose lead author is the present director of NMFS' Bioacoustics Program, has put traditional means of estimating safety zones into doubt. That paper demonstrates through modeling that, when uncertainties about impact thresholds and intraspecific variation are accounted for, a significant number of whales could suffer temporary threshold shift (*i.e.*, hearing loss) beyond 1 km from a relatively small seismic array (source energy level of 220 dB re 1 $\mu Pa^2(s)$) – a distance that seems likely to exceed BOEM's estimates (PDEIS at C-10).[90] Moreover, a recent dose-response experiment indicates that harbor porpoises are substantially more susceptible to temporary threshold shift than the two species, bottlenose dolphins and belugas, that had previously been tested.[91] And a number of recent studies suggest that the relationship between temporary and permanent threshold shift may not be as predictable as previously believed.[92] Further discussion appears at section IV.B.3 below ("Failure to set proper thresholds for hearing loss"). BOEM must take account of these studies, as, for example, by extending the safety zone by a precautionary distance, as the Navy and NMFS have done to compensate for uncertainties in the

Crisis 101-123 (2006); IWC Scientific Committee, Report of the Scientific Committee of the International Whaling Commission: Annex K: Report of the Standing Working Group on Environmental Concerns (2009).

[89] Royal Australian Navy, Maritime Activities Environmental Management Plan: Procedure S1 (2006); NATO Undersea Research Centre, NATO Undersea Research Centre Human Diver and Marine Mammal Risk Mitigation Rules and Procedures, at 10 (2006) (NURC Special Pub. NURC-SP-2006-008).

[90] Gedamke, J., Gales, N., and Frydman, S., Assessing risk of baleen whale hearing loss from seismic surveys: The effect of uncertainty and individual variation, *Journal of the Acoustical Society of America* 129: 496-506 (2011).

[91] Lucke, K., Siebert, U., Lepper, P.A., and Blanchet, M.-A., 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 (2009).

[92] Kastak, D., Mulsow, J., Ghoul, A., Reichmuth, C., Noise-induced permanent threshold shift in a harbor seal [abstract], *Journal of the Acoustical Society of America* 123: 2986 (2008) (sudden, non-linear induction of permanent threshold shift in harbor seal during TTS experiment); Kujawa, S.G., and Liberman, M.C., Adding insult to injury: Cochlear nerve degeneration after "temporary" noise-induced hearing loss, *Journal of Neuroscience* 29: 14077-14085 (2009) (mechanism linking temporary to permanent threshold shift).

case of SURTASS LFA. 67 Fed. Reg. 46712 (July 16, 2002); 72 Fed. Reg. 46846 (Aug. 21, 2007).

Additionally, BOEM should consider establishing a cumulative exposure metric for temporary threshold shift in addition to the present RMS metric, as suggested by Southall et al. (2007).[93]

Finally, BOEM should consider establishing larger shutdown zones for certain target species. Although time/area closures are a more effective means of reducing cumulative exposures of wildlife to disruptive and harmful sound, these expanded safety zones have value in minimizing disruptions, and potentially in reducing the risk of hearing loss and injury, outside the seasonal closure areas.[94] Visual sighting of any individual right whale should trigger shut-down; for other species, shut-down should occur if aggregations are observed within the 160 dB isopleth around the sound source.

(10) Adequate real-time monitoring.— It is well established that real-time visual shipboard monitoring is difficult for all marine mammal and sea turtle species, especially at night and during high sea states and fog.[95] Supplemental methods that have been used on certain other projects include ship-based passive acoustic monitors, hydrophone buoys and other platforms for acoustic monitoring, aerial surveys, shore-based monitoring, and the use of additional small vessels. Unfortunately, the real-time monitoring effort proposed in the DPEIS is inadequate.

While BOEM seems to require two observers for airgun surveys – the minimum number necessary to maintain 360 degree coverage around the seismic vessel – it otherwise sets forth requirements that are inconsistent with survey conventions and with prior studies of observer effectiveness. *First*, BOEM's "draft protocol" would allow visual observers to work at four-hour stretches, with two-hour breaks in between, and for a maximum of 12 hours per day. DPEIS at C-41. That four-hour work cycle doubles the amount of time conventionally allowed for marine mammal observation aboard NMFS survey vessels, and is even less appropriate for conditions where, as here, an animal's health is at stake. *Second*, BOEM's training requirements for marine mammal observers amount to little more than a desktop course – basically the "poor example" of a 45-minute "DVD" lesson criticized by Parsons et al. (2009) – and do not mandate any prior field experience. DPEIS at C-41 to C-42. Yet, as UK

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[93] Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran. J.J., Gentry, R.L., Greene, C.R., Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L., Marine mammal noise exposure criteria: Initial scientific recommendations, *Aquatic Mammals* 33:411-521 (2007).

[94] *See* MMS, Final Programmatic Environmental Assessment, Arctic Outer Continental Shelf Seismic Surveys – 2006, OCS EIS/EA MMS 2006-038 at 110-111 (June 2006) (noting sensitivity of baleen whale cow-calf pairs).

[95] *See, e.g.*, Barlow, J., and Gisiner, R., Mitigation and monitoring of beaked whales during acoustic events, *J. Cetacean Res. Manage.* 7: 239-249 (2006); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

data have demonstrated, use of observers with no meaningful experience in marine mammal observation, such as ships' crew, results in extremely low levels (approaching zero percent) of detection and compliance.[96] BOEM should require field experience in marine mammal observation of any

Furthermore, while it includes mandatory passive acoustic monitoring ("PAM") under Alternative B (DPEIS at C-21), the DPEIS discusses the measure in a later section as though it has already been "considered but not selected" (DPEIS at C-25 to C-26). The rationale for this seeming rejection is that the method is limited – but then, as the PDEIS acknowledges, visual observation is limited as well, "and most likely an integrated approach is necessary" (DPEIS at C-25). Real-time PAM has had some success in detecting toothed whale calls in the Arctic and elsewhere, as NMFS and its expert Open Water Panel have recognized; and towed arrays in the Gulf of Mexico have successfully detected sperm whales and implemented shut-down procedures.[97] Indeed, PAM systems appear to be widely used in the Gulf, in waters deeper than 200 meters; many of the same survey vessels are likely to be employed in east-coast exploration. There is no reason, especially given BOEM's high estimates of hearing loss, why PAM should not be mandated, or at least presumptively required.

Finally, BOEM improperly rules out aerial surveillance as a monitoring measure, apparently due to its limited application and to safety concerns that arise under some conditions. DPEIS at C-27. This, however, is hardly a reason to categorically reject the measure. The offshore industry routinely uses aircraft to carry out its own exploration and production activities; requiring flights to also reduce the environmental impacts of those activities should be viewed in the same light. Furthermore, the industry has run aerial monitoring around surveys in the Arctic since at least the 1980s. For its upcoming Arctic work, Shell is committed to implement an aerial program extending 37 kilometers from shore. 76 Fed. Reg. 69,958, 69,987 (Nov. 9, 2011). We agree that aerial monitoring should not be required of every airgun survey in every location within the two planning areas, but BOEM should consider prescribing it on a case-by-case basis, and should indicate in the Final EIS when they might be required.[98]

For HRG surveys, BOEM must require a sufficient number of competent, trained visual observers. Requiring only one trained observer, as proposed in Appendix C

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[96] Stone, C.J., The effects of seismic surveys on marine mammals in UK waters: 1998-2000 (2003) (Joint Nature Conservation Committee Report 323); *see also* Parsons et al., A critique of the UK's JNCC seismic survey guidelines, *supra*. It is worth noting that the "inexperienced" marine mammal observers involved in the UK study usually still received some basic training. Stone, The effects of seismic surveys, *supra*.

[97] *Id.*; Gillespie,D., Gordon, J., Mchugh, R., Mclaren, D., Mellinger, D.K., Redmond, P., Thode, A., Trinder, P., and Deng, X.Y., PAMGUARD: semiautomated, open source softward for real-time acoustic detection and localization of ceteaceans, *Proceedings of the Institute of Acoustics* 30(5) (2008).

[98] We fully support efforts by NMFS, BOEM, the Office of Naval Research and others to develop unmanned planes for offshore aerial monitoring (*see* PDEIS at C-27), but unfortunately that is no substitute at the present time for manned aircraft.

(DPEIS at C-16), is simply not adequate to maintain a steady visual watch for more than two hours or to effectively monitor in all directions around the sound source.[99] At least two observers should be required to have any chance of effectively spotting marine mammals on both sides of the survey vessel.

(11) Limiting activities in low-visibility conditions.— The DPEIS does not consider limiting activities in low-visibility conditions, which, as the agencies acknowledged in their Arctic DPEIS for exploration activities, can reduce the risk of ship-strikes and near-field noise exposures.[100] Anticipating BOEM's objection, however, it may be said that the agencies' categorical rejection of this measure in the Arctic context is flawed. *First*, they suggest (correctly) that the restriction could extend the duration of a survey and thus the potential for cumulative disturbance of wildlife; but this concern would not apply in circumstances, such as in the right whale migratory corridor, where the prime mitigation concern is migratory species. *Second*, while they suggest that the requirement would be expensive to implement, they do not consider the need to reduce ship-strike risk in heavily-used migratory corridors in order to justify authorization of an activity under the IHA process.[101] At the very least, BOEM should commit to consider this measure on a case-by-case basis and to describe the conditions under which it might be required.

(12) Adequate long-term monitoring.— Numerous sources have called for thorough biological surveying before, during, and after seismic surveys in biologically important areas.[102] And yet – remarkably for an activity that even BOEM estimates would take millions of marine mammals each year – the DPEIS does not set forth a long-term monitoring plan nor give any indication that one will be developed. By comparison, the U.S. Navy, when it embarked on regulatory compliance for Atlantic Fleet sonar training, began devising a long-term plan and entered into partnerships with Duke Marine Lab and others to begin vessel surveys, habitat modeling, and

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[99] *See* Weir, C.R., and Dolman, S.J., Comparative review of the regional marine mammal mitigation guidelines implemented during industrial seismic surveys, and guidance towards a worldwide standard, *Journal of International Wildlife Law and Policy* 10: 1-27 (2007); Parsons, E.C.M., Dolman, S.J., Jasny, M., Rose, N.A., Simmonds, M.P., and Wright, A.J., A critique of the UK's JNCC seismic survey guidelines for minimising acoustic disturbance to marine mammals: Best practice? *Marine Pollution Bulletin* 58: 643-651 (2009).

[100] NMFS, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 4-160 to 4-153 (Dec. 2011).

[101] IHAs cannot issue to activities with the potential to cause serious injury or mortality. 16 U.S.C. § 1371(a)(5)(D).

[102] *E.g.*, IWC Scientific Committee, Report of the Scientific Committee of the International Whaling Commission: Annex K: Report of the Standing Working Group on Environmental Concerns (2004); IWC Scientific Committee, Report of the Scientific Committee of the International Whaling Commission: Annex K: Report of the Standing Working Group on Environmental Concerns (2006); Parsons et al., A critique of the UK's JNCC seismic survey guidelines, *supra*; Weilgart, L. (ed.), Report of the workshop on alternative technologies to seismic airgun surveys for oil and gas exploration and their potential for reducing impacts on marine mammals, 31 Aug. – 1 Sept., 2009, Monterey, Calif. (2010) (available at www.okeanos-stiftung.org/okeanos/download.php?id=19); Weir and Dolman, Weir, C.R., and Dolman, S.J., Comparative review of the regional marine mammal mitigation guidelines implemented during industrial seismic surveys, and guidance towards a worldwide standard, *Journal of International Wildlife Law and Policy* 10: 1-27 (2007).

research in support of that effort.[103] Incredibly, the sum total of relevant BOEM research in the Atlantic since 2006 – other than for offshore alternative energy – consists of (1) a study of marine productivity across BOEM's oil and gas planning areas – a national study in which the Atlantic was included, and (2) a study of sperm whale dive patterns. DPEIS at G-3.

The purpose of any monitoring program is to establish biological baselines, to determine long-term impacts on populations of target species, and to test whether the biological assumptions underlying the DPEIS are correct. There is no sign that BOEM has even begun to think about such a thing. Yet it is imperative that the agencies elaborate a monitoring plan now, during the NEPA process, since BOEM apparently refuses to apply to NMFS for a programmatic, 5-year rulemaking. We urge BOEM to begin consulting *immediately* with NMFS regional fisheries science centers as well as with non-government experts on the components of an effective plan.

We note that any meaningful long-term monitoring program should include passive acoustics. As has been the case in other regions, acoustic data can have enormous value in helping to define marine mammal distribution and abundance, detect impacts from noise-generating activities, and assess cumulative levels of noise exposure for purposes of adaptive management.[104] For example, PAM has served as a critical means of impact assessment for wind farm construction in Europe.[105] It provides an important supplemental source of information for some species, such as researchers have seen in Southern California, where passive acoustics have altered conclusions about baleen whale seasonality that were established on the basis of visual surveys alone. Real-time acoustic monitoring can also improve safety zone monitoring, particularly for cryptic, vocalizing species and for nighttime operations. Finally, PAM is also cost-effective, typically costing far less than visual surveys.[106]

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[103] U.S. Navy, Final Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement (2008).

[104] Hatch, L., Clark, C., Merrick, R., Van Parijs, S., Ponirakis, D., Schwehr, K., Thompson, M., and Wiley, D., Characterizing the relative contributions of large vessels to total ocean noise fields: A case study using the Garry E. Studds Stellwagen Bank National Marine Sanctuary, *Environmental Management* 42:735-752 (2008).; Clark et al., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources; Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: Intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009). (e.g., Hatch et al. 2008; Clark et al. 2009)

[105] Evans, P.G.H. (Ed.), Proceedings of the ECS/ASCOBANS Workshop: Offshore wind farms and marine mammals: impacts and methodologies for assessing impacts, at 50-59, 64-65 (2007) (ECS Special Publication Series No. 49, available at www.wdcs.org/submissions_bin/wind_farm_workshop.pdf); *see also* Carstensen, J., Henriksen, O. D., and Teilmann, J., Impacts of offshore wind farm construction on harbour porpoises: acoustic monitoring of echolocation activity using porpoise detectors (T-PODs), *Mar. Ecol. Prog. Ser.* 321: 295-308 (2006).

[106] *See* Scientific Advisory Group for Navy Marine Species Monitoring, Workshop report and recommendations (2011) (available at www.cascadiaresearch.org/Navy_MMM_Scientific_Advisory_group_report_May_2011.pdf) (report by experts convened by U.S. Navy, per NMFS regulation, to evaluate Navy's range monitoring program for marine mammals).

(13) Adaptive management.— In justifying its decision not to delay seismic exploration, BOEM claims to have taken an "adaptive management approach that would incorporate new technology and improved mitigation measures as they are developed and proven efficacious." DPEIS at 2-48. Yet nowhere in the DPEIS does the agency set forth the terms of an adaptive management program. Such a program, if it is not mere window-dressing, must include (1) a means of monitoring impacts on target species (see "Adequate long-term monitoring," above), (2) a means of encouraging and developing mitigation measures (see, e.g., "Failure to develop a viable technology-based alternative," above), and (3) a means of modifying the proposed action as new information and mitigation measures emerge. The DPEIS provides none of these elements. One can only draw, again, an invidious comparison with the Navy, whose activities throughout the U.S. EEZ include a long-term monitoring program and are subject to annual adaptive management review, on consultation with NMFS. *See*, *e.g.*, 74 Fed. Reg. 4844, 4854-4858, 4884-4885 (Jan. 27, 2009).[107] Nor does BOEM set forth a protocol for emergency review or suspension of activities, if serious unanticipated impacts, such as a mass stranding or a vessel collision with a right whale, are found to occur – a standard element of Navy sonar mitigation. *See*, *e.g.*, 50 C.F.R. 216.244(xxx).[108] Here as elsewhere, the agency must expand its analysis of alternatives and mitigation measures.

IV. IMPACTS ANALYSIS

A. Failure to Obtain Essential Information

It is undisputed that there are significant gaps in basic information about the mid- and south Atlantic regions, their wildlife, and the potential effects of noise and disturbance from oil and gas exploration.

NEPA regulations set out an "ordered process" for an agency preparing an EIS in the face of missing information. *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1244 (9th Cir. 1984). When there is incomplete information relevant to reasonably foreseeable significant adverse impacts that is essential to a reasoned choice among alternatives, an agency must obtain and include the missing information in the EIS if the overall costs of obtaining it are not exorbitant. 40 C.F.R. § 1502.22. If the costs are exorbitant or the means to obtain the information are unknown, agencies must provide in the EIS a number of responses including, a "summary of existing credible scientific evidence" and an evaluation of impacts "based upon theoretical approaches or research methods generally accepted in the scientific community." *Id*. at § 1502.22(b).

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[107] The agencies use MMPA as their vehicle in the Navy context, but of course a different adaptive management scheme could be established through the NEPA process.

[108] *See also*, *e.g.*, NMFS, Stranding response plan for major Navy training exercises in the AFAST Study Area (2009) (available at www.nmfs.noaa.gov/pr/permits/afast_stranding_protocol_final.pdf).

The regulation furthers NEPA's purpose of ensuring that agencies make "fully informed and well-considered decision[s]," its mandate of "widespread discussion and consideration of the environmental risks and remedies associated with [a] pending project", and its "require[ment] that this evaluation take place *before* a project is approved." *Vt. Yankee Nuclear Power Corp. v. Natural Resources Def. Council,* 435 U.S. 519, 558 (1978) ("fully informed and well-considered decision[s]"; *LaFlamme v. FERC*, 852 F.2d 389, 398 (9th Cir. 1988) (internal quotation marks omitted).

The DPEIS cites to the applicable Council of Environmental Quality ("CEQ") regulation and maintains that it identifies those areas where information is unavailable to support a thorough evaluation of the environmental consequences of the alternatives. *See* DPEIS at 4-6. In fact, however, the document evades the analysis that § 1502.22 requires. In the first place, it fails to identify certain obvious gaps in information – such as important habitat areas for marine mammals – essential to a reasoned choice among alternatives. Beyond this, its modus operandi is to acknowledge major information gaps on virtually every topic under analysis, then insist – without any specific findings about their significance for the agencies' decisionmaking – that BOEM agency has an adequate basis for proceeding. *See, e.g.,* PDEIS at 4-46 (masking in marine mammals), 4-47 to 4-49 (stress and behavioral impacts in marine mammals), 4-79 (behavioral impacts on sea turtles). This approach simply does not satisfy NEPA.

The DPEIS, and the DPEIS that NMFS and BOEM recently prepared for the Arctic, reveal in many instances that relevant studies are already underway, indicating that obtaining essential information is not cost prohibitive. For example, a study undertaken by BP, the North Slope Borough, and the University of California "will help better understand masking and the effects of masking on marine mammals[.]"[109] NOAA has convened working groups on Underwater Sound Field Mapping and Cetacean Density and Distribution Mapping throughout the U.S. territorial sea and exclusive economic zone, including virtually the entirety of the present study area, for purposes of improving cumulative impact analysis and mitigation measures.[110] BOEM has an Environmental Studies Program that includes several relevant studies (though few specific to the Atlantic) and, more importantly, should serve as a vehicle for targeted research. *See* DPEIS at Appendix G. As the Ninth Circuit recently found, agencies have an obligation pursuant to NEPA "to ensure that data exists *before approval*" so that decisionmakers can "understand the adverse environmental effect *ab initio*." *Northern Plains Resource Council v. Surface Transport. Bd*, --- F.3d ----, 2011 WL 6826409, *14 (9th Cir. Dec. 29, 2011) (emphasis in original). BOEM has not done so here.

B. Failure to Set Proper Thresholds for Marine Mammal Take

As a comment letter from Duke Marine Lab has noted, the DPEIS has vastly underestimated marine mammal take from the proposed activity. The reasons for this are manifold, but lie principally in the agency's mistaken adoption of a 160 dB threshold for Level B take and its

[109] NMFS, Effects of Oil and Gas Activities in the Arctic Ocean: Draft Environmental Impact Statement at 4-88 (Dec. 2011).
[110] *Id*. at ES-34.

failure to calculate impacts from masking. Nor has BOEM performed a sensitivity analysis to determine how significantly its take and impact estimates would differ if some of its core assumptions – such as its 160 dB threshold – are wrong.

1. Illegal threshold for behavioral take

The DPEIS uses a single sound pressure level (160 dB re 1 µPa (RMS)) as a threshold for behavioral, sublethal take in all marine mammal species from seismic airguns. This approach simply does not reflect the best available science, and the choice of threshold is not sufficiently conservative in several important respects. Indeed, five of the world's leading biologists and bioacousticians working in this field recently characterized the present threshold, in a comment letter to BOEM and NMFS, as "overly simplified, scientifically outdated, and artificially rigid."[111] *See* 40 C.F.R. § 1502.22. BOEM must use a more conservative threshold for the following reasons:

(a) The method represents a major step backward from recent programmatic authorizations. For Navy sonar activity, NMFS has used a combination of specific bright-line thresholds (for harbor porpoises) and linear risk functions that endeavor to take account of risk and individual variability and to reflect the potential for take at relatively low levels.[112] In the wake of these past authorizations for acoustic impacts on marine mammals, the agencies' reversion to a single, non-conservative, bright-line threshold for all species is simply not tenable.

(b) The 160 dB threshold is non-conservative, since the scientific literature establishes that behavioral disruption can occur at substantially lower received levels for some species.

For example, a single seismic survey has been shown to cause endangered fin and humpback whales to stop vocalizing – a behavior essential to breeding and foraging – over an area at least 100,000 square nautical miles in size, and can cause baleen whales to abandon habitat over the same scale.[113] (Similarly, a low-frequency, high-amplitude fish mapping device was recently found to silence humpback whales at distance of 200 km, where received levels ranged from 88 to 110 dB.)[114] Sperm whale foraging success, as measured by buzz rate, appears to decline significantly on exposure to airgun received levels above 130 dB (RMS), with potentially serious

[111] Clark, C., Mann, D., Miller, P., Nowacek, D., and Southall, B., Comments on Arctic Ocean Draft Environmental Impact Statement at 2 (Feb. 28, 2012).

[112] *E.g.*, 74 Fed. Reg. 4844, 4844-4885 (Jan. 27, 2009).

[113] Clark, C.W., and Gagnon, G.C., Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales (2006) (IWC Sci. Comm. Doc. IWC/SC/58/E9); Clark, C.W., pers. comm. with M. Jasny, NRDC (Apr. 2010); *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).

[114] 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).

long-term consequences.[115] Harbor porpoises are known to be acutely sensitive to a range of anthropogenic sources, including airguns. They have been observed to engage in avoidance responses fifty 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 at very low received levels, well below 120 decibels (re 1 µPa (RMS)).[116] Bowhead whales migrating through the Beaufort Sea have shown almost complete avoidance at airgun received levels at 120-130 dB (RMS) and below;[117] for this reason BOEM has stated in past Arctic lease sale EISs that most bowheads "would be expected to avoid an active source vessel at received levels as low as 116 to 135 dB re 1 µPa when migrating.[118]. Beluga whales are highly sensitive to a range of low-frequency and low-frequency dominant anthropogenic sounds, including seismic airgun noise, which has been shown to displace belugas from near-coastal foraging areas out beyond the 130 dB (RMS) isopleth.[119]

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[115] Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009).

[116] *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); Kastelein, R.A., Verboom, W.C., Jennings, N., and de Haan, D., Behavioral avoidance threshold level of a harbor porpoise (Phocoena phocoena) for a continuous 50 kHz pure tone, *Journal of the Acoustical Society of America* 123: 1858-1861 (2008); Kastelein, R.A., Verboom, W.C., Muijsers, M., Jennings, N.V., and van der Heul, S., The influence of acoustic emissions for underwater data transmission on the behavior of harbour porpoises (Phocoena phocoena) in a floating pen, *Mar. Enviro. Res.* 59: 287-307 (2005); Olesiuk, P.F., Nichol, L.M., Sowden, M.J., and Ford, J.K.B., Effect of the sound generated by an acoustic harassment device on the relative abundance and distribution of harbor porpoises (Phocoena phocoena) in Retreat Passage, British Columbia, *Mar. Mamm. Sci.* 18: 843-862 (2002).

[117] Miller, G.W., Elliot, R.E., Koski, W.R., Moulton, V.D., and Richardson W.J., Whales, *in* Richardson, W.J. (ed.), Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea, 1998 (1999); Richardson, W.J., Miller, G.W., and Greene Jr., C.R., Displacement of migrating bowhead whales by sounds from seismic surveys in shallow waters of the Beaufort Sea, *Journal of the Acoustical Society of America* 106:2281 (1999).

[118] *See, e.g.*, Beaufort Sea and Chukchi Sea Planning Areas Oil and Gas Lease Sales 209, 212, 217, and 221: Draft Environmental Impact Statement (2008) (OCS EIS/EA MMS 2008-0055); 71 Fed. Reg. 66,912, 66,913 (2006). although bowheads appear less aversive while feeding, the Arctic EIS rightly acknowledges that they may be "so highly motivated to remain in a productive feeding area" that they experience adverse effects and increased chronic stress. NMFS, Effects of Oil and Gas Activities in the Arctic Ocean, Draft Environmental Impact Statement at 4-99 (Dec. 2011).

[119] Miller, G.W., Moulton, V.D., Davis, R.A., Holst, M., Millman, P., MacGillivray, A., and Hannay. D., Monitoring seismic effects on marine mammals—southeastern Beaufort Sea, 2001-2002, *in* Armsworthy, S.L., et al. (eds.), Offshore oil and gas environmental effects monitoring/Approaches and technologies, at 511-542 (2005). *See also* Findley, K.J., Miller, G.W., Davis, R.A., and Greene, C.R., Jr., Reactions of belugas, Delphinapterus leucas, and narwhals, Monodon monoceros, to ice-breaking ships in the Canadian high Arctic, *Can. J. Fish. Aquat. Sci*. 224: 97-117 (1990); Cosens, S.E., and Dueck, L.P., Ice breaker noise in Lancaster Sound, NWT, Canada: implications for marine mammal behavior, *Mar. Mamm. Sci*. 9: 285-300 (1993); Fraker, M.A., The 1976 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1977); Fraker, M.A., The 1977 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1977); Fraker, M.A., The 1978 white whale monitoring program, MacKenzie estuary, report for Imperial Oil, Ltd., Calgary (1978); Stewart, B.S., Evans, W.E., and Awbrey, F.T., Effects of man-made water-borne noise on the behaviour of beluga whales, *Delphinapterus leucas*, in Bristol Bay, Alaska, Hubbs Sea World (1982) (report 82-145 to NOAA); Stewart, B.S., Awbrey, F.T., and Evans, W.E., Belukha whale (*Delphinapterus leucas*) responses to industrial noise in Nushagak

Beaked whales, though never tested experimentally for their response to airgun noise, have shown themselves to be sensitive to various types of anthropogenic sound, going silent, abandoning their foraging, and avoiding sounds at levels of 140 dB and potentially well below.[120] And these are merely examples, consistent with the broader literature. *See, e.g.*, DPEIS at 4-49.

Little if any of these data were available in 1999, when the High Energy Seismic Survey panel issued the report on which the 160 dB threshold is purportedly based;[121] since that time, the literature on ocean noise has expanded enormously due to massive increases in research funding from the U.S. Navy, the oil and gas industry, and other sources. The evidentiary record for a lower threshold in this case substantially exceeds the one for mid-frequency sonar in *Ocean Mammal Institute v. Gates*, 546 F. Supp.2d 960, 973-75 (D.Hawaii 2008), in which a Hawaiian District Court judge invalidated a NMFS threshold that ignored documented impacts at lower received levels as arbitrary and capricious.

(c) The use of a multi-pulse standard for behavior harassment is non-conservative, since it does not take into account the spreading of seismic pulses over time beyond a certain distance from the array.[122] NMFS' own Open Water Panel for the Arctic – which has included some of the country's leading marine bioacousticians – has twice characterized the seismic airgun array as a mixed impulsive/continuous noise source and has stated that NMFS should evaluate its impacts on that basis.[123] That analysis is supported by the masking effects model referenced above, in which several NMFS scientists have participated; by a number of papers showing that seismic exploration in the Arctic, the east Atlantic, off Greenland, and off Australia has raised ambient noise levels at significant distances from the array;[124] and, we expect, by the

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Bay, Alaska: 1983 (1983); Edds, P.L., and MacFarlane, J.A.F., Occurrence and general behavior of balaenopterid cetaceans summering in the St. Lawrence estuary, *Canada, Can. J. Zoo*. 65: 1363-1376 (1987).

[120] Soto, N.A., Johnson, M., Madsen, P.T., Tyack, P.L., Bocconcelli, A., and Borsani, J.F., Does intense ship noise disrupt foraging in deep-diving Cuvier's beaked whales (*Ziphius cavirostris*)? *Mar. Mamm. Sci.* 22: 690-699 (2006); Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D'Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L., Beaked whales respond to simulated and actual Navy sonar, *PLoS ONE* 6(3):e17009.doi:10.13371/journal.pone.0017009 (2011) (beaked whales); California State Lands Commission, Draft Environmental Impact Report (EIR) for the Central Coastal California Seismic Imaging Project at H-47 (2012) (CSLC EIR No. 758).

[121] High Energy Seismic Survey Team, High energy seismic survey review process and interim operational guidelines for marine surveys offshore Southern California (1999).

[122] *See* Expert Panel Review 2011.

[123] *Id.*; *see also* Expert Panel Review 2010.

[124] Gedamke, J., Ocean basin scale loss of whale communication space: potential impacts of a distant seismic survey, Biennial Conference on the Biology of Marine Mammals, November-December 2011, Tampa, FL (2011) (abstract); Nieukirk, S.L., Klinck, H., Klinck, K., Mellinger, D.K., and Dziak, R.P., Seismic airgun sounds and whale vocalization recorded in the Fram Strait and Greenland Sea, Biennial Conference on the Biology of Marine Mammals, November-December 2011, Tampa, FL (2011) (abstract); Nieukirk, S.L., Mellinger, D.K., Moore, S.E., Klinck, K., Dziak, R.P., Goslin, J., Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999-2009, *Journal of the Acoustical Society of America* 131:1102- 1112 (2012); Nieukirk, S.L., Stafford, K.M.,

modeling efforts of NOAA's Sound Mapping working group, whose public release is supposed to occur in early July. BOEM cannot ignore this science.

(d) The threshold's basis in the root mean square ("RMS") of sound pressure, rather than in peak pressure, is non-conservative. Studies have criticized the use of RMS for seismic because of the degree to which pulsed sounds must be "stretched," resulting in significant potential underestimates of marine mammal take (see below).[125]

NMFS must revise the thresholds and methodology used to estimate take from airgun use. Specifically, we urge the following:

(a) NMFS should employ a combination of specific thresholds for which sufficient species-specific data are available and generalized thresholds for all other species.[126] These thresholds should be expressed as linear risk functions where appropriate. If a single risk function is used for most species, the 50% take parameter for all the baleen whales and odontocetes occurring in the area should not exceed 140 dB (RMS), per the February 2012 recommendation from Dr. Clark and his colleagues. At least for sensitive species such as harbor porpoises and beaked whales, BOEM should use a threshold well below that number, reflecting the high levels of disturbance seen in these species at 120 dB (RMS) and below. Recent analysis by the California State Lands Commission provides another alternative, differentiating among low-frequency, mid-frequency, and high-frequency cetaceans in a manner that is generally consistent with Southall et al (2007).[127]

(b) Data on species for which specific thresholds are developed should be included in deriving generalized thresholds for species for which less data are available.

(c) In deriving its take thresholds, NMFS should treat airgun arrays as a mixed acoustic type, behaving as a multi-pulse source closer to the array and, in effect, as a continuous noise source further from the array, per the findings of the 2011 Open Water Panel cited above.

(d) Behavioral take thresholds for the impulsive component of airgun noise should be based on peak pressure rather than on RMS, or dual criteria based on both peak

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Mellinger, D.K., Dziak, R.P., and Fox, C.G., Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean, *Journal of the Acoustical Society of America* 115: 1832-1843 (2004); Roth, E.H., Hildebrand, J.A., Wiggins, S.M., and Ross, D., Underwater ambient noise on the Chukchi Sea continental slope, *Journal of the Acoustical Society of America* 131:104-110 (2012).

[125] Madsen, P.T., Marine mammals and noise: Problems with root-mean-squared sound pressure level for transients, *Journal of the Acoustical Society of America* 117:3952-57 (2005).

[126] By "thresholds," we mean either bright-line thresholds or linear risk functions.

[127] California State Lands Commission, Draft Environmental Impact Report at Chap. 4.4 and App. H, *supra*; *see also* Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran. J.J., Gentry, R.L., Greene, C.R., Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L., Marine mammal noise exposure criteria: Initial scientific recommendations, *Aquatic Mammals* 33:411-521 (2007).

pressure and RMS should be used. Alternatively, BOEM should use the most biologically conservative method of calculating RMS, following Madsen (2005). (See section IV.C. below for additional detail.)

2. Failure to analyze masking effects or set thresholds for masking

The DPEIS fails to consider masking effects, either from continuous noise sources such as ships or from mixed impulsive/continuous noise sources such as airguns. Some biologists have analogized the increasing levels of noise from human activities to a rising tide of "smog" that is already shrinking the sensory range of marine animals by orders of magnitude from pre-industrial levels. DPEIS at 3-43 (citing Clark et al. 2007).[128] Masking of natural sounds begins when received levels rise above ambient noise at relevant frequencies.[129] Accordingly, BOEM must evaluate the loss of communication space – and consider the extent of acoustic propagation – at far lower received levels than the DPEIS currently employs.

Researchers at NOAA and Cornell have created a model that quantifies impacts on the communication space of marine mammals. That published model has already been applied to shipping noise off Massachusetts and off British Columbia, and the same researchers involved in the Massachusetts study have applied it to airgun surveys as well.[130] Additionally, researchers at BP, working with colleagues at the University of California and the North Slope Borough, are applying the model to an analysis of masking effects from seismic operations in the Beaufort Sea.[131] Remarkably, the DPEIS – instead of applying the Cornell/NOAA model – simply states without any discernible support that masking effects on marine mammals would be "minor,"

[128] *See also* Bode, M., Clark, C.W., Cooke, J., Crowder, L.B., Deak, T., Green, J.E., Greig, L., Hildebrand, J., Kappel, C., Kroeker, K.J., Loseto, L.L., Mangel, M., Ramasco, J.J., Reeves, R.R., Suydam, R., Weilgart, L., Statement to President Barack Obama of Participants of the Workshop on Assessing the Cumulative Impacts of Underwater Noise with Other Anthropogenic Stressors on Marine Mammals (2009); Clark, C., and Southall, B., Turn down the volume in the ocean, *CNN.com*, Jan. 20, 2012, *available at* www.cnn.com/2012/01/19/opinion/clark-southall-marine/index.html; McDonald, M.A., Hildebrand, J.A., and Wiggins, S.M., Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California, *Journal of the Acoustical Society of America* 120: 711-718 (2006).

[129] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009). *See also* Castellote, M., Clark, C.W., and Lammers, M.O., Potential negative effects in the reproduction and survival on fin whales (*Balaenoptera physalus*) by shipping and airgun noise (2010) (IWC Scientific Committee Doc. No. SC/62/E3).

[130] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009); Williams, R., Ashe, E., Clark, C.W., Hammond, P.S., Lusseau, D., and Ponirakis, D., Inextricably linked: boats, noise, Chinook salmon and killer whale recovery in the northeast Pacific, presentation given at the Society for Marine Mammalogy Biennial Conference, Tampa, Florida, Nov. 29, 2011 (2011).

[131] Fleishman, E., and Streever, B., Assessment of cumulative effects of anthropogenic underwater sound: project summary and status, at 2 (2012).

meaning neither extensive nor severe. DPEIS at 4-44. Furthermore, it asserts that its mitigation protocol would "reduce the potential for masking" by excluding some marine mammals from the narrow safety zone that BOEM would establish around the seismic array (DPEIS at 4-47) – a statement that evinces a fundamental misunderstanding of how airgun noise propagates.

Assessing masking effects is essential to a reasoned consideration of impacts and alternatives, and BOEM's failure even to apply a relevant, published model that NOAA's scientists helped develop and that is being used by NOAA, Cornell, BP, the North Slope Borough, the University of California, and St. Andrews University in other regions plainly violates NEPA.

3. Failure to set proper thresholds for hearing loss

The DPEIS appears to estimate cases of temporary threshold shift, or hearing loss, in two ways: by using the original NMFS threshold of 180 dB (SPL), and by applying the hybridized standards set forth in Southall et al. (2007) for different marine mammal functional hearing groups.[132] Unfortunately, BOEM's particular use of Southall et al. (2007) neglects the modifications that have since been made to these standards, by Dr. Southall and the U.S. Navy, in light of new scientific information.

First, BOEM must modify its standard for high-frequency cetaceans to account for new threshold shift data on harbor porpoises. The new data show that harbor porpoises experience threshold shift on exposure to airgun signals at substantially lower levels than the two mid-frequency cetaceans (bottlenose dolphins and beluga whales) on which the Southall et al. acoustic criteria were based.[133] Given similarities between the harbor porpoise ear and that of other high-frequency cetaceans, both the U.S. Navy – in its recent DEISs for the Atlantic Fleet and the Southern California and Hawaii Range Complexes, and in a related technical report prepared by SPAWAR – and Dr. Southall and colleagues from St. Andrew's University, in their Environmental Impact Report for a seismic survey off the central California coast, have significantly reduced the temporary and permanent threshold shift criteria for all high-frequency cetaceans.[134] BOEM must do the same.

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[132] Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran. J.J., Gentry, R.L., Greene, C.R., Jr., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., and Tyack, P.L., Marine mammal noise exposure criteria: Initial scientific recommendations, *Aquatic Mammals* 33:411-521 (2007).

[133] Lucke, K., Siebert, U., Lepper, P.A., and Blanchet, M.-A., 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 (2009).

[134] Finneran, J.J., and Jenkins, A.K., Criteria and thresholds for U.S. Navy acoustic and explosive effects analysis (Apr. 2012) (available at the aftteis.com website); Navy, Draft Environmental Impact Statement/ Overseas Environmental Impact Statement for Atlantic Fleet Training and Testing (2012); Navy, Hawaii-Southern California Training and Testing Activities Draft Environmental Impact Statement/ Overseas Environmental Impact Statement (2012); California State Lands Commission, Draft Environmental Impact Report (EIR) for the Central Coastal California Seismic Imaging Project at Chap. 4.4 and App. H (2012) (CSLC EIR No. 758) (includes report from Dr. Southall and colleagues at St. Andrews University).

Second, and similarly, BOEM must modify its Southall et al. standard for low-frequency cetaceans: the baleen whales. New data from SPAWAR indicates that mid-frequency cetaceans have greater sensitivity to sounds within their best hearing range than was supposed at the time Southall et al. was published.[135] It is both conservative and consistent with the methodology of that earlier paper to assume that low-frequency cetaceans, which have never been studied for threshold shift, also have greater sensitivity to sounds within their own best hearing range.[136] For this reason and others, Dr. Southall and his St. Andrew's colleagues reduced the threshold shift criteria for baleen whales exposed to airgun noise, in the report they recently produced for the California State Lands Commission.[137] Again, BOEM should do the same.

Hearing loss remains a very significant risk where, as here, the agency has not required aerial or passive acoustic monitoring as standard mitigation, appears unwilling to restrict operations in low-visibility conditions, has set safety zone bounds that are inadequate to protect high-frequency cetaceans, and has not firmly established seasonal exclusion areas for biologically important habitat. BOEM should take a conservative approach and apply the more precautionary standard, once the necessary modifications to Southall et al. (2007) have been made.

4. Failure to set proper thresholds for mid-frequency sources

BOEM has also failed to set appropriate take thresholds for sub-bottom profilers and other active acoustic sources.

As NMFS's Open Water Panel has indicated, some sub-bottom profilers used in Arctic oil and gas surveys have source levels and frequency ranges approaching that of certain active military sonar systems, with shorter intervals between pings.[138] Indeed, the chirp systems analyzed in the DPEIS (DPEIS at D-28) have threshold source levels close to that of the Navy's SQS-56 mid-frequency, hull-mounted sonar.[139] Additionally, these levels vastly exceed those analyzed for similar chirp systems used in HRG surveys for renewables, according to BOEM's recent programmatic EA for mid-Atlantic offshore wind.[140] BOEM's use of a 160 dB threshold under these circumstances is inappropriate. While we do not recommend the application of the Navy's generalized risk functions for mid-frequency sonar, enough data are available for some taxa to indicate species-specific thresholds. For purposes of authorizing mid-frequency sonar training, NMFS assumes that harbor porpoises are taken at received levels above 120 dB (RMS); and the Navy has adopted a 140 dB (RMS) threshold for beaked whales based on the findings of Tyack

[135] Finneran and Jenkins, Criteria and thresholds, *supra*.

[136] *See* discussion in California State Lands Commission, Draft Environmental Impact Report at H-46, *supra*.

[137] *Id*. at 4.4-49 to 4-50 and H-46; *see also* PDEIS at 4-51 (noting need to reassess TTS in light of SPAWAR data).

[138] *See* Expert Panel Review 2011.

[139] *See, e.g.*, 74 Fed. Reg. 4,844 (Jan. 27, 2009); U.S. Navy, Final Atlantic Fleet Active Sonar Training Environmental Impact Statement/ Overseas Environmental Impact Statement (2008).

[140] *Cf.* BOEM, Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia: Final Environmental Assessment at 28 (2012) (OCS EIS/EA BOEM 2012-003). The chirpers analyzed for wind farm HRG surveys have a source level of 201 dB.

et al. (2011).[141] At minimum, BOEM should adopt these specific thresholds for the mid-frequency acoustic sources considered in the DPEIS.

Furthermore, while the DPEIS does not provide ping intervals for sub-bottom profilers, the EA suggests that these sources may sound several times each second. It would be absurd to treat them as non-continuous sources.

C. Failure to Set Adequate Source Levels for Propagation Analysis

The DPEIS posits 230 dB (RMS) as a representative source level for purposes of modeling takes from large airgun arrays and 210 dB (RMS) for modeling takes from small arrays. DPEIS at 3-26. We see two significant issues with these assumptions.

First, as with behavioral risk thresholds, using the root mean square ("RMS") rather than peak pressure to estimate source levels for airguns is non-conservative and may not be biologically appropriate. The issue is not trivial: as Madsen 2005 observes, the RMS approach can result in underestimates of take of intense, impulsive sounds, depending on which method is used to calculate RMS and whether propagation takes place in a highly reverberant environment.[142] We recommend that BOEM use peak-pressure, or dual criteria of peak-pressure and RMS, to determine behavioral take for the impulsive component of the airgun source. Alternatively – and at the very least – BOEM should use the most biologically conservative method of determining RMS. According to Madsen's analysis, that method is likely to be the one followed by Madsen

[141] *Id.*; Tyack, P.L., Zimmer, W.M.X., Moretti, D., Southall, B.L., Claridge, D.E., Durban, J.W., Clark, C.W., D'Amico, A., DiMarzio, N., Jarvis, S., McCarthy, E., Morrissey, R., Ward, J., and Boyd, I.L., Beaked whales respond to simulated and actual Navy sonar, *PLoS ONE* 6(3):e17009.doi:10.13371/journal.pone.0017009 (2011) (beaked whales). *See also* Miller, P.J., Kvadsheim, P., Lam., F.-P.A., Tyack, P.L., Kuningas, S., Wensveen, P.J., Antunes, R.N., Alves, A.C., Kleivane, L., Ainslie, M.A., and Thomas, L., Developing dose-response relationships for the onset of avoidance of sonar by free-ranging killer whales (*Orcinus orca*), presentation given at the Society for Marine Mammalogy Biennial Conference, Tampa, Florida, Dec. 2, 2011 (killer whales); Miller, P., Antunes, R., Alves, A.C., Wensveen, P., Kvadsheim, P., Kleivane, L., Nordlund, N., Lam, F.-P., van IJsselmuide, S., Visser, F., and Tyack, P., The 3S experiments: studying the behavioural effects of navy sonar on killer whales (*Orcinus orca*), sperm whales (*Physeter macrocephalus*), and long-finned pilot whales (*Globicephala melas*) in Norwegian waters, Scottish Oceans Institute Tech. Rep. SOI-2011-001, *available at* soi.st-andrews.ac.uk (killer whales). *See also, e.g.*, Fernández, A., Edwards, J.F., Rodríguez, F., Espinosa de los Monteros, A., Herráez, P., Castro, P., Jaber, J.R., Martín, V., and Arbelo, M., 'Gas and Fat Embolic Syndrome' Involving a Mass Stranding of Beaked Whales (Family Ziphiidae) Exposed to Anthropogenic Sonar Signals, *Veterinary Pathology* 42:446 (2005); Jepson, P.D., Arbelo, M., Deaville, R., Patterson, I.A.P., Castro, P., Baker, J.R., Degollada, E., Ross, H.M., Herráez, P., Pocknell, A.M., Rodríguez, F., Howie, F.E., Espinosa, A., Reid, R.J., Jaber, J.R., Martín, V., Cunningham, A.A., and Fernández, A., Gas-Bubble Lesions in Stranded Cetaceans, 425 *Nature* 575-576 (2003); Evans, P.G.H., and Miller, L.A., eds., Proceedings of the Workshop on Active Sonar and Cetaceans (2004) (European Cetacean Society publication); Southall, B.L., Braun, R., Gulland, F.M.D., Heard, A.D., Baird, R.W., Wilkin, S.M., and Rowles, T.K., Hawaiian Melon-Headed Whale (*Peponacephala electra*) Mass Stranding Event of July 3-4, 2004 (2006) (NOAA Tech. Memo. NMFS-OPR-31).

[142] Madsen, P.T., Marine mammals and noise: Problems with root-mean-squared sound pressure level for transients, *Journal of the Acoustical Society of America* 117:3952-57 (2005).

et al. (2002) and Møhl et al. (2003), which involves applying -3 dB end points relative to the wave form envelope.[143]

Second, it is not self-evident that using a single representative or average source level for large or small arrays is a reasonable and sufficiently conservative approach to BOEM's take analysis. As the DPEIS recognizes, the effective source levels of industry arrays may run considerably higher or lower than the one used in its modeling, up to or beyond 255 dB (zero-to-peak) for a large array (DPEIS at D-12). Given that impact areas grow exponentially with increases in source levels, the undercount that would result from excluding surveys with higher source levels could significantly exceed the overcount that would result from excluding surveys with lower source levels. For this reason, BOEM should conduct a sensitivity analysis to ensure that any representative source level, or levels, chosen for modeling do not negatively bias the analysis towards an undercount of take. If there is negative bias, the agency should modify the source level, or levels, and either rerun the model or use a conservative corrective factor to estimate take.

D. Failure to Adequately Assess Impacts on the North Atlantic Right Whale

In its consideration of potential environmental impacts, the DPEIS rightly pays special attention to the highly endangered North Atlantic right whale (*Eubalaena glacialis*), which is considered to be one of the most endangered species of large whales in the world. Indeed, as the National Marine Fisheries Service ("NMFS") has repeatedly stated, "the loss of even a single individual [North Atlantic right whale] may contribute to the extinction of the species" and "preventing the mortality of one adult female a year" may alter this outcome. 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. 60,173, 60,173 (Oct. 10, 2008); 72 Fed. Reg. 34,632, 34,632 (June 25, 2007); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001).

The affected planning areas contain both the majority of the right whale's migratory corridor and the species' only known calving ground. NMFS has characterized the latter as "a location vital to the population" and "a very high-risk area for pregnant females, new mothers, and calves."[144] Waters from the Altamaha River in Georgia (north of Brunswick) to San Sebastian Inlet in Florida (south of Melbourne) are federally-designated as critical habitat, specifically to protect it. *See* 59 Fed. Reg. 28,793, 28,803 (June 3, 1994). In addition, these and other waters in the southeast have been designated as special management areas to protect right whales from significant threats, such as ship-strikes and gillnet fishing. *See*, *e.g.*, 73 Fed. Reg. 60,173; 72 Fed. Reg. 34,632. In September 2009, several major conservation organizations petitioned NMFS to expand right whale critical habitat, to include the migratory corridor within 30 nautical miles of shore (from the southern border of Massachusetts to the border between North and

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[143] *Id. See also* Madsen, P.T., Møhl, B., Nielsen, B.K., and Wahlberg, M., "Male sperm whale behavior during exposures to distant seismic survey pulses," *Aquatic Mammals* 28:231–240 (2002); Møhl, B., Wahlberg, M., Madsen, P.T., Heerfordt, A., and Lund, A., "The monopulsed nature of sperm whale clicks," *Journal of the Acoustical Society of America* 114:1143–1154 (2003).

[144] NMFS, Final Environmental Impact Statement to Implement Vessel Operational Measures to Reduce Ship Strikes to North Atlantic Right Whales at 4-4 (Aug. 2008).

South Carolina) as well as additional calving areas adjacent to existing critical habitat, based on substantial new information about their biological importance.[145]

As discussed above, a single seismic source can significantly reduce right whale communication range on a population scale. Recent modeling from Cornell and NOAA shows the right whale to be particularly vulnerable to masking effects from airguns and other low-frequency noise given the acoustic and behavioral characteristics of its calls.[146] Seismic surveys in the Mid-Atlantic and South Atlantic planning areas would add cumulatively to the high levels of noise that right whales already experience from commercial shipping in their foraging grounds and along their migratory route, from LNG tanker traffic through their northeast critical habitat, and from Navy antisubmarine warfare training, which is expected to increase near their calving grounds with the construction of a new instrumented training range off Jacksonville, Florida. The advent of airgun noise on top of these other acoustic intrusions could significantly affect right whale vital rates over large scales. For example, modeling of right whale foraging in the Great South Channel, an area subject to high levels of ship traffic, has found that decrements in the whales' sensory range had a larger impact on food intake than even patch-density distribution, and are likely to compromise fitness in this endangered species.[147]

In addition to the threat of noise impacts to right whales, G&G surveying also poses the risk of increasing ship strikes, the leading cause of death for right whales. More than half (10 out of 14) of the post-mortem findings for right whales that died from significant trauma in the northwest Atlantic between 1970 and 2002 indicated that vessel collisions were a contributing cause of death (in the cases where presumed cause of death could be determined);[148] and these data are likely to grossly underestimate the actual number of animals struck, as animals struck but not recovered, or not thoroughly examined, cannot be accounted for.[149] Further, some types of anthropogenic noise have been shown to induce near-surfacing behavior in right whales, increasing the risk of ship-strike at relatively moderate levels of exposure, as noted in the next section below. It is possible that mid-frequency sub-bottom profilers and broadband airguns could produce the same effects, and both should be treated conservatively.

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[145] Center for Biological Diversity, Defenders of Wildlife, Humane Society of the United States, Ocean Conservancy, and Whale and Dolphin Conservation Society, Petition to Revise the Critical Habitat Designation for the North Atlantic Right Whale (*Eubalaena Glacialis*) under the Endangered Species Act (Sept. 16, 2009) (submitted to Commerce and NOAA Fisheries).

[146] Clark et al., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources; Clark et al., Acoustic masking in marine ecosystems: intuitions, analysis, and implication.

[147] Mayo, C.S., Page, M., Osterberg, D., and Pershing, A., On the path to starvation: The effects of anthropogenic noise on right whale foraging success, North Atlantic Right Whale Consortium: Abstracts of the Annual Meeting (2008).

[148] Moore, M. J., Knowlton, A.R., Kraus, S.D., McLellan, W.A., and Bonde, R.K., Morphometry, gross morphology and available histopathology in North Atlantic right whale (*Eubalena glacialis*) mortalities (1970-2002), *Journal of Cetacean Research and Management* 6:199-214 (2004).

[149] Reeves, R.R., Read, A., Lowry, L., Katona, S.K., and Boness, D.J., Report of the North Atlantic right whale program review, 13–17 March 2006, Woods Hole, Massachusetts (2007) (prepared for the Marine Mammal Commission).

While the DPEIS proposes two time-areas closures to reduce impacts on right whales, these measures are inadequate to address the impacts described here, for reasons discussed earlier in these comments Nor does the DPEIS provide any quantitative or even detailed qualitative analysis of masking effects or other cumulative, sub-lethal impacts on right whales. BOEM has again violated NEPA.

E. Failure to Consider Potential for Death and Serious Injury of Marine Mammals

While the DPEIS acknowledges the potential for injury, and indeed allows that some marine mammals will undergo permanent threshold shift as a result of the activity, it improperly dismisses the risk of mortality and serious injury from acoustic impacts.

First, the DPEIS fails entirely to consider the adverse synergistic effect that at least some types of anthropogenic noise can have on ship-strike risk. Mid-frequency sounds with frequencies in the range of some sub-bottom profilers have been shown to cause North Atlantic right whales to break off their foraging dives and lie just below the surface, increasing the risk of vessel strike.[150]

Second, as noted above (and contrary to representations in the DPEIS), a number of recent studies indicate that anthropogenic sound can induce permanent threshold shift at lower levels than anticipated.[151] Hearing loss remains a significant risk where, as here, the agency has not required aerial or passive acoustic monitoring as standard mitigation, appears unwilling to restrict operations in low-visibility conditions, and has not established seasonal exclusion areas for biologically important habitat other than designated critical habitat for right whales.

Third, the DPEIS wrongly discounts the potential for marine mammal strandings, even though at least one stranding event, the September 2002 stranding of beaked whales in the Gulf of California, is tightly correlated with geophysical survey activity; and even though high-intensity sounds in general have long been used by drive fisheries to force marine mammals ashore.[152]

Fourth, and finally, as noted above, the DPEIS makes no attempt to assess the long-term effects of chronic noise and noise-related stress on life expectancy, survival, and recruitment although proxies are available from the literature on terrestrial mammals and other sources. The need for

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[150] Nowacek, D.P., Johnson, M.P., and Tyack, P.L., North Atlantic right whales (*Eubalaena glacialis*) ignore ships but respond to alerting stimuli, *Proceedings of the Royal Society of London, Part B: Biological Sciences* 271:227 (2004).

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

[152] Brownell, R.L., Jr., Nowacek, D.P., and Ralls, K., Hunting cetaceans with sound: a worldwide review, *Journal of Cetacean Research and Management* 10: 81-88 (2008); Hildebrand, J.A., Impacts of anthropogenic sound, *in* Reynolds, J.E. III, Perrin, W.F., Reeves, R.R., Montgomery, S., and Ragen, T.J., eds., *Marine Mammal Research: Conservation beyond Crisis* (2006).

precautionary analysis in this regard is manifest, given BOEM's failure to commit to any substantial long-term monitoring program in the DPEIS – and the probability that even with an effective monitoring program, catastrophic declines in some Atlantic populations would remain likely to go unobserved.[153]

The DPEIS must be revised conservatively to account for potential mortality of marine mammals in the short- and long-term.

F. Failure to Adequately Assess Cumulative Impacts of the Activity

Here as elsewhere, the DPEIS analysis is anemic. The document makes no attempt to analyze the cumulative and synergistic effects of masking, energetic costs, stress, hearing loss, or any of the other impact mechanisms identified over the last several years,[154] whether for its own action alternatives or for the combined set of activities it identifies in its "cumulative impact scenario." Instead, for each of six sources of impacts, it strings a few unsupported and indeed baseless assumptions together – *e.g.*, that mitigation measures largely dependent on visual detection will eliminate "most" Level A takes, that "no significant noise impacts" would occur, that there is "no evidence of ambient noise levels approaching a threshold" where marine mammals might be significantly affected – and concludes that cumulative impacts would be "negligible" to "minor." *E.g.*, DPEIS at 4-62 to 4-65. This bare-bones approach disregards available information and analytical methodologies that are clearly relevant to an analysis of reasonably foreseeable impacts. 40 C.F.R. § 1502.22.

(1) Qualitative or detailed qualitative assessment.— Over the last several years, the scientific community has identified a number of pathways by which anthropogenic noise can affect vital rates and populations of animals. These conceptual models include the 2005 National Research Council study, which produced a model for the Population Consequences of Acoustic Disturbance; an ongoing Office of Naval Research program whose first phase has advanced the NRC model; and the 2009 Okeanos workshop on cumulative impacts.[155] The DPEIS employs none of these methods, and even in its qualitative analysis does not attempt to analyze any pathway of impact.

(2) Models of masking effects.— As noted above, bioacousticians at NOAA and Cornell have developed a quantitative model to assess loss of communication

[153] Taylor, B.L., Martinez, M., Gerrodette, T., Barlow, J., and Hrovat, Y.N., Lessons from monitoring trends in abundance of marine mammals, *Marine Mammal Science* 23:157-175 (2007).

[154] National Research Council, Marine Mammal Populations and Ocean Noise: Determining When Noise Causes Biologically Significant Effects (2005); Wright, A.J. ed., Report on the workshop on assessing the cumulative impacts of underwater noise with other anthropogenic stressors on marine mammals: from ideas to action, proceedings of workshop held by Okeanos Foundation, Monterey, California, August 26-29, 2009 (2009).

[155] *Id.*.

space over time from both commercial shipping and seismic exploration.[156] Incredibly, the DPEIS does not model for masking effects.

(3) Energetics.— Researchers have studied the impacts of various types of noise on the foraging success of killer whales and sperm whales. Both species were shown to experience significant decrements in foraging, of 18-19% and greater, within areas of obvious biological importance.[157] The DPEIS fails to consider the impacts of noise on foraging and energetics; indeed, despite its own recognition that animals who remain on their feeding grounds may suffer adverse impacts over time, it repeatedly characterizes "observed" impacts as minor and short-term. *E.g.*, DPEIS at 4-55. Based on the published evidence, for example, the DPEIS should conservatively assume that animals that are not evidently displaced from their feeding grounds nonetheless experience a significant decrement in foraging, of at least 20%, at received levels of 140 dB and greater.

(4) Chronic noise.— NOAA's Underwater Sound-Field Working Group has generated cumulative noise maps on ambient noise from ships around the world and on seismic surveys in the Gulf of Mexico, and noise maps covering individual seismic seismic surveys, military training exercises, and piledriving activity.[158] The draft EIS has not incorporated any of this quantitative information into its cumulative impact analysis.

(5) Stress.— Following from studies on terrestrial mammals, stress from ocean noise—alone or in combination with other stressors—may weaken a cetacean's immune system, interfere with brain development, increase the risk of myocardial infarctions, depress reproductive rates, cause malformations and other defects in young, all at moderate levels of exposure.[159] Because physiological stress response is highly

[156] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., Van Parijs, S.M., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems: intuitions, analysis, and implication, *Marine Ecology Progress Series* 395: 201-222 (2009).

[157] Lusseau, D., Bain, D.E., Williams, R., and Smith, J.C., Vessel traffic disrupts the foraging behavior of southern resident killer whales *Orcinus orca*, *Endangered Species Research* 6: 211-221 (2009); Williams, R., Lusseau, D. and Hammond, P.S., Estimating relative energetic costs of human disturbance to killer whales (Orcinus orca), *Biological Conservation* 133: 301-311 (2006); Miller, P.J.O., Johnson, M.P., Madsen, P.T., Biassoni, N., Quero, M., and Tyack, P.L., Using at-sea experiments to study the effects of airguns on the foraging behavior of sperm whales in the Gulf of Mexico, *Deep-Sea Research I* 56: 1168-1181 (2009). *See also* Mayo, C.S., Page, M., Osterberg, D., and Pershing, A., On the path to starvation: the effects of anthropogenic noise on right whale foraging success, North Atlantic Right Whale Consortium: Abstracts of the Annual Meeting (2008) (finding that decrements in North Atlantic right whale sensory range due to shipping noise have a larger impact on food intake than patch-density distribution and are likely to compromise fitness).

[158] NOAA, Cetecean and Sound Mapping, *available at* www.st.nmfs.noaa.gov/cetsound (previewed at May NOAA symposium).

[159] *See*, *e.g.*, Chang, E.F., and Merzenich, M.M., Environmental Noise Retards Auditory Cortical Development, 300 *Science* 498 (2003) (rats); Willich, S.N., Wegscheider, K., Stallmann, M., and Keil, T., Noise Burden and the Risk of Myocardial Infarction, *European Heart Journal* (2005) (Nov. 24, 2005) (humans); Harrington, F.H., and Veitch,

conserved across species, it is reasonable to assume that marine mammals would be subject to the same effects, particularly if, as here, they are exposed repeatedly to noise from oil and gas exploration and other stressors.[160] Indeed, a recent New England Aquarium study of North Atlantic right whales, the closest relative of the bowhead whale, indicates that shipping noise alone can induce chronic stress in marine mammals.[161] The DPEIS, while acknowledging the potential for chronic stress to significantly affect marine mammal health, and while expecting that anthropogenic noise would induce physiological stress responses in marine mammals, does not incorporate chronic stress into its cumulative impact analysis, such as by using other species as proxies for lower life expectancies.

(6) Impacts from other sources.— While it lists numerous other reasonably foreseeable activities that stand to impact the same animal populations (DPEIS at 3-36 to 3-43), the DPEIS makes no attempt to incorporate their effects into its cumulative analysis. Perhaps most prominently, though it notes that naval activities will take increasing numbers of marine mammals in the region, BOEM nowhere accounts for the many millions of takes, including thousands of mortalities and serious injuries and hundreds of thousands of cases of threshold shift, that the Navy presently estimates will occur between January 2014 and January 2019 as a result of its Atlantic training and testing activities.[162] The lack of analysis is not supportable under NEPA.

The data already show that industrial noise can disrupt biologically significant behavior and shrink whale communication range on a region-wide scale. As Dr. Chris Clark (Cornell) postulated in a report of the International Whaling Commission's Scientific Committee, such repeated and persistent acoustic insults over the large areas affected by airgun surveys alone should be considered enough to cause population-level impacts in at least some species of marine mammals.[163] That analysis has since been underscored by additional quantitative analysis.[164]

A.M., Calving Success of Woodland Caribou Exposed to Low-Level Jet Fighter Overflights, *Arctic* 45:213 (1992) (caribou).

[160] A special issue of the International Journal of Comparative Psychology (20:2-3) is devoted to the problem of noise-related stress response in marine mammals. For an overview published as part of that volume, *see, e.g.,* A.J. Wright, N. Aguilar Soto, A.L. Baldwin, M. Bateson, C.M. Beale, C.Clark, T. Deak, E.F. Edwards, A. Fernández, A. Godinho, L. Hatch, A. Kakuschke, D. Lusseau, D. Martineau, L.M. Romero, L. Weilgart, B. Wintle, G. Notarbartolo di Sciara, and V. Martin, Do marine mammals experience stress related to anthropogenic noise? (2007).

[161] Rolland, R.M., Parks, S.E., Hunt, K.E., Castellote, M., Corkeron, P.J., Nowacek, D.P., Wasser, S.K., and Kraus, S.D., Evidence that ship noise increases stress in right whales, *Proceedings of the Royal Society B: Biological Sciences* doi:10.1098/rspb.2011.2429 (2012).

[162] Navy, Draft Environmental Impact Statement/ Overseas Environmental Impact Statement for Atlantic Fleet Training and Testing (2012).

[163] IWC Scientific Committee, Report of the 2004 Scientific Committee of the International Whaling Commission, Annex K: Report of the Standing Working Group on Environmental Concerns (2004).

[164] Clark, C.W., Ellison, W.T., Southall, B.L., Hatch, L., van Parijs, S., Frankel, A., and Ponirakis, D., Acoustic masking in marine ecosystems as a function of anthropogenic sound sources (2009) (IWC Sci. Comm. Doc. SC/61/E10); Clark, C., and Rice, A., Seismic airgun surveys and marine vertebrates (2012) (presentation given June 12, 2012 to the Mid-Atlantic Fishery Management Council); NOAA, Cetecean and Sound Mapping, *available at*

The DPEIS' summary conclusions to the contrary are made without support, and without even attempting to address data gaps through methods accepted within the scientific community.[165]

G. Failure to Adequately Define Impact Levels

For each resource, the DPEIS provides specific impact criteria, which are then used to determine whether the overall effect on the resource qualifies as "negligible," "minor," "moderate," or "major." DPEIS at 4-44, 4-50. Unfortunately, as the ultimate measure of potential effects, these descriptors, as stated and as applied, are problematic in the extreme. They do not incorporate all of the factors relevant to NEPA "significance" analysis; and insofar as they reflect standards embodied in other statutes, such as the Marine Mammal Protection Act and Endangered Species /Act, they are fundamentally misapplied.

(1) As BOEM states at the outset, the DPEIS is intended to provide the information necessary for agency compliance with the Marine Mammal Protection Act, Endangered Species Act, and other statutes, as well as the Outer Continental Shelf Lands Act and NEPA. DPEIS at vii. This approach comports with applicable caselaw. Courts have observed that, when an action is taken pursuant to a specific statute, not only do "the statutory objectives of the project serve as a guide by which to determine the reasonableness of objectives outlined in an EIS," but "the statutory objectives underlying the agency's action work significantly to define its analytic obligations." *Oregon Natural Desert Ass'n v. BLM*, 625 F3d 1092, 1109 (9th Cir. 2010). Indeed, agencies are required by NEPA to explain how alternatives in an EIS will meet requirements of "other environmental laws and policies." 40 C.F.R. § 1502.2(d). But that does not remove the obligation to evaluate significance according to the factors articulated in CEQ's regulations: e.g., "(3) "Unique characteristics of the geographic area," including "ecologically critical areas"; (4) the degree to which impacts "are likely to be highly controversial"; and (5) the degree to which potential impacts "are highly uncertain or involve unique or unknown risks. 40 C.F.R. § 1508.27. Although a defined threshold is particularly needed when an agency prepares an EA, it has consequences here given the programmatic nature of the analysis. BOEM and NMFS may later incorporate portions of the EIS by reference, and under such circumstances, it will be critical to understand the import of the analysis within the context of an established threshold. For that, incorporating the NEPA significance factors is essential.

(2) As noted above, NEPA regulations require agencies to explain how alternatives meet the requirements of other applicable statutes. 40 C.F.R. § 1502.2(d). And yet BOEM, while referencing elements of the MMPA's "negligible impact" standard, does not appear to apply the relevant OCSLA standard, "undue harm," anywhere in the DPEIS. *See* 43

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www.st.nmfs.noaa.gov/cetsound (previewed at May NOAA symposium, showing vast increase in equivalent noise level (L_{EQ}) of ambient noise from seismic in Gulf of Mexico, averaged over one year).

[165] 40 C.F.R. § 1502.22. *See also* Bejder, L., Samuels, A., Whitehead, H., Finn, H., and Allen, S., Impact assessment research: use and misuse of habituation, sensitization and tolerance in describing wildlife responses to anthropogenic stimuli, *Marine Ecology Progress Series* 395:177-185 (2009).

U.S.C. § 1340(a). The omission is puzzling given the DPEIS' ostensible aim of supporting permitting decisions made under OCSLA. DPEIS at vii. BOEM should consider "undue harm" into its analysis.

(3) The DPEIS, having incorporated the MMPA's "negligible impact" standard into its significance criteria, fails completely to apply it. In practice, the document does not provide, for example, the necessary information for determining whether any of the proposed alternatives will have a greater than negligible impact on any marine mammal stock. 16 U.S.C. § 1371(a)(5)(D)(i)(I). Instead, the DEIS offers qualitative conclusions, made without any apparent support or indeed any apparent attempt at assessing the cumulative impacts of the activity. For example, Level B takes are considered to result in only "moderate" impacts, even though the surveys "would affect a large number of individuals," since "it is presumed that exposure to elevated sound would be somewhat localized and temporary in duration." DPEIS at 4-55. Not only does this analysis make assumptions about behavioral response and take thresholds that are inconsistent with the available literature, it makes no attempt to translate short-term behavioral impacts into long-term impacts on populations – a failure that violates NEPA. 40 C.F.R. § 1508.7. The 2006 programmatic environmental assessment for seismic surveying in the Arctic incorporated the MMPA "negligible impact" standard by using "potential biological removal" to determine the number of harassed whales that could affect the population's rates of survival and recruitment.[166] The recent Draft Environmental Impact Report, by the California State Lands Commission, for seismic surveys off the Diablo Canyon nuclear reactor site develops another methodology for evaluating a project's cumulative Level A and Level B impacts against the MMPA standard.[167] BOEM must improve its analysis.

H. Failure to Analyze Impacts on Fish and Other Species of Concern

The activities considered in the DPEIS have potential to detrimentally affect multiple fish species, harm vital fish habitat, and conflict with multiple fisheries.

As an initial matter, the DPEIS's consideration of impacts does not give adequate weight to the effects of repeated seismic testing and other activities on the behavior of fish and invertebrates. For instance, the DPEIS dismisses temporary hearing loss in fish as a minor effect without considering whether the hearing loss may be permanent or whether even a temporary loss of hearing renders the fish vulnerable to predation, unable to locate food, or unable to locate a mate.[168] In addition, sublethal disturbance that causes fish to avoid key feeding or spawning

[166] MMS, Final Programmatic Environmental Assessment, Arctic Outer Continental Shelf Seismic Surveys – 2006, OCS EIS/EA MMS 2006-038 at 36-37 (June 2006) (2006 PEA), *available at* http://www.alaska.boemre.gov/ref/EIS%20EA/Final_PEA/Final_PEA.pdf.

[167] California State Lands Commission, Draft Environmental Impact Report (EIR) for the Central Coastal California Seismic Imaging Project at Chap. 4.4 and App. H (2012) (CSLC EIR No. 758).

[168] *See* McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid (2000) (industry-sponsored study undertaken

areas could have a detrimental effect on the population of the species itself. For example, the DPEIS acknowledges that the activities it describes could disrupt feeding by Atlantic sturgeon, which is listed under the Endangered Species Act because its numbers are critically low. DPEIS at 4-131, 4-138. Yet it gives virtually no consideration to what effect disrupted feeding and effects benthic habitat will have when added to the species' ongoing struggle to survive in severely degraded, limited habitat. The DPEIS does not even consider the impacts such as masking, and silencing of fish vocalizations, may have on fish breeding success. For example, masking of black drum fish and toadfish choruses, which overlap with the low-frequency output of seismic airguns, could significantly impair breeding in those species.[169]

In the case of coastal pelagic species, also known as forage species, the action's adverse effects could ripple through the food chain. The DPEIS acknowledges that forage species are often very sensitive to sound and tend to avoid the sort of noise generated by G&G activities. DPEIS at 4-131. These species, such as herring, alewife, and others, comprise an important part of the diets of many predatory fish, including tuna and swordfish. Changes in aggregation behavior or movements of forage species could reduce the available food for predatory species, reducing their fitness and numbers and potentially causing them to shift their own movement patterns in response. Any such effects on predatory fish species would likely adversely affect the commercial and recreational fisheries that depend on them. Nor does the PDEIS assess the impact of G&G activities on invertebrates, such as cephalopods like squid and octopus, even though a number of studies have demonstrated that seismic and other low-frequency sound sources can disrupt, injure, and kill these taxa.[170]

Indeed, airgun surveys are known to significantly affect the distribution of some fish species, which can impact commercial and recreational fisheries and could also displace or reduce the foraging success of marine mammals that rely on them for prey. Indeed, as one study has noted, fishermen in various parts of the world have complained for years about declines in their catch rates during oil and gas airgun surveys, and in some areas have sought industry compensation for their losses.[171] Airguns have been shown experimentally to dramatically depress catch rates of some commercial fish species, by 40 to 80% depending on catch method, over thousands of

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by researchers at the Curtin University of Technology, Australia); McCauley, R., Fewtrell, J., and Popper, A.N., High intensity anthropogenic sound damages fish ears, *Journal of the Acoustical Society of America* 113: 638-642 (2003); *see also* Scholik, A.R., and Yan, H.Y., Effects of boat engine noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*, *Environmental Biology of Fishes* 63: 203-209 (2002).

[169] Clark, C., and Rice, A., Seismic airgun surveys and marine vertebrates (2012) (presentation given June 12, 2012 to the Mid-Atlantic Fishery Management Council).

[170] André, M., Solé, M., Lenoir, M., Durfort, M., Quero, C., Mas, A., Lombarte, A., van der Schaar, M., López-Bejar, M., Morell, M., Zaugg, S., and Houégnigan, L., Low-frequency sounds induce acoustic trauma in cephalopods, *Frontiers in Ecology and the Environment* 2011: doi:10.1890/100124 (2011); Guerra, A., and Gonzales, A.F., Severe injuries in the giant squid *Architeuthis dux* stranded after seismic explosions (2006) (paper presented at International Workshop on the Impacts of Seismic Survey Activities on Whales and Other Marine Biota, convened by German Federal Environment Agency, Sept. 6-7, 2006, Dessau, Germany); McCauley *et al.*, Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure.

[171] McCauley *et al.*, Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure.

square kilometers around a single array.[172] Large-scale displacement is likely to be responsible for the fallen catch rates: studies have shown both horizontal (spatial range) and vertical (depth) displacement in a number of other commercial species on a similar spatial scale.[173] Impacts on fisheries were found to last for some time beyond the survey period, not fully recovering within 5 days of post-survey monitoring.[174] Airguns also have been shown to substantially reduce catch rates of rockfish, at least to the distances (less than 5 km) observed in the experiment.[175] Yet the DPEIS – which acknowledging that displacement can increase the risk of predation, disrupt fish spawning and reproduction, alter migration routes, and impact feeding – appears to assume without support that effects on both fish and fisheries would be localized and "minor." PDEIS at 4-120.

In short, the DPEIS fails to recognize the scale of seismic survey impacts on commercial fish species, does not assess impacts of decreased prey availability on marine mammals, ignores the potential for acoustic impacts on Essential Fish Habitat – and, finally, fails to consider measures to mitigate these impacts, such as excluding surveys from spawning areas and other areas of biological importance to Arctic fish species. BOEM must improve its scant analysis.[176]

I. Failure to Adequately Consider Issues Related to Climate Change

The analysis related to the effects of climate change is faulty in a two key respects: (1) it fails to analyze the direct and indirect effects of the proposed action on climate change and ocean acidification, and (2) it fails to explain how the proposed action will impact the marine environment against the backdrop of ocean warming and acidification. Yet NEPA requires analysis of the direct and indirect effects of greenhouse gas ("GHG") emissions and their consequences for climate change. Indeed, proposed guidance by CEQ concludes that the NEPA

[172] Engås, A., Løkkeborg, S., Ona, E., and Soldal, A.V., Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*), *Canadian Journal of Fisheries and Aquatic Sciences* 53: 2238-2249 (1996); *see also* Løkkeborg, S., Ona, E., Vold, A., Pena, H., Salthaug, A., Totland, B., Øvredal, J.T., Dalen, J. and Handegard, N.O., Effects of seismic surveys on fish distribution and catch rates of gillnets and longlines in Vesterålen in summer 2009 (2010) (Institute of Marine Research Report for Norwegian Petroleum Directorate).

[173] Slotte, A., Hansen, K., Dalen, J., and Ona, E., Acoustic mapping of pelagic fish distribution and abundance in relation to a seismic shooting area off the Norwegian west coast, *Fisheries Research* 67:143-150 (2004).

[174] Engås *et al.*, Effects of seismic shooting.

[175] Skalski, J.R., Pearson, W.H., and Malme, C.I., Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes ssp.*), *Canadian Journal of Fisheries and Aquatic Sciences* 49: 1357-1365 (1992).

[176] Additionally, BOEM must consider the impacts of seismic surveys and other activities on invertebrates. *See, e.g.*, McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J., and McCabe, K., Marine seismic surveys: Analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid (2000); André, M., Solé, M., Lenoir, M., Durfort, M., Quero, C., Mas, A., Lombarte, A., van der Schaar, M., López-Bejar, M., Morell, M., Zaugg, S., and Houégnigan, L., Low-frequency sounds induce acoustic trauma in cephalopods, *Frontiers in Ecology and the Environment* doi:10.1890/100124 (2011); Guerra, A., and Gonzales, A.F., Severe injuries in the giant squid *Architeuthis dux* stranded after seismic explorations, *in* German Federal Environment Agency, International Workshop on the Impacts of Seismic Survey Activities on Whales and Other Marine Biota at 32-38 (2006);

process "should incorporate consideration of both the impact of an agency action on the environment through the mechanism of GHG emissions and the impact of changing climate on that agency action."[177]

First, BOEM must fully analyze the direct and indirect effects on climate change from the greenhouse gas emissions attributable to its G&G operations from vessels and other sources. While the DPEIS acknowledges that survey vessels and aircraft involved in G&G activities would emit greenhouse gas pollution, it never quantifies or evaluates the impact of those emissions. *See* DPEIS at 4-4. Additionally, the DPEIS cannot ignore the greenhouse gases that will be released in to the atmosphere as a result of the oil and gas produced as a result of the exploration activities authorized here. NEPA requires that agencies consider a proposed action's future indirect effects, which are those "caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable." 40 C.F.R. § 1508.8(b). The stated need for the action is to determine the extent and location of oil and gas reserves to facilitate oil and gas development. DPEIS at 1-8. Accordingly, BOEM must calculate not only the greenhouse gas emissions from the vessels and activities used for the G&G operations, but the impacts of the greenhouse gases emitted from the produced oil and gas reserves.

Second, the DPEIS fails to explain how its G&G activities will impact marine species and ecosystems that are already compromised by rapid climate change and ocean acidification. The DPEIS' cursory description of climate change and ocean acidification, which concludes without analysis that the environmental effects are likely to be small, incremental, and difficult to discern from effects of other natural and anthropogenic factors (DPEIS at 3-43), falls short of the hard look required by NEPA. Moreover, simply stating, in the cumulative impacts section, that climate change is a broad cumulative impact is inadequate and does nothing to examine the relevance of the proposed action to that cumulative effect. *See, e.g.*, DPEIS at 4-21, 4-62, 4-85, 4-102, 4-122, 4-135, 4-150, 4-158, 4-164, 4-170, 4-183, 4-199, 4-212. For example, the analysis fails to evaluate the project in light of the increasing frequency and strength of hurricanes in the Atlantic, increasing sea level rise along the Atlantic seaboard, and stress to marine species from ocean warming and acidification that will be compounded by risks from oil and gas exploration and development.

1. Climate change impacts requiring analysis

Climate change is already resulting in warming temperatures, rising sea levels, and increases in the frequency of extreme weather events, particularly heat waves and extreme precipitation events.[178] The average temperature in the United States rose more than 2°F over the past 50 years; by the end of this century, it is expected to increase by 4 to 6.5°F under a lower emissions

[177] Nancy Sutley, Chair, Council on Environmental Quality, Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (Feb. 18, 2010).

[178] U.S. Global Change Research Program, Global Climate Change Impacts in the United States: A State of Knowledge Report from the U.S. Global Change Research Program (2009) (Cambridge University Press).

scenario and by 7 to 11°F under a higher emissions scenario.[179] The decade from 2000 to 2010 was the warmest on record,[180] and 2005 and 2010 tied for the hottest years on record.[181]

Global average sea level rose by roughly eight inches over the past century, and sea level rise is accelerating in pace.[182] Indeed, sea level is rising faster along the U.S. east coast now than at any other time during at least the past 2,000 years.[183] About 3.7 million Americans live within a few feet of high tide and risk being hit by more frequent coastal flooding in coming decades because of the sea level rise.[184] The most vulnerable state is Florida, followed by Louisiana, California, New York and New Jersey. Modeling indicates that the Atlantic is in danger of in danger of seeing historical extremes of sea level surges frequently surpassed in the coming few decades.[185] Studies that have attempted to improve upon the IPCC estimates have found that a mean global sea-level rise of at least 1 to 2 meters is highly likely within this century.[186] Others that have reconstructed sea-level rise based on the geological record, including oxygen isotope and coral records, have found that larger rates of sea-level rise of 2.4 to 4 meters per century are possible.[187]

As briefly mentioned in the DPEIS, sea turtles that nest on the Atlantic coast will be affected by rising and surging sea levels. The added pressure and displacement from their nesting and migration from the G&G program will further impact these threatened and endangered sea species. Additionally, critical habitat designation for the North Atlantic DPS of loggerhead sea turtles is imminent, and accordingly BOEM should evaluate the extent to which the proposed action will affect areas of potential marine and beach critical habitat. Other coastal wildlife species are also impacted by sea level rise, and these effects must also be evaluated.

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179 *Id.*

180 National Aeronautic Space Association, *NASA Research Finds Last Decade was Warmest on Record, 2009 One of the Warmest Years* (Jan. 21, 2010), www.nasa.gov/home/hqnews/2010/jan/HQ_10-017_Warmest_temps.html

181 National Oceanic and Atmospheric Administration, *NOAA: 2010 Tied for Warmest Year on Record*, www.noaanews.noaa.gov/stories2011/20110112_globalstats.html

182 U.S. Global Change Research Program, Global Climate Change Impacts, *supra*.

183 Kemp, A.C., Horton, B.P., Donnelly, J.P., Mann, M.E., Vermeer, M., and Rahmstorf, S., Climate related sea-level variations over the past two millennia, *Proceedings of the National Academy of Sciences of the United States of America* 108: 11017-22 (2011).

184 Strauss, B.H., Ziemlinski, R., Weiss, J.L., and Overpeck, J.T., Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States, *Environmental Research Letters* 7(1): 014033. doi:10.1088/1748-9326/7/1/014033 (2012).

185 Tebaldi, C., Strauss, B.H., and Zervas, C.E., Modelling sea level rise impacts on storm surges along US coasts, *Environmental Research Letters* 7(1): doi:10.1088/1748-9326/7/1/014032 (2012).

186 Rahmstorf, S., A semi-empirical approach to projecting future sea-level rise, *Science* 315: 368-370 (2007); Pfeffer, W.T., Harper, J.T., and O'Neel, S., Kinematic constraints on glacier contributions to 21st-century sea-level rise, *Science* 321: 1340-1343 (2008); Vermeer, M., and Rahmstorf, S., Global sea level linked to global temperature, *PNAS* 2009: doi:10.1073/pnas.0907765106 (2009); Grinsted, A., Moore, J.C., and Jevrejeva, S., Reconstructing sea level from paleo and projected temperatures 200 to 2100 AD, *Clim. Dyn.* 2010: doi:10.1007/s00382-008-0507-2 (2010); Jevrejeva, S., Moore, J.C., and Grinsted, A., How will sea level respond to changes in natural and anthropogenic forcings by 2100? *Geophysical Research Letters* 37: doi:10.1029/2010GL042947 (2010).

187 Milne, G.A., Gehreis, W.R., Hughes, C.W., Tamisiea, M.E., Identifying the causes of sea-level change, *Nature Geoscience* 2009: doi:10.1038/ngeo544 (2009).

Extreme weather events, most notably heat waves and precipitation extremes, are striking with increased frequency,[188] with deadly consequences for people and wildlife. In 2011 alone, a record 14 weather and climate disasters occurred in the United States, including droughts, heat waves, and floods, that cost at least $1 billion (U.S.) each in damages and loss of human lives.[189] Tropical cyclones in the Atlantic have already gotten stronger due to warmer waters, and on average storms in recent years have ramped up in severity more quickly than in the past.[190] Over the last 30 years the Atlantic coast has seen a significant increase in hurricane wave heights.[191] Models predict a doubling of severe category 4 and 5 hurricanes in the Atlantic within the century,[192] and the risks of oil and gas exploration and development increase during severe storms.

Recent studies on the impacts of climate change on biodiversity have demonstrated that current levels of greenhouse gases are already having significant impacts on species and ecosystems in all regions of the world, including changes in wildlife distribution, physiology, demographic rates, genetics, and ecosystem services, as well as climate-related population declines and extinctions.[193] Because greenhouse gas emissions to date commit the Earth to substantial climatic changes in the coming decades, and because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to result in catastrophic species losses during this century. The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise

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[188] Coumou, D., and Rahmstorf, S., A decade of weather extremes, *Nature Climate Change* doi:10.1038/nclimate1452 (2012); IPCC, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (2012).

[189] National Oceanic and Atmospheric Administration, *Extreme Weather 2011*, http://www.noaa.gov/extreme2011/.

[190] Elsner, J.B., Kossin, J.P., and Jagger, T.H., The increasing intensity of the strongest tropical cyclones, *Nature* 455: 92-5 (2008); Kishtawal, C.M., Jaiswal, N., Singh, R., and Niyogi, D., Tropical cyclone intensification trends during satellite era (prepub.); Saunders, M.A., and Lea, A.S., Large contribution of sea surface warming to recent increase in Atlantic hurricane activity, *Nature* 451: 557-60 (2008).

[191] Komar, P.D., and Allan, J.C., Increasing hurricane-generated wave heights along the U.S. east coast and their climate controls," *Journal of Coastal Research* 242: 479-488 (2008).

[192] Bender, M.A., Knutson, T.R., Tuleya, R.E., Sirutis, J.J., Vecchi, G.A., Garner, S.T., and Held. I.M., Modeled impact of anthropogenic warming on the frequency of intense Atlantic hurricanes, *Science* 327: 454-8 (2010).

[193] Chen, I., Hill, J.K., Ohlemuller, R., Roy, D.B., and Thomas, C.D., Rapid range shifts of species associated with high levels of climate warming, *Science* 333: 1024-1026 (2011); Maclean, I.M.D., and Wilson, R.J., Recent ecological responses to climate change support predictions of high extinction risk, *Proceedings of the National Academy of Sciences of the United States of America* 108: 12337-12342 (2011); Parmesan, C., and Yohe, G., A globally coherent fingerprint of climate change impacts across natural systems, *Nature* 421: 37-42 (2003); Parmesan, C., Ecological and evolutionary responses to recent climate change, *Annu. Rev. Ecol. Evol. Syst.* 37: 637–669 (2006); Root, T.L., Price, J.T., Hall, K.R., Schneider, S.H., Rosenzweig, C., and Pounds, J.A., Fingerprints of global warming on wild animals and plants, *Nature* 421: 57-60 (2003); Walther, G., Post, E., Convey, P., Menzel, A., Parmesan, C., Beebee, T.J.C., Fromentin, J., Hoegh-Guldberg, O., and Bairlein, F., Ecological responses to recent climate change, *Nature* 416: 389-395 (2002); Walther, G.R., Berger, S., and Sykes, M.T., An ecological "footprint" of climate change, *Proceedings of the Royal Society B: Biological Sciences* 272: 1427-1432 (2002); Warren, R., Price, J., Fischlin, A., de la Nava Santos, S., and Midgley, G., Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise, *Climatic Change* 106: 141-177 (2011).

exceeds 1.5°C to 2.5°C relative to 1980-1999 levels, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999 levels.[194] Thomas et al. (2004) projected that 15%-37% of species will be committed to extinction by 2050 under a mid-level emissions scenario—a trajectory which the world has been exceeding.[195] Maclean and Wilson (2011) concluded that the harmful effects of climate change on species exceed predictions and that one in ten species could face extinction by the year 2100 if current rates of climate change continue unabated.[196] The updated IPCC Reasons for Concern reflect that current warming is already at a point where significant risks to species and ecosystems are occurring, and that these risks will become "severe" at a ~1°C rise above preindustrial levels.[197] A comprehensive literature review by Warren et al. (2011) found that significant species range losses and extinctions are predicted to occur at a global mean temperature rise below 2°C in several biodiversity hotspots and globally for coral reef ecosystems. At a 2°C temperature rise, projected impacts increase in magnitude, numbers, and geographic scope. Beyond a 2°C temperature rise, the level of impacts and the transformation of the Earth's ecosystems will become steadily more severe, with the potential collapse of some entire ecosystems, and extinction risk accelerating and becoming widespread.[198]

Contrary to the statements in the DPEIS, the impacts of climate change are happening within the next decade and are already occurring. For the North Atlantic, ocean warming has already been reported as contributing to ecosystem shifts.[199] Changes are seen from phytoplankton to zooplankton to fish and are modifying the dominance of species and the structure, diversity and function of marine ecosystems.[200] These changes in biodiversity, combined with other impacts from fishing, oil and gas exploration and development, and ocean acidification, can contribute to the decline or extinction of species and must be analyzed in the DPEIS.

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[194] IPCC, *Climate Change 2007: Synthesis Report-- An Assessment of the Intergovernmental Panel on Climate Change* (2007).

[195] Thomas, C.D., Cameron, A., Green, R.E., Bakkenes, M., Beaumont, L.J., Collingham, Y.C., Erasmus, B.F.N., Extinction risk from climate change, *Nature* 427: 145-148 (2004); Global Carbon Project, *Carbon Budget 2009*, (2010) (report available at http://www.globalcarbonproject.org/index.htm); Raupach, M.R., Marland, G., Ciais, P., Le Quéré, C., Canadell, J.G., Klepper, G., and Field, C.B., Global and regional drivers of accelerating CO2 emissions, *Proceedings of the National Academy of Sciences* 104: 10288 (2007).

[196] Maclean, I.M.D., and Wilson, R.J., Recent ecological responses to climate change support predictions of high extinction risk, *Proceedings of the National Academy of Sciences of the United States of America* 108: 12337-12342 (2011).

[197] Smith, J.B., Schneider, S.H., Oppenheimer, M., Yohe, G.W., Hare, W., Mastrandrea, M.D., Patwardhan, A., Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change (IPCC) "reasons for concern," *Proceedings of the National Academy of Sciences of the United States of America* 106 (11): 4133-4137 (2009).

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[199] Beaugrand, G., Edwards, M., Brander, K., Luczak, C., and Ibanez, F., Causes and projections of abrupt climate-driven ecosystem shifts in the North Atlantic, *Ecology letters* 11: 1157-68 (2008).

[200] Beaugrand, G., Decadal changes in climate and ecosystems in the North Atlantic Ocean and adjacent seas, *Deep Sea Research Part II: Topical Studies in Oceanography* 56: 656-673 (2009); Kerr, L.A., Connelly, W.J., Martino, E.J., Peer, A.C., Woodland, R.J., and Secor, D.H., Climate change in the U.S. Atlantic affecting recreational fisheries, *Reviews in Fisheries Science* 17: 267-289 (2009).

2. Ocean acidification impacts requiring analysis

The oceans are becoming more acidic faster than they have in the past 300 million years, a period that includes four mass extinctions.[201] Friedrich et al. (2012) concluded that anthropogenic ocean acidification already exceeds the natural variability on regional scales and is detectable in many of the world's oceans, including Atlantic regions.[202] Observed trends over the last couple of decades off Bermuda indicate that aragonite saturation has declined -0.04 per decade—exceeding the last glacial termination by orders of magnitude.[203]

BOEM must examine the impacts of its proposed project on the marine environment in light of changes that are already occurring due to ocean acidification. Especially relevant to the proposed project is that the oceans are becoming noisier due to ocean acidification.[204] A 0.3 pH decrease causes of loss of ~40% sound absorption.[205] At levels of acidification predicted before the end of the century sound will travel 70% further in the ocean. The DPEIS must discuss the cumulative impacts of combined ocean acidification and the addition of noise to the marine environment from the proposed project.

Most marine animals respond negatively to ocean acidification, undermining calcification, growth, reproduction, metabolism, and survival.[206] Indeed, ocean acidification has already impacted Atlantic wildlife. For example, areas of the Chesapeake Bay have already been lost to oyster harvesting –[207] analogous to oyster die-offs in the Pacific Northwest that have now definitively been linked to ocean acidification.[208] Oyster populations in the bay are already at historically low levels, and an examination of 23 years of water quality data concluded that significant trends in acidity will have impacts on juvenile oyster growth and survival.[209] Already,

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201 Honisch, B., Ridgwell, A., Schmidt, D.N., Thomas, E., Gibbs, S.J., Sluijs, A., Zeebe, R., The Geological Record of Ocean Acidification, *Science* 335: 1058-1063 (2012).

202 Friedrich, T., Timmermann, A., Abe-Ouchi, A., Bates, N.R., Chikamoto, M.O., Church, M.J., Dore, J.E., Detecting regional anthropogenic trends in ocean acidification against natural variability, *Nature Climate Change* 2 (2): 1-5 (2012).

203 *Id.*

204 Hester, K.C., Peltzer, E.T., Kirkwood, W.J., and Brewer, P.G., Unanticipated consequences of ocean acidification: A noisier ocean at lower pH, *Geophysical Research Letters* 35: L19601 (2008).

205 Brewer, P.G., and Hester, K.C., Ocean acidification and the increasing transparency of the ocean to low frequency sound, *Oceanography* 22 (4): 86–93 (2009).

206 Kroeker, K.J., Kordas, R.L., Crim, R.N., and Singh, G.G., Meta-analysis reveals negative yet variable effects of ocean acidification on marine organisms, *Ecology Letters* 13: 1419-1434 (2010).

207 Fincham, M.W., Who Killed *Crassostrea virginica*? The Fall and Rise of Chesapeake Bay Oysters (2012) (documentary film made for Maryland Sea Grant at the University of Maryland Center for Environmental Science, summary and excerpt available at www.mdsg.umd.edu/store/videos/oyster).

208 Barton, A., Hales, B., Waldbusser, G.G., Langdon, C., and Feely, R.A., The Pacific oyster, *Crassostrea gigas*, shows negative correlation to naturally elevated carbon dioxide levels: Implications for near-term ocean acidification effects, *Limnol. Oceanogr.* 57: 698-710 (2012).

209 Waldbusser, G.G., Voigt, E.P., Bergschneider, H., Green, M.A., and Newell, R.I.E., Biocalcification in the eastern oyster (*Crassostrea virginica*) in relation to long-term trends in Chesapeake Bay pH, *Estuaries and Coasts* 34(2): 1–11 (2010).

calcification of juvenile oysters is compromised by acidification. Waldbusser et al. (2011) conducted a study of eastern oyster under 4 levels of pH that encompass a range typical of the mesohaline waters of the Chesapeake Bay (7.2–7.9 on the NBS scale). They found that in as little as 2 weeks under various pH levels, shells began to dissolve even in waters that were not corrosive (7.9 pH). The treatments were not atypical for estuarine waters in the Chesapeake Bay and demonstrate that shell dissolution increases with declining pH, especially for fresh shells.[210]

Studies of Northwest Atlantic bivalves demonstrate that changes in ocean acidification and temperature can have significant negative consequences for these coastal animals, especially at larval stages. Eastern oyster and bay scallop are particularly sensitive to ocean acidification, while ocean acidification and temperature rise together impair the survival, growth, development, and lipid synthesis of hard clams and bay scallops.[211]

Not only do calcifying organisms suffer from an increasingly acidic ocean environment, but fish and fisheries are threatened as well. New science confirms the negative consequences of ocean acidification on Atlantic herring, Atlantic cod, and *Menidia beryllina*, a common Atlantic estuarine fish. In Atlantic cod, exposure to CO2 resulted in severe to lethal tissue damage in many internal organs, with the degree of damage increasing with CO2 concentration.[212] Larval survival and length of *M. beryllina* unambiguously decreased with increased carbon dioxide treatments.[213] Eggs exposed to high levels also had a higher rate of malformations, with larvae developing curved bodies. Increased carbon dioxide in the water also negatively affected Atlantic herring larvae.[214] Slower-growing larvae are more vulnerable to predation and decreased feeding success.[215] Since larval survival is critical to recruitment, ocean acidification has the potential to act as an additional source of natural mortality, affecting populations of already exploited fish stocks.[216]

Even now, ocean acidification is putting vulnerable marine animals at the threshold of their tolerance levels. Declines of plankton, shellfish, and fish will reverberate up the marine food web with impacts on entire ecosystems. The DPEIS must quantify and discuss the contribution of the proposed action to further acidification, and it must also evaluate the cumulative impacts of the G&G program on the marine environment, in combination with acidification.

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[210] Waldbusser, G.G., Steenson, R.A., and Green, M.A., Oyster shell dissolution rates in estuarine waters: Effects of pH and shell legacy, *Journal of Shellfish Research* 30: 659-669 (2011).

[211] Talmage, S.C., and Gobler, C.J., Effects of elevated temperature and carbon dioxide on the growth and survival of larvae and juveniles of three species of Northwest Atlantic bivalves, *PLoS ONE* 6(10): e26941.doi:10.1371/journal.pone.0026941 (2011).

[212] Frommel, A.Y., Maneja, R., Lowe, D., Malzahn, A.M., Geffen, A.J., Folkvord, A., Piatkowski, U., Reusch, T.B.H., and Clemmesen, C., Severe tissue damage in Atlantic cod larvae under increasing ocean acidification, *Nature Climate Change* 2: 1-5 (2011).

[213] Baumann, H., Talmage, S.C., and Gobler, C.J., Reduced early life growth and survival in a fish in direct response to increased carbon dioxide, *Nature Climate Change* 2: 6-9 (2011).

[214] Franke, A., and Clemmesen, C., Effect of ocean acidification on early life stages of Atlantic herring (*Clupea harengus L.*), *Biogeosciences* 8: 3697-3707 (2011).

[215] *Id.*; Baumann et al., Reduced early life growth and survival in a fish, *supra*.

[216] Frommel et al., Severe tissue damage in Atlantic cod larvae, *supra*.

V. COMPLIANCE WITH OTHER STATUTES

A number of other statutes and conventions are implicated by BOEM's permitting of G&G activities in the Atlantic. Among those that must be disclosed and addressed during the NEPA process are the following:

A. Marine Mammal Protection Act ("MMPA")

The MMPA prohibits citizens, including federal agencies, or those operating within the jurisdiction of the United States from "taking" marine mammals without first securing either an "incidental take" permit or an "incidental harassment" authorization. 16 U.S.C. § 1371(a); 50 C.F.R. §216.107. For most activities, "take" is broadly defined to include both the "potential to injure a marine mammal or marine mammal stock in the wild" ("Level A" harassment) and the potential to "disturb" them "by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" ("Level B" harassment). 16 U.S.C. § 1362(18); 50 C.F.R. § 216.3.

In 1994, Congress amended the MMPA to add provisions that allow for the incidental harassment of marine mammals through incidental harassment authorizations ("IHAs"), but only for activities that result the "taking by harassment" of marine mammals. 16 U.S.C. § 1371(a)(5)(D)(i). For those activities that could result in "taking" other than harassment, interested parties must continue to use the pre-existing procedures for authorization through specific regulations, often referred to as "five-year regulations." 16 U.S.C. § 1371(a)(5)(A). Accordingly, NMFS' implementing regulations state that an IHA in the Arctic cannot be used for "activities that have the *potential* to result in serious injury or mortality." 50 C.F.R. § 216.107 (emphasis added). In the preamble to the proposed regulations, NMFS explained that if there is a potential for serious injury or death, it must either be "negated" through mitigation requirements or the applicant must instead seek approval through five-year regulations. 60 Fed. Reg. 28,379, 28,380-81 (May 31, 1995).

The caution exhibited by NMFS in promulgating the 1996 regulations is consistent with the MMPA's general approach to marine mammal protection. Legislative history confirms that at the time of the MMPA's original passage Congress intended to build in a "conservative bias" that would avoid adverse or irreversible effects "until more is known." H.R. Rep. 92-707, at 5 (1971) *reprinted in* 1972 U.S.C.C.A.N. 4144, 4148. The committee report that accompanied the House version of the 1994 amendments emphasizes that the IHA provisions were not intended to "weaken any of the existing standards which protect marine mammals and their habitats from incidental takes[.]" H.R. Rep. 103-439, at 37 (1994). Thus, the 1994 amendments preserved the existing five-year regulation process for those activities that risked the possibility of lethal or seriously injurious marine mammal take.

The risk of mortality and serious injury, discussed at section IV.E above, has implications for MMPA compliance. Here, in assessing their MMPA obligations, BOEM presupposes that industry will apply for IHAs rather than 5-year take authorizations and that BOEM will not apply to NMFS for programmatic rulemaking. DPEIS at 1-13, 5-9. But the potential for mortality and serious injury bars industry from using the incidental harassment process to obtain take authorizations under the MMPA. BOEM should therefore consider applying to NMFS for a programmatic take authorization, and revise its impact and alternatives analyses in the EIS on the assumption that rulemaking is required.

Additionally, we are concerned about BOEM's general statement that an IHA "may not be necessary" for certain HRG surveys if operators can demonstrate that they can effectively monitor out to the 160 dB isopleth, which BOEM construes as the threshold for Level B take. DPEIS at C-15. As noted above, we believe that BOEM has applied the incorrect threshold given (1) the potential for take from mid-frequency sources at received levels well below 160 dB (RMS); (2) the demonstrated sensitivity of some species, such as harbor porpoises and beaked whales, requiring far lower take thresholds; and (3) the virtually continuous acoustic output of some sub-bottom profilers, which suggests that a standard designed for transient sounds should not be used. It is not possible for operators to effectively monitor out to the impact distances implied by these conditions; indeed, it is highly unlikely that operators could monitor – with the 100% efficacy that would be necessary – the smaller distances that BOEM appears to contemplate here, especially if surveys occur at night and other times of low visibility.[217]

B. Endangered Species Act ("ESA")

The ESA requires that agencies give first priority to the protection of threatened and endangered species. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 174 (1978) (Supreme Court found "beyond doubt" that "Congress intended endangered species to be afforded the highest of priorities."). Section 2(c) of the ESA establishes that it is "…the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." 16 U.S.C. § 1531(c)(1).

The ESA defines "conservation" to mean "…the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary." 16 U.S.C. § 1532(3). Section 7(a)(2) of the ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency… is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species… determined… to be critical…." 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a). To accomplish this goal, agencies must consult with the National Marine Fisheries Service or U.S. Fish and Wildlife Service, depending upon the species, whenever their actions "may affect" a listed species. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a). Should they find that any listed species is likely to be adversely affected, the consulting agency must issue a biological opinion determining whether the action is likely to jeopardize the continued existence of the species or destroy or adversely modify critical habitat. If so, the opinion must specify reasonable and prudent alternatives that will avoid the likelihood of jeopardy or adverse modification and allow the action to proceed. 16 U.S.C. § 1536(b).

[217] The limitations of real-time visual monitoring are well known, as observed at sections III.B.1 and III.C.10 above.

For its part, BOEM, as the action agency, has an ongoing, substantive duty to ensure that any activity it authorizes, funds, or carries out does not jeopardize a listed species or destroy or adversely modify its critical habitat. An action agency's reliance on an inadequate, incomplete, or flawed biological opinion cannot satisfy its duty to avoid the likelihood of jeopardy to listed species. *See, e.g., Florida Key Deer v. Paulson*, 522 F.3d 1133, 1145 (11th Cir. 2008); *Pyramid Lake Tribe of Indians v. U.S. Navy*, 898 F.2d 1410, 1415 (9th Cir. 1990); *Stop H-3 Ass'n. v. Dole*, 740 F.2d 1442, 1460 (9th Cir. 1984) (action agency must independently ensure that its actions are not likely to cause jeopardy).

The central purpose of the ESA is to recover species to the point where ESA protections are no longer necessary. 16 U.S.C. §§1531(b), 1532(3). The ESA's emphasis on recovery of species means that BOEM may not authorize or carry out actions that will significantly reduce the likelihood of either the survival *or the recovery* of a listed species. *See, e.g. National Wildlife Federation v. National Marine Fisheries Serv.*, 524 F.3d 917, 932 (9th Cir. 2008).

The DPEIS indicates that BOEM has begun the consultation process, and that a Biological Opinion, if issued, will be included as an appendix to the final document. To be sure, the consultation should include every listed marine mammal, sea turtle, fish, and seabird species in the region, but the agencies should spend particular attention on the North Atlantic right whale. Without substantial additional mitigation, NMFS cannot legally issue a no-jeopardy opinion for this species. As noted above, the right whale is so critically endangered that the loss of a single adult female could threaten its survival; it is particularly vulnerable to masking effects at far distances from low-frequency sound sources, to stress effects from anthropogenic noise, and to ship strikes especially in combination with certain types of sound; and sublethal effects that impair the individual whales' ability to feed, communicate, or travel, or otherwise disrupt normal behavior could compromise their overall fitness and reproductive success, diminishing the species' chances at survival and recovery over the long term. Significantly, the members of the population most vulnerable to the effects of the proposed action are mothers and calves – the individuals most vital to maintaining and rebuilding the population.[218]

In order to comply with the ESA, BOEM must select an alternative that sufficiently protects the right whale, its designated critical habitat, and all known migratory corridors, feeding areas, calving and nursery grounds. The seasonal exclusion proposed in Alternative A would not avoid jeopardy, nor would the additional exclusion (though superior) proposed in Alternative B.[219]

C. Coastal Zone Management Act ("CZMA")

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[218] *E.g.*, McCauley, R.D., Fewtrell, J., Duncan, A.J., Jenner, C., Jenner, M.-N., Penrose, J.D., Prince, R.I.T., Adhitya, A., Murdoch, J. and McCabe, K., Marine seismic surveys: analysis and propagation of air-gun signals, and effects of air-gun exposure on humpback whales, sea turtles, fishes, and squid (2000).

[219] *See* Comment letter from Dr. Scott Kraus, Vice-President for Research, New England Aquarium, to BOEM (Aug. 10, 2011) (concerning BOEM's Draft Mid-Atlantic Wind Energy Area EA, and noting the risk that acoustic sources will displace mothers and mother/calf pairs into "rougher and more predator-occupied waters, potentially reducing calf survival").

The CZMA requires that "[e]ach Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs." 16 U.S.C. § 1456(c)(1)(A). *See also California v. Norton*, 311 F.3d 1162 (9th Cir. 2002) (applying consistency requirement to activities well outside state waters). Under the law, BOEM must provide a consistency determination to the relevant State agency responsible for the State's CZM program at least 90 days before final approval of the federal activity. 16 U.S.C. § 1456(c)(1)(C); 15 C.F.R. § 930.36(b)(1). The State must provide its concurrence with or objection to the consistency determination within 60 days of receiving the determination and supporting information; otherwise, the federal agency may presume that the State concurs with its consistency determination. 15 C.F.R. § 930.41(a). If the State determines that the federal agency has not provided sufficient information to support the consistency determination, as required by 15 C.F.R. § 930.39(a), it must notify the federal agency of the deficiency and the 60-day clock will not commence until the State receives the necessary information. *Id.*

If the State objects to the consistency determination, the federal agency must work with the State to attempt to resolve their differences before the 90-day notice period expires. After that time expires, the federal may only proceed with the activity over the State's objection if the agency determines that federal law requirements prevent the activity from achieving full consistency with enforceable state management program policies or the agency concludes, despite the State's objection, that the activity is fully consistent with such enforceable policies. *Id.* § 930.43(d). In the alternative, a State may issue a conditional concurrence that states the conditions that must be satisfied in order to ensure consistency with specific enforceable polies of the State's CZM program. The agency must modify the proposed plan or application to include the State's conditions or notify the State that it refuses to do so, in which case the State's conditional concurrence will be treated as an objection. *Id.* § 930.4(a)-(b). More specifically:

(1) Importantly, the consistency requirement applies to multiple phases of OCS activities. When BOEM develops a plan to direct the agency's future OCS actions, such as the plan of activities considered in the DPEIS, the agency must provide a consistency determination and seek each State's concurrence that the activities covered by the plan are consistent to the maximum extent practicable with the enforceable policies of the State's coastal zone management program. 15 C.F.R. § 930 Subpart C. This phase of planning and consistency review helps set the stage for future permitting and licensing decisions regarding OCS activities being carried out pursuant to the plan, but does not take the place of subsequent consistency determinations. Activities carried out by private entities that require a permit or license, such as a G & G permit, and all federal license or permit activities described in an OCS plan, must be determined to be fully consistent with the affected State's enforceable coastal zone management policies. 15 C.F.R. § 930 Subparts D, E. The DPEIS acknowledges the multi-stage nature of consistency review under the CZMA, but does not indicate that BOEM will undergo review at the present stage. *See* 5-8 to 5-9. BOEM must.

(2) The CZMA and its regulations broadly define the "may affect" trigger for consistency review. An activity that occurs outside the coastal zone still crosses the threshold if it affects resources within the coastal zone, or if it affects resources (such as whales and fish) that regularly come within the coastal zone but are outside the zone at the time of impact. This definition has significant implications for the high-intensity noise produced by airgun exploration, since a survey occurring tens or even hundreds of miles offshore can still affect coastal resources due to its enormous propagation footprint and its impact on wide-ranging species. *See NRDC v. Winter*, No. 8:07-cv-00335-FMC-FMOx, 2007 WL 2481037 (C.D. Cal. Aug. 7, 2007), *aff'd in rel. part*, 508 F.3d 885 (9th Cir. 2007), *rev'd in part on other grounds sub nom. Winter v. NRDC*, 129 S.Ct. 365 (2008). Perhaps most pressingly, BOEM must include New Jersey – which is omitted from the DPEIS' distribution list (DPEIS at 5-6) – among the affected coastal states. Further, BOEM must acknowledge the full scope of activity that would affect coastal resources under the Act, for purposes of satisfying this important provision at both the planning and permitting stages.

(3) Finally, it is crucial that BOEM provide a thorough analysis of the proposed action's effects on the myriad coastal resources that State programs are designed to protect. Without such a thorough analysis, it is impossible for the states to assess the validity of any consistency determination BOEM issues – particularly in light of the short period of time the states have to object to a consistency determination. In addition, the states need full information to inform their own citizens and give those citizens a meaningful opportunity to comment on the proposed action, as required by 15 C.F.R. § 930.2. As written, however, the DPEIS glosses over many important impacts to coastal resources and, aside from the seasonal restrictions targeted at North Atlantic right whales and loggerhead sea turtles, fails to present reasonable alternatives necessary to protect those resources, including other marine mammals and fisheries. In its final PEIS, BOEM must present these missing alternatives and information, and give State CZM programs sufficient time to assess the information and the proposed actions' consistency with their enforceable policies.

D. Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fisheries Conservation and Management Act, 16 U.S.C. § 1801 et seq., requires federal agencies to "consult with the Secretary [of Commerce] with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken" that "may adversely affect any essential fish habitat" identified under that Act. 16 U.S.C. § 1855 (b)(2). In turn, the Act defines essential fish habitat as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1802 (10). As discussed above, BOEM's Atlantic study area contains such habitat, and geological and geophysical operations have the significant potential to adversely affect at least the waters, and possibly the substrate, on which fish in these areas depend. Accordingly, and as the DPEIS anticipates, BOEM must consult with the Secretary of Commerce through NMFS and the Mid-Atlantic and South Atlantic Fisheries Management Councils. DPEIS at 5-9.

E. National Marine Sanctuaries Act

The National Marine Sanctuaries Act requires agencies whose actions are "likely to injure a sanctuary resource" to consult with the Office of National Marine Sanctuaries ("ONMS"). 16 U.S.C. § 1434(d). As the DPEIS recognizes, the agency does not need to conduct the activity itself, since any federal agency action, including permitting or licensing, can trigger the requirement; nor must the activity occur within the sanctuary, so long as the resource is likely to be injured. DPEIS at 1-17; 16 U.S.C. § 1434(d). ONMS may also request that the agency initiate the consultation process.[220] Under the consultation scheme, BOEM is required to prepare a Sanctuary Resource Statement; if ONMS determines that the statement is complete and that injury is indeed likely, it must prepare recommended alternatives to the proposed action, which may include relocation, rescheduling, or use of alternative technologies or procedures.[221]

To ensure compliance with the consultation provision, BOEM should keep several critical points in mind.

First, ONMS in its regulations defines the term "sanctuary resource" quite broadly, to the extent that it includes "virtually every living and nonliving component of the sanctuary ecosystem";[222] these include any resource "that contributes to the conservation, recreation, ecological, historical, research, educational, or aesthetic value of the Sanctuary." 15 C.F.R. § 922.182. Consistent with this approach, ONMS defines the term "injure" to mean "change adversely, either in the short or long term, a chemical, biological, or physical attribute of, or the viability of." 15 C.F.R. § 922.3. The DPEIS appears to interpret these provisions narrowly. *See* DPEIS at 5-9 to 5-10. Yet there can be no question, under these definitions, that an activity that degrades the acoustic habitat of a National Marine Sanctuary, even temporarily, or impinges on the sanctuary's value for scuba diving or other recreational activities, injures a sanctuary resource. Thus BOEM should not consider itself subject to consultation only if its permitting activities physically injure a marine animal within sanctuary boundaries. The permitting of any seismic survey likely to degrade the acoustic environment of the Monitor or Gray's Reef NMS, or (given the best available science on scuba diver aversion to low-frequency sound) raise noise levels within the sanctuaries above 145 dB (SPL), is subject to consultation under the Act.

Second, we strongly encourage BOEM to tier consultation with the sanctuaries. As it stands, the agency plans to undertake consultation only with respect to the issuance of survey-specific permits. DPEIS at 1-17. But this approach only risks greater conflict down the line, since BOEM will have less latitude to accept some types of recommended alternatives, such as restricting a survey from certain areas, when the action turns to individual surveys; and it fails to benefit from any streamlining that a tiered process would afford.[223] BOEM should undertake

[220] NOAA Office of National Marine Sanctuaries, Overview of conducting consultation pursuant to section 304(d) of the National Marine Sanctuaries Act (16 U.S.C. 1434(d)) at 4 (2009).

[221] *Id.* at 8.

[222] *Id.* at 5.

[223] For example, if, as a result of consultation, BOEM establishes a time-area closure around the sanctuaries, its need to consult on individual permitting activities could diminish.

consultation now on its proposed programmatic alternatives and renew the process, if necessary, for individual permits.

F. National Ocean Policy

The National Ocean Policy ("NOP") is a "stewardship" plan for our coast and ocean, including BOEM's area of interest. Under NOP, it is the policy of the federal government to "protect, maintain, and restore the health and biological diversity of ocean, coastal, and Great Lakes ecosystems and resources"; "to improve the resiliency of ocean, coastal, and Great Lakes ecosystems, communities, and economies"; "to respect and preserve our Nation's maritime heritage, including our social, cultural, recreational, and historical values"; "to use the best available science and knowledge to inform decisions affecting the ocean, our coasts, and the Great Lakes"; and "to foster a public understanding of the value of the ocean, our coasts, and the Great Lakes to build a foundation for improved stewardship. Exec. Order No. 13547, 75 Fed. Reg. 43023 (July 22, 2010).

Taken together, the intrusion of oil and gas exploration into the communities of the Atlantic Coast will seriously impact the economies of clean ocean uses. Unlike other regions, where oil and gas operations permeate coastal zone activities, the Atlantic Ocean has been oil and gas industry-free for decades, and has built a clean ocean economy that depends on thriving fisheries, whales to drive ecotourism, and safe, swimmable beaches. The proposed action will lead to the direct displacement of commercial and recreational fishermen and will likely impact long-term ecotourism and coastal cultural values. The President's Executive Order, which directs all agencies to "take such action as necessary to implement the policy set forth in section 2 of this order and the stewardship principles and national priority objectives," does not exempt BOEM from any of its provisions. Therefore, BOEM has the responsibility to protect the economies and ecosystems of the Atlantic Ocean under a program of improved understanding, stakeholder engagement, and science-based decisionmaking. This DPEIS does not achieve any of these goals, does not represent good ocean governance, and does not represent the use of good science. Until it does so, BOEM is in violation of the President's declared policies for the protection of our ocean's ecosystems and resources.

VI. CONCLUSION

For the above reasons, we urge BOEM first and foremost to adopt Alternative C as its preferred alternative, and next to seriously consider the recommendations we have made to improve analysis and mitigate the far-reaching impacts of the proposed activity.

We would welcome the opportunity to meet with you, your staff, and other relevant offices at any time to discuss these matters. Given the swift timeline BOEM has set for finalizing the DPEIS and producing a record of decision, we would urge you to contact us at the earliest opportunity. For further discussion, please contact Michael Jasny of NRDC (mjasny@nrdc.org).

Very truly yours,

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EXHIBIT 7

OCEANA | Protecting the World's Oceans

MEMORANDUM

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Re: Final Programmatic Environmental Impact Statement for Geological and Geophysical Activities in the Outer Continental Shelf Waters of the Atlantic Coast in Support of Oil and Gas Exploration and Development, 79 Fed. Reg. 13,074 (March 7, 2014), ID# *BOEM-2014-0028-0001*

Dear Mr. Goeke:

Oceana and the International Fund for Animal Welfare (IFAW) thank you for the opportunity to submit comments on the above-captioned final programmatic environmental impact statement ("PEIS") concerning high-intensity seismic surveys in the Atlantic Ocean. This PEIS is important because sound is a fundamental element of the marine environment, but the seismic surveys would include airgun blasts that will harm marine mammals. The sound from airguns can travel hundreds to thousands of miles underwater and across entire ocean basins.[1] Studies have documented the harm from airgun blasts. For example, humpback and fin whales stopped vocalizing in a 100,000 square mile area[2] during airgun activity. Evidence shows that blasts cause baleen whales to abandon habitats over a similar spatial area.[3] Yet even though the proposed action is an activity with significant potential impacts on the marine environment along nearly the entire East Coast of the United States, the PEIS fails to take a hard look at its impacts.

[1] Nieukirk, S.L., Stafford, K.M., Mellinger, D.K., Dziak, R.P., and Fox, C.G., (2004). Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean, *Journal of the Acoustical Society of America* 115: 1832-1843.
[2] 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).
[3] MacLeod, K., Simmonds, M.P., and Murray, E., (2006).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.

The PEIS is fatally flawed because

1) The Bureau of Ocean Energy Management ("the Bureau") had, but did not consider, information from a Cornell study on the extent of right whales' presence in the Atlantic Ocean.
2) The Bureau failed to consider a full range of alternatives in light of the information published in the Cornell study. As a result, the preferred alternative mitigation measure will not adequately protect right whales.
3) The Bureau had, but did not consider, information on acoustic thresholds for marine mammals that shows that marine mammals suffer harm at much lower decibel levels than is assumed in the PEIS.
4) The Bureau had, but did not consider, information on the possible indirect impacts of Level B Takes, including the possibility of Level B Takes resulting in mass mortality events.
5) The baseline against which the Bureau measured environmental impacts is inaccurate for several reasons, resulting in inadequate consideration of the impacts of the proposed action.
6) The Bureau failed to take a hard look at environmental impacts on essential fish habitat ("EFH").

For these six reasons, the PEIS is fatally flawed, and therefore the Bureau cannot rationally adopt the preferred alternative in the Record of Decision ("ROD"). In order to proceed with a proposal for geological and geophysical ("G&G") activities in the Outer Continental Shelf ("OCS") waters of the Atlantic coast, the Bureau must develop an adequate PEIS that considers the best available science, analyzes a full spectrum of reasonable and feasible alternatives, and takes a hard look at the impacts on marine life, especially protected marine mammals.

I. THE BUREAU HAD, BUT DID NOT CONSIDER, INFORMATION FROM A CORNELL STUDY ON THE EXTENT OF RIGHT WHALES' PRESENCE IN THE ATLANTIC OCEAN.

The Bureau had, but did not consider, information from a study by Cornell University's Bioacoustics Research Program, regarding the extent of right whales' presence in the Atlantic Ocean. Under Council of Environmental Quality ("CEQ") regulations promulgated under the National Environmental Policy Act ("NEPA"), an agency's evaluation of environmental consequences, in an environmental impact statement ("EIS"), must be based on "accurate" and "high quality" scientific information.[4] Therefore EISs "must present accurate and complete information to decision-makers to allow informed decisions."[5] The Bureau did not base the PEIS

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[4] 40 C.F.R. § 1500.1(b).
[5] *N.C. Wildlife Fed'n v. N.C. Dept. of Transp.*, 677 F.3d 596 (4th Cir. 2012), *cited by* David R. Mandelker, NEPA Law and Litigation § 10:33:20 (2013 ed.). "[Environmental] impact statement[s] must contain an adequate compilation of relevant data and information…." *Id.*, *citing N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067 (9th Cir. 2011); *Sierra Club v. U.S. Army Corps of Eng'rs*, 701 F.2d 1101 (2d Cir. 1983); *Native Ecosystems Council v. Weldon*,

on either accurate or complete scientific information by failing to include data from a study performed by researchers at Cornell on the distribution of the right whale, an endangered species within the Atlantic OCS area where seismic surveys are proposed.[6]

In the PEIS, the Bureau listed alternatives to the proposed action. The preferred Alternative mitigation measure (named "Alternative B" in the PEIS) contains the most protective measures for the endangered right whales. This alternative includes a time-area closure extending 20 nautical miles from shore from Delaware Bay to the southern edge of the area of interest ("AOI"), running from November 15 to April 15 within the right whale's critical habitat, and a closure within the Mid-Atlantic and Southeast U.S. Seasonal Management Areas ("SMAs") from November 1 to April 30.[7]

In developing the preferred alternative mitigation measure, the Bureau relied on historical sighting data of right whales from the National Marine Fisheries Service ("the Service") and an assumption that approximately 83% of right whales occur within 20 nautical miles of the coast.[8] While shipboard and aerial sighting surveys are important, they are also highly limited because they are constrained to daylight hours and favorable weather, spotting whales only when they surface. Some sighting data is recorded by the public and can suffer from a near-shore bias. Long-term passive acoustic monitoring networks, in combination with sighting survey data, provide a much more accurate assessment of right whale distribution in the mid and south Atlantic.

The Cornell study shows that critically endangered North Atlantic right whales are present throughout the year off the Virginia coast.[9] By using marine autonomous recording units

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848 F.Supp. 2d 1207 (D. Mont. 2012); *Border Power Plant Working Grp. v. Dep't of Energy*, 467 F.Supp. 2d 1040 (S.D. Cal. 2006); *Fund for Animals v. Norton*, 365 F. Supp. 2d 394 (S.D. N.Y. 2005); *Nat'l Wildlife Fed'n v. Norton*, 332 F. Supp. 2d 170, 183 (D.D.C. 2004).

[6] Aaron Rice, ET. AL., *Acoustic Ecology of North Atlantic Right Whales off the Virginia Coast: Data Quality and Initial Right Whale Presence Results*, Cornell University Bioacoustics Research Program (Oct. 2013). The study was partially funded by and prepared for Oceana and the International Fund for Animal Welfare. Dr. Rice presented the results to Brian Hooker and other staff in the Bureau's Office of Renewable Energy Programs in Herndon, VA on Thursday, Nov. 14, 2013.

[7] *See* Bureau of Ocean Energy Mgmt., Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement, Vol. I Summary, Time-Area Closure for North Atlantic Right Whales for HRG surveys at xxvii (2014).

[8] *See* Bureau of Ocean Energy Mgmt., Atlantic Outer Continental Shelf Proposed Geologic and Geophysical Activities Mid and South Atlantic Planning Areas Draft Programmatic EIS, Vol I. Chapter 2.2.21, Expanded Time-Area Closure for North Atlantic Right Whales at 2-28 (2012).

[9] Aaron Rice, ET. AL., *Acoustic Ecology of North Atlantic Right Whales off the Virginia Coast: Data Quality and Initial Right Whale Presence Results*, Cornell University Bioacoustics Research Program (Oct. 2013). The study was partially funded by and prepared for Oceana and the International Fund for Animal Welfare. Dr. Rice presented the results to Brian Hooker and other staff in the Bureau's Office of Renewable Energy Programs in Herndon, VA on Thursday, Nov. 14, 2013.

(“MARUs”) to record right whale vocalizations, Cornell researchers assessed right whale presence in five locations off the Virginia coast. Researchers used MARUs in two separate deployments to provide acoustic coverage from June 3, 2012, to June 13, 2013. All five of the MARUs detected right whale presence at varying distances from shore: 16, 30, 38, 48, and 63 nautical miles. The results indicate a year-round presence of right whales with peak concentrations occurring from mid-January 2013 through late March 2013. This information is not considered in the PEIS, which assumes a mostly seasonal presence. Moreover, the vast majority of right whale detections occurred outside the bounds of the time-area closure proposed by the Bureau as the preferred alternative mitigation measure in the draft EIS.[10] Therefore, the preferred alternative mitigation measure will not adequately protect endangered right whales.

On December 6, 2013, Oceana and IFAW not only sent Secretary Jewell a letter describing the Cornell study’s findings,[11] but also met with Bureau leadership to discuss re-scoping the draft EIS in light of the relevant scientific information.[12] The Bureau then failed to include the relevant information from the study in the PEIS.

The Bureau had this information but did not consider it in the PEIS. The assumptions under which the PEIS analyzed impacts, proposed alternatives, and adopted mitigation measures are not justified, and therefore the Bureau cannot rationally adopt the preferred alternative in the PEIS for the ROD.[13] Accordingly, it is now necessary for the Bureau to re-scope the issue and alternatives, and develop a new draft EIS for public comment prior to advancing further with the Atlantic seismic exploration program.

II. IN LIGHT OF NEW INFORMATION, THE PREFERRED ALTERNATIVE MITIGATION MEASURE WILL NOT ADEQUATELY PROTECT RIGHT WHALES AND THEREFORE THE PEIS IS INADEQUATE BECAUSE IT LACKS AN ALTERNATIVE WHICH WOULD ADEQUATELY PROTECT RIGHT WHALES.

In light of the information published in the Cornell study, the preferred alternative mitigation measure will not adequately protect right whales, so the PEIS is inadequate because it fails to consider a complete range of alternatives. Under NEPA, EISs must include an analysis of “all

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[10] *See* Bureau of Ocean Energy Mgmt., Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas Final Programmatic Environmental Impact Statement, Vol. I Chapter 2.2.2.1., Expanded Time-Area Closure for North Atlantic Right Whales for Alternative B at 2-36 (2014).
[11] Letter from Oceana and IFAW to Sec’y Sally Jewell, Dep’t of Interior (Dec. 6, 2013) (attached) (Re: Significant New Information Requires a New Programmatic Environmental Impact Statement for Atlantic Geological and Geophysical Activities).
[12] Meeting between Walter Cruickshank, Deputy Director, the Bureau, *et al.*, and Jackie Savitz, Vice Pres., Oceana, *et al.* (Dec. 6, 2013). At this meeting, Bureau staff raised the issue that this study is not yet published; however, we explained that research used in these contexts is normally not published. Since this information is of the type normally relied on by scientists in this context, the Bureau cannot postpone considering this information until after the completion of the PEIS.
[13] 40 C.F.R. § 1502.9.

reasonable alternatives" to the proposed action.[14] The new information published in the Cornell study mentioned above shows a larger spectrum of the potential effects than is included in the PEIS.

Prior to the Cornell study, Alternative B may have seemed to prevent blasts within the temporal and geographic range where whales would be present. However, as discussed above, the Cornell study shows an expanded geographic and temporal range for the presence of whales. On December 6, 2013, Oceana and IFAW sent a letter to, and met with, the Bureau to discuss the Cornell study's findings.[15] However, the findings were not incorporated into the PEIS.

Therefore, the preferred alternative mitigation measure does not offer adequate protection of right whales, because it does not consider the right whales' actual geographic and temporal range. Consequently the PEIS is inadequate because it does not consider a full range of alternatives to mitigate the impacts on right whales. Alternative B can be kept as a mid-range alternative, but a new alternative is needed, that will coincide with the correct temporal and geographic range in which whales will be present. Without a new alternative, the PEIS is fatally flawed, and the Bureau cannot rationally rely on it because the EIS does not contain a full spectrum of alternatives to the project.

When re-developing an adequate PEIS, the Bureau should, at a minimum, expand the time area closures to at least 63 miles, where MARUs recorded significant numbers of right whales. A failure to expand the mitigation measures will needlessly threaten the right whale and will increase the proposed numbers of injuries and disturbances of this critically endangered species.

III. THE BUREAU HAD, BUT DID NOT CONSIDER, INFORMATION ON THE ACOUSTIC THRESHOLDS OF MARINE MAMMALS.

The Bureau had, but did not consider, data on the threshold levels for acoustic activity that harms marine mammals—in other words, data that show the decibel levels at which noise becomes too loud and therefore harmful to marine mammals. An EIS must be based on accurate and complete scientific information.[16] The Bureau relied on outdated information and therefore failed to include years of available scientific data. The new information is important because the data show that the impacts from the sound of seismic testing cover a much larger geographic range than originally thought. A larger geographic range of effects would affect a larger number of marine mammals that are not protected by the preferred alternative mitigation measure and are not considered as affected in the PEIS. By failing to consider available data that the Bureau was (1) given and (2) was aware of because of its incorporation in the Draft Guidance, [17] the Bureau failed to base the PEIS on either accurate or complete scientific information.

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[14] 40 C.F.R. § 1502.14(a).
[15] *See supra* notes 11, 12.
[16] 40 C.F.R. § 1500.1(b).
[17] *See* NOAA, *NOAA's Marine Mammal Acoustic Guidance, available at*: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm

On July 2, 2012, Oceana and other parties informed the Bureau of the inadequacy of the acoustic threshold data used in the draft EIS.[18] Our communication included dozens of studies concerning acoustic-threshold data that should have been included in the draft EIS.[19] On January 8, 2014, four members of the U.S. House of Representatives sent a letter to the Department of the Interior ("Interior") urging the agency to use the best available acoustic-threshold data before approving any seismic activity.[20] On February 20, 2014, a coalition of 102 scientists sent President Obama a letter urging that the best available science be used for acoustic-threshold data before permitting seismic surveys in the Atlantic.[21] On February 26, 2014, nine members of the U.S. Senate sent a letter to Interior urging the agency to use the best available science for acoustic-threshold data in the PEIS.[22] Despite several notifications of the updated scientific information available, the Bureau failed to consider the current data. Moreover, the Bureau must have been aware of the data because the Service used this data while formulating the new Draft Guidance. In order to accurately assess the scope of marine mammal impacts from proposed seismic airgun surveys, the Service must include all relevant scientific data.

IV. THE BUREAU HAD, BUT DID NOT CONSIDER, INFORMATION REGARDING THE POSSIBILITY OF LEVEL B TAKES CAUSING MASS MORTALITY EVENTS AND OTHER SERIOUS INJURIES.

The Bureau had, but did not consider, information regarding the potential of Level B takes to cause mass mortality events. An EIS must be based on accurate and complete scientific information.[23] The Bureau had, but failed to include, data from a mass mortality event in Madagascar. Therefore, the Bureau did not base the PEIS on either accurate or high quality scientific information.

The high number of Level B takes authorized in the PEIS requires the Bureau to address the severity of the impacts that Level B takes can have, particularly when examining an AOI that contains six species of endangered cetaceans. Level B takes, or disturbances in behavior, have indirect effects, such as behavior alterations, that can change the dynamics of a population and influence stock size.

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[18] Oceana, *et al.*, Comments on the Draft PEIS for Atlantic G&G Activities at 37-45 (July 2, 2012) (attached).
[19] *See id.*
[20] Letter from Rep. Peter DeFazio, Rep. Frank Pallone, Jr., Rep. Rush Hold, Rep. Joe Carcia to Sec'y Sally Jewell, Dep't of the Interior (Jan. 8, 2014) (attached) (Letter concerning the impacts of offsore oil and gas exploration and development activities on living marine resources).
[21] Letter from Matthew Huelsenbeck, *et al.*, to Pres. Obama (Feb. 20, 2014) (attached) (Re: Use the Best Available Science before Permitting Seismic Surveys for Offshore Oil and Gas in the Mid- and South-Atlantic).
[22] Letter from Sen. Cory Booker, Sen. Edward Markey, Sen. Brian Schatz, Sen. Maria Cantwell, Sen. Barbara Mikulski, Sen. Sheldon Whitehouse, Sen. Robert Menendez, Sen. Benjamin Cardin, Sen. Barbara Boxer to Sec'y Sally Jewell, Dep't of the Interior (Feb. 26, 2014) (attached) (Letter concerning the PEIS on seismic airgun testing for offshore oil and gas exploration in the Atlantic Ocean.
[23] 40 C.F.R. § 1500.1(b).

One example of the potential for deadly impacts from Level B takes is the stranding of over 75 melon-headed whales off the coast of Madagascar. An Independent Scientific Review Panel (ISRP) examined the conditions surrounding this stranding to determine plausible cause for the unusual events. This scientific expert panel concluded that the most plausible explanation was the use of a multibeam echosounder, another technology that causes acoustic disturbance in the marine environment.[24] The use of this echosounder caused the melon headed whales to divert from their original location, to a bay farther inshore, otherwise known as a behavioral disturbance or Level B take. This diversion caused the whales to enter shallow water, which led to a mass stranding, followed by emaciation, dehydration, and eventually death. This study is a primary example of how Level B takes, or a simple behavioral disturbance, can ultimately lead to harm greater than a Level B take. Two additional instances of airgun use have been linked to beaked whale strandings in the Gulf of California and the Galapagos. While no scientific report was published as in the Madagascar study, U.S. courts required the seismic activity to stop until further investigation was completed.[25,26] Especially when considering endangered populations, mortalities of this magnitude can have serious population-level consequences.

Additionally, there are other studies of marine mammal populations that examine the effects of behavioral disturbance on survival of marine mammals as well as the possible consequences for population levels. One study of behavioral disturbance to a fin whale pod found that seismic activity caused a migratory diversion. This is classified as a Level B take although it is thought to have implications for the breeding season and fecundity of this population, as it may have caused them to lose a year of calves.[27] Literature reviews of the effects of seismic surveys have found potential serious long-term consequences due to chronic exposure to seismic activity. These reviews have also found that populations can be adversely affected by the behavioral disturbances that constitute a Level B take, such as alteration of feeding, orientation, hazard avoidance, migration or social behavior.[28]

On January 8, 2014, four members of the U.S. House of Representatives sent a letter to the Bureau informing the agency of the mass stranding event in Madagascar and the study that

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[24] 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.
[25] Malakoff, D. 2003. Suit ties whale deaths to research cruise. Science 298: 722-723.
[26] Gentry, R.L. 2002. Mass Stranding of Beaked Whales in the Galapagos Islands, April 2000. http://www.nmfs.noaa.gov/prot_res/PR2/Health_and_Stranding_Response_Program/Mass_Galapagos_Islands.htm.
[27] Castellote, M., Clark, C. W., and Lammers, M. O. 2010. Potential negative effects in the reproduction and survival on fin whales (Balaenoptera physalus) by shipping and airgun noise. Int. Whal. Comm. Working Pap. SC/62 E, 3.
[28] Gordon, J.C.D., Gillespie, G., Potter, J., Frantzis, A., Simmonds, M.P., Swift, R., Thompson, D. 2003. A review of the effects of seismic survey on marine mammals. Marine Technology Society Journal 37(4): 14-32.

connected the strandings to seismic activity.[29] Despite being aware of the information, the Bureau failed to include the information in the PEIS.

V. THE BASELINE AGAINST WHICH THE BUREAU MEASURED ENVIRONMENTAL IMPACTS IS INACCURATE FOR SEVERAL REASONS, CAUSING A FATAL FLAW IN THE PEIS ANALYSIS OF ENVIRONMENTAL IMPACTS.

The baseline against which the Bureau measured environmental impacts is inaccurate for several reasons. The baseline is inaccurate because (1) the Bureau relied on outdated stock assessments; (2) the Bureau did not consider the unusual mortality event ("UME") occurring for bottlenose dolphins in the Atlantic; (3) the Bureau did not consider the impacts of Hurricane Sandy; and (4) the Bureau did not consider the impacts of the 2010 British Petroleum ("B.P.") oil-spill disaster in the Gulf of Mexico.

Before the Bureau can claim that the impacts of the proposed G&G activities will have a moderate, rather than major, impact on marine mammals, the Bureau must use updated population information and complete baseline data. The Marine Mammal Protection Act ("MMPA") requires that marine-mammal stocks be assessed every five years; however 80 percent of marine mammal stocks in U.S. Atlantic waters have not been assessed in the past five years. Of the 46 stocks that have not been recently assessed, two are considered endangered under the Endangered Species Act ("ESA"), and five are considered depleted under the MMPA.[30] This stock abundance information must be updated if it is to form the baseline data used by the Bureau to determine possible population effects of seismic activity in the Atlantic.

Furthermore, this baseline data does not take into account the UME that occurred along the Atlantic coast. Beginning in 2013, the Service designated a UME for bottlenose dolphins in the Mid-Atlantic ranging from New York to Florida.[31] Bottlenose dolphins are estimated to be killed or injured in large numbers during this seismic activity, but the PEIS does not address the unusual mortality event and the population level effects this may have. As the mortality event is so recent, it has not yet been incorporated into the Service population data, which again invalidates the underlying baseline population estimates, particularly for bottlenose dolphins.

In addition, the Bureau did not consider the impacts of Hurricane Sandy in determining the baseline, as urged by a coalition of parties in a December 3, 2012, letter to Interior.[32] Finally, the

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[29] Letter from Rep. Peter DeFazio, *et al.*, at 2.
[30] Waring, G.T., Josephson, E., Maze-Foley, K., and Rosel, P.E. 2013. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments: 2012. U.S. Department of Commerce, NOAA Technical Memorandum p. 419.
[31] "2013-2014 Bottlenose Dolphin Unusual Mortality Event in the Mid-Atlantic". NOAA Fisheries. 25 March 2014, *available at*: http://www.nmfs.noaa.gov/pr/health/mmume/midatldolphins2013.html
[32] Letter from Clean Ocean Action, *et al.*, to Sec'y Ken Salazar, Department of Interior (Dec. 3, 2012) (attached) (Re: Request for Postponement of Proposed Geological and Geophysical Survey Decisions for Atlantic Ocean Offshore Oil and Gas Energy Development).

Bureau did not consider the impacts of the 2010 B.P. oil-spill disaster, as urged by four members of the U.S. House of Representatives in a January 8, 2014, letter to Interior.[33]

Under CEQ regulations, any agency must explain when necessary information is missing or incomplete.[34] If the missing or unavailable information is "essential," then the agency must include the information in the EIS.[35] However, if the costs of obtaining the information "are exorbitant or the means to obtain it are not known,"[36] the agency must: (1) state that the information is unavailable or incomplete; (2) state the relevance of the information to the impacts discussed in the EIS; (3) summarize the relevant, existing scientific evidence; and (4) evaluate the impacts based on generally accepted theoretical approaches or methods.[37]

The Bureau failed to include data from a current stock assessment, the UME, Hurricane Sandy, and the B.P. disaster, all of which are essential to the PEIS's baseline. Because that information is essential, the Bureau must include it in the PEIS, or follow the four steps listed just above, either of which the Bureau failed to do in the PEIS. Therefore the Bureau cannot rationally adopt the preferred alternative in the PEIS. Basic population assessments for marine mammal stocks in the Atlantic must be updated before the Bureau can accurately analyze potential impacts of seismic activity on these populations.

VI. THE BUREAU FAILED TO TAKE A HARD LOOK AT THE ENVIRONMENTAL IMPACTS ON ESSENTIAL FISH HABITATS (EFH).

The Bureau failed to take a hard look at the impacts on EFH. Agencies must take a "hard look" at environmental impacts "likely to result" from the action considered.[38] The Bureau must take a hard look at impacts to EFH, as well as the commercial fisheries that rely on these managed species.[39] The PEIS merely states that impacts from active acoustic sound sources, such as airguns, would range from minor to moderate.[40]

The available science states that acoustic disturbances of the same magnitude as acoustic surveys can cause physical damage, and disrupt essential behaviors necessary for life functions of fish stocks. Research described below indicates that seismic surveys, and other anthropogenic noises at similar intensities, can impact fish physiology as well as behavior. One study found that direct

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[33] Letter from Rep. Peter DeFazio, *et al.*, at 2, 3.
[34] 40 C.F.R. § 1502.22.
[35] *Id*. at (a).
[36] *Id.* at (b).
[37] *Id*. at (b)(1).
[38] *Town of Orangetown v. Gorsuch*, 718 F.2d 29, 35 (2d Cir. 1983), *cert. denied*, 465 U.S. 1099 (1984).
[39] As discussed in Section VII, part of taking a hard look is consulting with the Service regarding "any" action "that may affect EFH." 50 C.F.R. § 600.920(a)(1).
[40] *See* Bureau of Ocean Energy Mgmt., Atlantic Outer Continental Shelf Proposed Geologic and Geophysical Activities Mid and South Atlantic Planning Areas Draft Programmatic EIS, Vol I. Table 2-4, Comparison of Impact Levels for Alternatives A,B, and C at Tables-11 (2014).

mortality from seismic airguns is limited, in some species, to a range of 5 meters from airguns. [41] This same study notes that seismic surveys should be avoided in areas of spawning or fish migration.[42] Additional studies show that fish exposed to airguns from geological survey exhibit damaged sensory epithelia, with no evidence of repair two months after seismic airgun exposure.[43] Physical damage from airguns must be assessed in the context of potential population level effects.

Acoustic impacts detailed in the literature can affect important fish behaviors. There can be economic consequences to these changes in behavior. For example, one study found a 50% reduction in catch of haddock and cod using longlines and trawls in the area of seismic blasting, with significant effects noted over the entire study area of 40 x 40 nautical miles.[44] Rockfish studies showed CPUE decline by over 50% on average in areas of geophysical surveys with economic losses averaging 49%.[45] Slotte *et al.* illustrate that the large-scale distribution of both herring and blue whiting systematically showed lower abundances after periods of seismic activity.[46] While there is little data available for commercially important species that are not finfish, captive squid showed a strong startle response to nearby air-gun start up and evidence suggests that they would significantly alter their behavior at an estimated 2-5 km from an approaching large seismic source.[47] These behavioral impacts are not addressed in this EIS, and there is no mention of potential population-level effects that could emerge due to repeated behavioral alterations. Qualitative categorization of impacts encompassing such a broad range of impacts from minor to moderate is insufficient detail to satisfy the requirements of NEPA regarding authorization of activities that can be potentially harmful to EFH.

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[41] Dalen, J., and Knutsen, G. M. 1987. Scaring effects in fish and harmful effects on eggs, larvae and fry by offshore seismic explorations. *Progress in Underwater Acoustics*: 93-102. Springer US.

[42] Dalen, J., and Knutsen, G. M. 1987. Scaring effects in fish and harmful effects on eggs, larvae and fry by offshore seismic explorations. *Progress in Underwater Acoustics*: 93-102. Springer US.

[43] McCauley, R., Fewtrell, J., and Popper, A.N. 2003. High intensity anthropogenic sound damages fish ears. *Journal of the Acoustical Society of America* 113: 638-642.

[44] Engås, A., Løkkeborg, S., Ona, E., & Soldal, A. V. 1996. Effects of seismic shooting on local abundance and catch rates of cod ((*Gadus morhua*) and haddock)(*Melanogrammus aeglefinus*). *Canadian Journal of Fisheries and Aquatic Sciences* 53(10): 2238-2249.

[45] Skalski, J. R., Pearson, W. H., & Malme, C. I. 1992. Effects of sounds from a geophysical survey device on catch-per-unit-effort in a hook-and-line fishery for rockfish (*Sebastes* spp.). *Canadian Journal of Fisheries and Aquatic Science* 49(7): 1357-1365.

[46] Slotte, A., Hansen, K., Dalen, J., & Ona, E. 2004. Acoustic mapping of pelagic fish distribution and abundance in relation to a seismic shooting area off the Norwegian west coast. *Fisheries Research* 67(2): 143-150.

[47] McCauley, R., Duncan, A., Penrose, J., & McCabe, K. 2003. Marine seismic surveys: analysis and propagation of air-gun signals; and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid.

VII. CONCLUSIONS

In sum, the Bureau should not move forward with permitting seismic activity off of the Mid- and South-Atlantic coasts. The PEIS is fatally flawed, and therefore the Bureau cannot rationally adopt the preferred alternative in the ROD, nor can it commence the proposed activity. In order to proceed with G&G activities in the OCS waters of the Atlantic coast, the Bureau must first develop an adequate PEIS that considers the best available science, analyzes a full spectrum of reasonable and feasible alternatives, and takes a hard look at the impacts. We appreciate the opportunity to provide input and thank you for your time. We will continue to be engaged in this process moving forward.

Sincerely,

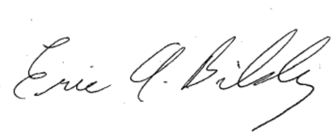

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EXHIBIT 8

MARINE MAMMAL COMMISSION

2 July 2012

Mr. Gary D. Goecke
Chief, Regional Assessment Section
Office of the Environment
Gulf of Mexico Outer Continental Shelf Region
Bureau of Ocean Energy Management
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Dear Mr. Goecke:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed (1) the Bureau of Ocean Energy Management's Draft Programmatic Environmental Impact Statement on Geological and Geophysical Exploration of the Atlantic Outer Continental Shelf and (2) the associated 30 March 2012 notice (77 Fed. Reg. 19321) seeking comments. The Commission provides the following recommendations and rationale.

RECOMMENDATIONS

The Marine Mammal Commission recommends that the Bureau of Ocean Energy Management—

- select alternative B as its preferred alternative;
- amend alternative B to 1) expand the geographic boundary of the time-area restriction on airgun seismic surveys to all coastal waters out to 55 km from shore and 2) require passive acoustic monitoring to detect nearby vocalizing marine mammals for all active acoustic surveys that have the potential to take marine mammals by harassment, including high resolution geophysical surveys;
- add an analysis of the direct and indirect economic costs of implementing each alternative, describe the criteria the Bureau will use to select a preferred alternative, and add an additional comment period so that the public is able to review and judge that material and comment on it;
- increase its efforts to maximize the utility of seismic data while minimizing the number and impacts of new seismic studies, using suggested strategies described below;
- include in its final environmental impact statement an alternative that, as part of the permitting process, would promote the further development, testing, and use of alternative, less harmful technologies to collect the required geophysical information;
- work with other agencies with related responsibilities, the oil and gas industry, scientists, conservation organizations, and other stakeholders to develop standards for baseline data collection and ensure the availability of adequate baseline information before moving forward with the proposed geological and geophysical surveys;
- provide confidence limits and sources of potential bias associated with the density and take estimates that were calculated for each species;

- use the 120-dB re 1 μPa threshold to recalculate the Level B harassment zone and associate takes for the use of shallow-penetration sub-bottom profilers and other non-impulsive sound sources;
- include in its calculation of estimated takes an assessment of all potential sound sources associated with geological and geophysical surveys, including exploratory drilling and vessel sounds;
- require, as a term and condition for issuing a geological and geophysical permit, that applicants obtain authorization under section 101(a)(5)(A) or (D) of the Marine Mammal Protection Act to take small numbers of marine mammals incidental to those activities; such approval should also stipulate minimum requirements for mitigation, monitoring, and reporting, as outlined in Appendix C of the draft document;
- use the mitigation measures proposed for seismic airgun surveys (i.e., the seismic airgun survey protocol) as minimal mitigation measures for all high-resolution geophysical surveys and other sounds that have the potential to take marine mammals by Level A or Level B harassment;
- develop comprehensive, standardized monitoring protocols for assessing the effects of geological and geophysical surveys and associated activities on marine mammals;
- prepare annual summaries of marine mammal observer reports, including an analysis of the frequency and outcome of all marine mammal-vessel interactions;
- require that all operators report immediately to the National Marine Fisheries Service and the local marine mammal stranding network all injured and dead marine mammals in the vicinity of the proposed surveys, and suspend those activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh dead carcass is found); and
- revise its cumulative effects analysis to provide a more rigorous and comprehensive assessment of the full impacts of sound and other human-caused and natural activities that affect marine resources in the proposed action area.

Analysis of alternatives

The draft programmatic environmental impact statement evaluates the potential environmental impacts of geological and geophysical surveys in state and federal waters of the South and Mid-Atlantic planning areas of the outer continental shelf and adjacent high seas out to 350 nmi (648 km). The surveys would support oil and gas, renewable energy, and marine minerals exploration and development from 2012 to 2020.

The statement evaluates two action alternatives. Both include mitigation and monitoring measures to avoid, reduce, or minimize impacts on protected species, including marine mammals. They include—

1) time-area restrictions on airgun surveys within the Mid-Atlantic and Southeast Seasonal Management Areas designated under 50 CFR 224.105 when vessel speeds are restricted
2) (1 November to 1 April for the mid-Atlantic and 15 November to 15 April for the southeast);
3) ramp-up, start-up, and shut-down procedures for seismic airgun surveys and at least two protected species observers on duty at all times to monitor the exclusion zone, the radius of which would be determined on a survey-specific basis but in any case would not be less than 500 m;
4) no initiation of ramp-up at night or in poor visibility conditions if the minimum source level drops below 160 dB re 1 µPa-m (rms); maintaining a minimum source level of 160 dB re 1 µPa-m (rms) to avoid visual clearance of the exclusion zone prior to ramp-up would only be authorized under certain situations (e.g., turning, airgun maintenance);
5) start-up and shut-down procedures for acoustic sources used in high resolution geophysical surveys operating at a frequency less than 200 kHz and the use of at least one protected species observer on duty at all times to monitor a minimum 200-m exclusion zone (larger exclusion zones may be established where necessary);
6) the optional use of passive acoustic monitoring to detect vocalizing marine mammals;
7) training of observers in statutory and regulatory requirements, protected species identification, data collection, and reporting of marine mammals in the exclusion zone;
8) guidance to vessel operators on vessel strike avoidance, marine debris awareness, and prevention of discharges into the marine environment;
9) reporting and protection of suspected historic and prehistoric archaeological resources;
10) avoidance of sensitive benthic communities;
11) minimizing impacts on National Marine Sanctuary resources and users; and
12) coordination of all permitted activities with activities of the military and the National Aeronautics and Space Administration.

Alternative B

Alternative B would provide more protection for marine mammals. In addition to the above, alternative B would (1) expand the time-area restrictions for airgun surveys to include all coastal waters from Cape Canaveral to Delaware Bay out to 20 nmi offshore, (2) add a sea turtle time-area restriction for airgun surveys in waters offshore Brevard County, Florida, during the nesting season, (3) require seismic operators to use passive acoustic monitoring for all seismic airgun surveys, and (4) maintain a minimum of 40-km between vessels that are conducting simultaneous deep penetration seismic surveys.

The continuous time-area restrictions along the east coast would protect breeding and migrating right whales as well as other cetaceans in near-coastal waters (e.g., bottlenose dolphins, common dolphins, white-sided dolphins, spotted dolphins, harbor porpoise, and humpback whales). However, the Commission believes that the proposed corridor is too narrow and should be expanded from 37 km (20 nmi) to 55 km (30 nmi) offshore. Prior to issuing its 2008 regulations to reduce whale-vessel collisions (73 Fed. Reg. 60173), the National Marine Fisheries Service had proposed a protective corridor out to 55.6 km (71 Fed. Reg. 36299). The width of the area was reduced based on potential economic impacts on shipping, even though it reduced protection for right whales. Since then, Schick et al. (2009) have confirmed that migrating right whales occur at least 55 km and as far as 200 km offshore in the mid-Atlantic. Hence, in the Commission's view, the area that would be restricted under alternative B likely would not provide adequate protection for migrating whales.

The 40-km spacing requirement for vessels conducting simultaneous deep penetration airgun surveys is intended to prevent the merger of two ensonified areas to create a single, much larger obstacle to migration. The use of passive acoustic monitoring would provide additional assurance that marine mammals in the area would be detected and shut-down procedures implemented as appropriate. It also would provide a more accurate estimate of the number of animals exposed to airgun noise. This technology already is required for certain seismic surveys in the Gulf of Mexico and the Arctic, and recent advances have improved its use for detecting, classifying, and localizing marine mammals using open-source software (e.g., PAMGUARD). The Commission has commented often on the limited effectiveness of visual observations and believes that passive acoustic monitoring should be used during all surveys with active sound sources that may take marine mammals, including high resolution geophysical surveys.

Because it provides greater protection for marine mammals, including the highly endangered North Atlantic right whale, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management select alternative B as its preferred alternative. The Commission further recommends that the Bureau amend alternative B to 1) expand the geographic boundary of the time-area restriction on airgun seismic surveys to all coastal waters out to 55 km from shore and 2) require passive acoustic monitoring to detect nearby vocalizing marine mammals for all active acoustic surveys that have the potential to take marine mammals by harassment, including high resolution geophysical surveys.

The Bureau has stated that the additional mitigation measures proposed under alternative B would add direct and indirect economic costs to the industry, and that the Bureau wishes to review the totality of the record generated by the programmatic environmental impact statement in the public review period to assist in identifying its preferred alternative. However, the information the Bureau is reviewing is not clear because it did not describe the direct and indirect economic costs associated with each alternative. The omission of economic information is inconsistent with the Bureau's regulations implementing the National Environmental Policy Act, which state that the preferred alternative is the alternative the Bureau believes would "best accomplish the purpose and need of the proposed action while fulfilling its statutory mission and responsibilities, giving consideration to *economic*, environmental, technical, and other factors" (emphasis added) (43 CFR § 46.420). The Marine Mammal Commission therefore recommends that the Bureau of Ocean Energy Management add an analysis of the direct and indirect economic costs of implementing each alternative, describe the criteria the Bureau will use to select a preferred alternative, and add an additional comment period so that the public is able to review and judge that material and comment on it.

Reducing the potential for redundant seismic surveys

At least 38 marine mammal species occur in the North Atlantic during all or part of the year (Waring et al. 2011). The area of interest for the proposed surveys includes a wide range of marine mammal habitats. The surveys would involve the use of seismic airguns that emit high energy, low frequency acoustic pulses that travel long distances and may disrupt important marine mammal behaviors (i.e., feeding, resting, migrating, breeding, calving) and—at close range—can cause physical or physiological injury (Gordon et al. 2004). The noise also can mask biologically important sounds, such as communication calls between conspecifics (Richardson et al. 1995). Baleen whales (right, humpback, fin, blue, and minke whales) are the most likely to be affected by the proposed activities because of their sensitivity to low frequency sounds, whereas other cetaceans could be adversely affected if close enough to the sound source.

The Bureau has received nine applications for geological and geophysical activities in the Atlantic. Eight of those have proposed two-dimensional seismic surveys in some or all of the area of interest to identify potential oil and gas reserves. The projected two-dimensional seismic activity in the south and mid-Atlantic for 2012 to 2020 exceeds the total level of seismic survey activity documented for the entire Atlantic from 1968 to 2005 (Minerals Management Service 2007). If seismic activities proceed as projected, the potential for multiple surveys of the same areas by different applicants is considerable (Figure E-19, page E-59)—especially during 2013 and 2014, the two years of highest projected seismic survey activity.

Conducting multiple seismic surveys of the same area will increase risks to marine mammals and marine ecosystems unnecessarily with no meaningful gain in information. Permitting unnecessarily duplicative surveys is contrary to the charge of balancing orderly resource development with protection of the human, marine, and coastal environments, as directed by the Outer Continental Shelf Lands Act of 1953 (43 U.S.C. 1331 et seq.), as amended. The Bureau stated that they considered coordinating and consolidating seismic surveys to eliminate duplication of survey effort but rejected this approach because the vessel spacing requirements of alternative B would limit concurrent surveys. The Commission agrees that alternative B would prohibit concurrent overlapping or immediately adjacent surveys, but it would not prevent two or more operators from conducting multiple, unnecessarily redundant seismic surveys of the same area at a different time of year or in subsequent years.

As the permitting authority for companies that conduct geological or geophysical exploration of the Outer Continental Shelf, the Bureau is responsible under the National Environmental Policy Act to identify and evaluate alternatives that avoid unnecessary adverse impacts on the environment. The Bureau also must ensure that permitted activities are compliant with the provisions of other federal laws, including the requirement under the Marine Mammal Protection Act that any permitted taking of marine mammals have a negligible and least practicable impact on the affected marine mammal species or stocks.

The Bureau's analysis of existing seismic survey data provides a comprehensive assessment of undiscovered technically recoverable oil and gas resources in the Atlantic (Post et al. 2012).

Rather than re-survey large areas of the Atlantic for which two-dimensional seismic surveys already exist, or conduct multiple overlapping surveys of the same areas, the Bureau should require the oil and gas industry to make the most use of existing, publicly available seismic data. The Bureau also should provide broader access to seismic data that has been collected but that may not yet be in the public domain. This could help to focus and restrict the scope of future surveys to areas that show the most promise for oil and gas development, especially considering that oil and gas resources in the south and mid-Atlantic are expected to be relatively small (Bureau of Ocean Energy Management 2011, Post et al. 2012). The Bureau also should encourage companies that are engaged in or interested in acquiring seismic data in the same areas to collaborate on data collection to limit the number of surveys that are required.

The Commission has emphasized the need to minimize redundant seismic surveys in the Gulf of Mexico and the Arctic. The Bureau has considered methods to achieve that objective under the current regulatory framework, but the Commission believes more could be done. To that end, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management increase its efforts to maximize the utility of seismic data while minimizing the number and impacts of new seismic studies. Steps that could be taken include—

- analyzing fully all existing, publicly available seismic data;
- encouraging industry to release seismic data that is not yet in the public domain;
- collaborating on seismic surveys in areas of common interest;
- limiting the geographic scope, frequency, sound output, and/or duration of surveys that occur in any given year, especially in preferred marine mammal habitat areas;
- having the Bureau conduct seismic surveys and making them available to the industry for a fee;
- auctioning the right to conduct seismic surveys in certain planning areas or blocks; and
- providing tax or other incentives to companies that use alternative, less harmful technologies for the collection of seismic data.

Clearly, the Bureau will need to engage the industry in identifying the best ways to move forward, but the Bureau will have to provide the leadership and retain decision-making authority to ensure the necessary progress.

Alternatives to airguns

As noted previously, sound from seismic airguns poses a number of risks to marine mammals. In its draft environmental impact statement the Bureau discussed several alternative (i.e., non-airgun) technologies including the use of marine vibrators (vibroseis), low-frequency acoustic sources, deep-towed acoustics/geophysics systems, low-frequency passive acoustic systems, and controlled source electromagnetic systems. Some may have the potential to replace airguns, but all are still in various stages of development and not yet commercially available for use on the scale considered in the proposed action. For that reason, the Bureau rejected an alternative that would have prohibited the use of seismic airguns.

Rather than immediately prohibiting airguns, the Bureau should seek an orderly transition by industry from airguns to alternative technologies. In addition to time, such a transition undoubtedly will require permitting incentives and additional research investments. But unless the Bureau steps forward and facilitates a transition to new, less harmful technologies, the development and use of those technologies will be stalled.

Marine vibroseis is a particularly promising and potentially less harmful alternative to airguns for collecting subsurface geophysical data (Weilgart 2010). The draft environmental impact statement indicates that it could be commercially viable within two to four years with additional investment in design and testing. This is well within the nine-year timeframe considered for the proposed action. Controlled source electromagnetic technology also provides an alternative to seismic airguns for characterizing oil and gas resources identified using traditional airgun surveys. That technology already has been used in Norway to direct three-dimensional surveys toward the most prospective oil and gas areas prior to drilling (pers. comm. D. Ridyard, EMGS).

Given the need for and potential of alternative technologies to replace or minimize the use of airguns, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management include in its final environmental impact statement an alternative that, as part of the permitting process, would promote the further development, testing, and use of alternative, less harmful technologies to collect the required geophysical information.

Baseline information

A thorough evaluation of the potential impacts of geophysical surveys and related vessel activities on marine mammals and their habitats depends on the availability of good baseline information. That information is essential to inform efforts to identify and avoid potential harmful interactions with sensitive populations (e.g., those listed as threatened or endangered under the Endangered Species Act or depleted under the Marine Mammal Protection Act) and to minimize impacts on particularly sensitive areas (e.g., marine protected areas, national monuments, essential fish habitats, designated critical habitats, and biological hotspots or areas of particular biological richness). It also should be collected at temporal and spatial scales necessary to characterize the variability inherent in the affected ecosystem. For potentially affected marine mammals, the necessary information includes their stock structure, population status, abundance and trends, distribution and seasonal movements, habitat use patterns, and trophic relationships. For example, additional baseline data regarding migrating North Atlantic right whales could be collected using tagging or aerial surveys to assess their movement patterns (e.g., their distance from shore at different times of the year).

The Bureau has acknowledged that baseline information is lacking for many marine mammals in the area of interest. However, the Bureau has concluded that the cost of acquiring such information would be exorbitant and such information could not be collected in time to evaluate the impacts of the proposed action. The Commission agrees that the collection of comprehensive baseline information requires a long-term and consistent commitment of effort and resources, and that federal funding for such studies has been limited. Nevertheless, such information is needed to inform decision-makers regarding whether, where, and under what conditions to conduct activities that could have acute or long-term adverse effects on marine mammals and other marine species. In addition, the Commission does not consider the cost of collecting such information to be exorbitant, particularly when viewed in the context of the billions of dollars involved in oil and gas development. In any given year, the total funding for marine mammal research and conservation is on the order of 200 million dollars or less. At the same time, the annual profits of some individual oil companies are in the tens of billions of dollars. Furthermore, the failure to invest in the necessary studies undermines our professed intent to manage our marine resources on the basis of sound science.

The Commission has long argued that the industry and regulatory agencies have a responsibility to ensure that the research needed to manage resource use is conducted in a timely and comprehensive manner. The Bureau's Environmental Studies Program, in collaboration with other federal agencies, has committed to providing multi-year funding to the National Marine Fisheries Service for the Atlantic Marine Assessment Program for Protected Species. That program is supporting a broad-scale, multi-year data collection of abundance and seasonal distribution data for marine mammals and other wildlife in the area of interest for geological and geophysical surveys. The Commission commends that joint effort as it will improve the quality of baseline information needed for assessments of marine mammal stocks. For that reason, it should continue to be a high priority for the Bureau. However, as noted by the Bureau, the resources provided still fall short of what is needed. The Commission believes that the Bureau and the industry need to find additional means of supporting essential research. The industry, in particular, should provide multi-year financial support for stock assessment surveys and stock structure research in areas where seismic surveys are proposed because the risks to marine mammals stem from their activities. The industry should consider efforts to address and manage these risks responsibly as a cost of doing business.

The development of a rigorous program to collect baseline information in the Atlantic, especially in advance of any future leasing activities, is well within existing scientific capacity and would require only a very small fraction of the total cost of developing energy resources in this region. A long-term and consistent investment in baseline data collection would ensure that the decisions regarding proposed survey activities are guided by the best available scientific information. For those reasons, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management work with other agencies with related responsibilities, the oil and gas industry, scientists, conservation organizations, and other stakeholders to develop standards for baseline data collection and to ensure the availability of adequate baseline information before moving forward with the proposed geological and geophysical surveys.

Estimating takes

The data used to estimate takes of marine mammals in the area of interest is based on incomplete or outdated stock assessment surveys. The Bureau used density estimates derived from limited shipboard surveys conducted between 1994 and 2006 by the National Marine Fisheries Service. The density estimates were then extrapolated to other areas for which density estimates were not available, including areas beyond the exclusive economic zone. As a result, the reliability of the density estimates is uncertain, as are the resulting take estimates. In addition, the uncertainty has not been quantified and hence is not available and apparent to decision-makers. To better convey the uncertainty or reliability of the density and take estimates used in the draft environmental impact statement, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management provide confidence limits and sources of potential bias associated with the density and take estimates that were calculated for each species.

The Bureau used 160 dB re 1 μPa (rms) as the behavioral disturbance criteria for the calculation of Level B incidental takes from all sound sources, pulse and non-pulse. Although 160 dB re 1 μPa (rms) is appropriate for pulse signals, such as airguns, it is not appropriate for non-impulsive sound sources, such as chirp (shallow penetration) sub-bottom profilers. The National Marine Fisheries Service recently clarified that for non-impulsive sound sources, whether continuous or intermittent, Level B harassment is presumed to begin at received levels of 120 dB re 1 μPa (76 Fed. Reg. 43639). Consistent with that guidance, the Level B harassment zone should be calculated based on that threshold rather than 160 dB re 1 μPa. To address this concern, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management use the 120-dB re 1 μPa threshold to recalculate the Level B harassment zone and associate takes for the use of shallow-penetration sub-bottom profilers and other non-impulsive sound sources.

The Bureau also noted that certain activities (e.g., drilling of deep stratigraphic or shallow test wells, geotechnical bottom sampling for renewable energy site characterization) would generate continuous sounds associated with the drilling rig or the support vessel's dynamic positioning thrusters. However, the Bureau did not include those sound sources in its modeling or calculation of take estimates. To address this shortcoming, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management include in its calculation of estimated takes an assessment of all potential sound sources associated with geological and geophysical surveys, including exploratory drilling and vessel sounds.

Mitigation, monitoring, and reporting measures

Seismic airgun and high resolution geophysical surveys both use active sound sources that have the potential to take marine mammals by Level A or Level B harassment, as defined under the Marine Mammal Protection Act. Operators conducting those surveys are required to seek authorization under section 101(a)(5)(A) or (D) of the Marine Mammal Protection Act to take small numbers of marine mammals incidental to those activities. In the case of cetaceans and pinnipeds, authorization is to be sought from the National Marine Fisheries Service and, in the case of manatees, from the Fish and Wildlife Service. The Bureau has not been consistent in its guidance to applicants regarding compliance with the Marine Mammal Protection Act, and this has led to confusion and litigation. To avoid confusion for applicants seeking permits to conduct geological and geophysical surveys in the south and mid-Atlantic, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management require, as a term and condition for issuing a geological and geophysical permit, that applicants obtain authorization under section 101(a)(5)(A) or (D) of the Marine Mammal Protection Act to take small numbers of marine mammals incidental to those activities; such approval should also stipulate minimum requirements for mitigation, monitoring, and reporting, as outlined in Appendix C of the draft document.

The Bureau has proposed that the exclusion zone for each survey would be determined on a survey-specific basis, but in any case would not be less than 500 m for airgun seismic surveys and 200 m for high-resolution geophysical surveys. The Commission has previously commented on the need to obtain in-situ sound propagation measurements to calculate survey-specific exclusion zones, and commends the Bureau for including that provision in its proposed mitigation measures for both airgun surveys and high-resolution geophysical surveys.

As seismic airgun and high-resolution geophysical surveys both use active sound sources that have the potential to take marine mammals by Level A or Level B harassment, it is unclear why the Bureau has proposed different mitigation measures for the two types of surveys. The survey protocols proposed for high resolution geophysical surveys are inconsistent with those proposed by Cape Wind Associates for geophysical surveys, which included the use of ramp-up procedures, multiple observers, and a minimum 500-m exclusion zone. The Commission believes that the mitigation measures proposed for airgun surveys, including the use of passive acoustic monitoring as identified under alternative B and expanded to include also monitoring of high-resolution geophysical surveys, are minimal requirements for all surveys involving active sound sources. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management use the mitigation measures proposed for seismic airgun surveys (i.e., the seismic airgun survey protocol) as minimal mitigation measures for all high-resolution geophysical surveys and other sounds that have the potential to take marine mammals by Level A or Level B harassment.

Rigorous monitoring is needed to assess the effectiveness of mitigation measures and to determine the effects of survey activities on marine mammals at different times and in different locations. Such effects often are assessed by measuring changes from baseline conditions. The monitoring program should follow hypothesis-driven, standardized protocols for data collection to facilitate consistency in data collection and analysis, whether by industry, government, or contracted researchers. Monitoring protocols should be rigorous enough to detect effects caused by specific survey activities or other key anthropogenic or natural events that may be occurring at the same time in the project area. Figure 1 represents a conceptual framework that could be used to guide the development of monitoring protocols (adapted from MMC 2011). For that purpose, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management develop comprehensive, standardized monitoring protocols for assessing the effects of geological and geophysical surveys and associated activities on marine mammals.

The Bureau's recently published summary of seismic survey mitigation measures and marine mammal observer reports indicated that the presence of marine mammals and the resulting ramp-up and shut-down procedures do not cause frequent delays during surveys (Barkaszi et al. 2012). The summary also indicated that shut-down procedures in response to sightings of small cetaceans also would not cause significant delays. The Commission has commented on several occasions that

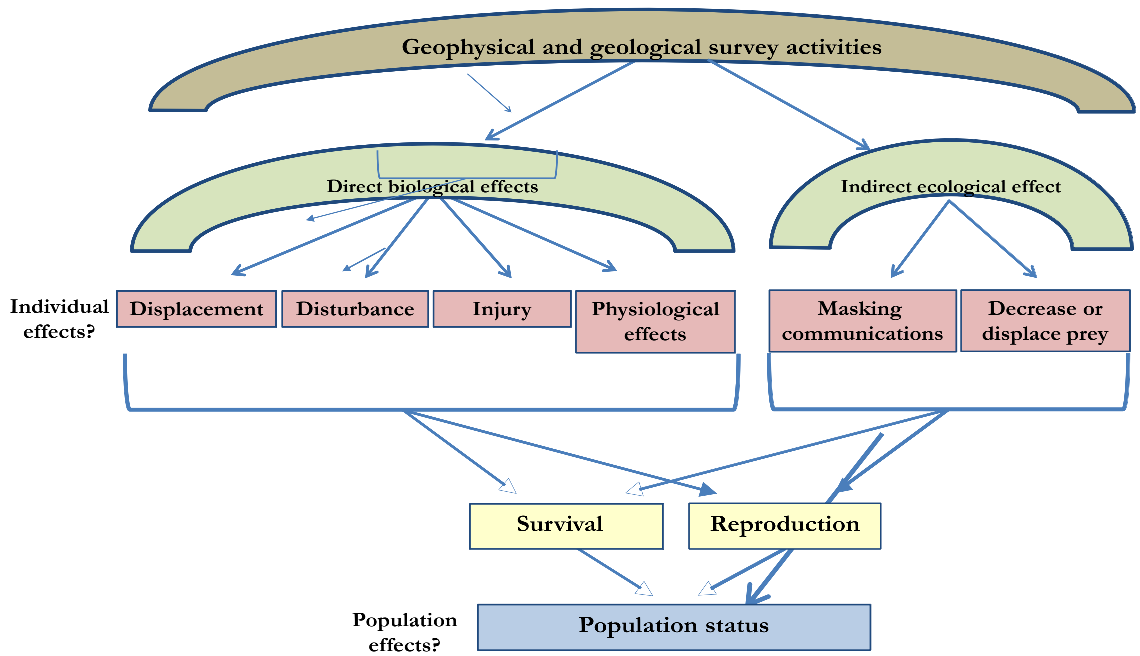

Figure 1. Conceptual framework for assessing the effects of geophysical and geological survey and associated activities on marine mammals.

shut-down procedures should be used to protect all marine mammals, not just whales, and the analysis in the summary report suggests that implementing this recommendation would not create significant economic concerns. Indeed, the Bureau proposes to require that ramp-up and shut-down procedures be used to protect all marine mammals. The one situation where this may not be feasible is when dolphins approach a vessel or towed equipment to bow-ride or draft off the equipment. The frequency of such interactions and the best ways to manage them are not clear. To provide that information, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management prepare annual summaries of marine mammal observer reports, including an analysis of the frequency and outcome of all marine mammal-vessel interactions.

Incidental harassment authorizations issued under sections 101(a)(5)(A) and 101(a)(5)(D) generally require reporting of all injured or dead marine mammals. The Bureau's proposed activities have the potential to harass marine mammals. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management require that all operators report immediately to the National Marine Fisheries Service and the local marine mammal stranding network all injured and dead marine mammals in the vicinity of the proposed surveys, and suspend those activities if a marine mammal is seriously injured or killed and the injury or death could have been caused by those activities (e.g., a fresh dead carcass is found).

Cumulative effects

The Bureau's analysis of cumulative effects evaluated the incremental increase of certain aspects of the proposed action when added to other impacts of a similar nature (for example, the incremental increase in sound from the proposed active acoustic surveys when added to other sources of underwater noise). However, the analysis falls short in evaluating the combined effect of all impacts resulting from the proposed action when compared to all existing and reasonably foreseeable future actions. The Commission recognizes the difficulty in monitoring and evaluating the individual effects of specific activities on marine mammals, let alone the combined effects of multiple activities in a constantly changing environment. This is especially true considering that effects resulting from the proposed action likely will involve behavioral changes in the affected marine mammals and/or indirect effects on prey species, the long-term biological significance of which are harder to assess than the significance of acute effects such as injuries or mortalities.

Nevertheless, numerous guidelines are available for developing a conceptual framework to analyze the cumulative effects of sound and other stressors on marine mammals and the marine environment (Council on Environmental Quality 1997, National Research Council 2005, Moore et al. 2012). A comprehensive analytical framework is necessary to determine if, when, and where marine resources, including marine mammals, are being exposed to cumulative effects that reduce their status or hinder their potential to grow and recover. Therefore, the Marine Mammal Commission recommends that the Bureau of Ocean Energy Management revise its cumulative effects analysis to provide a more rigorous and comprehensive assessment of the full impacts of sound and other human-caused and natural activities that affect marine resources in the proposed action area.

Please contact me if you have questions about the Commission's recommendations or comments.

Sincerely,

Timothy J. Ragen

Timothy J. Ragen, Ph.D.
Executive Director

cc: Michael Payne, National Marine Fisheries Service

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EXHIBIT 9

OCEAN CONSERVATION RESEARCH

Science and technology serving the sea

Mr. Gary D. Goeke, Chief, June 14, 2012
Regional Assessment Section,
Office of Environment (MS 5410),
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Re: Comments on the Draft PEIS for Atlantic G&G Activities

Dear Mr. Goeke,

We welcome the opportunity to review and comment on the Draft Environmental Impact Statement on the Atlantic OCS Proposed Geological and Geophysical Activities (hereinafter DEIS). We will attempt to be thorough and informative in our review comments. We will also be focusing the bulk of our comments on the acoustical impacts of the proposed actions because this is our area of expertise.

While the document reflects much work and a comprehensive exploration into the possible impacts of the proposed activities as required by the National Environmental Policy Act (NEPA), we believe that the DEIS leaves much to be desired if it is to be considered a guiding document for environmental stewardship.

This observation is made in particular light of the fact that despite our assumptions about the boundless ability of the ocean to absorb the assaults of human enterprise we are rapidly finding that the ocean is in very poor shape. This is a consequence of reckless resource extraction and relentless dumping and pollution. The fact is that in many of the more extreme cases ocean environmental degradation has been a significant byproduct industrial practices – particularly the practices of the petroleum exploration and extraction industry.

It was due to the extents of environmental degradation due to reckless and unregulated industrial practices that in the early 1980's a moratorium was placed on exploration and extraction on the US Outer Continental Shelf (OCS). It was clear at that time that the coastal resources for commercial and recreational fishing, and the socio-economic value of clean and vibrant coastal environments were far too valuable to put at risk to the dangers of the fossil fuel extraction and production chain.

This moratorium remained in place until 2008 when the original bill requiring annual reinstatement expired. It was the assumption that technologies and techniques had

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improved that would diminish the likelihood of catastrophic events the likes of which ushered in the 1980's moratoriums in the first place.

Unfortunately as we found in April 2010, the technologies are still dangerous and unpredictable. The full extent of the damages in the Deepwater-Horizon-Macondo well disaster is still unknown, and likely to continue to unfold well into the future. It is also clear that while technologies have advanced significantly in the past 27 years since the initial moratorium (and the reason that legacy OCS surveys are no longer suitable), the task has also become more complex as the reach of exploration sinks down into ever-deeper waters, and ever deeper hydrocarbon deposits.

This has left us with a technology bank that while impressive, is definitely not up to the task. I substantiate this statement by referring to the recently out-of-control gas well in the North Atlantic (Total-Elgin gas leak) and the ongoing leaks, spills, and blowouts that have continued to plague the ocean from Timor, to Nigeria, to Brazil, to the Gulf of Mexico just in this last year. And while the "Atlantic Geological and Geophysical Activities DEIS" is not specifically about deepwater extraction operations, it pre-supposes fossil fuel extraction and production.

Unfortunately that despite the ongoing global problems associated with offshore hydrocarbon exploration and extraction that we are not learning that the cost of powering our global economy with fossil fuel is becoming increasingly expensive. These costs are not just "borne at the pump;" rather they are heavily distributed into the environment at the cost of nature's bounty and the compromised quality of our own lives.

It is also clear from how the three alternatives are presented in the DEIS that Alternative A or B are assumed to be not just the preferred alternatives, but the likely ones as well. This is obviated by the many reinforcing assumptions made to "pave the way" for the proposed Geological and Geophysical activities, but also in the quaint convention used of highlighting the word **"negligible"** throughout the document. This highlighted word shows up some 956 times in just 550 pages. (The highlighted word "**minor**" shows up 513 times in the document, "**moderate"** only 131 times.) While this observation is only a casual metric, it does appear to reveal a bias in the drafting of the DEIS.

The words "**negligible," "minor,"** and **"moderate"** indicate value judgments which while they are sometimes backed up through more detailed discussions in Vol. 1 Chapter 4 using citations, these citations do not track consistently and clearly back to the summary impact assessments. We feel that any assessment in the DEIS should be directly backed up with either peer reviewed literature or some other qualified accountability.

We are also concerned about the arbitrary use of impact conventions when evaluating an action for its "Level A" or "Level B" threshold. The current standard is used by National Marine Fisheries Service (NMFS) under the Marine Mammal Protection Act (MMPA). It is a blunt metric and could use some refinement, but it is the standard. Using it in parallel selectively substituting it with the "Southall Criteria[1]" is confusing and inconsistent,

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[1] Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33(4):411-521.

particularly since the "Southall Criteria" is only an initial scientific recommendation and has not yet gone through an EIS review as would be required under the National Environmental Policy Act (NEPA) to be used as a guiding document for this DEIS.

And while I believe that the "Southall Criteria" will eventually represent a significant improvement to the current impact threshold assessment process. The motivation behind using one or the other is particularly confusing when there is such a disparity between the results. The table below highlights a few examples of these disparities from Section 4.2.2.2.2 page 4.52- 4.53 referring to "Level A" harassment.

Species	Southall 2007 Criteria (Quoted in the DEIS)[2]	NMFS "180 dB" criteria (Not quoted in DEIS)[3]
Risso's Dolphin	8 - 731	444 - 3180
Striped Dolphin	86 - 1020	495 – 2038
Atlantic Spotted Dolphin	154 – 1496	640 - 3180
Bottlenose Dolphin	3 - 39	1314 - 11748

Table 1: Disparity between estimated "Level A" takes between the Southall 2007 (Table 4-9 in the DEIS) and the 180 dB "historic" criteria (table 4-10 in the DEIS).

The reason for choosing one standard over the other is not clear in the arguments, but the numbers in Table 1 suggest that the lower estimation of the "Level A" takes were used in the DEIS, which would seem to infer a "cherry picking" to derive a desired outcome. We suggest that historic NMFS standard be consistently used throughout the DEIS until that time when the Southall Criteria is complete and has gone through public review as required by the National Environmental Policy Act (NEPA).

Another conceit appears occasionally throughout the DEIS that "marine mammals within the AOI are familiar with vessel noises, so the effects of vessel noises are expected to be **negligible** to **minor.**[4]**"**

Firstly, forced habituation is not a mitigation strategy. Additionally, "habituation" is a faulty assumption because there is no evidence that marine mammals (or fish for that matter) habituate to broad-band noise that would potentially mask biologically significant signals. In fact it has recently been determined that chronic shipping noise induces stress in bowhead whales,[5] so the assumption that animals habituate to vessel noise is patently false and should to be removed from both the marine mammal as well as the fisheries sections of the DEIS until proven to be true.

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[2] From DEIS Vol. 2,. Table 4-9 "Annual Level A Take Estimates from Seismic Airgun Sources Using Southall et al. (2007) Criteria for Marine Mammal Species during the Project Period (2012-2020)"
[3] From DEIS Vol. 2,. Table 4-10 "Annual Level A Takes Estimates from Seismic Airgun Sources Using 180-dB Criteria for Marine Mammal Species during the Project Period (2012-2020)
[4] This "presumption" or "assumption" appears in Vol. 1 Summary p.xv, Ch. 2 pages 15, 31, and 40, Ch. 4 page 58 and 255.
[5] Rosalind M. Rolland, Susan E. Parks, Kathleen E. Hunt, Manuel Castellote, Peter J. Corkeron, Douglas P. Nowacek, Samuel K. Wasser and Scott D. Kraus (2012) "Evidence that ship noise increases stress in right whales" Proc. R. Soc. B doi:10.1098/rspb.2011.2429

Rolland et. al.(2012)[6] points to another serious shortcoming in the entire DEIS; While there are sections throughout the document addressing "Cumulative" impacts of the activities, these are considered as "incremental" impacts[7] rather than synergistic impacts.

Biological systems are not adding machines; they have operating ranges that can be stable in the center of their range, but as the systems approach the extents of their range they become instable and subject to amplification of synergistic inputs. Subjecting entire ecosystems to a chronic assault such as noise, physical disruption, or chemical pollution will at some point cause an irrecoverable instability that will crash the system.

In this context the DEIS fails to address anything but the immediate or concurrent impacts of an assault, assuming that once the assault has "moved on" or ceased that it no longer has a measurable impact. While our ability to account for synergistic impacts is rudimentary at best, precaution and empirical evidence would dictate that we factor in synergistic impacts even while we don't entirely understand them.

Furthermore, while we may be arguable that "Level B" behavioral adaptations to proposed activities would be disruptive but recoverable, there is absolutely no justification for biological damage indicated in a "Level A" harassment. Even short term "recoverable" assaults such as temporary threshold shift (TTS) are barbaric. NMFS issuing "Incidental Harassment Authorizations" or "Take Permits" for "Level A" harassment is the apex of institutional hubris. If someone were to apply to the Department of Health and Human Services for a permit to yell in someone's ear, or spill diesel fuel in their salad they would be watched cautiously and put on some "security risk list." So why are institutions encouraged to apply for permission to damage animals? It is patently unethical to damage an animal unless you are going to eat it, or it is going to eat you.

While the forgoing opinions do not have a structural procedure within NEPA to address, they substantiate a systematic shortcoming in this process which is continuously echoed throughout the DEIS: What is the overall impact of 956 "**negligible**" impacts on top of 513 "**minor**" impacts, added to 131 "**moderate**" impacts?

Specific oversights and shortcomings in the DEIS

While it is the purpose of the DEIS to model and address the entire foreseen impacts of the proposed actions, given the complexity of the subject environment and the challenges of introducing complicated technologies and procedures into it, understanding the possible range of impacts is speculative at best. There is no way that comprehensive foreknowledge can be formed with the limited data available.

This situation is addressed to some extent in the DEIS with "When an agency is evaluating reasonably foreseeable significant adverse effects on the environment in an EIS and there is incomplete or unavailable information, the agency reports that such information is lacking…the agency is required to report what relevant information is

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[6] Ibid.

[7] DEIS 2.4.1

incomplete and why it is unavailable… Complex environmental evaluations are always to some degree a documentation exercise in the face of imperfect information.[8]"

To this I would add that environmental evaluations are also a studied speculation fed by available, but necessarily incomplete data. This speculation "fills in the gaps" − of which there are many in the field of marine biology, with assumptions − of which there are many in this DEIS. The aforementioned assumption about "habituation" is clearly an incorrect assumption.

Another assumption that is also found in the DEIS is the assumption that "ramp-up" or "soft start" of seismic surveys are effective mitigation strategies. In fact Jochens et. al. (2008)[9] indicates that there was no avoidance behavior with ramp up in sperm whales. This could be due to a number of factors; one possibility being that animals familiar with the seismic survey pulses did not find suitable respite in swimming away from the source so they just waited it out. This hypothesis would be supported by the observation in the study that a whale lingered at the surface throughout the exposure, and then sounded immediately after the last pulse.

Another possibility is that the subjects of Jochens et.al controlled exposure experiments had already been so deeply exposed to airgun blasts that their hearing was already significantly compromised and did not find much reason to avoid airguns (particularly since the study exposures were so carefully controlled to not exceed Level B harassment thresholds).

It may be that some highly mobile and migratory animals would avoid airgun surveys, but animals that exhibit strong site-fidelity such as the sperm whales or sedentary fish would likely not depart from their legacy hunting grounds, or in the case of the fish "shelter in place" rather than seek refuge in unknown areas. Engås et al. (1996)[10] and Løkkeborg and Sodal (1993)[11] showed decreased catch rates of fish following seismic surveys, but the fishing technique in the study was long-lining, requiring some action on the part of the fish, so whether the fish left the area or were not feeding due to physiological compromise remains ambiguous.

Thus the assumption that "ramping up" and "soft starts" constitute an effective mitigation should be withdrawn from the DEIS until proven otherwise.

The comment on page xviii in the summary, and in section 2.1.3.5, and 4.2.5.1.4 that "there is no permanent damage in fish ears" is incorrect and based on outdated literature.[12] The citation from Smith et. al. (2006)[13] is work done on a goldfish, a

[8] DEIS section 4.1.4.1

[9] Jochens et.al. 2008 "Sperm Whale Seismic Study in the Gulf of Mexico" Minerals Management Service contract.

[10]Engås, A. S. Løkkeborg, E. Ona, and A.V. Soldal. 1996." Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*)". Can. J. Fish. Aquat. Sci. 53:2238-2249.

[11] Løkkeborg, S. and A.V. Soldal. 1993. The influence of seismic exploration with airguns on cod (Gadus morhua) behaviour and catch rates. ICES mar. Sci. Symp., 196:62-67.

[12] McCauley, R. D., Fewtrell, J. & Popper, A. N. (2003). High intensity anthropogenic sound damages fish ears. Journal of the Acoustical Society of America 113, 638–642.

[13] Smith, M.E., A.B. Coffin, D.L. Miller, and A.N. Popper. 2006. Anatomical and functional recovery of

freshwater air-breathing fish that resides in turbid environments. The goldfish has been categorized as a “hearing specialist” due to adaptations that are specific to their environment which have no analogies in open ocean fish. So the comment about “fish not suffering lasting hearing damage” and the associated assumptions should be removed from the DEIS.

There is also the phrase “No mortality or injury is expected in any case because there has been no observation of direct physical injury or death to fishes from airguns” found in the fisheries impacts sections of the DEIS. This phrase is only partially correct, as there is evidence of physical injury of fishes from airguns in McCauley et. al. 2003[14]. And while there may be no direct evidence of fish mortality from airguns, if fish sensory systems are compromised by seismic surveys it may lead to intermediate or long term impacts that are not evident immediately after a survey. In this case an absence of evidence does not indicate an absence of harm. Engås et. al 1996 does indicate damage to caged fish, but sedentary fish, while not caged would not necessarily attempt to leave their habitat to escape a pervasive noise, particularly since the pressure-gradient wavelengths are too long for localization, and the particle motion vectors in the far field would be ambiguous and not provide benthic and demersal (and often sedentary) species cues or incentives to leave familiar habitats.

The DEIS treats invertebrates very lightly − almost dismissively. In section 2.1.3.1 the comment is made that “…limited available data assessing physiological effects or biochemical responses of marine invertebrates to underwater noise indicate that serious pathological and physiological effects are unlikely.” This is clearly not the case according to André et.al (2006)[15] wherein giant squid mortality was directly correlated to seismic airgun surveys. This is clearly a case where the writers of the DEIS were wrong when they assumed that in a paucity of evidence that the impacts would be “**negligible.**”

These findings, along with the prior work of Angel Guerra et.al (2004)[16] should be incorporated into the DEIS section 2.1.3.1 and 4.2.1.2.2, and the assumptions revised to reflect the papers.

Also in section 4.2.1.2.2 is after citing Payne (2007)[17] the comment is made that “this particular species of lobster was not present in the AOI,” thus dismissed. While this species of lobster is not present in the AOI, it stands to reason that other arthropods may suffer the same damage under similar exposures – an “assumption” on our part that holds

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the goldfish (*Carassius auratus*) ear following noise exposure. Journal of Experimental Biology 209:4193-4202.

[14] McCauley, R. D., Fewtrell, J. & Popper, A. N. (2003). High intensity anthropogenic sound damages fish ears. Journal of the Acoustical Society of America 113, 638–642

[15] Michel André, Marta Solé, Marc Lenoir, Mercè Durfort, Carme Quero, Alex Mas, Antoni Lombarte, Mike van der Schaar, Manel López-Bejar, Maria Morell, Serge Zaugg, and Ludwig Houégnigan (2011) “Low-frequency sounds induce acoustic trauma in cephalopods” Front Ecol. Environ. 2011; doi:10.1890/100124

[16] A. Guerra, A.F. González and F. Rocha (2004) A review of the records of giant squid in the north-eastern Atlantic and severe injuries in *Architeuthis dux* stranded after acoustic explorations” International Council for the Exploration of the Sea CC:29

[17] Payne, J.F., C.A. Andrews, L.L. Fancey, A.L. Cook, and J.R. Christian. 2007. Pilot study on the effects of seismic air gun noise on lobster (*Homarus americanus*). Canadian Technical Report of Fisheries and Aquatic Sciences 2712. 46 pp.

much more water than the blanket use of goldfish hearing as a proxy for all marine teleost fishes found in the DEIS.

Also found in section 4.2.1.2.2 and consistent with worrying convention in the DEIS to conflate an absence of data with an absence of harm is the comment that “The BOEM has determined that incomplete or unavailable data or information on the physiological effects or biochemical response of marine invertebrates in the AOI that results from acoustic noise is not relevant to reasonably foreseeable significant adverse impacts or essential to a reasoned choice among the alternatives.”

This phrase and the assumptions that it substantiates should be pulled from the DEIS as it is only an opinion and not substantiated by the literature.

Some comments on modeling

Sound propagation and noise attenuation in the ocean is a complex topic. Almost any marine setting will exhibit propagation characteristics that defy our ability to model. This may obviate a need for ongoing monitoring during any potentially noisy operation as a matter of course. In lieu of comprehensive regional and temporal sound propagation models to feed with data we must rely on some stock, simple assumptions. Some simple assumptions are used in the DEIS, but given the scope of the proposed actions both in spatial and temporal terms, the simple models used in the DEIS fail to capture the extents of the impacts.

One assumption is that sound will propagate in a hemispherical pattern away from the source until the acoustical energy encounters a boundary. The ‘broad brush’ attenuation formula for this is: $20\log_{10} (r_1/r_2)$ where r_1 is the reference distance (usually 1 meter) and r_2 is the subject distance for evaluation.

Once the energy hits the seafloor the energy tends to spread in a cylindrical pattern wherein the attenuation formula is $10\log_{10} (r_1/r_2)$. Because the first boundary encountered is the seafloor, the sound levels at a distance within the depth of the ocean directly beneath the source will be more in line with attenuation at 20dB $\log_{10}$ of r. Far field will be more in line with $10\log_{10} r$. But there is some continuum between these attenuation conditions, so depending on the distance between the receiver and the source the attenuation factor may be closer to 17 in the “nearish field” and 13 in the far field.

Additionally, while it is not mentioned anywhere in the DEIS there is a secondary transmission path in the “mixed layer” above the marine thermocline that behaves as a “surface duct.” While the propagation in this transmission path is dependent on the wavelength of the source, the angle of incidence, the depth of the mixed layer, and the surface conditions, the attenuation characteristics are more in consistent with the cylindrical model of $10\log_{10} r$. (see Urick 1983)[18]

[18] Urick, R. J. 1983. Principles of Underwater Sound. (3rd Edition). McGraw-Hill Book Company, New York, NY. Chapter 6

Transmission in the surface duct, along with the far-field cylindrical propagation highlights concerns in the "nearish" field pertaining to both required "exclusion zones" and the efficacy of marine mammal observers (MMO). It is already impractical to expect MMOs to effectively spot marine mammals at distances over 1000 meters in calm seas during the day. In these conditions a large airgun array with a source level of 229 dB re:1μPa @ 1m[(FN.19)] would require 10km to attenuate to 180dB re:1μPa exposure level.

$$229\text{dB} - 180\text{dB} = 41\text{dB} \rightarrow 10\log_{10}(1/13000) = -41\text{dB}$$

MMO effectiveness over these ranges is not just impractical, it is improbable. So it is clear that in most situations a large capacity survey cannot avoid subjecting any marine mammal within 10km to Level A harassment exposures from either the surface ducting or the cylindrical propagation of acoustical energy.

If you add the "second hit" from the reflected sound off of the sea bottom, and the direct noise from the hemispherical propagation, the receiver is hit with at least three distinct wave fronts from multi-path sources (all three transmission paths have differing geometrical lengths as well as different transmission speeds due to temperature, pressure, and salinity factors). These three paths need to be integrated into the Sound Exposure Level (SEL) metric in the near-to-intermediate field.

Additionally, due to the various transmission artifacts there may be situations in the far field in which the noise from the surveys are not heard as distinct pulses, but as a continuous noise due to reverberation and multipath effects.[2021,22,23] Because the noise would be continuous it should be mitigated under the 120dB "continuous noise" exposure threshold, particularly since the surveys will likely be occurring around the clock anyway.

These considerations preclude the use of large capacity seismic surveys if Level A harassment conditions are to be avoided.

Regarding the mitigation strategy of separating the survey vessels by more than 40 km: While the model was not clearly articulated it appears that the DEIS used the hemispherical attenuation factor of $20\log_{10} r$ to derive the 40km "mitigation" strategy.

A more accurate model for this setting is to determine what the exposure level would be at the midpoint (20km) between the two survey vessels. We assume that a source level of 235 dB (convergence in the far field is not influenced by the directivity of the array).

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[19] 235 dB (from Appendix D Table-22) – 6dB to accommodate for directionality of the array.
[20] Guerra, M., Thode, A.M., Blackwell, S.B., Macrander, A.M. (2011) "Quantifying seismic survey reverberation off the Alaskan North Slope., J. Acoustical Society of America 130:5 3046-3058
[21] Nieukirk, S.L., Mellinger, D.K., Moore, S.E., Klinck, K., Dziak, R.P., Goslin, J. (2012) "Sounds from airguns and fin whales recorded in the mid-Atlantic Ocean, 1999-2009, J. Acoustical Society of America 131:1102- 1112
[22] Nieukirk, S.L., Stafford, K.M., Mellinger, D.K., Dziak, R.P., and Fox, C.G.(2004)"Low-frequency whale and seismic airgun sounds recorded in the mid-Atlantic Ocean" J. Acoustical Society of America 115: 1832-1843
[23] Roth, E.H., Hildebrand, J.A., Wiggins, S.M., and Ross, D. (2012). "Underwater ambient noise on the Chukchi Sea continental slope" J. Acoustical Society of America 131:104-110

Using the hemispherical propagation model:

$$20\log_{10}(1/20000) = 86\text{dB} \rightarrow 235\text{dB} - 86\text{dB} = 149\text{dB re:}1\mu\text{Pa}$$

Each survey would contribute 149dB to the system, which at the mid-point between them would yield 152dB (adding two equal sound levels increases the overall level by 3dB). But as we know, far field propagation is not hemispherical, rather it is more cylindrical. Using exclusively the cylindrical model:

$$10\log_{10}(1/20000) = 43\text{dB} \rightarrow 235\text{dB} - 43\text{dB} = 192\text{dB re:}1\mu\text{Pa}$$

Each survey would contribute 192dB to the system, which at the mid-point between them would combine to add +3dB yielding 195dB – well above the 180dB exclusion zone. (These levels would also be significantly beyond the visual reach of MMOs.)

Of course the attenuation factor is somewhere between these two models, but this − like the surface ducting transmission path, is not accounted for in the DEIS.

Section comments on Alternatives:

In Section 2.1.3.1 (associated with chapter 4.2.1) evaluating the impacts of Alternative A, the statement is made regarding the lack of pressure gradient sensors in most marine invertebrates. It is known that many invertebrates have particle motion sensing systems. It is also mentioned that there is limited data on the vulnerability of these sensing systems to mechanical damage, and with this lack of data the writers of the DEIS assume therefore that marine invertebrates are "unlikely" to suffer physiological or pathological impacts from noise exposure.

Unfortunately most of the data we do have on the impacts of large vector particle motion on marine invertebrates is limited to intertidal animals and coastal animals such as lobster, shrimp, clams, scallops, and octopus which would have evolved sensory systems adapted to coastal turbulence and crashing waves and thus not necessarily vulnerable to high amplitude, coherent-vector particle motion. But there has been a correlation to squid mortality and damage associated with seismic airgun surveys, so the blanket assumption that damage to marine invertebrates "is expected to be **negligible**" is an assumption that is not supported by the range of evidence [24] (see also ref. 15, 16, and 17 above).

In Section 2.1.3.2 (associated with chapter 4.2.2) regarding the impacts of boomer, chirp, and sub-bottom profilers, and multi-beam depth sounders, the statement is made that "some of [these] are expected to be beyond the functional hearing range of marine mammals or would be detectable only at very close range." With the exception of the multi-beam depth sounders, these other sources would be detectable by odontocetes and should be evaluated for impacts.

[24] R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch and K. McCabe (2000) "Marine seismic surveys— a study of environmental implications" The Australian Petroleum Production & Exploration Association Journal p.692-708

Also in Section 2.1.3.2 the Level B impacts of vessel noise is discounted by the fact that Level B impacts from seismic surveys and other active noise sources have been accounted for. While numerically the exposure levels may have been accommodated in the Level B exposure criteria, this is an over-simplification of the response of animals to increasingly complex noises. It is likely that a fully operating seismic survey with system calibration signals, sea-floor profilers, and various other noises added to the sum of the noises of the vessel would have a more pronounced behavioral impact than the simple exposure impact of each of the sounds separately. It would stand to reason that a complex and varying sound field would have greater impacts than the impacts of just sound type at a specific amplitude – even if each one of them was at or below the Level B harassment threshold. Response to sound quality rather than level alone is substantiated in Frankel and Clark (1998).[25] (This argument appears in section 4.2.2.2 p.4-58 under Vessel Noise Evaluation as well.)

A more accurate (but equally simplistic) model would treat each noise source that exceeded the Level B harassment threshold as a separate Level B harassment.

While it is not entirely within the range of our acoustical impacts evaluation, under the same section 2.1.3.2 regarding accidental oil spills that "marine mammals would be expected to avoid areas of heavy fuel sheen" and thus the impacts would be "**negligible** to **minor."**[26] Avoidance behavior of oil-sheen waters has not been confirmed and would not necessarily be an evolutionary adaptation. The fact is that there are many compelling photographs and accounts of dolphins and whales surfacing trough oil sheens during the BP oil disaster of 2010.[27] Additionally since the BP disaster the number of dead cetaceans washing ashore has increased significantly with evidence of hydrocarbon poisoning in their systems.[28] The "avoidance behavior" assumption should be pulled from the DEIS along with the assumptions that the comment substantiates.

Chapter 4 Description and Analysis comments

Where not previously addressed in these comments, the following comments are in consideration of Chapter 4 statements and evaluations.

In Section 4.2.2.2.2 "Evaluation" (p.4-52) the comment is made referencing Au and Hastings (2008)[29] that mammalian ears "behaves like an integrator with an integrator time constant," which in the paper is determined to be 100ms, and through this mechanism a 10ms pulse integrated over 100ms represents a 10dB decrease in exposure (presumably impacts). While this does mathematically work into the "Sound Exposure

[25] Frankel, A.S. and C. W. Clark. 1998. Results of low-frequency playback of M-sequence noise to humpback whales, *Megaptera novaeangliae*, in Hawaii. Canadian Journal of Zoology 1998:521-535.
[26] DEIS p. 2-16
[27] See the photos by John Wathan http://www.docudharma.com/diary/21948/wathen-bp-slick-covers-dolphins-whales-video-text.
[28] Leigh Coleman "Baby dolphin deaths rise along Gulf Coast" Reuters Feb. 23, 2011
[29] Au, W.L. and M.C. Hastings. 2008. Hearing in marine animals. In: Principles of marine bioacoustics. New York: Springer-Verlag.

level" metric[30] this metric is for physiological impacts only, there is no evidence of decreased stress from repetitive exposures of "short duration shocks" over longer pulses.

In the same section, p.4-53 "Level A Incidental Take Estimates" are referenced to Tables 4-9 and 4-10. These tables variously refer to either the "Southall criteria" or the "180dB criteria." The reason for choosing one over the other standard is not clear here, except that the "Southall Criteria" numbers are all significantly smaller. As mention before, the Southall Criteria should not be used until complete and approved through NEPA review.

In this same paragraph regarding the use of "other equipment, including sub-bottom profilers, side-scan sonars, and depth sounders" concurrently with airguns would have no additional impacts because "airguns represent the highest energy source" this "it is reasonable to assume that there would be no additional take from the electromechanical sources operating concurrently."

As indicated above it is a faulty assumption based on noise level exposure alone - we can assume that like humans, other animals respond negatively to the complexity of any agonistic signal. For example a racing engine may not in-and-of-itself be too alarming, but if it is accompanied by the noise of grinding metal, or a the beeping of an alarm - even if the noises do not measurably add to the overall noise level, they will induce very different impacts on the nervous system.

Additionally, the noises of the other electromechanical systems are operating across different frequency bands which would not necessarily be masked by the low frequency noise of airguns. Concurrent noise sources are not a set of individual exposures, rather they all contribute to an entire soundscape. These "holo-phonic" impacts will be far greater than individual sound sources or even the sum of concurrent sound sources. In this context a survey operation with two or more boats and an array of profilers and multi-beam sonars should be evaluated across the entire noise spectrum, and over the entire time of the operation. In this context many of these surveys would qualify as "continuous noise sources, and thus subject to the 120dB mitigation criteria.

In the "Conclusion" section the airgun evaluation it is stated from Tables 4-10 and 4-11 that "Incidental take calculations presented in for seismic airgun survey-related noise may be "conservative" because the exposure evaluations "do not consider functional hearing sensitivity ranges for the various species and so assume that all of the species are equally sensitive to received sound frequencies and levels."

While it is true that various animals have adapted to their own acoustical niches, we must assume that these animals reside in a complete bio-acoustic habitat with other animals and that the receivers are not just individual subjects in a test environment.

It would actually be more realistic to state that the auditory thresholds of odontocetes have been determined by way of captive animals that have been habituated (trained) to respond to operant conditioning and to cooperate with Audio Evoked Potential auditory

[30] Hastings MC, Popper AN (2005). Effects of Sound on Fish. California Department of Transportation Contract 43A0139, Task Order 1. Available from URL: http://www.dot.ca.gov/hq/env/bio/files/Effects_of_Sound_on_Fish23Aug05.pdf

testing. These individual animals only approximate the hearing responses of wild animals which often respond as a group to sound stimulus and are adapted to be more responsive to environmental sounds.

Additionally the auditory responses of mysticetes have only been approximated by way of anatomical studies of dead animals and modeled from other vertebrate hearing and thus the auditory threshold models do not clearly represent the entire auditory response capabilities of living baleen whales residing in their natural habitat.

In the same section p.4-55 in is insinuated that animals with differing hearing priorities would have the chance to evade a slow-moving seismic operation to "avoid exposure to injurious sound levels." What is not taken into consideration is the likelihood that most animals are in a particular area because they need to be there – for feeding, community coherence, family bonding, and breeding opportunities. Forced relocation due to exposure to agonistic stimulus undoubtedly increases stress, compromising metabolic, social, and immune system functions.

On p.4.56 referring to the "non-airgun HRG surveys" impacts conclusion section, the statement is made that "Level A take estimates that were calculated utilizing only the 180-dB criterion do not consider functional hearing sensitivity ranges for the various species and so assume that all of the species are equally sensitive to received sound frequencies and levels."

This statement appears to be a specious attempt to soft-pedal exposure impacts. The decision to use the "180 dB Criteria" as a mitigation threshold is an accepted, historical standard predicated on a known auditory thresholds found in captive animals. It was chosen as a mitigation threshold after long deliberation. Deconstruction of this standard for the purpose of this this DEIS is inappropriate.

In the same paragraph: "assuming selective avoidance of the sound source by individual animals and operations within an open ocean environment" is implied as a mitigation strategy. This is not a mitigation strategy; rather it is why mitigation strategies are required. This statement should be pulled from the DEIS along with the assumptions it purportedly substantiates.

In the evaluation of noise impacts from "Vessels and Equipment Noise" p.4-57 that "broadband source levels for most small ships (a category that would include seismic survey vessels and support vessels for drilling of COST wells or shallow test wells) are anticipated to be in the range of 170-180 dB re 1 μPa at 1 m and source levels for smaller boats (a category that would include survey vessels for renewable energy and marine minerals sites) are in the range of 150-170 dB re 1 μPa at 1 m (Richardson et al., 1995)." As these operations are continuous and not periodic or pulse noises the mitigation threshold would be 120dB re: 1 μPa, so the exclusion zone in the loudest instance would be:

$$180\text{dB} - 60\text{dB} = 120\text{dB}$$

$20\log_{10}(1/1000) = -60\text{dB}$ or 1000m for spherical propagation, and

$13\log_{10}(1/40000) = -60\text{dB}$ or 40km for far field propagation per our earlier argument.

Also on the same page is the statement:

> "Drilling-related noises from semi-submersible platforms in deeper waters ranges in frequencies from 10 to 4,000 Hz, and therefore audible to all cetacean and pinneped species within the AOI. Drilling sound source levels from semi-submersible platforms are estimated at 154 dB re 1 μPa-m. Source levels for drillships have been reported to be as high as 191 dB re 1 μPa during drilling. It is expected that marine mammals would detect drilling-related noises within a radius of audibility."

This statement needs to be clarified: Semi-submersible platforms are stabilized by way of thrusters, which have not been characterized in the literature, nonetheless with a source level of 191dB and due to the continuous characteristic of the noise will need to be mitigated at the 120dB exclusion zone, not just "within a radius of audibility."

Given: 191dB – 69dB = 120dB

$20\log_{10}(1/2850) = -69$dB or 2.85km for spherical propagation, and

$13\log_{10}(1/200000) = -69$dB or 200km for far field propagation per our earlier argument

Of course this is a simple model and does not account for frequency-dependent sound absorption over distance, but is also does not account for surface channel propagation or effects of multipath propagation over distance. The appropriate use of the 120dB mitigation threshold would preclude the use of semi-submersible platforms in the Area of Interest for exploratory drilling, and in the future for extraction and production.

Summary and Conclusion

While BOEM, and their legacy agencies MMS under the Department of the Interior have not been known to be precautionary, the Atlantic Geological and Geophysical DEIS appears to over-extend hospitality to industry by systematically failing to address many impacts that will occur if either Alternative A or Alternative B is approved.

From the foregoing discussion the following corrections and recommendations should be included in the Atlantic Geological and Geophysical DEIS:

1. NMFS –MMPA Level A and level B criteria should be used exclusively throughout the DEIS. The "Southall Criteria" should not be used until it is complete and has gone through NEPA review.
2. The words "**negligible"** and "**minor"** in the DEIS should be always traceable to peer reviewed papers that substantiate the particulars of the specific evaluation.
3. All references to "habituation" should be removed from the DEIS, especially where it is inferred as a mitigation strategy because it is not supported by the literature.
4. All references to "Ramp-up" and "Soft Start" being used as a mitigation strategy should be either pulled from the DEIS, or included with the caveat that there is no evidence that these techniques are effective (until proven otherwise).

5. All references to fish not being subject to permanent hearing damage should be removed from the DEIS along with the consequent assumptions associated with the comment because it is not supported by the literature.
6. References to acoustical impacts on marine invertebrates – particularly squid, should be updated and included in the EIS to reflect current state of understanding.[31,32,33,34,35]
7. Sound propagation models should include provisions for surface duct transmission paths in seismic surveys, and thruster-stabilized platform and drill-ship operations.
8. Sound propagation models of seismic surveys should account for reverberation and multipath effects in the far field. If the far field noise artifacts are not distinguishable as discrete pulses then the noise criteria should fall under the 120dB mitigation threshold for continuous noise.
9. Exposure to the same seismic signal that arrives at the receiver as multiple signals due to time domain differences in direct, reflected, surface, and SOFAR ducting should be considered separately and figured into the overall Sound Exposure Level (SEL) metric.
10. Complex noise exposures should be integrated as a complete sound field over time rather than taken as a set of discrete noise sources. As such most seismic surveys would be considered "continuous noise sources" in the far field and should be subject to the120 dB Continuous Noise mitigation criteria.
11. Expecting MMOs to effectively find marine mammals at night or in exclusion zones greater than 1000 meters is impractical even in calm sea states. Seismic survey operations should be limited to times and conditions in which MMOs can actually locate marine mammals within the prescribed exposure-dependent "exclusion zone".
12. Boomers, chirp, and sub-bottom profilers, should be more closely scrutinized in terms of their respective impacts on odontocetes.
13. Suggesting an animal's "selective avoidance" be used as a mitigation strategy is circular reasoning and fails to address the purpose of the DEIS. Comments to this effect found throughout the DEIS should be pulled from the document.
14. Under any airgun operation the noise propagation models used in the Final EIS should be verified in the field with acoustical monitoring both in the near and far fields until there is confidence that the EIS models represent the actual noise propagation in the field.

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[31] Michel André, Marta Solé, Marc Lenoir, Mercè Durfort, Carme Quero, Alex Mas, Antoni Lombarte, Mike van der Schaar, Manel López-Bejar, Maria Morell, Serge Zaugg, and Ludwig Houégnigan (2011) "Low-frequency sounds induce acoustic trauma in cephalopods" Front Ecol Environ 2011; doi:10.1890/100124

[32] T. Aran Mooney, Roger T. Hanlon, Jakob Christensen-Dalsgaard, Peter T. Madsen, Darlene R. Ketten and Paul E. Nachtigall" Sound detection by the longfin squid (*Loligo pealeii*) studied with auditory evoked potentials: sensitivity to low-frequency particle motion and not pressure J Exp Biol 2010 213:3748-3759.

[33] R.D. McCauley, J. Fewtrell, A.J. Duncan, C. Jenner, M-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch and K. McCabe (2000) "Marine seismic surveys— a study of environmental implications" The Australian Petroleum Production & Exploration Association Journal p.692-708

[34] A. Guerra*, A.F. González and F. Rocha (2004) A review of the records of giant squid in the north-eastern Atlantic and severe injuries in *Architeuthis dux* stranded after acoustic explorations" International Council for the Exploration of the Sea CC:29

[35] Payne, J.F., C.A. Andrews, L.L. Fancey, A.L. Cook, and J.R. Christian. 2007. Pilot study on the effects of seismic air gun noise on lobster (*Homarus americanus*). Canadian Technical Report of Fisheries and Aquatic Sciences 2712. 46 pp.

15. Semi-submersible drilling platforms and thruster stabilized drilling ships need to be evaluated for noise contribution while in operation and due to the continuous noise characteristic of their thrusters, and need to be mitigated at the 120dB re 1 μPa exclusion criteria.

It appears from the forgoing that neither Alternative A nor Alternative B will meet safe exposure criteria established under the Marina Mammal Protection act, and will cause significant habitat and wildlife damage. This should be avoided. Waiving the extents of the damages with “take authorizations” and “harassment permits” is a short-sighted hubristic strategy that does not take into consideration our own species dependence on healthy, productive marine habitats.

It is increasingly clear that the costs of promoting fossil fuel exploration and production is becoming prohibitively high. The good news in this is that consideration of the true costs of hydrocarbon exploration, extraction, production, and consumption will give our economic society greater incentives to conserve the fossil fuel that we can extract without the extreme collateral damage, and to develop energy alternatives that are regenerative and less damaging to our own habitat.

Thank you for this opportunity to review and comment on the proposed actions.

Sincerely,

Michael Stocker
Director

EXHIBIT 10

TABLE 6—ESTIMATED DENSITIES OF MARINE MAMMAL TO SOUND LEVELS ≥160 dB DURING USGS'S SEISMIC SURVEY IN THE NORTHWEST ATLANTIC OCEAN OFF TO SOUND LEVELS ≥160 dB DURING USGS'S SEISMIC SURVEY IN THE NORTHWEST ATLANTIC OCEAN OFF SPECIES AND ESTIMATES OF NUMBERS OF MARINE MAMMALS EXPOSED THE EASTERN SEABOARD, AUGUST TO SEPTEMBER 2014 AND APRIL TO AUGUST 2015

Species	Authorized take for 2014/2015 (includes increase to average group size)
North Atlantic right whale	3
Humpback whale	41
Minke whale	4
Bryde's whale	6
Sei whale	6
Fin whale	6
Blue whale	2
Sperm whale	166
Pygmy sperm whale	66
Dwarf sperm whale	66
Northern bottlenose whale	4
Cuvier's beaked whale	168
True's, Gervais', Sowerby's, and Blainville's beaked whale	
Bottlenose dolphin	499
Atlantic white-sided dolphin	66
Fraser's dolphin	200
Atlantic spotted dolphin	2112
Pantropical spotted dolphin	1448
Striped dolphin	9832
Spinner dolphin	130
Clymene dolphin	393
Short-beaked common dolphin	406
Rough-toothed dolphin	32
Risso's dolphin	684
Melon-headed whale	200
Pygmy killer whale	50
False killer whale	30
Killer whale	12
Short-finned pilot whale	1394
Long-finned pilot whale	1394
Harbor porpoise	8
Harbor seal	0
Gray seal	0
Harp seal	0
Hooded seal	0
TOTAL	19428