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April 29, 2015

Submitted via regulations.gov

Ms. Abigail Ross Hopper
Director
Bureau of Ocean Energy Management
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

Re: Comments on Applications to Conduct Geological & Geophysical Activities in the Atlantic OCS Region under Review by the U.S. Bureau of Ocean and Energy Management

Dear Ms. Hopper,

The Southern Environmental Law Center ("SELC") submits these comments on behalf North Carolina League of Conservation Voters, Environment North Carolina, North Carolina Conservation Network, North Carolina Wildlife Federation, Sound Rivers, Inc., Environmental Defense Fund, South Carolina Wildlife Federation, Coastal Conservation League, Charleston Waterkeeper, Winyah River Foundation, Conservation Voters of South Carolina, Charleston Surfrider Foundation, Southern Alliance for Clean Energy, Center for a Sustainable Coast, Altamaha Riverkeeper, Satilla Riverkeeper, Initiative to Protect Jeckyll Island, Ogeechee Riverkeeper, Virginia Conservation Network, Defenders of Wildlife, Center for Biological Diversity, and Natural Resources Defense Council regarding the Bureau of Ocean and Energy Management's ("BOEM" or "Agency") consideration of seven permits to conduct Geological & Geophysical ("G&G") activities in the Atlantic Outer Continental Shelf ("OCS") region using airgun technology. Thank you for the opportunity to submit comments on these applications.

TGS (Application No. E14-001), GX Technology (Application No. E14-003), Western Geco, LLC (Application No. E14-004), CGG Services (Application No. E14-005), and Spectrum Geo (Application Nos. E14-006, E14-009) propose conducting 2D seismic testing off the coasts of Virginia, North Carolina, South Carolina, and Virginia. PGS (Application No. E14-007, and collectively "applicants") proposes conducting 3D seismic testing off the coast of North Carolina.

The undersigned are profoundly concerned about the applicants' intentions to conduct high-intensity seismic surveys off our region's coast because of the significant environmental harms presented by seismic exploration, as well as the potentially catastrophic impacts of offshore oil drilling. Our members in Virginia, North Carolina, South Carolina, and Georgia

would be directly impacted by oil and gas activities in the Atlantic OCS and are strongly opposed to such a substantial threat to their natural resources and communities.

As a starting point, SELC reiterates the concerns expressed in an April 10, 2015 letter to BOEM from Oceana regarding this comment period. The public comment period beginning March 30 was not announced through the Federal Register, substantially limiting public input and violating the Administrative Procedure Act. The publicly available applications provide very limited information and fail to include important details about proposed survey activities, including timing of seismic activities, location of the activities, sound source characteristics, and other information necessary to provide substantive and informed feedback on the applicants' proposed activities.[1] Finally, BOEM provided the public a mere 30 days to review and comment on seven applications, overextending the resources of the public and interested stakeholders.

Notwithstanding the fact that we think BOEM's public comment period is designed to avoid public input and illegal, we hereby provide comment on the pending seismic applications. BOEM has not been clear as to the purpose of these comments; we provide comments on the lawfulness of the pending applications in light of the requirements of the National Environmental Policy Act ("NEPA"), Outer Continental Shelf Lands Act ("OCSLA"), and the Coastal Zone Management Act ("CZMA"). We specifically incorporate our earlier comments on the Draft Programmatic Environmental Impact Statement ("DPEIS") for G&G activities off the mid-Atlantic and southeast coasts provided on July 2, 2012, and attach those comments as Exhibit B for ease of reference. Similarly, we incorporate our May 7, 2014 comments explaining why the Final Programmatic Environmental Impact Statement ("PEIS") for G&G activities does not cure these defects and pointing out additional new information that should be considered by BOEM before any G&G activities take place; these comments are attached as Exhibit A.

In keeping with, and in addition to, all of the legal flaws explained in these earlier comments, we believe that BOEM must deny the pending seismic applications in the Atlantic OCS for the following reasons:

1. The proposed activities will have a substantial and adverse impact on the fragile and unique natural resources in our region, including fish and fish habitat; marine mammals, including the critically endangered North Atlantic right whale ("right whale"); and other endangered species found in our region, including endangered sea turtles.
2. BOEM has failed to comply with the NEPA and may not rely on a flawed programmatic EIS that fails to consider adequate mitigation measures or cumulative impacts, among other shortcomings.
3. BOEM will continue to fail to comply with NEPA unless it completes a supplemental EIS to take into account new information developed since the draft EIS was released, including new scientific information and new critical habitat for two species listed as endangered under Endangered Species Act.

[1] In drafting this letter, SELC has relied heavily on the information applicants have provided in their consistency certifications submitted to state coastal management agencies. Many applicants provided additional detail about proposed activities in publicly available consistency certifications.

4. If BOEM fails to complete a supplemental EIS, the Agency may not approve pending seismic applications without site-specific EISs given that each pending application will have significant environmental impacts.
5. BOEM's approval of pending seismic applications would result in undue harm to natural resources in our region in violation of regulations promulgated pursuant to OCSLA.
6. BOEM may not approve these applications because seismic exploration is inconsistent with the enforceable policies of the coastal management plans in Virginia, North Carolina, South Carolina, and Georgia under CZMA.

I. Background: Seismic testing will have an adverse and substantial impact on important coastal and marine resources in our region.

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. The applicants' proposed actions would dramatically degrade the acoustic environment along most of the east coast. The applicants propose towing 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, and 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 endangered species, including sea turtles; and that they can significantly impact fish and fisheries.

The noise impacts of seismic surveys are so severe that a group of seventy-five scientists from around the world recently sent a letter to the President Barack Obama to voice their concern that these surveys would result in "over 20 million seismic shots" in the Atlantic and "represent[] a significant threat to marine life throughout the region."[2] In their letter, the scientists describe likely impacts to marine mammals, sea turtles, and fish, and conclude that:

> the [Department of Interior's] premise that [seismic] activities have only a negligible impact on marine species and populations . . . 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.[3]

The concern with seismic surveys does not end with scientists. Coastal communities are deeply worried about the threats posed to their resources, and twenty communities in our region have passed resolutions opposing offshore drilling and the use of seismic airguns to explore for oil and gas off our coast.[4] In a series of public meetings held by BOEM in the region to solicit

[2] Letter from Seventy-Five Scientists to President Obama (Mar. 5, 2015), attached as Exhibit F, at 2.
[3] *Id*.
[4] To date Carolina Beach, Caswell Beach, Manteo, Nags Head, Oak Island, Southport, St. James, Sunset Beach, and Topsail Beach North Carolina have passed resolutions against seismic testing in North Carolina waters. In addition, Beaufort, Charleston, Edisto Beach, Folly Beach, Georgetown, Isle of Palms, James Island, Port Royal, Rockville,

feedback on seismic activities, hundreds individuals attended to learn more about the proposed activities and express concern about proposed activities. Moreover, important stakeholder groups including local chambers of commerce, tourism boards, fisheries associations, and the Mid Atlantic Fishery Management Council ("MAFMC") have expressed concerns about the impact seismic blasting and offshore drilling on vital coastal resources.[5] The substantial impacts of seismic testing are documented in great detail in Exhibit B, which we incorporate by reference.

a. Impacts to fish and fish habitat.

MAFMC and the South Atlantic Fishery Management Council ("SAFMC") manage numerous commercially and recreationally valuable species in federal waters in our region, including shrimp, dolphin-wahoo, snapper-grouper, summer flounder, and black sea bass, to name a few.[6]

Our region is a prime destination for recreational fishing. According to BOEM, recreational fishing expenditures generate more than $2 billion in total value added in the Mid-Atlantic economy, and more than $1.3 billion in the South Atlantic economy.[7] In 2012, the industry supported 8,143 jobs in Virginia, 18,202 jobs in North Carolina, 4,095 jobs in South Carolina, and 2,787 jobs in Georgia.[8] In the same year, the industry contributed $539.9 million to the Virginia economy, $1.1 billion to the North Carolina economy, $228.7 million to the South Carolina economy, and $187.7 million to the Georgia economy.[9]

Coastal communities in our region are highly dependent upon commercial fisheries for their economic wellbeing. In 2012 alone, Virginia, North Carolina, South Carolina and Georgia generated a total of $4.3 billion dollars from seafood sales.[10] Virginia's commercial fishing industry is particularly strong, and in 2012 the state was ranked third in the nation for volume of landings.[11] The economic benefits of the commercial fishing industry are vast. In Virginia, the industry supported approximately 19,000 jobs and generated $1.5 billion in sales in 2012.[12] Likewise, the industry supported 8,800 jobs and generated $782 million in sales in North

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and Sullivan's Island in South Carolina have passed resolution opposing seismic blasting. Hilton Head, SC also sent a letter to BOEM and the South Carolina Department of Health and Environmental Control in opposition to seismic blasting and offshore drilling, respectively. In Georgia, Tybee Island and St. Mary's have passed similar resolutions. *See* Oceana Coastal Resolution Toolkit, available at http://usa.oceana.org/seismic-airgun-testing/coastal-resolution-toolkit (last visited April 20, 2015).

[5] *Id.*

[6] *Fishery Management Plans / Amendments*, S. ATL. FISHERY COUNCIL, http://safmc.net/resource-library/fishery-management-plans-amendments (last visited April 22, 2015); *Fishery Management Plans*, MID ATLANTIC FISHERY MANAGEMENT COUNCIL, http://www.mafmc.org/fishery-management-plans/ (last visited April 22, 2015).

[7] *Fisheries of the United States: A Statistical Snapshot of 2012 Fish Landings*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://www.st.nmfs.noaa.gov/Assets/commercial/fus/fus12/FUS_2012_factsheet.pdf (last visited April 28, 2015) [hereinafter *2012 Fish Landings Report*].

[8] *Id.*

[9] *Id.*

[10] *Fisheries Economics of the United States: Economics and Sociocultural Status and Trends Series*, U.S. DEP'T OF COMMERCE (Feb. 2014), *available at* https://www.st.nmfs.noaa.gov/Assets/economics/documents/feus/2012/FEUS2012.pdf.

[11] *See 2012 Fish Landings Report, supra* note 7.

[12] *Id.*

Carolina in the same year.[13] In South Carolina, the commercial fishing industry supported 1,766 jobs and generated $120 million in sales in 2-12.[14] And lastly, the industry supported 14,124 jobs and generated more than $1.9 billion in sales in Georgia in 2012.[15]

Protecting fish habitat is critical for ensuring the health of the region's commercial and recreational fishing industries. The areas of the Atlantic OCS in which applicants propose to conduct testing contain numerous areas that have been designated as Essential Fish Habitat ("EFH") and Habitat Areas of Particular Concern ("HAPC"). The MAFMC has identified EFH for species such as summer flounder, scup, black sea bass, bluefish, Atlantic surfclam, ocean quahog, ilex and loligo squid, Atlantic mackerel, Atlantic butterfish, golden tilefish and spiny dogfish.[16] MAFMC has also identified HAPC for summer flounder and tilefish. In addition, the New England Fishery Management Council has identified EFH that extend into the mid-Atlantic for species such as monkfish, yellowtail flounder, windowpane flounder, winter founder, red hake and silver hake.[17]

Likewise, the SAFMC has identified EFH for species such as shrimp, red drum, snapper grouper, spiny lobster, rock shrimp, coastal migratory pelagic, golden crab, spiny lobster, dolphin wahoo, royal red shrimp, cobia and dolphin.[18] It has also identified HAPC for shrimp, *Sargassum*, red drum, snapper grouper complex, spiny lobster, coastal migratory pelagic, coral and dolphin wahoo.[19] Deepwater corals have also been mapped and designated by the SAFMC.[20] Additionally, the SAFMC is currently considering Amendment 36 to the Snapper Grouper Fishery Management Plan, which will identify important spawning habitat for snapper-grouper species off the coasts of North Carolina, South Carolina, and Georgia and protect these areas in order to enhance spawning and increase recruitment.[21] Seismic activity in this special management zone would severely disrupt spawning and recruitment activities and hinder efforts to bolster the snapper-grouper population.

Of particular concern is the Point, a "biological hotspot"[22] northeast of Cape Hatteras that "harbors a unique, productive, and potentially fragile biological community."[23] Another

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[13] *Id.*
[14] *Id.*
[15] *Id.*
[16] *See Habitat Program*, MID-ATL. FISHERY MGMT. COUNCIL, http://www.mafmc.org/habitat/ (last visited April 28, 2015).
[17] *See EFH Mapper*, NAT'L MARINE FISHERIES SERV., EFH http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html (last visited April 28, 2015); *see also* MID-ATLANTIC FISHERY MANAGEMENT COUNCIL, http://www.mafmc.org/ (last visited Mar. 29, 2015).
[18] *EFH Designations*, S. ATLANTIC FISHERY MGMT. COUNCIL, http://safmc.net/EFH/EFH%20Table.pdf (last visited April 28, 2015).
[19] *EFH-HAPC and Coral Habitat Areas of Particular Concern*, S. ATLANTIC FISHERY MGMT. COUNCIL, http://www.safmc.net/Portals/0/EFH/EFH-HAPC%20Table.pdf (April 27, 2015).
[20] *Id.*
[21] Amendment 36 to the Fishery Management Plan For the Snapper Grouper Fishery of the South Atlantic Region: Spawning SMZs off NC, SC, GA, and FL, S. ATLANTIC FISHERIES MGMT. COUNCIL, Mar. 25, 2015 http://safmc.net/sites/default/files/meetings/pdf/Advisory%20Panels/2015/SG_Apr/WEB_A4b_SGAm36PHDocument032515.pdf.
[22] Steve W. Ross, *Unique Deep-Water Ecosystems off the Southeastern United States*, OCEANOGRAPHY 20(4): 130-139 (2007), available at http://www.tos.org/oceanography/archive/20-4_ross.pdf.

significant area concern is the Charleston Bump, a unique habitat located southeast of Charleston, South Carolina. The Charleston Bump deflects the flow of the Gulf Stream offshore, "causing eddies and other current features that are important fish habitats."[24] The slow-growing and long-lived corals that characterize the Charleston Bump are fragile in nature and highly vulnerable to disturbance.[25]

In addition, a number of deepwater Marine Protected Areas ("MPA") provide habitats for marine life in the Atlantic OCS. MPAs are areas "of the marine environment that ha[ve] been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein."[26] In addition to Grays Reef National Marine Sanctuary off the coast of Georgia, these include the Norfolk Canyon Gear Restricted Area off the coast of Virginia, the Blue Crab Sanctuary located at the mouth of the Chesapeake Bay, and the Snowy Grouper Wreck MPA off the coast of North Carolina.[27] South Carolina has identified the Charleston Deep Artificial Reef, Edisto and Northern South Carolina MPAs off its coast. Lastly, the Georgia MPA lies east of the Triple Ledge, an important commercial fishing area.[28]

We also emphasize the fragility and importance of submarine canyons and canyon heads, as 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.[29] The canyons represent high-value habitat for many other species, and 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.[30] 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.

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[23] *A Profile of the Point,* NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://oceanexplorer.noaa.gov/explorations/islands01/background/islands/sup8_thepoint.html (last visited April 28, 2015).

[24] *A Profile of the Charleston Bump,* NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://oceanexplorer.noaa.gov/explorations/islands01/background/islands/sup11_bump.html (last visited April 28, 2015).

[25] *See* Letter from Mark Sanford, Governor of South Carolina, to George W. Bush, President of the United States, 21 May 2008, *available at* http://www.palmettoscoop.com/wp-content/uploads/2008/10/Sanford_Letter.pdf.

[26] Executive Order 13158, Marine Protected Areas, 65 Fed. Reg. 34909 (May 26, 2000).

[27] List of National System MPAs, NAT'L OCEANIC AND ATMOSPHERIC ADMIN, http://marineprotectedareas.noaa.gov/pdf/national-system/nationalsystem_siteslist_0713.pdf.

[28] *See Georgia MPA*, S. ATLANTIC FISHERIES MGMT. COUNCIL, http://www.safmc.net/managed-areas/georgia-mpa (last visited April 28, 2015).

[29] 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).

[30] 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).

Airgun surveys will 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,[31] leading fishermen in some parts of the world to seek industry compensation for their losses. Other impacts on commercially harvested fish include habitat abandonment, reduced reproductive performance, and hearing loss.[32] Even brief playbacks of predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[33] Recent data suggest that loud, low-frequency sound also disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial species.[34] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.[35] Additionally, disturbances in designated habitat areas, including EFHs, EFH-HAPCs, and MPAs, as well as primary and secondary nursery areas, could affect local fish abundance by deterring foraging, refuge, and spawning activities in preferred habitat areas.[36]

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[31] 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).

[32] 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).

[33] 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).

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

[35] 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).

[36] *See* Memorandum from Jessi Baker, N.C. Division of Coastal Management ("NCDCM") Fisheries Resource Specialist to Daniel Govoni, NCDCM Assistant Major Permits Coordinator, Aug, 19, 2014 at 2 (on file with NCDCM) (referencing National Science Foundation's certification of consistency with the State's coastal management plan that was submitted when NSF proposed conducting seismic testing off of the State coast in late 2014). In comments on the PEIS, the MAFMC echoed the State's concern about impacts to fish behavior and physiology, especially given the duration and scope of the proposed testing. *See* Letter from Dr. Christopher Moore, Executive Director of MAFMC, to Gary Goeke, U.S. Bureau of Ocean Energy Management 2 (no date listed), *available at* http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/GOMR/AtlGGCommentsFedStaLoc.pdf ("The extensive (months long) survey timeframe makes it likely that prolonged avoidance of the arrays will be necessary and could lead to interruptions in fish spawning and access to forage.").

b. Impacts to marine mammals

More than thirty marine mammal species occur within proposed survey areas, including the North Atlantic right whale.[37] The North Atlantic right whale is "the world's most critically endangered large whale species and one of the world's most endangered mammals."[38] Fewer than 500 North Atlantic right whales remain, and, each fall, females return to the waters off the southeastern coast to give birth to their calves before migrating north to their feeding grounds in the spring.[39] As the species' only known calving grounds, the area offshore of the southeastern U.S. is vital to the population. For this reason, the site has been designated as critical habitat pursuant to the federal Endangered Species Act, and regulations have been adopted to protect right whales from their leading threats of fishing gear entanglement and ship collisions.[40] In February 2015, the National Marine Fisheries Service ("NMFS") proposed expanding critical habitat for the right whale to include waters stretching from central Florida to the southern coast of North Carolina.[41] NMFS has repeatedly stated "the loss of even a single individual [right whale] may contribute to the extinction of the species," and "preventing the mortality of one adult female a year" may alter this outcome.[42]

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

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[37] *Atlantic OCS Proposed Geological & Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement*, Bureau of Ocean and Energy Mgmt Table 4.4 (April 2014) http://www.boem.gov/Atlantic-G-G-PEIS/#Final PEIS [hereinafter *PEIS*].

[38] *See* Final Rule To Implement Speed Restrictions to Reduce the Threat of Ship Collisions With North Atlantic Right Whales, National Marine Fisheries Service, 73 Fed. Reg. 60,173 (Oct. 10, 2008).

[39] North Atlantic Right Whales (*Eubalaena glacialis*), NAT'L OCEANIC AND ATMOSPHERIC ADMIN, http://www.nmfs.noaa.gov/pr/species/mammals/whales/north-atlantic-right-whale.html (last checked April 28, 2015).

[40] *See* Designated Critical Habitat; Northern Right Whale, National Marine Fisheries Service, 59 Fed. Reg. 28,793 (June 3, 1994); 73 Fed. Reg. at 60,187-89 (imposing seasonal speed limits for vessels in an area of the Southeast that expands beyond critical habitat boundaries); Taking of Marine Mammals Incidental to Commercial Fishing Operations; Atlantic Large Whale Take Reduction Plan, National Marine Fisheries Service, 72 Fed. Reg. 34,632, 34,636 (June 25, 2007) (imposing seasonal restrictions on gillnet fishing in a "substantial and core portion of the right whale calving area" that expands beyond critical habitat boundaries).

[41] *See* Endangered and Threatened Species: Critical Habitat for North Atlantic Right Whale, National Marine Fisheries Service, 80 Fed. Reg. 9314, 9319 (Feb. 20, 2015) ("Given that the area of the southeastern U.S. is the only known calving ground for North Atlantic right whales, and that the most biologically valuable portion of the species' population is utilizing this habitat, we conclude that facilitating successful calving by protecting the species' calving population is a key conservation objective."). The North Atlantic right whale tagging in the Southeast U.S. program led by Dr. Russel Andrews of the Alaska SeaLife Center and the University of Alaska will provide additional information about the movement and location of right whales in southeast waters. *See* Semi-annual progress report of the North Atlantic Right Whale Satellite Tagging in the Southeast U.S., Georgia DNR Contract ID: 46200-605-150076, at 1-3.

[42] Endangered Fish and Wildlife; Advance Notice of Proposed Rulemaking (ANPR) for Right Whale Ship Strike Reduction, National Marine Fisheries Service, 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. at 60,176 ("[T]he population can sustain no deaths or serious injuries due to human causes if its recovery is to be assured."); Marine Mammals; Atlantic Large Whale Take Reduction Plan (ALWTRP) Regulations; Seasonal Area Management (SAM) Program, National Marine Fisheries Service, 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001) ("[T]he loss of even one right whale, particularly a reproductively active female, may reduce appreciably the likelihood of the survival and recovery of this species.").

displacement, disruption of vital behaviors essential to foraging and breeding, loss of biological diversity, and, in some circumstances, injuries and mortalities.[43] 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.[44] Similar responses, all occurring over enormous areas of ocean, have been seen in these and other baleen whale species in a variety of regions and across behavioral states, affecting foraging, breeding, and migration.[45] According to recent modeling from Cornell and NOAA, the highly endangered right whale is particularly vulnerable to masking effects from airguns and other sources given the acoustic and behavioral characteristics of its calls.[46] 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 PEIS. 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.[47]

c. Impacts to sea turtles

Our region is also home to many species of sea turtles, including the green turtle, hawksbill turtle, Kemp's Ridley turtle, leatherback turtle and loggerhead turtle. The applicants' proposed survey areas overlap with numerous populations of endangered species on our region's coast and offshore waters, including populations of and critical habitat for sea turtles.

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[43] *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).

[44] Clark, C.W., and Gagnon, G.C., *Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales*, INTL WHALING COMM'N (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).

[45] See, *e.g.*, Blackwell, S.B., Nations, C.S., McDonald, T.L., Greene, Jr., C.R., Thode, A.M., Guerra, M., and Macrander, M., *Effects of airgun sounds on bowhead whale calling rates in the Alaskan Beaufort Sea*, MARINE MAMMAL SCIENCE 29(4): E342-E365 (2013); Castellote, M., Clark, C.W., and Lammers, M.O., *Acoustic and behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise*, BIOLOGICAL CONSERVATION 147: 115-122 (2012); Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., *Seismic surveys negatively affect humpback whale singing activity off Northern Angola*, PLOS ONE 9(3): e86464. doi:10.1371/journal.pone.0086464 (2014).

[46] 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).

[47] A more thorough discussion of the marine mammal literature, and the need to protect marine mammals and marine mammal habitat, is contained in our comments on BOEM's draft and final EISs for offshore G&G exploration, attached as Exhibits B and A, respectively

In 2014, the loggerhead sea turtle received extensive critical habitat protection along nesting beaches and offshore, spanning from the Mid- and South Atlantic region through the Gulf of Mexico.[48] This critical habitat includes near-shore reproductive habitats, wintering areas, breeding areas, migratory corridors and *Sargassum* habitat.[49] Significantly, the PEIS and the ROD were completed *before* the U.S. Fish and Wildlife Service designated additional critical habitat throughout the proposed survey areas.

In 2014, endangered sea turtles dug 1,205 nests on the Georgia coast, including 1,201 nests by loggerheads, 2 nests by green sea turtles, and 2 nests by leatherbacks.[50] In May of each year in North Carolina, female sea turtles begin laying their eggs along the state's coast; sea turtles laid 1,103 nests in 2012 along North Carolina coast.[51] South Carolina turtle nests in 2014 included 2,071 loggerheads, 8 greens, and 2 leatherbacks.[52] Sea turtles also nest on the barrier islands off the Eastern Shore and the Back Bay Wildlife Refuge in Virginia.[53]

The United States and Oman represent the majority of nesting sites for loggerhead sea turtles worldwide;[54] limiting anthropogenic disturbances to these nesting locations is paramount for the global conservation of this species. As BOEM observed in the PEIS, "…breeding adults, nesting adult females, and hatchlings could be 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."[55] 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.[56] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, which is where much of the energy produced by airguns is

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[48] Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle, U.S. Fish and Wildlife Service, 79 Fed. Reg. 39756, 38756 (July 10, 2014).
[49] *Id.*
[50] *Sea Turtle Nest Monitoring Program*, http://www.seaturtle.org/nestdb/index.shtml?view=3&year=2014 (last visited April 28, 2015).
[51] *Sea Turtles Fared Well along North Carolina's Coast in 2012*, N.C. WILDLIFE RES COMM'N (Jan. 7, 2013), http://www.ncwildlife.org/Default.aspx?IndexId=8359&tabid=416.
[52] *SCDNR Sea Turtle Conservation Program*, *available at* http://www.seaturtle.org/nestdb/index.shtml?view=2&year=2014 (accessed Feb. 10, 2015).
[53] *Loggerhead sea turtle* (caretta caretta), VIRGINIA HERPETOLOGIAL SOCIETY, http://www.virginiaherpetologicalsociety.com/reptiles/turtles/loggerhead-sea-turtle/loggerhead_sea_turtle.php (last visited April 21, 2015).
[54] *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle* (Caretta caretta) Second Revision (2008), U.S. FISH AND WILDLIFE SVC AND NAT'L MARINE FISHERIES SVC. I-2 (Dec. 2008) www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf [hereinafter *Recovery Plan*].
[55] *PEIS*, *supra* note 37, at 2-24. It is important to note that in Appendix I to the PEIS, BOEM acknowledges that there is insufficient data and information about the impacts of sound on sea turtles to fully understand the potential risks of seismic surveying, and that more research is necessary in order to develop appropriate noise exposure criteria to reduce the risk of injury or death. The lack of information about potential adverse impacts demonstrates the need to proceed with caution and implement mitigation measures that will be overly protective in order to avoid harm to sea turtles.
[56] *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle* (Caretta caretta) Second Revision (2008), U.S. FISH AND WILDLIFE SVC AND NAT'L MARINE FISHERIES SVC. I-52 (Dec. 2008) www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf ("Petroleum seismographic cannons produce intense noise at both high and low frequencies and have the potential to harm sea turtles.").

concentrated.[57] Given these findings, along with the global significance of the region for loggerheads, all important habitats for endangered and threatened sea turtles within the applicants' proposed survey area should be avoided.[58]

II. Argument: BOEM should deny all permits to conduct seismic activities using airguns because granting these permits would violate NEPA and OCSLA, and would not be consistent with the enforceable policies of state coastal management plans under CZMA.

BOEM's announcement of the current public comment period failed to indicate precisely on what issues BOEM seeks comment and where in the permitting process this comment period fits. This in and of itself is problematic, as the public has not been told how BOEM intends to evaluate these comments – or for what purpose. Nonetheless, as explained above, SELC provides comments on the lawfulness of the pending seismic applications in light of the requirements of NEPA, OCSLA, and the CZMA.[59]

As explained more thoroughly in our comments on the draft and final EISs for seismic exploration, Exhibits B and A (again, which we incorporate by reference), respectively, BOEM should deny these seismic applications because the agency has failed to comply with NEPA in its review of these proposals, and would violate OCSLA by issuing the pending permits. Moreover, BOEM should deny these applications because the proposed activities are inconsistent with the enforceable policies of the state coastal management plans in Virginia, North Carolina, South Carolina, and Virginia, as explained in our letters submitted during state CZMA consistency review processes. We also incorporate examples of our state consistency comments herein, and attach them as Exhibits C, D, and E.

A. BOEM should not grant permits to any applicant because the PEIS under which the permits must be evaluated is fundamentally flawed.

The PEIS for Atlantic OCS G&G activities is flawed, and therefore no permit to conduct activities evaluated under the PEIS may be issued. The PEIS is flawed for numerous reasons, including that it fails to provide mitigation measures sufficient to protect marine wildlife and habitat[60] and fails to adequately address the cumulative impacts of simultaneous and overlapping

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[57] 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); *see also* Scientist Letter, Exhibit F, explaining that "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."

[58] A more thorough discussion of seismic impacts on sea turtles may be found in Exhibit B.

[59] We do not provide comments on the lawfulness of these applications under the ESA and provide very limited comments under Marine Mammal Protection Act ("MMPA"), as we understand that this will be a separate permitting process (allowing for additional public input) undertaken by the NMFS. We are skeptical that NMFS can demonstrate that the activities proposed have "negligible impacts" on relevant stocks of marine mammals for many of the same reasons explained in this letter. We also urge BOEM to minimize impacts to marine mammals in our comments above. Likewise, we believe that NMFS will have a difficult time ensuring that these seismic applications do not pose jeopardy to many ESA-listed species.

[60] *See* Exhibit B at 25-35; *see also* Exhibit A at 5-8.

seismic surveys,[61] as discussed below.[62] NEPA was passed by Congress to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man."[63] NEPA has two primary aims. "First, it places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action. Second, it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision making process."[64]

i. Mitigation measures in the PEIS Record of Decision are wholly inadequate to protect important coastal and marine resources in our region.

In an EIS, a federal agency must disclose and analyze measures to mitigate the impacts of proposed actions.[65] The mitigation analysis is "one important ingredient" of the EIS; the analysis of mitigation measures must be "reasonably complete" in order to properly evaluate the severity of the adverse effects of an agency's proposed action before the agency makes a final decision.[66]

The mitigation measures in the Record of Decision ("ROD") are wholly inadequate to protect important and unique species and habitat in our region.[67] We incorporate by reference the discussion of mitigation measures in Exhibits A and B, which articulate in great detail why the mitigation measures proposed by BOEM in the ROD fail to protect marine life and habitat. In a nutshell, however, some of these reasons include the following.

1. Fish and fish habitat are not adequately protected by mitigation measures.

The PEIS essentially dismisses any effects of seismic activity on fish and fish habitat.[68] As discussed in detail above and in Exhibits A and B, research indicates that impacts to fish may be adverse and substantial. Many of these very important fishery areas lie along a ridge line wallowed out by historic movement of the Gulf Stream and only a veritable handful of specific

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[61] *See* Exhibit B at 48-51; *see also* Exhibit A at 9-10.
[62] The PEIS also fails to adequately consider alternatives to the proposed action. *See* Exhibit B at 10-25; Exhibit A.
[63] 42 U.S.C. § 4321 (2012).
[64] *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 97, 103 S. Ct. 2246, 2252, (1983) (internal citations and quotations omitted).
[65] 40 C.F.R. §§ 1502.14(f), 1502.16(h).
[66] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989).
[67] *See Record of Decision: Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement* (2014), http://www.boem.gov/Record-of-Decision-Atlantic-G-G/ [hereinafter *Record of Decision*].
[68] *See* Exhibit B at 52-54. BOEM oversimplifies the notion that impacted fish species will temporarily displaced, and thus are minimally impacted by seismic testing. This analysis does not account for the high site fidelity of spawning and feeding fish (particularly the snapper/grouper complex). *See, e.g.*, *Public Hearing Document: Amendment 36 to the Fishery Management Plan for the Snapper-Grouper Fishery off the South Atlantic Region: Spawning SMZs of NC, SC, GA, and FL*, S. ATL. FISHERY MGMT COUNCIL, 15-16, Mar, 25, 2015, http://safmc.net/sites/default/files/meetings/pdf/Advisory%20Panels/2015/SG_Apr/WEB_A4b_SGAm36PHDocument032515.pdf. These fish will probably stay in the vicinity of their historic spawning and feeding habitats and be subject to exposure of multiple shocks of high-level sound.

sites, compared to what may exist, have been located and identified. Allowing seismic exploration without the research necessary to further map the location of other important fishery areas may have major impacts on fisheries resources. Moreover, no mitigation measures articulated in the ROD specifically address fisheries or fish habitat. BOEM should consider additional mitigation measures that exclude the following areas from seismic activities: EFH, HAPCs, and MPAs designated by SAFMC and MAFMC.[69] Additionally, BOEM should prohibit seismic activities in the highly productive areas of The Point, the Charleston Bump, Triple Ledge, Ten Fathom Ledge, and Big Rock.[70] Finally, submarine canyons and canyon heads should be closed to seismic activities.

2. Marine mammals are not adequately protected by mitigation measures.

Given the enormous distances over which baleen whales are affected, the present time-area closures developed by BOEM are plainly inadequate to protect right whales and other endangered baleen whales. Further, existing mitigation measures do not sufficiently protect other marine mammal species for which time-area closures have not been proposed or, apparently, considered by the Agency. While the ROD restricts applicants' ability to conduct seismic testing in existing right whale critical habitat,[71] this does not go far enough. The recent proposal to expand the existing critical habitat designation for right whales, including calving grounds off North Carolina's and South Carolina's coasts, underscores the importance of requiring additional time-area closures to protect right whales and their critical habitat. Furthermore, some of our groups have asked the National Marine Fisheries Service ("NMFS") to include a migratory corridor for the species as part of the critical habitat designation.[72] The Point, described above, is as vitally important for marine mammals as it is for fish. BOEM has not analyzed the new predictive density models for the Atlantic region, produced under NOAA's CetMap program, to identify potential areas for closure. At a minimum, BOEM must consider new time area closures for these areas proposed for protection, and, as discussed in our comments on BOEM's draft and final EISs, must include other mitigation measures aimed at reducing source levels and/or the amount of survey activity.

3. Sea turtles and sea turtle critical habitat are not adequately protected by mitigation measures.

We are very concerned that the ROD contemplates time-area closures for Brevard County, Florida only, ignoring the fact that beaches along the Virginia, North Carolina, South Carolina, and Georgia coasts provide important habitat for sea turtles. Loggerhead sea turtles received extensive critical habitat protection along the beaches and off the coast of North Carolina, South Carolina, and Georgia in 2014 -- after the PEIS was completed and the ROD drafted.[73] Long-term datasets show nesting declines for loggerheads in North Carolina, South

[69] *Id.* at 22-25.
[70] *Id.*
[71] *See Record of Decision*, *supra* note 67, at 3.
[72] *See* Exhibit H (providing comments to NMFS regarding the proposed expansion of right whale critical habitat).
[73] Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle, 79 Fed. Reg. 39756, 38756 (July 10, 2014). It is important to note that the U.S. Fish and Wildlife

Carolina, Georgia, and southeast Florida.[74] All near-coastal waters from Florida through North Carolina from May 1 through October 31 should be excluded from seismic airgun activity to protect both nesting sea turtles and hatchlings. More generally, all newly designated sea turtle critical habitat areas must be included in time-area closures for seismic to protect imperiled sea turtles.

ii. BOEM failed to conduct an adequate cumulative effects analysis.

The PEIS is also flawed because it fails to adequately consider the cumulative effects of individual seismic applications. In determining the scope of the required NEPA analysis, an agency must consider not only the proposed action, but also three types of related actions—"connected actions," "similar actions," and "cumulative actions."[75] "Cumulative actions" are those "which when viewed with other proposed actions have cumulatively significant impacts."[76] In determining the significance of a proposed action, an agency must consider

> [w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.[77]

NEPA regulations define "cumulative impact" as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.[78]

Consideration of cumulative impacts requires "some quantified or detailed information; ... [g]eneral 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."[79] The cumulative impact analysis must be more than perfunctory; it must provide a "useful analysis of the cumulative impacts of past, present, and future projects."[80] Finally, cumulative impact

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Service designated additional habitat for the loggerhead sea turtle after the BOEM completed the final PEIS for geophysical and geographic activities in the Atlantic OCS.

[74] *See Loggerhead Sea Turtle* (Caretta caretta), NAT'L MARINE FISHERIES SVC, *available at* http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (last visited April 28, 2015).

[75] 40 C.F.R. § 1508.25(a) (2015).

[76] *Id*. § 1508.25(a)(2).

[77] 40 C.F.R. § 1508.27(b)(7). *See also Churchill County v. Norton*, 276 F.3d 1060, 1072 (9th Cir. 2001).

[78] 40 C.F.R. § 1508.7.

[79] *Neighbors of Cuddy Mountain v. U.S. Forest Svc.*, 137 F.3d 1372, 1379–80 (9th Cir. 1998) (internal citations omitted).

[80] *Muckleshoot Indian Tribe v. U.S. Forest Svc.*, 177 F.3d 800, 810 (9th Cir. 1999) (citing *City of Carmel-by-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1160 (9th Cir. 1997)).

analysis must be timely. It is not appropriate to defer consideration of cumulative impacts to a future date when meaningful consideration can be given.[81]

BOEM fails to meaningfully address or account for the projected impact of repeated seismic surveys in the same survey area.[82] Moreover, no applicant addresses the cumulative impacts of seismic testing on the region's coastal resources in the publicly available applications. BOEM is currently considering nine applications to conduct seismic testing in the Atlantic OCS off the coasts of Virginia, North Carolina, South Carolina, and Georgia with largely overlapping survey areas, including two non-airgun surveys and seven airgun surveys.[83] As noted in detail above, the impact of one seismic survey is substantial. Indeed, the cumulative impact of nine seismic surveys in our region on marine and coastal resources of the region will put marine life and coastal resources at great risk, especially when combined with other sources of acoustic effects, such as ongoing Navy training, in the areas where seismic will occur. BOEM must plan for and mitigate the impact of numerous seismic surveys before issuing permits, and the Agency has failed to do so.

B. BOEM may not tier permit-specific environmental assessments to the PEIS; instead BOEM must complete a supplemental EIS or permit-specific EISs.

Because the PEIS is fundamentally flawed as discussed above, BOEM is not permitted to tier individual permit-specific environmental assessments to the PEIS without conducting new NEPA analyses. It is true that NEPA encourages the use of tiering "to eliminate repetitive discussions of the same issues . . . [w]henever a broad environmental impact statement has been prepared . . . and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action)."[84]

But it is also clear that an agency may not tier to a previous invalid NEPA analysis,[85] as BOEM apparently plans to do here.[86] Because the PEIS is fundamentally flawed, BOEM is not permitted to tier individual permit-specific environmental assessments ("EAs") to the PEIS in the future.

Instead, because of new information explained in our May 7, 2014 comments on the PEIS,[87] BOEM must prepare a supplemental EIS for all Atlantic seismic exploration. An agency must prepare a supplemental EIS ("SEIS") when "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its

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[81] *See Neighbors of Cuddy Mountain*, 137 F.3d at 1380; *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1312–13 (9th Cir. 1990).
[82] *See* Exhibit B at 48-51; Exhibit A at 9-10.
[83] *Currently Submitted Atlantic OCS Region Permits*, BUREAU OF OCEAN AND ENERGY MGMT., http://www.boem.gov/Currently-submitted-Atlantic-OCS-Region-Permits/ (last visited April 22, 2015).
[84] 40 C.F.R. § 1502.20.
[85] *See Oregon Natural Res. Council Fund v. Forsgren,* 252 F. Supp. 2d 1088, 1107 (D. Or. 2003); *see also Coker v. Skidmore*, 941 F.2d 1306, 1309 (5th Cir. 1991).
[86] *See, e.g.*, Atlantic Permit Application E14-005, http://www.regulations.gov/#!documentDetail;D=BOEM-2015-0029-0001 1 (last checked April 22, 2015) (This environmental review process will tier from the Programmatic Environmental Impact Statement (PEIS) prepared for G&G activities on the Mid-Atlantic and South Atlantic Outer Continental Shelf.).
[87] *See* Exhibit A, pp. 2-15.

impacts."[88] Supplemental NEPA analyses are necessary when an existing NEPA analysis is not sufficient to allow a hard look.[89] "The standard for determining when an SEIS is required is essentially the same as the standard for determining when an EIS is required."[90] An SEIS is necessary if there are changes in the project that "will have a significant impact on the environment that ha[ve] not previously been covered by the [original] EIS."[91] Whether new circumstances are significant depends on many factors, including "[t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks," "[t]he degree to which the action. . . may cause loss or destruction" of significant resources, and "[t]he degree to which the action may adversely affect an endangered or threatened species" or critical habitat.[92]

Many of these factors are present here. As explained repeatedly throughout this letter, seismic exploration presents unique risks, many of which are highly uncertain. Seismic exploration also may cause loss or destruction of numerous resources from fisheries to endangered marine wildlife. According to BOEM's estimates, seismic activity would injure up to 130,000 marine mammals and disrupt marine mammal feeding, calving, breeding, and other vital activities more than 13 million times over the next eight years alone.[93] Additionally, the new predictive habitat model for the Atlantic region, produced under NOAA's CetMap program, constitutes significant new information for impact, alternatives, and mitigation analysis.[94] Finally, seismic exploration is planned for areas that have recently been designated as sea turtle critical habitat and that are newly proposed as critical habitat for one of the world's most endangered marine mammals, the North Atlantic right whale. These new critical habitat areas and proposal alone are sufficient to require the preparation of an SEIS.

If BOEM declines to prepare a SEIS covering seismic exploration in the Atlantic OCS, BOEM must prepare EISs for each application given that these applications all individually meet the criteria for significance as discussed above.[95] Site-specific EISs must include a complete and legally sufficient analysis of alternatives to the proposed action, cumulative impacts, and mitigation measures.

C. BOEM should not grant any permit for seismic testing because the activities contemplated by the permits violate OCSLA.

OCSLA grants the Secretary of the Interior the authority to regulate exploration activities within the OCS. Among the goals of OCSLA is that of "preserv[ing], protect[ing], and develop[ing] oil and natural gas resources of the OCS in a manner that is consistent with the need . . . (b) to balance orderly resource development with protection of the human, marine, and

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[88] 40 C.F.R. § 1502.9(c)(1)(ii) (2015).
[89] *Pennaco Energy Inc. v. Dep't of Interior*, 377 F.3d 1147, 1156-57 (10th Cir. 2004).
[90] *Sierra Club v. U.S. Army Corps of Eng'rs*, 295 F.3d 1209, 1215-16 (11th Cir. 2002) (quotation marks and citation omitted).
[91] *Id.* at 1216.
[92] 40 C.F.R. § 1508.27(b).
[93] *See PEIS*, *supra* note 37, at Tables 4-9, 4-10.
[94] *See* Cetacean & Sound Mapping, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://cetsound.noaa.gov/cda-index (last visited April 28, 2015).
[95] *See* 40 C.F.R. 1508.27(b).

coastal environments."[96] Exploration activities include "geophysical surveys where . . . seismic . . . systems are used to detect or imply the presence of such minerals."[97] BOEM may issue permits for exploration activities, including G&G activities, "only if . . . such exploration will not be unduly harmful to aquatic life in the area, result in pollution, create hazardous or unsafe conditions, unreasonably interfere with other uses of the area, or disturb any site, structure, or object of historical or archeological significance."[98] Further, G&G permit holders "must not . . . cause harm or damage to life (including fish and other aquatic life), property, or to the marine, coastal, or human environment."[99]

The activities proposed by applicants will result in substantial harm to fish, marine mammals, sea turtles, and important habitat areas in the Atlantic OCS. Further, proposed activities are expected to interfere with commercial and recreational fishing activities, which are vital to coastal economies. The anticipated impact to marine life and habitat clearly violates the "undue harm" standard and the regulatory requirement that no permit holder "cause harm or damage to life . . . or the marine, [or] coastal . . . environment."

Further, a central goal of OCSLA is to balance development of offshore energy resources with environmental protection. This balancing should weigh in favor of environmental protection. As discussed in great detail above, seismic testing will have substantial impact on marine and coastal resources. The benefits of seismic activities are far outweighed by the environmental harm expected from these activities. For these reasons, BOEM should deny the applicants' permits to conduct seismic testing in the Atlantic OCS.[100]

D. <u>BOEM should not grant any permit for seismic testing because seismic testing is inconsistent with the enforceable policies of the Virginia, North Carolina, South Carolina, and Virginia coastal management plans developed under CZMA.</u>

The federal Coastal Zone Management Act of 1972 ("CZMA") was passed by Congress to "promote comprehensive and coordinated planning for coastal zone development and preservation between states and the federal government."[101] The CZMA articulates a number of policy objectives, including "to preserve, protect . . . and restore or enhance the resources of the Nation's coastal zone; [and] to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management

[96] *PEIS, supra* note 37, at 1-11.
[97] 43 U.S.C. § 1331(k) (2012). *See also* 30 C.F.R. § 551.1 (2015) (classifying G&G seismic surveys as exploration activities).
[98] 43 U.S.C. § 1340(g)(3).
[99] 30 C.F.R. § 551.6 (2015) (describing the obligations and rights of a G&G permit holder).
[100] BOEM may not approve exploration plans under OCSLA if the activities under the plan would "probably cause serious harm or damage to life (including fish and other aquatic life), to property, to any mineral (in areas leased or not leased), to the national security or defense, or to the marine, coastal, or human environment." 43 U.S.C. § 1334(a)(2)(A)(i). An activity that meets the "undue harm" under Section 1340 of the statute likely meets the "probable harm" standard as well. Applicants have not submitted exploration plans to BOEM for approval at this time, however, it is important to note that applicants' proposed activities meet neither the "undue harm" standard applicable during the G&G permitting phase nor the "probable harm" standard applicable during the exploration phase.
[101] *Conservation Law Found. v. Watt*, 560 F. Supp. 561, 574 (D. Mass. 1983) *aff'd sub nom. Com. of Mass. v. Watt*, 716 F.2d 946 (1st Cir. 1983).

programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development."[102] Coastal states have "substantial and significant interests in the protection, management, and development" of resources in the exclusive economic zone that are best served by state involvement in plans that impact coastal resources and the development of state coastal management plans.[103] Under the CZMA, each coastal state may adopt a coastal zone management plan that provides for "the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone" and "management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters," among other objectives.[104] During federal consistency review, states have an important opportunity to protect their coastal resources from seismic exploration, as well as the potential dangers of offshore oil development.

Our organizations have participated in the consistency review process in North Carolina, South Carolina, and Georgia.[105] Each state's coastal management plan puts in place strong protections for important coastal resources, including fish and fish habitat, marine mammals, and endangered species. The applicants' proposed activities are inconsistent with the enforceable policies of the coastal management plans in each state.[106] As noted above, we incorporate by reference the consistency letters to coastal management agencies in North Carolina, South Carolina, and Georgia attached hereto.

Seismic activities are inconsistent with the region's coastal management plans and therefore BOEM must deny all applications to conduct seismic testing off our region's coast.[107]

III. Conclusion

Finally, we note that even though the NMFS has not yet begun its permitting process pursuant to the Marine Mammal Protection Act for Atlantic G&G activities, the subject of marine mammal take is clearly a significant environmental impact of the proposed seismic activities. The Atlantic PEIS specifically anticipates the injury and death of 130,000 marine mammals.[108] Notably, the MMPA prohibits the take of marine mammals except in specific limited circumstances.[109] One of the specific limited circumstances is for the incidental take of "small numbers" where the "*total of such taking* during each five-year (or less period) will have a negligible impact on such species or stock."[110] The regulations providing for such take must

[102] 16 U.S.C. § 1452 (1)-(2) (2012).
[103] *Id.* at § 1451.
[104] *Id.* at § 1452 (2)(a)-(b).
[105] For unknown reasons, Virginia did not request consistency review, nor did BOEM grant Virginia the opportunity to conduct a consistency review for seismic testing off its coast. However, Virginia's coastal zone management program comprises a number of programs with enforceable policies that protect coastal resources. We believe that seismic activities are inconsistent with Virginia's coastal management program.
[106] Please see Exhibits C, D, and E for examples of comment letters submitted to the state agency in responsible for making the final consistency determination in North Carolina, South Carolina, and Georgia.
[107] *See PEIS*, *supra* note 37, at 1-13.
[108] *See PEIS*, *supra* note 37, at Tables 4-9, 4-10.
[109] 16 U.S.C. 1371 § (2012).
[110] *Id.* at (a)(4)(A)(i) (emphasis added).

further specify "permissible methods of taking pursuant to such activity, and other means of effecting the *least practicable adverse impact on such species or stock and its habitat*."[111] These provisions clearly indicate a statutory intent and requirement to minimize impacts to marine mammals. In its consideration of the nine pending permit applications and their cumulative impacts on the marine environment, we urge BOEM to carefully examine options for avoiding undue harm to marine mammals, including denial of approval for duplicative surveys.

BOEM has failed to comply with NEPA in considering seismic applications. Further, BOEM will violate OCSLA and CZMA if the Agency issues seismic permits. Seismic testing is the first step toward the development of offshore oil resources. The impacts of offshore drilling in deep water on fish, endangered species, marine mammals, and wildlife habitat are well documented. SELC and the undersigned are strongly opposed to the exploration and development of offshore oil and gas off our region's coast because of the substantial risks oil and gas exploration and development poses to valuable coastal resources and the coastal way of life.

Thank you for your consideration of these comments.

Sincerely,

Catherine M. Wannamaker
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Blakely E. Hildebrand
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CC:

Carrie Clark, North Carolina League of Conservation Voters
David Rogers, Environment North Carolina
Brian Buzby, North Carolina Conservation Network
Tim Gestwicki, North Carolina Wildlife Federation
Matthew Starr, Upper Neuse Riverkeeper, Sound Rivers, Inc.
Travis Graves, Lower Neuse Riverkeeper, Sound Rivers, Inc.
Heather Deck, Pamlico-Tar Riverkeeper, Sound Rivers, Inc.

[111] *Id*. (emphasis added).

Jane Preyer, Environmental Defense Fund
Steve Gilbert, South Carolina Wildlife Federation
Hamilton Davis, Coastal Conservation League
Andrew Wunderley, Charleston Waterkeeper
Paula Reidhaar, Winyah River Foundation
Ann Timberlake, Conservation Voters of South Carolina
Kate Dittloff, Charleston Surfrider Foundation
Chris Carnevale, Southern Alliance for Clean Energy
David Kyler, Center for a Sustainable Coast
Jen Hilburn, Altamaha Riverkeeper
Ashby Nix, Satilla Riverkeeper
David Egan, Initiative to Protect Jeckyll Island
Emily Markestyn, Ogeechee Riverkeeper
Chelsea Harnish, Virginia Conservation Network
Jane Davenport and Karimah Schoenut, Defenders of Wildlife
Kristen Monsell, Center for Biological Diversity
Michael Jasny, Natural Resources Defense Council

Attachments (8)

EXHIBIT A

CENTER FOR BIOLOGICAL DIVERSITY – CLEAN OCEAN ACTION
FLORIDA WILDLIFE FEDERATION – INTERNATIONAL FUND FOR ANIMAL WELFARE – NATURAL RESOURCES DEFENSE COUNCIL
OCEAN CONSERVATION RESEARCH – THE OCEAN FOUNDATION
OCEANA – SOUTH CAROLINA COASTAL CONSERVATION LEAGUE
SOUTHERN ENVIRONMENTAL LAW CENTER

By Electronic Mail

May 7, 2014

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
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 Final 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 Final Programmatic Environmental Impact Statement ("FEIS") for geological and geophysical ("G&G") activities off the mid-Atlantic and southeast coasts. 79 Fed. Reg. 13074 (Mar. 7, 2014).

As you know, we are deeply concerned about BOEM's intention to permit 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 seismic exploration itself. The import and scale of this decision demands a rigorous standard of environmental review. Unfortunately, the FEIS does little to repair the fundamental problems we observed in the draft document and, indeed, creates new ones.

During our last opportunity to comment, in 2012, we drew the agency's attention to numerous defects in its impacts analysis. We remarked on its use of a cookie-cutter threshold for harm that was no longer accepted by the scientific community and that almost certainly led to a gross underestimation of marine mammal take. We criticized its cursory treatment of masking effects, despite the availability of quantitative models and methods to assess them; and its lack of any serious analysis of cumulative and adverse synergistic impacts, despite its massive projected

takes of wildlife populations already hard hit by naval and other activity. These problems have not been cured. Indeed, they are exacerbated by the present document's seeming indifference to new research—on right whale distribution, masking effects, impacts on fish and fisheries, and disruptions in baleen whale behavior (for example)—that further contradicts its assumptions.

Nor has BOEM's analysis of reasonable alternatives improved. While the agency has expanded its seasonal exclusion for North Atlantic right whales—its one advance on the DEIS—it nevertheless disregards the best available science on right whale distribution, which shows extensive habitat use for both migration and calving in waters beyond the exclusion area, as discussed more fully below. As for other wildlife species, BOEM has postponed identifying any important habitat.[1] It does not attempt to restrict exploration from waters that are unlikely to be leased, such Navy training areas, or to reduce the environmental footprint of the activity that does occur. And it fails even to devise a long-term monitoring plan, which is a staple of Navy mitigation and essential to any meaningful management program. In short, the agency has not devised alternatives and mitigation to address the serious cumulative, sublethal impacts of its activity.

BOEM proposes to remedy many of these problems through some uncertain future action, perhaps through a "programmatic management plan" or project-specific NEPA analyses (FEIS at 1-27). It is at such a later stage, the agency says, that it will incorporate new take thresholds into its impact assessments, identify important habitat through NOAA's CetMap program, and consider the essential mitigation measures and alternatives—additional time-area closures, limitations on activities, consolidation of surveys, use of quieting technology—that we and numerous others have identified (FEIS at 1-27 to 1-28). We appreciate BOEM's intentions and its recognition that more basic analysis is necessary. But given the poor precedent of the FEIS, we would be naïve to put much faith in it.

The present NEPA review represents the agency's best opportunity to rigorously examine its proposed action at the scale at which it would occur, as the law requires. This opportunity must not be wasted. **We strongly urge you to defer issuance of a Record of Decision and, instead, to renew the NEPA scoping process or, at minimum, prepare a Supplemental Programmatic EIS for public comment.**

I. NEW INFORMATION SINCE THE PUBLICATION OF THE DEIS

A. Distribution of North Atlantic Right Whales

In its Final PEIS, the Bureau listed alternatives to the proposed action that were intended to protect North Atlantic right whales, an endangered species and the subject of extensive conservation efforts by NOAA and other stakeholders. BOEM's most protective alternative,

[1] The one exception is the loggerhead sea turtle, whose habitat use the agency likewise underestimates. *See* Comments of NRDC et al. on the Draft PEIS for Atlantic G&G Activities at 20-22 (July 2, 2012) [hereinafter "DEIS comments"].

Alternative B, includes a time-area closure extending seaward 20 nautical miles from Delaware Bay to the southern edge of the agency's planning area, running from November 1 through April 30 or from November 15 to April 15, depending on location, and within any active Dynamic Management Areas separately established under NOAA's speed reduction rule to reduce ship-strike risk (FEIS at 2-36). As we discussed in our DEIS comments, we believe that these boundaries fail to include, and that the agency has failed to consider, areas of demonstrated biological importance to right whales, including calving and migratory habitat. Our concerns are only amplified by recent developments in the literature on right whale occurrence.

(1) New acoustic monitoring data

In developing its proposed area closures, the Bureau relied on historical sighting data of right whales from the National Marine Fisheries Services and a rigid assumption that approximately 83% of right whales occur within 20 nautical miles of the coast (DEIS at 2-28). While essential, shipboard and aerial sighting surveys are also highly limited, in that they are constrained to daylight hours and favorable weather, spotting whales only when they surface. Additionally, some sighting data are recorded by the public and can therefore suffer from near-shore bias. Long-term passive acoustic monitoring, in combination with visual survey data, provide a much more accurate assessment of right whale distribution in the mid- and south Atlantic.

Cornell University's Bioacoustics Research Program recently completed a study which shows that critically endangered North Atlantic right whales are present throughout the year off the Virginia coast.[2] This information differs from what was considered in the preparation of the EIS, 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 a primary mitigation measure in the DEIS.

Had new information from the Cornell study, which was presented to the agency prior to the completion of the Final PEIS, been incorporated into the Final PEIS, the agency would either have developed additional mitigation alternatives to address the information or have altered its preferred mitigation alternative, Alternative B. The Cornell results run counter to previous estimations of right whale presence based on visual sighting data alone. In reality, the majority of recorded calls during the peak season of right whale activity (mid-January 2013 through late March 2013) occurred further offshore at marine autonomous recording unit ("MARU") sites 3 (38 nautical miles from shore) and 5 (63 nautical miles from shore) than at MARU sites closer to shore. Thus, the spatial protection afforded to right whales in the Preferred Alternative—the broadest time-area closure for this species that BOEM considered—remains an inadequate option that does not reflect the actual habitat use of right whales during the migration period.

[2] Rice, A., Acoustic ecology of North Atlantic right whales off of the Virginia coast: Data quality and initial right whale presence results, Cornell University Bioacoustics Research Program (Oct. 2013). This 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 Nov. 14, 2013.

Additionally, BOEM, in proposing its alternatives for right whales, has not taken into account the species' year-round presence off Virginia, which could reflect non-migratory behavior among some cohort of the right whale population. The same Cornell study also demonstrated near-year-round presence off the Georgia coast. BOEM suggests that its separate time-area closure for sea turtle nesting, which would cover the remainder of the calendar year, would provide an additional measure of protection for right whales (FEIS at 2-37). Yet this closure will provide little marginal benefit, as the closure area extends only 5.9 nm off the coast of one county (Brevard County, Florida), and is limited to sound sources operating below 1.6 kHz, well below the 30 kHz that marks the upper bounds of baleen whale hearing (*id.*).

If BOEM incorporated the best available science, it would have proposed more expansive area closures for right whales. At a minimum, the Bureau should expand its preferred time-area closures along the mid-Atlantic migratory path to at least 63 miles, where MARUs recorded significant numbers of right whales. Moreover, the Final PEIS should have considered extending the closure to incorporate other times of year when right whales are present. 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.

(2) Other data supporting expansion of right whale critical habitat

The FEIS does not consider establishing time-area closures in other important right whale habitat identified in recent studies.

As we noted in our Draft EIS comments, NMFS has determined that expansion of the right whale critical habitat designation, as proposed in a 2009 petition, may be warranted and has committed to revise the designation. 75 Fed. Reg. 61690. That petition called, in part, for designation of coastal waters off South Carolina, Georgia, and Florida as critical habitat, based in part on a 2007 NMFS study indicating the importance of these waters for right whale calving.[3] Notably, the 2007 study has since been published in *Endangered Species Research*, and identifies as calving and other habitat areas that clearly fall outside the time-area closure proposed in BOEM's preferred alternative.[4] In the FEIS, BOEM states, with respect to Alternative A, that it will modify its closure to reflect any NMFS revisions to the critical habitat designation (FEIS at 2-9). But NOAA is currently being sued under the Administrative Procedure Act for unlawful delay in its revision. *HSUS v. NMFS*, Case No. 1:2014-cv-11754 (D. Mass.) (case filed Apr. 10, 2014). In any case, NMFS' tardiness does not absolve the agency from considering best available science in formulating reasonable alternatives for purposes of NEPA. While we appreciate the agency's expansion of the right whale closure as part of its new preferred alternative, its alternatives analysis remains inadequate.

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[3] 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).

[4] Keller, C.A., Garrison, L., Baumstark, R., Ward-Geiger, L.I., and Hines, E., Application of a habitat model to define calving habitat of the North Atlantic right whale in the southeastern United States, *Endangered Species Res.* 18: 73-87 (2012). The original study is Garrison, L., Defining the North Atlantic right whale calving habitat in the southeastern United States: An application of a habitat model (2007) (NOAA Tech. Memo. NMFS-SEFSC-553).

B. Impacts and Mitigation of Non-Airgun Geophysical Sound Sources

Since the Draft EIS comment period closed, substantial new information has become available on the impacts and mitigation of other geophysical noise sources, such as those used in high-resolution geophysical surveys. Many of these sources were previously thought to be of small concern given their acoustic characteristics, particularly their high-frequency output.

(1) Potential impacts of certain powerful high-frequency sources

Recent investigation into a mass stranding of melon-headed whales raises strong concerns about the impacts of some of these acoustic systems. On May 30, 2008, a pod of some 100 to 200 whales stranded in Loza Lagoon, a large mangrove estuary on the northwest end of Madagascar; despite rescue efforts, at least half are believed to have died, with unknown consequences for the larger population. The report of an Independent Scientific Review Panel ruled out nearly all potential causes of this pelagic species entering the lagoon, and found that the "most plausible and likely behavioral trigger" was an industrial multibeam echosounder employed by Exxon, in close spatial and temporal association with the stranding event.[5]

The multibeam echosounder associated with that event, the Kongsberg Simrad EM120, has an output carrier frequency of 12 kHz, with 191 directional but overlapping sound beams, an across-track beam fan width of 150°, and an output source level of 236-242 dB (RMS). Such a system is more likely to be dangerous for marine mammals than the systems described in Appendix D of the FEIS, since the latter's peak frequencies (above 200 kHz) are virtually undetectable by marine mammals, whereas the peak frequency of 12 kHz produced by the former is in the range of best hearing for many cetaceans and pinnipeds. Indeed, the relevant characteristics of the Kongsberg system are comparable with some hull-mounted naval sonar systems, e.g., the AN/SQS-25. Even though echosounders, as opposed to military sonar systems, are directed towards the seafloor, such equipment could still easily propagate noise at levels above 120 decibels over a greater than 30 km radius, as the Madagascar report found.

A comparable multibeam sonar system—with a center frequency of 15.5 kHz and associated source levels of 237 dB—was used by a Lamont-Doherty Earth Observatory research survey prior to the Gulf of California beaked whale strandings in September 2002, with which the survey was closely correlated, and may have played a role in that event as well.[6] Regardless, it is

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

[6] Cox, T.M., Ragen, T.J., Read, A.J., Vos, E., Baird, R.W., Balcomb, K., Barlow, J., Caldwell, J., Cranford, T., Crum, L., D'Amico, A., D'Spain, G., Fernández, A., Finneran, J., Gentry, R., Gerth, W., Gulland, F., Hildebrand, J., Houser, D., Hullar, T., Jepson, P.D., Ketten, D., MacLeod, C.D., Miller, P., Moore, S., Mountain, D., Palka, D., Ponganis, P., Rommel, S., Rowles, T., Taylor, B., Tyack, P., Wartzok, D., Gisiner, R., Mead, J., and Benner, L., Understanding the impacts of anthropogenic sound on beaked whales. 7 *J. Cetacean Res. Manage.* 177-187 (2006); 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 Crisis* 101-123 (2006).

clear that high-power, lower-frequency echosounders and other sonar systems have the potential to impact marine mammal behavior, especially of odontocetes, over a wide spatial scale—and to a far greater extent than has previously been supposed for this category of sound source.[7] To address these impacts, BOEM should have expanded its consideration of alternatives and mitigation to include, for example, outright restrictions on the use of these systems, particularly in areas close to shore; time-area closures; and improvements in safety zone monitoring.

(2) Potential impacts of sources with peak output greater than 200 kHz

Two recent papers document the significant frequency "leakage" that can occur in some geophysical sound sources, particularly sources used in high-resolution surveys, such as echosounders, that combine high source levels with rapid rise times. The leakage is so significant that tested sources with peak frequencies at and above 200 kHz, well beyond the range of marine mammal hearing, produced substantial noise within marine mammal hearing ranges in much lower bands.[8] For example, a BioSonics sonar system produces 165 dB (SPL) in the 1/3-octave band centered at 20 kHz, and comparable levels of sound across much of the frequency spectrum below 100 kHz. While these source levels are appreciably lower, at relevant frequencies, than those generated by sub-bottom profilers and other lower-frequency systems, their amplitude is sufficient to induce behavioral effects and contradicts the assumptions made in the FEIS, in its modeling of representative low-energy sources (*see* FEIS at App. D-21 to D-33).

Furthermore, the short rise times that these sources exhibit are correlated across mammalian species with startle response, raising concerns about sensitization. In a 2011 study, researchers demonstrated that sounds eliciting an acoustic startle response in captive grey seals were associated with "rapid and pronounced" sensitization, taking hold after only about 3 playbacks, whereas sounds that failed to induce a startle response did not sensitize the animals.[9] The startled seals then displayed sustained spatial avoidance, rapid flight responses, and "clear signs of fear conditioning," and, once sensitized, even avoided food that was proximate to the sound source. According to the authors, sounds with short rise times thus have "the potential to cause severe effects on long-term behavior, individual fitness and longevity of individuals in wild animal populations." In one of the more recent studies, the BioSonics sonar system discussed above produced a strong behavioral response in the same species, leading the researchers to conclude that it could produce startle responses, and therefore potentially sensitization, as well.[10] The FEIS should consider the effects of short rise time from these (and other) sources.

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[7] The point is echoed by Southall et al., Final Report of the Independent Scientific Review Panel.

[8] Deng, Z.D., Southall, B.L., Carlson, T.J., Xu, J., Martinez, J.J., Weiland, M.A., and Ingraham, J.M., 200 kHz commercial sonar systems generate lower frequency side lobes audible to some marine mammals, *PLoS ONE* 9(4): e95315.doi:10.1371/journal.pone.0095315 (2014); Hastie, G.D., Donovan, C., Götz, T., and Janik, V.M, Behavioral responses by grey seals (*Halichoerus grypus*) to high frequency sonar, *Marine Pollution Bulletin* 79: 205-210 (2014)..

[9] Götz, T., and Janik, V.M, Repeated elicitation of the acoustic startle reflex leads to sensitisation in subsequent avoidance behaviour and induces fear conditioning, *BMC Neurosci* 12:30. doi:10.1186/1471-2202-12-30 (2011).

[10] Hastie et al., Behavioral responses by grey seals.

These recent findings raise questions not only about BOEM's impact analysis of higher-frequency geophysical sources, but also about its limited mitigation for such surveys, including, for example, its decision, in the preferred alternative, to allow sources "operating above 30 kHz" in right whale critical habitat and seasonal management areas without additional mitigation, and to allow sources "operating above 200 kHz" to proceed in all circumstances without any mitigation (FEIS at 2-13, 2-70). The FEIS should address them.

(3) Advances in mitigating low-energy geophysical sources

The FEIS should consider recent developments that have occurred outside the federal agencies in mitigating the impacts of non-airgun geophysical sources.

First, a number of major offshore wind developers entered into an agreement with environmental NGOs, including several signatories to the present comment letter, to undertake additional mitigation and monitoring during high-resolution geophysical surveys (and during meteorological tower installation as well).[11] The agreement, which covered the mid-Atlantic Wind Energy Areas from New York south to Virginia, was primarily intended to reduce risk to North Atlantic right whales by barring this activity throughout the peak migration period, reducing co-occurrence with the species, and by setting additional requirements during other months. Such additional requirements include a vessel speed restriction for all ships involved in the activity regardless of vessel length, including supply ships transiting to the survey site; and sound source validation and extended safety zone and monitoring requirements for sub-bottom profiling. Earlier today, a conceptually similar agreement covering the Rhode Island/ Massachusetts Wind Energy Area was signed by many of the same parties, including the area's leaseholder.[12] All of these agreed-upon measures supplement what BOEM has prescribed in its Environmental Assessments for wind development site assessment and characterization activities, and, similarly, exceed what, in the instant document, BOEM has required outside designated critical habitat (see FEIS at 2-13). NMFS' Office of Protected Resources has reviewed the measures for the mid-Atlantic agreement and acknowledged their reasonableness.[13]

Second, the California State Lands Commission revised its general permit program for "low-energy" geophysical surveys to substantially increase mitigation and monitoring requirements to protect marine wildlife and to require additional environmental review and, potentially,

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[11] Grybowski, J., Beinecke, F., Gordon, J., Kassel, J., Davis, W.L., Schweiger, L., Kraus, S., Sharpless, A., Middleton, R., Downes, A., Alt, M., and Brune, M., Proposed Mitigation Measures to Protect North Atlantic Right Whales from Site Assessment and Characterization Activities of Offshore Wind Energy Development in the Mid-Atlantic Wind Energy Areas (2012) (Dec. 12, 2012 letter to Maureen Bornholdt, BOEM).

[12] Grybowski, J., Beinecke, F., J., Kassel, J., Lyon, J., Alt, M., Savitz, J., Downes, A., and Brune, M., Proposed Mitigation Measures to Protect North Atlantic Right Whales from Site Assessment and Characterization Activities of Offshore Wind Energy Development in the Rhode Island and Massachusetts Wind Energy Area (2014) (May 7, 2014 letter to Maureen Bornholdt, BOEM).

[13] Correspondence from Michelle Magliocca, NMFS Office of Protected Resources, to Michael Jasny, NRDC (Sept. 14, 2012).

mitigation for certain sources.[14] These mitigation measures include a bar on nighttime operations, except in the case of single-beam echosounders under particular circumstances; use of the highest frequency band and fewest pulse rates to the maximum extent practicable; exclusion of activity and other mitigation around pinniped haul-out sites; and soft-start before the commencement of each day's activity and after any mitigative shutdowns.

The FEIS should consider these new agreements and protocols in its analysis of reasonable alternatives and mitigation measures.

C. Impacts of Airgun Surveys on Fish and Fisheries

In our Draft EIS comments, we observed that 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 (DEIS comments at 53-54). That concern about fish and fisheries is shared by the Mid-Atlantic Fisheries Management Council, which, as you know, submitted comments opposing airgun surveys on the U.S. east coast.[15]

In 2013, Namibian tuna fishers complained to their government of a significant decline in catch during seismic surveys conducted over the prior two years within the albacore migratory route. In 2011, fishers reported that tuna sightings and catch plummeted after February 2011, when seismic crews began operating around the tuna grounds. In 2012, during more extensive surveys around the Tripp Seamount, a hotspot for tuna fishing, catch rates declined dramatically compared to previous years; a similar decline was seen in 2013, when the seismic industry conducted surveys just across the South African border, from which the tuna were migrating. While numbers of operating boats differed significantly from year to year, that difference does not explain the significant decline in catch in 2012, 2013, and possibly in the later months of the tuna season in 2011. Notably, Taiwanese vessels fishing outside Namibia's exclusive economic zone reported anomalous landings of albacore, suggestive of a displacement of the migration well offshore.[16]

In subsequent months, a task force chaired by the Namibian Ministry of Fisheries and Marine Resources was charged with making recommendations for mitigating the impacts of seismic exploration on the tuna fishery. Those recommendations included excluding seismic during the October through April tuna season on the Namibian OCS between 25 and 30° N.; initiating ministerial-level consultations with the South African government given the migration of tuna through South African waters; conducting research on the distance needed to avoid interference

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[14] California State Lands Commission, General Permit to Conduct Geophysical Surveys (2013) (with exhibits A-I). Exhibit H contains a summary of the Mitigation Monitoring Program.

[15] Christopher M. Moore, Executive Director, MAFMC, Comments on Atlantic G&G Draft Environmental Impact Statement (2012).

[16] Anonymous, Key issues and possible impacts of seismic activities on tunas, for the Large Pelagic and Hake Longlining Association in Namibia, presentation given at the Benguela Current Commission 5th Annual Science Forum, Sept. 24, 2013 (2013) (provided to NRDC by the Namibian Ministry of Fisheries and Marine Resources).

with fishing; and exploring alternative methods of conducting seismic surveys to avoid harming tuna.[17]

Additionally, according to a Namibian document, the Australian Southern Bluefin Tuna Industry Association documented a significant shift in the tuna migration during a 2011-2012 seismic survey, which took place directly within the migration path in the western Great Australian Bight. Tuna sightings were reported to have dropped 80 percent from previous years, and the Association, after comparing that year's migration to those of previous years, ruled out other causes other than the geophysical survey. After the tuna industry petitioned for government action under the Commonwealth Environment Act, the company conducting the survey (Bight Petroleum) agreed to avoid overlap with the tuna migration; and, during the 2013 season, bluefin tuna sightings rebounded to previous levels.[18]

These events only underscore the findings made in several studies of significant displacement of commercial fish, and loss of catch, over wide spatial scales (DEIS comments at 53-54). Indeed, the Namibian and Australian events appear to extend those findings to species of tuna, which have not previously been examined. The FEIS should more carefully consider impacts on Atlantic fish and fisheries.

D. Cumulative Impacts from Other Reasonably Foreseeable Activities

In our Draft EIS comment letter, we communicated—in no uncertain terms—the need for BOEM to more rigorously assess cumulative acoustic effects: "The fundamental problem," we wrote, "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" (DEIS comments at 3). While we appreciate the additions the agency has made to recognize the problem, we remain deeply concerned about the cursory quality of its analysis.

As one obvious example, BOEM incorporates the Navy's similarly enormous marine mammal take estimates from Atlantic Fleet Training and Testing Activities—[19] which are concentrated in precisely the same region as the surveys BOEM would permit—only to make a simple comparison as to which program has the biggest impact (*see*, *e.g.*, FEIS at 4-74 to 4-75).[20] Nowhere does BOEM combine take estimates to determine the aggregate impact on individual species and populations of marine mammals. Nor does it assess the potential for adverse synergistic effects from naval exercises and geophysical surveys occurring in the same general

[17] Seismic Task Force, Recommendations on the impact of seismic surveys on the tuna pole and line subsector (Sept. 4, 2013).

[18] Anonymous, Key issues and possible impacts of seismic activities on tunas.

[19] Navy, Atlantic Fleet Training and Testing Final Environmental Impact Statement/ Overseas Environmental Impact Statement (2013).

[20] There is copious evidence that the Navy has significantly underestimated the impacts of its activities, creating the potential for additional unknown environmental impact. *See* discussion in NRDC et al., Comments Regarding Proposed Rule and Navy's Proposed AFTT Activities, 2014-2019 (0648-BC53) (Mar. 11, 2013) (submitted to P. Michael Payne, NMFS).

area at the same time. Nor does it attempt to model total sound exposures in the region, using the modeling methods developed through NOAA's CetSound program. These are only a few of the basic approaches to cumulative impact analysis that have been taken in environmental impact assessments and should have been considered here.

Moreover, the FEIS does not assess the aggregate effects of other reasonably foreseeable activities, including geophysical surveys that are not authorized pursuant to the Outer Continental Shelf Lands Act. These include scientific research surveys undertaken by the National Science Foundation and Lamont-Doherty Earth Observatory, such as a survey planned offshore the southern New Jersey coast this summer; and an extensive, possibly multi-year activity planned by the U.S. Geological Survey, of which at least NMFS and the Marine Mammal Commission have been notified.

Over the last two years, the scientific literature on anthropogenic noise, much of it funded by the Navy, has begun to produce evidence of population-level effects from disruptive activities on disparate marine mammal taxa. This includes evidence of substantial demographic alteration in beaked whales resident to the Navy's AUTEC testing range in the Bahamas,[21] and evidence of disruption by naval mid-frequency sonar of metabolic rates in blue whales on the Navy's Southern California range, which the authors conclude may pose a significant risk to the recovery of blue whales in the Pacific.[22] These new studies join a larger cohort on diverse sources of anthropogenic noise, many of them referenced in our comments on the Draft EIS, showing effects that are conducive to long-term impacts on individuals and populations. Additionally, a satellite tagging study of humpback whale movements off western Africa demonstrated how even a wide-ranging species with coastal and oceanic distribution can be exposed throughout its migratory cycle to localized anthropogenic stressors, requiring effective population-level management.[23]

In our 2012 comments, we described several approaches that would help improve BOEM's analysis. Unfortunately, the FEIS does not seem to have undertaken any of them. It is essential that BOEM properly account for cumulative, sublethal effects.

E. Auditory and Behavioral Take Thresholds

As you are aware, NMFS is in the process of revising its behavioral thresholds for seismic airguns and its auditory thresholds for all anthropogenic sound sources. BOEM should defer

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[21] Claridge, D.E., Population ecology of Blainville's beaked whales (*Mesoplodon densirostris*) (2013) (Ph.D. thesis, University of St. Andrews); *see also* New, L.F., Moretti, D.J., Hooker, S.K., Costa, D.P., and Simmons, S.E., Using energetic models to investigate the survival and reproduction of beaked whales (family *Ziphiidae*), *PLoS ONE* 8(7): e68725. doi:10.1371/journal.pone.0068725 (2013).

[22] Goldbogen, J.A., Southall, B.L., DeRuiter, S.L., Calambokidis, J., Friedlaender, A.S., Hazen, E.L., Falcone, E.A., Schorr, G.S., Douglas, A., Moretti, D.J., Kyburg, C., McKenna, M.F., and Tyack, P.L., Blue whales respond to simulated mid-frequency sonar. *Proceedings of the Royal Society Part B: Biological Sciences* 280: 20130657 http://dx.doi.org/10.1098/rspb.2013.0657 (2013).

[23] Rosenbaum, H.C., Maxwell, S.M., Kershaw, F., and Mate, B., Long-range movement of humpback whales and their overlap with anthropogenic activity in the South Atlantic Ocean, *Conservation Bio.* 28: 604-615 (2014).

issuing a Record of Decision until NMFS has produced its guidelines and a Supplemental EIS can be prepared.

Our comments on the Draft EIS described some of the reasons why the flat 160 dB behavioral threshold that BOEM has applied—one that was excoriated by a group of leading bioacousticans as "overly simplified, scientifically outdated, and artificially rigid"—[24] cannot rationally be used as the basis for the agency's impact assessment. Since that time, NMFS has acknowledged the weakness of the threshold and committed to revise it, going so far as to circulate a draft set of guidelines last July to peer reviewers and interested agencies, including BOEM. It is likely that these new thresholds will, when released, render most of the analysis in the present FEIS obsolete. For now, BOEM's use of the 160 dB threshold is incompatible with the obligation to use best available scientific evidence in NEPA and related analyses. In its place, BOEM must adopt behavioral take standards that better reflect the existing literature. This could mean applying the criteria developed for California's 2012 Environmental Impact Report for the Central Coastal California Seismic Imaging Project;[25] or adopting the default standard set forth in the bioacousticians' letter cited above. As the experts stated, "a risk function with a 50% midpoint at 140 dB (RMS) that accounts, even qualitatively, for contextual issues likely affecting response probability… comes much closer to reflecting the existing data for marine mammals." In any case, BOEM cannot base its programmatic analysis on a specious standard that clearly is no longer "generally accepted in the scientific community." 40 C.F.R. § 1502.22(b)(4).

Similarly, NMFS is presently revising its criteria for temporary and permanent auditory impacts and, by extension, direct tissue injury.[26] Several of the signatories to this letter, based on consultation and review by three bioacousticians, have submitted extensive comments on the draft criteria, which address, among other issues, new data that have appeared since BOEM's comment period on the Draft EIS closed. None of the new data, and few of the relevant studies appearing since 2007, appear to be discussed in the FEIS (see, *e.g.*, FEIS at App. H-10 to H-14). BOEM should consider these comments, which are attached to the present letter, in its FEIS.

As you know, take estimation is highly sensitive to changes in take thresholds, especially for behavioral impacts.[27] Any modification of these thresholds is likely to have a significant influence on BOEM's programmatic environmental review and to constitute "significant new information" under NEPA regulations. 40 C.F.R. § 1502.9(c). Certainly it is not credible for the agency to say, as it does repeatedly throughout this document (*e.g.*, FEIS at 4-74), that its take estimates—which, among many other problems, do not take account of masking effects and use a grossly non-conservative standard for behavioral take—represent the "upper limits of highly

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

[25] Wood, J., Southall, B.L., and Tollit, D.J., PG&E Offshore 3-D Seismic Survey Project EIR: Marine Mammal Technical Report, Appendix H, Central Coastal California Seismic Imaging Project Final Environmental Report (2012) (CSLC EIR No. 758).

[26] NOAA, Draft guidance for assessing the effects of anthropogenic sound on marine mammals: Acoustic threshold levels for onset of permanent and temporary threshold shifts (Dec. 23, 2013).

[27] Bain, D.E., Critique of the risk assessment model employed to calculate takes in the Hawaii Range Complex Supplemental Draft Environmental Impact Statement (2008) (sensitivity analysis of Navy behavioral risk functions).

conservative models." Again, we urge the agency to defer issuing its Record of Decision and to renew the NEPA scoping process or, at minimum, prepare a Supplemental EIS for public comment once the take standards have been revised.

F. Entanglement in Ocean Bottom Nodal Systems

BOEM must consider entanglement risk from ocean bottom nodal surveys, in line with recent evidence. In February 2014, a spotted dolphin was found fatally entangled in a nodal array during a geophysical survey, conducted by FairfieldNodal, in the Gulf of Mexico.[28] The nodes were tethered with flexible, relatively thin synthetic line, rather than with the rigid, sheathed cable that is often used in ocean bottom nodal surveys and that would have posed a far smaller entanglement risk. Shortly after the discovery, BSEE issued Incident of Non-Compliance ("INC") reports to the operator, and BOEM—commendably—suspended the survey and instructed the permittee to remove all equipment from the seafloor.

BOEM must consider entanglement in both its impact analysis and its analysis of reasonable alternatives and mitigation measures. Presently the FEIS addresses entanglement only in the context of marine debris, whose impacts, it states, "are expected to be avoided through vessel operators' required compliance with USCG and USEPA regulations" (FEIS at 2-23, 2-25; see also, *e.g.*, FEIS at 4-48, 4-71 to 4-72, 4-96 to 4-97, 4-114, 4-146, 4-149, 4-228). Plainly that discussion is not sufficient to address this issue.

G. Impacts of Airguns and Other Low-Frequency Sources on Baleen Whales

As we've observed, airgun surveys and some other low-frequency sources have been found to silence some species of baleen whales over wide spatial scales. Three new papers further substantiate the problem and show it occurring in additional geographies and contexts. An important 2014 study of humpback whale breeding grounds off Angola found very significant declines in singers and singing during a seismic survey, completely eclipsing even seasonality as a factor in predicting whale calls, as received levels increased.[29] Another study, focused on the western Mediterranean, showed fin whales significantly altering their breeding calls (becoming shorter in duration, narrower in bandwidth, and lower in tone) with increases in shipping noise, and both altering their singing and completely abandoning habitat during seismic exploration.[30] The seismic survey had this effect over the entire Alboran Basin and much of the Balearic Basin, an area encompassing some 100,000 km^2, and the effect lasted for at least two weeks after the survey concluded—a spatial and temporal scale that the authors conclude are consistent with population-level impacts. A third study, taking place around a Shell seismic survey in the Beaufort Sea, found a dramatic drop in bowhead whale calling rates at 41-45 km distance, where

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[28] *See* Permit for Geophysical Exploration for Mineral Resources or Scientific Research on the Outer Continental Shelf—Fairfield Industries Incorporated d/b/a FairfieldNodal (2014) (GOM region permit no. L13-023).

[29] Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., Seismic surveys negatively affect humpback whale singing activity off Northern Angola, *PLoS ONE* 9(3): e86464. doi:10.1371/journal.pone.0086464 (2014).

[30] Castellote, M., Clark, C.W., and Lammers, M.O., Acoustic and behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise, *Biological Conservation* 147: 115-122 (2012).

median broadband received levels were 116-129 dB (RMS), leaving it unclear whether the migrating whales had gone silent or were displaced.[31]

Additionally, troubling new research has appeared showing strong responses of baleen whales to frequency-modulated pulses. Male humpback whales off Massachusetts were found to go silent and possibly also abandon habitat at 200 km distance from an experimental, predominantly low-frequency, fish-finding sonar source.[32] And blue whales foraging calls on the Southern California Bight, a major foraging ground for the species, were suppressed by naval mid-frequency active sonar pulses, and at such low received levels that, according to the study, even a single sonar vessel could impact the species over a broad part of the Bight.[33] These last two studies are relevant to the use of other geophysical sound sources and provide general insight into the vulnerability of baleen whales to large-scale adverse behavioral effects of noise.

The FEIS should have analyzed the potential consequences of these sublethal effects and have considered alternatives and mitigation to minimize them.

Further, as we noted in our 2012 comments, 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 (DEIS comments at 6). A 2012 paper, from NOAA and the Cornell Bioacoustics Research Program, calculated masking effects from shipping traffic on right whales foraging around Stellwagen Bank National Marine Sanctuary, off Massachusetts.[34] It found that the whales experienced severe losses in communication space during roughly 80 percent of the study period, and that the majority of masking noise derived from ambient contributions of ships transiting the continental shelf, not from local traffic. This study underscores the extreme vulnerability of right whales to masking effects, the extraordinary propagation range of low-frequency sound, and the potential for significant cumulative impacts from the introduction of airgun surveys to the region. NOAA and Cornell researchers have established, and now published, a methodology for quantitatively estimating one important element of masking. The FEIS should have employed it.

H. Other New Information

Since the Draft EIS comment period closed, numerous other studies have appeared of obvious relevance to BOEM's analysis here. These studies include, but are not limited to:

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[31] Blackwell, S.B., Nations, C.S., McDonald, T.L., Greene, Jr., C.R., Thode, A.M., Guerra, M., and Macrander, M., Effects of airgun sounds on bowhead whale calling rates in the Alaskan Beaufort Sea, *Marine Mammal Science* 29(4): E342-E365 (2013).

[32] 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).

[33] Melcon, M.L., Cummins, A.J., Kerosky, S.M., Roche, L.K., and Wiggins, S.M., Blue whales respond to anthropogenic noise. *PLoS ONE* 7(2): e32681 (2012).

[34] Hatch, L.T., Clark, C.W., van Parijs, S.M., Frankel, A.S., and Ponirakis, D.W., Quantifying loss of acoustic communication space for right whales in and around a U.S. National Marine Sanctuary, *Conservation Bio.* 26: 983-994 (2012).

(1) Research on the energetic costs of vocalization in cetaceans.— A 2013 paper, which measured the metabolic costs of whistle production in bottlenose dolphins, showed that costs were orders of magnitude higher than previously predicted using acoustic energetics models.[35] This finding indicates the potentially adverse energetic consequences of some compensatory responses to masking, such as increasing the duration and frequency of calls.[36]

(2) Research on the impacts of anthropogenic noise on invertebrates.— We observed in our Draft EIS comments that noise can have significant impacts on invertebrates, such as cephalopods and squid (DEIS comments at 54). A study published last year showed that low-frequency sound induced physical abnormalities and significant growth delays in large numbers of exposed scallop larvae, leading the authors to conclude that "routinely-occurring anthropogenic noise" could potentially affect recruitment in scallop stocks.[37]

(3) Research on cetacean and sound distribution.— As we've noted previously (DEIS comments at 19), NOAA in 2010 launched a CetSound program with the purpose of evaluating, compiling, supplementing, and enhancing available density information for marine mammals, as well as information on noise levels, within the U.S. EEZ.[38] Its products include habitat-based density maps and annual average ambient noise levels and other data for nearly all of BOEM's area of interest.[39] Second-generation density maps, produced by Duke University in consultation with NOAA, as well as information on biologically important habitat not already represented in the density maps, are due to appear within the next few months.

(4) Research and guidance on quieting technologies.— As the FEIS indicates, considerable current effort is focused on developing quieting technologies for use in offshore exploration. Last winter, BOEM convened an international workshop on noise-reduction alternatives for deep-penetration seismic exploration, pile-driving for offshore construction, and shipping for offshore development in general. Findings of that workshop appear in two reports, one general and the other technical, that were released last month.[40] Last June, parties to *NRDC v. Jewell* entered into a settlement

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[35] Noren, D.P., Holt, M.M., Dunkin, R.C., and Williams, T.M., The metabolic cost of communicative sound production in bottlenose dolphins (*Tursiops truncates*), *J. Exp. Biol.* 216: 1624-1629 (2013).

[36] *See*, *e.g.*, Foote, A.D., Osborne, R.W., and Hoelzel, A.R., Whale-call response to masking boat noise, *Nature* 428: 910 (2004).

[37] Aguilar de Soto, N., Delorme, N., Atkins, J., Howard, S., Williams, J., and Johnson, M., Anthropogenic noise causes body malformations and delays development in marine larvae, *Scientific Reports* 3: 2831 DOI:10.1038.srep02831 (2013).

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

[39] NOAA, Cetacean and Sound Mapping, website accessible at http://cetsound.noaa.gov/index.html.

[40] CSA Ocean Sciences, Quieting Technologies for Reducing Noise During Seismic Surveying and Pile Driving Workshop. Summary Report for the US Dept. of the Interior (2014) (BOEM rep. no. 2014-061).

agreement that establishes a timeframe for industry development and testing of three vibroseis prototypes;[41] and Geo-Kinetics has made substantial recent progress in bringing its own vibroseis unit to commercial viability. Last month, the International Maritime Organization adopted guidelines to reduce underwater noise from commercial ships.[42]

In short, all of the information discussed above, from new right whale distribution data to entanglement risk, is highly relevant to BOEM's impact and alternatives analysis, and constitutes "significant new information" requiring the preparation of a Supplemental EIS. 40 C.F.R. § 1502.9(c). Moreover, the agency has an obligation to include information that is essential to a reasoned choice among alternatives if the overall costs of obtaining it are not exorbitant. 40 C.F.R. § 1502.22.[43]

II. ISSUES RAISED IN OUR PRIOR COMMENTS

Unfortunately, virtually all of the issues we raised in our July 2, 2012 comment letter on the Draft EIS remain unanswered or inadequately addressed in the final document. These issues include, but are in no way limited to:

- the agency's failure to develop reasonable alternatives that effectively reduce noise at the source, such as alternatives that cap levels of activity, that eliminate duplicative survey effort, and that require or incentivize use of less disruptive technologies;
- the failure to systematically consider time-area restrictions for marine mammal habitat, such as in the Cape Hatteras Special Research Area; for sea turtle nesting habitat from Florida to North Carolina, and foraging habitat and migratory pathways; for fish habitat, such as highly productive and biodiverse submarine canyons in the mid-Atlantic, and important fisheries; and for established Marine Protected Areas;
- the failure to consider and adopt reasonable mitigation measures, such as sound source validation and universal vessel speed limits, or to establish a meaningful long-term monitoring program;
- the failure to establish proper thresholds for marine mammal take, such as by using an outdated, non-conservative behavioral take standard for seismic airguns that is not accepted by the scientific community, as discussed above;
- the failure to quantify masking effects, despite the availability of a model developed by NOAA and Cornell to assess loss of communication space; to adequately assess the

[41] Settlement Agreement, NRDC v. Jewell, Case No. 2: 10-cv-01882 (E.D. La.) (settlement filed June 18, 2013).

[42] IMO, Guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life (2014) (U.N. Doc. IMO/ MEPC.1/ Circ.833).

[43] Where complete information is not available, BOEM should take a precautionary approach to management, in accordance with the recommendations of this administration's Interagency Ocean Policy Task Force. CEQ, Final Recommendations of the Interagency Ocean Policy Task Force (2010).

effects of masking on the North Atlantic right whale, which the literature recognizes as particularly vulnerable; or to consider alternatives or mitigation to address these effects;

- the failure to provide any meaningful analysis of the cumulative impacts from permitted activities, or from the aggregated impacts of permitted activities together with other anthropogenic stressors affecting the same wildlife populations;
- the failure to develop evaluative standards that reflect the factors for "significant" impact set forth in NEPA regulations, that incorporates the Outer Continental Shelf Lands Act's "undue harm" prohibition, or that properly applies the Marine Mammal Protection Act's "negligible impact" or "small numbers" ceilings;
- the failure to adequately assess impacts on fish and invertebrates and on fisheries, through declines in catch rate and loss in recruitment to commercial species; and
- the failure to meaningfully assess the proposed action in relation to climate change, either to analyze its potential direct and indirect impacts on global warming and ocean acidification, or to explain how it will impact the marine environment against a baseline of ocean warming and acidification.

Each of these issues was discussed at length in our comments on the Draft EIS, which we append to the present letter.

Thank you for considering these comments. As always, we welcome the opportunity to discuss these matters with you and your staff. For further dialogue, please contact Michael Jasny of NRDC (mjasny@nrdc.org, 604-736-9386).

Very truly yours,

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Ocean Program Manager
Surfrider Foundation

EXHIBIT B

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

By Electronic Mail

July 2, 2012

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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.

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

(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.

(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

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

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

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 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.

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[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).

[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).

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.

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

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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).

disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial 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

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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).

extent possible" the "policies, regulations, and public laws of the United States shall be 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] Received levels of 130 dB

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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.,

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

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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

[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 cetaceans, *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,"

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[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

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[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

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[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 precautionary analysis in this regard is manifest, given BOEM's failure to commit to any

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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).

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

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[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 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

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[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

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[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., Modeling 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).

[198] 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).

[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]

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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).

Already, 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")

[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

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[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 C

SOUTHERN ENVIRONMENTAL LAW CENTER

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April 8, 2015

Via Electronic Mail

Braxton Davis
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Email submission: michele.walker@ncdenr.gov

Re: CGG Certification of Consistency with the North Carolina Coastal Management Plan - Consistency Review of Permit Application Submitted to U.S. Department of Interior – Bureau of Ocean Energy Management for 2D Geophysical and Geological Surveys

Dear Mr. Davis,

The Southern Environmental Law Center ("SELC") submits these comments on behalf of the North Carolina Conservation Network, Sound Rivers, Inc., Defenders of Wildlife, Center for Biological Diversity, and Natural Resources Defense Council regarding CGG's submission of its certification of consistency with the North Carolina coastal management plan to the North Carolina Department of Environment and Natural Resources - Division of Coastal Management ("DCM"). Thank you for the opportunity to provide these comments. CGG has submitted an application to the Bureau of Ocean Energy Management ("BOEM") to conduct 2D seismic surveys off North Carolina's coast. Our organizations are profoundly concerned about CGG's intention to conduct high-intensity seismic surveys off North Carolina's coast because of the significant environmental harms presented by seismic exploration, as well as the potentially catastrophic impacts of offshore oil drilling. During federal consistency review, North Carolina has an important opportunity to protect its coastal resources from seismic exploration, as well as the potential dangers of offshore oil development.

To protect North Carolina's coastal resources, and ensure compliance with the State's coastal management plan, we request that DCM object to CGG's consistency determination and find that CGG's activities are inconsistent with the enforceable policies of the State's coastal management plan because:

a. CGG's proposal would result in adverse impacts to North Carolina's fisheries and fish habitat;

b. CGG's proposal fails to adequately protect sea turtles and other endangered species found in North Carolina and would result in unacceptable levels of harm to these species; and
c. CGG's proposal would result in unacceptable levels of harm to marine mammals found in waters off North Carolina's coast.

In addition, or in the alternative, we request that DCM object to CGG's findings of consistency on the basis of a lack of information. The applicants failed to address cumulative impacts of seismic testing on North Carolina's coastal resources, and they failed to provide adequate information related to the significant impacts of the proposed activity on North Carolina's marine mammals and habitat.[1]

I. Legal Background: The federal Coastal Zone Management Act and the enforceable policies under North Carolina's coastal management plan protect North Carolina's unique and valuable coastal resources.

BOEM received an application from CGG to conduct geological and geophysical exploration activities off North Carolina's coast at an unspecified date. DCM requested an opportunity to review CGG's activities for consistency with the enforceable policies of the State's coastal management plan. CGG provided minimal details of its plans to conduct seismic testing or of the impact of these activities in waters off the State coast or the mitigation measures it intends to adopt to limit impacts to important species and habitat areas.

The federal Coastal Zone Management Act of 1972 ("CZMA") was passed by Congress to "promote comprehensive and coordinated planning for coastal zone development and preservation between states and the federal government."[2] The CZMA articulates a number of policy objectives, including "to preserve, protect . . . and restore or enhance the resources of the Nation's coastal zone; [and] to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development."[3] Coastal states have "substantial and significant interests in the protection, management, and development" of resources in the exclusive economic zone that are best served by state involvement in plans that impact coastal resources and the development of state coastal management plans.[4] Under the CZMA, each coastal state may adopt a coastal zone management plan that provides for "the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone" and "management of coastal development to improve,

[1] 15 C.F.R. § 930.58 requires that applicants provide states with "necessary data and information" to make a consistency determination, including a "detailed description of the proposed activity, its associated facilities, the coastal effects, and any other information relied on by the applicant to make its certification." CGG provided insufficient information about its activities and, more importantly, the impacts of its activities on coastal resources, and therefore failed to meet the requirements for a complete application under federal regulations.
[2] *Conservation Law Found. v. Watt*, 560 F. Supp. 561, 574 (D. Mass. 1983) *aff'd sub nom. Com. of Mass. v. Watt*, 716 F.2d 946 (1st Cir. 1983).
[3] 16 U.S.C. § 1452 (1)-(2) (2012).
[4] *Id.* at § 1451.

safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters," among other objectives.[5]

The North Carolina Coastal Area Management Act ("CAMA"), the rules promulgated thereunder, the State Dredge and Fill Law, and the land use plans of the State's coastal counties and municipalities together comprise North Carolina's coastal management program. Taken together, these components of the State's coastal management plan provide substantial protection of the State's unique and abundant natural resources on the coast, in the marine environment, and in the Atlantic Ocean off the State's coast. The North Carolina General Assembly adopted CAMA in 1973 with the goals of:

> "preserving and managing the natural ecological conditions of the estuarine system, the barrier dune system, and the beaches, so as to safeguard and perpetuate their natural productivity and their biological, economic and esthetic values; to ensure that the development or preservation of the land and water resources of the coastal area proceeds in a manner consistent with the capability of the land and water for development, use or preservation based on ecological considerations; and to ensure the orderly and balanced use and preservation of our costal resources on behalf of North Carolina and the nation; [and] to establish policies, guidelines and standards for [the] [p]rotection, preservation, and conservation of natural resources including but not limited to water use, scenic vistas, and fish and wildlife; and management of . . . areas of significant natural value."[6]

The Coastal Resource Commission ("CRC") adopted rules to effectuate these goals. DCM manages coastal management programs and activities, and is responsible for ensuring that proposed activities on the coast preserve and protect the biological, social, economic, and aesthetic values of North Carolina's coast.

The State coastal management plan designates "areas of environmental concern" ("AECs") in coastal wetlands, estuarine waters, public trust areas, coastal shorelines, and natural and cultural resource areas. The CRC must "conserv[e] and manag[e] [AECs] so as to safeguard and perpetuate their biological, social, economic and aesthetic values, and to coordinate and establish a management system capable of conserving and utilizing [AECs] as a natural resource essential to the functioning of the entire [ecosystem]."[7] Public trust areas, including all waters of the Atlantic Ocean and the lands thereunder within the State's jurisdictional lines, must be maintained so as to "protect public rights for navigation and recreation" and conserved and managed "so as to safeguard and perpetuate their biological, economic, and aesthetic value."[8]

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[5] *Id.* at § 1452 (2)(a)-(b).
[6] N.C. Gen. Stat. § 113A-102 (2015).
[7] 15A N.C. Admin. Code 7H.0205(c) (2015) (addressing coastal wetlands), 0206(c) (addressing estuarine waters), 0209(c) (addressing coastal shorelines).
[8] 15A N.C. Admin. Code 7H.0207(c). "[A]ny use which jeopardizes the capability of waters to be used by the public for navigation or other public trust rights which the public may be found to have in these areas shall not be allowed." *Id.* at (d).

Natural and cultural resource areas, including areas with educational, scientific, or cultural significance and habitats that support endangered and threatened species and native plants must likewise be protected and maintained for the preservation of such species.[9] Coastal complex natural areas, which support native plant and animal communities which have "remained essentially unchanged by human activity," must be protected in order to "safeguard biological relationships, educational and scientific values, and aesthetic qualities."[10] Activities occurring outside of AECs that impact AECs, including the activities proposed by CGG, must adhere to these standards.

Under the State's coastal management plan, energy development in coastal areas and in offshore waters must be balanced with protecting valuable coastal resources and preserving public trust resources. Development of energy resources in the State's waters and offshore "shall avoid significant adverse impact upon vital coastal resources or uses, public trust areas and public access rights."[11] Further, no use of land or water in the coastal area shall "cause the degradation of water quality so as to impair traditional uses of the coastal waters," including commercial and recreational fishing, recreational boating, and commerce.[12]

The North Carolina Endangered Species Act ("NCESA"), the Coastal Habitat Protection Plan ("CHPP"), and the Fisheries Reform Act ("FRA") also provide vital protections for endangered species, coastal habitat, and the State's fisheries, respectively. These provisions have been incorporated by reference into the State's coastal management plan and therefore must guide DCM as it makes a consistency determination.[13] NCESA provides that "the best interests of the State require that endangered and threatened species of wild animals and wild animals of special concern be protected and conserved, that their numbers should be enhanced and that conservation techniques be developed for them."[14] Further, the CHPP, which is adopted by the CRC, Marine Fisheries Commission, and the Environmental Management Commission, includes recommendations for habitat conservation that are binding on these agencies.[15] CHPP Recommendation 3.6 provides that "energy development and infrastructure [must be] designed and sited in a manner that minimizes negative impacts to fish habitat."[16] Finally, one central goal of the FRA is to "ensure the long-term viability of the State's commercially and recreationally significant species or fisheries."[17]

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[9] 15A N.C. Admin. Code 7H.0501.
[10] 15A N.C. Admin. Code 7H.0506.
[11] 15A N.C. Admin. Code 7M.0401(a) (2015).
[12] 15A N.C. Admin. Code 7M.0801(a). *See also* 7M.1202(b) ("Damage to or interference with existing or traditional public trust uses, such as fishing, navigation, or access to public trust areas, or areas with high biological, historical archaeological, or recreational value" shall be minimized.).
[13] *See, e.g.*, 15A N.C. Admin. Code 7H.0501 (referencing natural and cultural resource areas, including endangered and threatened species and their habitat), 7H.0506 (referencing coastal complex natural areas, which support endangered and threated species).
[14] N.C. Gen. Stat. § 113-332 (2015).
[15] N.C. Gen. Stat. § 143B-279.8 (2015).
[16] *2010 Coastal Habitat Protection Plan*, N.C. DEP'T OF ENV'T AND NAT. RES., 457 (2010) http://portal.ncdenr.org/c/document_library/get_file?uuid=c8c9b384-57d1-459e-b287-6741ba19ea38&groupId=38337.
[17] N.C. Gen. Stat. § 113-182.1(b).

Through the consistency process, a state has the authority to ensure protection of its resources. Any federal activity proposed within or outside of a state's 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."[18] DCM requested the opportunity to conduct a consistency determination regarding CGG's application to conduct seismic testing off North Carolina's coast after concluding that CGG's activities would have "reasonably foreseeable coastal effects" on fish and fish habitat.[19] DCM did not express concern regarding the impact of proposed activities on marine mammals or endangered species or their habitat found in State waters and in nearby offshore waters. Marine mammals and endangered species, including sea turtles, are integral parts of the coastal ecosystem, however, and the State must protect these resources under the coastal management plan.[20] DCM should evaluate the impact of CGG's activities on all coastal resources when making its consistency determination.

II. Discussion: Seismic testing off the coast of North Carolina will adversely impact the State's valuable coastal resources, and these activities are inconsistent with the enforceable policies of the State's coastal management plan.

CGG plans to conduct 2D seismic testing using seismic airgun arrays in the Atlantic Ocean off the coast of North Carolina to gather geological and geophysical data for the development of offshore oil and gas resources. CGG has not specified when it intends to conduct testing. In fact, CGG fails to provide complete information to DCM or the public about its planned activities, the anticipated impact of its activities, and mitigation measures it intends to implement to reduce negative impacts on wildlife and habitat. Moreover, CGG claims that only one provision of CAMA applies to its activities. CGG's certification is incomplete and inaccurate; CGG's activities will have an adverse impact on North Carolina's coastal resources and implicate multiple provisions of the North Carolina coastal management plan. The failure of CGG to include this information has left North Carolina with insufficient information to fully review these consistency certifications.

CGG will tow arrays of high-volume seismic airguns, firing intense impulses of compressed air about every twelve seconds, twenty-four hours per day, seven days a week for days, weeks, or months on end.[21] CGG claims it will not conduct seismic testing within state

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[18] 16 U.S.C. § 1456 (c)(1)(A).
[19] *See* Letter from Braxton Davis, Director, N.C. Div. Coastal Mgmt., to Paul Scholz, Acting Director, Office of Coastal and Resource Management (Aug. 20, 2014) 1 (on file with N.C. Div. of Coastal Management).
[20] *See* 15A N.C. Admin. Code 7H.0505 (outlining a management objective under the coastal management plan: "to protect unique habitat conditions that are necessary to the continued survival of *threatened and endangered native plants and animals* and to minimize land use impacts that might jeopardize these conditions") (emphasis added); 15A N.C. Admin. Code 7H.0506 (providing the following management objective for the protection of coastal complex areas, which include habitat for endangered species: "to protect the features of a designated coastal complex natural area in order to safeguard its biological relationships, educational and scientific values, and aesthetic qualities.").
[21] *Notice of Federal Consistency Review* (2015), http://portal.ncdenr.org/c/document_library/get_file?uuid=f756add8-a527-4d47-86f3-ad9b8d3a8957&groupId=38319 [hereinafter *CGG Application*].

waters, which extend three miles beyond the coastline into the Atlantic Ocean, however, the impacts of seismic testing will undoubtedly be felt in state waters.[22]

It is undisputed that sound is a fundamental element of the marine environment. Fish, whales, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators. CGG's proposed survey would dramatically degrade the acoustic environment along North Carolina's coast. In fact, the noise impacts of seismic surveys are so severe that a group of 75 scientists from around the world recently sent a letter to the President of the United States to voice their concern that these surveys would result in "over 20 million seismic shots" in the Atlantic and "represent[] a significant threat to marine life throughout the region."[23] In their letter, the scientists describe likely impacts to marine mammals, sea turtles, and fish, and conclude that

> Our expert assessment is that the [Department of Interior's] premise [that seismic activities would only have a negligible impact on marine species and populations] 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.[24]

The concern with seismic surveys does not end with scientists. Coastal communities are deeply worried about the threats posed to their resources, and several have passed resolutions opposing offshore drilling and the use of seismic airguns to explore for oil and gas off the coast of North Carolina.[25]

The enforceable policies of the North Carolina coastal management plan protect the State's valuable natural resources from the damaging effects of development and other activities. As discussed in greater detail below, seismic testing off North Carolina's coast will adversely impact the State's fisheries, endangered species, and marine mammals in State waters and off the State's coast. Thus, seismic testing is not consistent with the State's coastal management plan, and the DCM should object to CGG's consistency certification.

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[22] CGG states that its survey will run be carried out a minimum of 50 miles from the coast and extend to about 250 miles from the coast. *See CGG Application*, *supra* note 21, at 1.

[23] Letter from Seventy-Five Scientists to President Obama (Mar. 5, 2015), provided as Attachment 2.

[24] *Id*.

[25] To date, the local governments of nine communities on the coast, including Carolina Beach, Caswell Beach, Manteo, Nags Head, Oak Island, Southport, St. James, Sunset Beach, and Topsail Beach, have passed resolutions against seismic testing in North Carolina waters. Other communities in North Carolina are considering similar resolutions, and a huge number of communities bordering on the Atlantic areas where seismic testing is allowed have enacted such resolutions. *See* Oceana Coastal Resolution Toolkit, available at http://usa.oceana.org/seismic-airgun-testing/coastal-resolution-toolkit (last visited March 11, 2015).

A. Seismic activity off of North Carolina's coast will adversely and significantly impact the State's fisheries and fish habitat, and is therefore inconsistent with the State coastal management plan.

CGG's activities will adversely and significantly impact the State's valuable fisheries resources and harm important fish habitat, which are vital to the State's economy.[26] "Among North Carolina's most valuable resources are its coastal lands and waters."[27] Our coast includes some of the "most biologically productive regions of the State and of the nation" providing "ninety percent of the most productive sport fisheries on the east coast of the United States" that have "extremely high recreational and esthetic value." [28]

North Carolina's commercial and recreational fisheries are major drivers of the coastal economy. In 2013, commercial fisherman landed 50.1 million pounds of fish valued at $79 million.[29] Over 8,200 commercial fishermen are licensed to fish in State waters, and almost 800 seafood dealers are permitted to buy local catch.[30] The commercial fishing industry supports thousands of jobs and produces an economic impact of over $305 million annually.[31] Recreational fishing is also very important economically and culturally in the State's coastal region. The recreational fishing industry employs almost 20,000 people and produces an economic impact of over $1.7 billion annually.[32] North Carolina is also home to numerous fishing tournaments that draw thousands of fishermen from across the region to North Carolina's coast.[33] Tourism also generates substantial economic benefits. Beaches and inlets along the coast support almost 40,000 jobs and generate $3 billion in revenue.[34] The economic impact of the commercial fishing, recreational fishing, and tourism industries demonstrates the critical importance of protecting and maintaining the natural resources of our coast.

The N.C. Division of Marine Fisheries ("DMF") manages the State's marine and estuarine resources, including the state's fisheries and coastal fish habitat. To that end, DMF implements fishery management plans for twelve fish species that are recreationally and commercially significant in State waters, including shrimp, blue crab, and flounder, which are among the most valuable species caught in State waters. DMF has also designated hundreds of

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[26] Please see Attachment 1 for an illustration of North Carolina coastal assets and concerns.
[27] N.C. Gen. Stat. § 113A-102.
[28] *Id.*
[29] *Fish Dealer Report*, N.C. DIV. OF MARINE FISHERIES (April 2014), http://portal.ncdenr.org/c/document_library/get_file?uuid=607a5e65-ca25-49f5-a176-d7609785bd1e&groupId=38337.
[30] *2014 License Statistics Annual Report*, N.C. DIV. OF MARINE FISHERIES 10 (Nov. 2014), http://portal.ncdenr.org/c/document_library/get_file?uuid=363ec218-948c-407f-8bfe-a24245f814be&groupId=38337.
[31] *2014 License Statistics Annual Report: Chapter IV: Fisheries Economics Sections*, N.C. DIV. OF MARINE FISHERIES IV-19 (Nov. 2014), http://portal.ncdenr.org/c/document_library/get_file?uuid=da15d82d-fdc2-4405-b406-107cde62cf2b&groupId=38337.
[32] *Id.* at IV-21.
[33] *See, e.g., NC Fishing Tournaments*, Fishing NC.com, http://www.fishing-nc.com/nc-fishing-tournaments.php (last visited Feb. 12, 2015).
[34] *N.C. Beach and Inlet Management Plan Final Report*, N.C. DIV. OF COASTAL MGMT AND N.C. DIV. OF WATER RES. ES-3 (April 2011), http://portal.ncdenr.org/c/document_library/get_file?uuid=61a21961-a328-4cf6-8010-84e59119bef6&groupId=38319.

thousands of acres of nursery areas off the coast; nursery areas are areas where post-larval and juvenile development of young finfish and crustaceans takes place.[35] Under the State's coastal management plan, nursery areas are protected as AECs.[36]

Protecting fish habitat is critical to ensuring the viability of the State's economically beneficial species. The South Atlantic Outer Continental Shelf ("OCS") contains many areas that have been designated as essential fish habitat ("EFH"), "those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity,"[37] under the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801, *et seq*. by the South Atlantic Fishery Management Councils ("SAFMC"). Many commercially valuable species of fish found in North Carolina waters migrate from estuarine waters to EFHs in offshore waters at some point during their lifecycle. A subset of EFH are Habitat Areas of Particular Concern ("HAPC"); HAPCs are habitats that are rare, particularly at risk of "human-induced degradation, especially ecologically important, or located in environmentally stressed areas."[38] The SAFMC has also designated eight deepwater Marine Protected Areas ("MPAs") in the South Atlantic region, including off the coast of North Carolina, to protect a portion of the long-lived, "deep water" snapper-grouper species, such as snowy grouper, speckled hind, and blueline tilefish.[39]

Of particular importance to North Carolina fisheries are the EFHs for shrimp, red drum, snapper grouper, and EHF-HAPC for shrimp, *Sargassum*, snapper grouper complex, coastal migratory pelagics, and dolphin wahoo.[40] In North Carolina EFH-HAPC for coral, coral reefs, and live/hard bottom habitats have been designated at 10 Fathom Ledge, Big Rock, and The Point.[41] Hard bottom habitat is important habitat for many commercially and recreationally important fisheries, including the snapper-grouper complex. Spawning of the snapper-grouper complex occurs in the hard bottom of The Point, Ten Fathom Ledge, and Big Rock.[42] Additionally, the Cape Lookout and Cape Fear *Lophelia* Banks Coral HAPC off the North Carolina coast provide important habitat for over 50 fish species, including greatest numbers of large fish off the coast.[43] Finally, the Snowy Grouper Wreck MPA is located east of Cape Fear, NC; this area is fished heavily by snapper-grouper fishermen, as well as fishermen trolling for tuna, marlin, dolphin, and wahoo.[44]

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[35] 15A N.C. Admin. Code 3N.0101(4) (2015) (differentiating between primary, secondary, and special secondary nursery areas).
[36] 15A N.C. Admin. Code 7H.0502, 0505.
[37] 16 U.S.C.§ 1802(10) (2012).
[38] *Habitat Program Overview*, MID-ATLANTIC FISHERY MGMT. COUNCIL, http://www.mafmc.org/habitat/ (last visited Feb. 12, 2015).
[39] *See Marine Protected Areas*, S. ATL. FISHERIES MGMT. COUNCIL, http://www.safmc.net/managed-areas/snowy-grouper-wreck-mpa (last visited Feb. 13, 2015).
[40] *Essential Fish Habitat – Habitat Areas of Particular Concern*, S. ATL. FISHERIES MGMT. COUNCIL, http://www.safmc.net/EFH/EFH-HAPC%20Table.pdf (last visited Feb. 10, 2015).
[41] *Id.*
[42] *Id.*
[43] *Deepwater Coral HPACs*, S. ATL. FISHERIES MGMT. COUNCIL, http://safmc.net/managed-areas/deepwater-coral-hapcs (last visited Feb. 10, 2015).
[44] *Snowy Grouper Wreck MPA*, S. ATL. FISHERIES MGMT. COUNCIL, http://safmc.net/managed-areas/snowy-grouper-wreck-mpa (last visited Feb. 10, 2015).

Despite CGG's assertion that the proposed activities would have minimal impacts on fisheries,[45] research indicates that seismic surveys would have significant negative consequences for both commercial and recreational fishing industries. 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,[46] 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.[47] Even brief playbacks of predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[48] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.[49] BOEM acknowledged in the Atlantic OCS Geological and Geophysical Programmatic Environmental Impact Statement ("PEIS") that airguns may result in changes to "behavioral responses, masking of biologically important sounds, temporary hearing loss, and physiological effects."[50]

Among other species, blueback herring and alewife (together known as river herring) and American shad will be impacted by high frequency sounds created by seismic testing activities. River herring are "hearing specialists" and able to detect sounds at high frequencies.[51] Disturbing noises could impact these species' ability to forage, avoid predators, navigate, and find a mate.[52] Further, both the river herring and American shad stock are depleted throughout

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[45] CGG fails to acknowledge any impacts to fish habitat in its consistency certification.

[46] Engås, A., Løkkeborg, S., Ona, E., and Soldal, A.V., E*ffects 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).

[47] 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).

[48] Purser, J., and Radford, A.N., *Acoustic noise induces attention shifts and reduces foraging performance in threespined sticklebacks* (Gasterosteus aculeatus), PLOS ONE, 28 Feb. 2011, DOI: 10.1371/journal.pone.0017478 (2011).

[49] 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*, 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).

[50] *Atlantic OCS Proposed Geological & Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement*, BUREAU OF OCEAN AND ENERGY MGMT xix (April 2014) http://www.boem.gov/Atlantic-G-G-PEIS/#Final PEIS [hereinafter *PEIS*].

[51] *See* Memo from Anne Deaton, N.C. Div. of Marine Fisheries Habitat Protection Section, to Melba McGee, Environmental Coordinator, N.C. Dep't of Env't and Nat. Res., May 29, 2012, at 1-2 (on file with Bureau of Ocean and Energy Management) (citing Nestler et al. 1992 in support of this statement).

[52] *See id.* at 1-2 (expressing concern about river herring in DMF's comments on the PEIS).

their range in State waters. River herring, in particular, remains depleted because the population of the species has not fully recovered from overfishing.[53] Atlantic coast states, including North Carolina, are taking steps to reduce overfishing to encourage population recovery, and impacts from seismic testing will counteract these critical efforts. In its comments on the PEIS, DMF expressed substantial concern regarding the cumulative impacts of proposed seismic testing on river herring specifically, stating that "any additional negative effects of the population should be avoided."[54]

Disturbances in designated habitat areas, including EFHs, EFH-HAPCs, and MPAs, as well as primary and secondary nursery areas designated by DMF, could affect local fish abundance by deterring foraging, refuge, and spawning activities in preferred habitat areas.[55] In 2014, the National Science Foundation ("NSF") submitted its certification for consistency with the State's coastal management plan to DCM prior to conducting seismic testing off the North Carolina coast. In reviewing NSF's consistency certification, DCM's in-house fisheries expert recommended that "deployment of ocean bottom seismometers or any other bottom-disturbing activities should not be allowed."[56] CGG's proposed seismic testing, together with seven other companies proposing to conduct similar activities, will be much larger in scope and longer in duration than NSF's testing, and will undoubtedly have a greater impact on fisheries and fish habitat than NSF's testing. DCM should heed its expert's recommendations in evaluating the CGG's proposal.

The impact of seismic testing on the State's fisheries extends beyond direct impacts on fish and fish habitat. CGG's survey vessels have the potential to disrupt recreational and commercial fishing operations and diving operations that occur in offshore waters. Seismic testing activity will interrupt commercial fishing activities by damaging bottom founded fishing gear and interfering with other settling fishing gear,[57] and may require recreational fishermen to divert themselves away from a preferred fishing location.[58] Moreover, seismic activity is known

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[53] *North Carolina Fishery Management Plan: River Herring: Amendment 2*, N.C. DIV. MARINE FISHERIES 1 (Feb. 2014), http://portal.ncdenr.org/c/document_library/get_file?uuid=c56d0fd2-a56e-4933-90a5-0b765d1aa7ce&groupId=38337.

[54] *See* Memo from Anne Deaton, *supra* note 51 ("The DMF has concerns regarding the cumulative impacts of the proposed seismic survey activities on blueback herring and alewife, collectively known as river herring . . . Given that the states are working diligently to curtail or greatly reduce fishing harvest to enhance population recovery . . . any additional negative effects of the population should be avoided.").

[55] *See* Memorandum from Jessi Baker, NCDCM Fisheries Resource Specialist to Daniel Govoni, NCDCM Assistant Major Permits Coordinator, Aug, 19, 2014 at 2 (on file with NC Division of Coastal Management) (referencing NSF's certification of consistency with the State's coastal management plan that was submitted when NSF proposed conducting seismic testing off of the State coast in late 2014). In comments on the PEIS, the Mid Atlantic Fishery Management Council echoed the State's concern about impacts to fish behavior and physiology, especially given the duration and scope of the proposed testing. *See* Letter from Dr. Christopher Moore, Executive Director of Mid-Atlantic Fishery Management Council, to Gary Goeke, U.S. Bureau of Ocean Energy Management 2 (no date listed), *available at* http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/GOMR/AtlGGCommentsFedStaLoc.pdf ("The extensive (months long) survey timeframe makes it likely that prolonged avoidance of the arrays will be necessary and could lead to interruptions in fish spawning and access to forage.").

[56] *See* Memorandum from Jessi Baker, *supra* note 55, at 2. DCM should reference this recommendation as the Division determines whether CGG's plans comply with the State's coastal management plan.

[57] *PEIS*, *supra* note 50, at 2-31.

[58] *Id.* at xvii-xviii.

to reduce fishery catch rates over large areas of ocean, such as by causing displacement of commercial fish. In addition to other recreational and commercial fishing operations, dozens of fishing tournaments hosted each year off the North Carolina coast may be impacted.

CGG's proposed activities are in direct conflict with the enforceable policies of the North Carolina coastal management plan, including CAMA's objective of "protect[ing], preserv[ing], and conserve[ing] [] natural resources including . . .fish and wildlife"[59] and the prohibition on the "degradation of water quality so as to impair" commercial and recreational fishing.[60] Further, the coastal management plan protects public rights for navigation and recreation, which will be impaired during the survey period. CGG's plans are inconsistent with the State's coastal management plan, and thus DCM should object to CGG's consistency certification.

B. Seismic activity off of North Carolina's coast will adversely and significantly impact the State's endangered species populations and their critical habitat, including sea turtle and sea turtle critical habitat, and is therefore inconsistent with the State coastal management plan.

CGG's proposed survey area overlaps with numerous populations of endangered species on North Carolina's coast and offshore waters, including populations of and critical habitat for sea turtles, piping plovers, and Atlantic sturgeon. North Carolina is home to many species of sea turtles, including the green turtle, hawksbill turtle, Kemp's Ridley turtle, leatherback turtle, and loggerhead turtle.[61] In May of each year, female sea turtles begin laying their eggs along the North Carolina coast. In August, nests hatch and hatchlings make their way to the Atlantic Ocean. Sea turtles laid 1,103 nests in 2012 along North Carolina's coastline.[62] Non-breeding sea turtles are found in inshore and near-shore waters off North Carolina's coast throughout the year.[63]

The U.S. and Oman represent the majority of nesting sites for loggerhead sea turtles worldwide;[64] limiting anthropogenic disturbances to these nesting locations is paramount for the global conservation of this species. As BOEM observed in the PEIS, "…breeding adults, nesting adult females, and hatchlings could be 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."[65] The recovery plan for the

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[59] N.C. Gen. Stat. § 113A-102.
[60] 15A N.C. Admin. Code 7M.0801(a), 7M.1202(b).
[61] *Endangered and Threatened Species of North Carolina*, U.S. FISH AND WILDLIFE SVC, http://www.fws.gov/raleigh/es_tes.html (last visited Feb. 13, 2015).
[62] *Sea Turtles Fared Well along North Carolina's Coast in 2012*, N.C. WILDLIFE RES COMM'N (Jan. 7, 2013), http://www.ncwildlife.org/Default.aspx?IndexId=8359&tabid=416.
[63] *Cape Hatteras National Seashore Sea Turtle Monitoring 2012 Annual Report*, NAT'L PARK SVC, 1, http://webcache.googleusercontent.com/search?q=cache:XV12ckekqL8J:www.nps.gov/caha/naturescience/upload/2012-Sea-Turtle-Annual-Report-Final.pdf+&cd=1&hl=en&ct=clnk&gl=us (last visited Feb. 20, 2015).
[64] *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle* (Caretta caretta) Second Revision (2008), U.S. FISH AND WILDLIFE SVC AND NAT'L MARINE FISHERIES SVC. I-2 (Dec. 2008) www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf [hereinafter *Recovery Plan*].
[65] *PEIS*, *supra* note 50, at 2-24. It is important to note that in Appendix I to the PEIS, BOEM acknowledges that there is insufficient data and information about the impacts of sound on sea turtles to fully understand the potential risks of seismic surveying, and that more research is necessary in order to develop appropriate noise exposure

Northwest Atlantic population of loggerhead sea turtles also notes that several aspects of oil and gas activities, including seismic surveying, threaten these populations.[66] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, which is where much of the energy produced by airguns is concentrated.[67] Given these findings, along with the global significance of the region for loggerheads, all important habitats for endangered and threatened sea turtles within CGG's proposed survey area should be avoided.

CGG fails to specify mitigation measures it will follow when conducting testing to protect the important population of sea turtles and sea turtle habitat off our coast. Moreover, CGG did not indicate it intends to adhere to important, albeit insufficient, mitigation measures outlined in the Record of Decision for the PEIS. We are deeply concerned that the PEIS only contemplates time-area closures for Brevard County, Florida, ignoring the fact that beaches along the North Carolina coast, among others, provide important habitat for nesting sea turtles. The Northwest Atlantic Distinct Population Segment of loggerhead sea turtles received extensive critical habitat protection along the beaches and offshore of the coast of North Carolina in 2014.[68] Critical habitat for the loggerhead sea turtle is located in Brunswick, Carteret, New Hanover, Onslow, and Pender counties in North Carolina.[69] Sand temperatures during the middle third of the incubation period for loggerhead sea turtles determine the gender of hatchlings.[70] Nesting beaches in southern Florida produce almost exclusively females.[71] The northern subpopulation of loggerhead sea turtles, including those sea turtles that nest in North Carolina, produces a closer gender ratio of males to females.[72] Achieving a gender balance within the population is vital to the propagation of the species. Climate change is expected to increase the temperature at beaches in the southern part of the loggerhead sea turtle nesting range, further skewing the gender ratio toward females.[73] North Carolina, however, is expected to be largely insulated from increases in temperatures because of its proximity to the Gulf Stream

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criteria to reduce the risk of injury or death. The lack of information about potential adverse impacts demonstrates the need to proceed with caution and implement mitigation measures that will be overly protective in order to avoid harm to sea turtles.

[66] *Recovery Plan*, *supra* note 64, at I-52 ("Petroleum seismographic cannons produce intense noise at both high and low frequencies and have the potential to harm sea turtles.").

[67] 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).

[68] Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle, 79 Fed. Reg. 39756, 38756 (July 10, 2014). It is important to note that the U.S. Fish and Wildlife Service designated additional habitat for the loggerhead sea turtle *after* BOEM completed the final PEIS for geophysical and geographic activities in the Atlantic OCS.

[69] *Id.*

[70] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle (*Caretta caretta*), 78 Fed. Reg. 18,000, 18,007 (March 25, 2013).

[71] *See* M.J. Witt, L.A. Hawkes, M.H. Godfrey, B.J. Godley, A.C. Broderick, *Predicting the impacts of climate change on globally distributed species: the case of the loggerhead sea turtle*, THE JOURNAL OF EXPERIMENTAL BIOLOGY, 905(Nov. 2009).

[72] *Id.*

[73] *See* L.A. Hawkes, A.C. Broderick, M.H. Godfrey, B.J. Godley, *Investigating the potential impacts of climate change on a marine turtle population*, 13(5) GLOBAL CHANGE BIOLOGY, 923-932 (May 2007).

and thus will continue to produce a male population.[74] It is critically important to protect the small and vulnerable population of sea turtles found on North Carolina coasts and offshore.

Long-term datasets show nesting declines for loggerheads in North Carolina, South Carolina, Georgia, and southeast Florida.[75] Nesting sea turtles and hatchlings could be disturbed or injured by seismic surveying in any of these locations through an increase in vessel traffic, accidental oil discharges, and noise propagation from the use of airguns.[76] For these reasons, all near-coastal waters from Florida through North Carolina from May 1 through October 31 should be excluded from seismic airgun activity to protect both nesting sea turtles and hatchlings. Additionally, large areas of designated critical habitat, including important "foraging habitat, internesting (between nest-laying events) habitat, breeding habitat, overwintering habitat, and migratory habitat for adult loggerheads," overlap with the CGG's proposed survey area.[77] Mitigation measures should be developed and implemented to ensure that effects to sea turtles in these areas are also minimized.

In sum, seismic surveying will have significant impacts on sea turtles, rendering CGG's proposal inconsistent with the North Carolina coastal management plan. At the very least, time-area closures should be expanded to include important nesting habitat, as well as foraging and migrating habitat, in order to ensure that endangered and threatened sea turtle populations are adequately protected from the harmful impacts of seismic surveying.

The enforceable policies of the State's coastal management plan include important protections for endangered species and their habitat. Specifically, the plan provides that coastal complex areas and natural and cultural resource areas must be protected and maintained for the preservation of endangered species.[78] The impacts to sea turtles and their critical habitat are adverse and substantial, and are inconsistent with the enforceable policies of the State's coastal management plan. DCM must consider endangered species and critical habitat, including sea turtles and their critical habitat, on the State's coast and in offshore waters in making its consistency determination.[79]

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[74] *Id.*

[75] *Loggerhead Sea Turtle* (Caretta caretta), NAT'L MARINE FISHERIES SVC, *available at* http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed May 2012).

[76] *PEIS*, *supra* note 50, at 4-91-96.

[77] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle (Caretta caretta), 78 Fed. Reg. 18,000, 18,004 (March 25, 2013).

[78] 15A N.C. Admin. Code 7H.0501, 0506.

[79] CGG's proposed survey area also overlaps with populations of the threatened piping plover and the endangered Atlantic sturgeon. Populations of the threatened piping plovers nest on the Cape Lookout National Seashore and winter along the North Carolina coast. *Piping plover*, NAT'L PARK SVC., http://www.nps.gov/calo/naturescience/pipl.htm (last visited Feb. 20, 2015). North Carolina is located at the southern end of the breeding range and northern end of the wintering range, and is thus uniquely positioned in the bird's range such that it can be found on the North Carolina coast year-round. *Compilation and Assessment of Piping Plover Wintering and Migratory Staging Area Data in North Carolina*, N.C. WILDLIFE RESOURCES, http://www.fws.gov/raleigh/pdfs/ES/Cameron_Presentation.pdf (last visited Feb. 20, 2015). *See also Piping plover*, NAT'L PARK SVC., http://www.nps.gov/calo/naturescience/pipl.htm (last visited Feb. 20, 2015). CGG's survey area may impact the species and its habitat. The PEIS evaluated only the impacts to diving birds and failed to evaluate the hearing impacts to other marine birds flying over the survey area. The spawning population of the Carolina

C. Seismic activity off of North Carolina's coast will adversely and significantly impact the State's marine mammal populations, and is therefore inconsistent with the State coastal management plan.

North Carolina's coast and offshore waters provide habitat for numerous federally-listed endangered species, including the Fin whale, Humpback whale, North Atlantic right whale, sei whale, sperm whale, and West Indian manatee.[80] CGG's proposed activities overlap with these habitat areas, however, CGG fails to acknowledge any impact that its activities will have on marine mammal populations and habitat or any mitigation measures it will adopt to protect marine mammal populations.

The North Atlantic right whale ("NARW") is of particular concern, as this species is one of the most critically endangered whale species in the world; the NARW population is estimated to be approximately 500 individuals.[81] NARWs are found along the eastern seaboard from Nova Scotia to Florida. Females migrate south to the coasts of Georgia and Florida to breed and give birth. NARWs have been documented along the Mid-Atlantic coast, including off the coast of North Carolina.[82] The mothers and calves that pass through the mid-Atlantic are the most valuable members of the species for purposes of its long term survival and recovery.[83] The National Oceanic and Atmospheric Administration ("NOAA") recently acknowledged that not just the migratory pathway for these vulnerable mothers and calves, but also the calving grounds themselves, may extend into the waters of North Carolina. In February 2015, the National Marine Fisheries Service proposed additional critical habitat for the NARW, which includes waters off the coast of Cape Fear, North Carolina.[84]

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

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distinct population segment of the Atlantic sturgeon has been in dramatic decline, and currently amounts to approximately 300 adults each year. *Atlantic Sturgeon Carolina Distinct Population Segment: Endangered*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_carolina_dps.pdf (last visited Feb. 20, 2015). Atlantic sturgeon spawn in estuarine waters and migrate to the marine environment as sub-adults and adults; adults concentrate off of the Oregon Inlet in North Carolina during the summer months. *Biological Opinion*, BUREAU OF OCEAN AND ENERGY MGMT. 150-151 (July 2013) http://www.boem.gov/Final-Biological-Opinion-19-July-2013/. The PEIS suggests that seismic activity may disrupt or displace Atlantic sturgeon in areas with high concentrations of the species. *PEIS*, *supra* note 50, at 4-144.

[80] *Endangered and Threatened Species of North Carolina*, U.S. FISH AND WILDLIFE SVC., http://www.fws.gov/raleigh/es_tes.html (last visited Feb. 10, 2015).

[81] *North Atlantic right whale* (Eubalaena glacialis), NAT'L OCEANIC AND ATMOSPHERIC ADMIN., http://www.fisheries.noaa.gov/pr/species/mammals/whales/north-atlantic-right-whale.html (last visited Feb. 16, 2015). *See also* Attachment 2.

[82] *Id.*

[83] *See* Endangered and Threatened Species: Critical Habitat for North Atlantic Right Whale, 80 Fed. Reg. 9314, 9319 (Feb. 20, 2015) ("Given that the area of the southeastern U.S. is the only known calving ground for North Atlantic right whales, and that the most biologically valuable portion of the species' population is utilizing this habitat, we conclude that facilitating successful calving by protecting the species' calving population is a key conservation objective.")

[84] *Id.*

diversity, and, in some circumstances, injuries and mortalities.[85] 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.[86] Similar responses, all occurring over enormous areas of ocean, have been seen in these and other baleen whale species in a variety of regions and across behavioral states, affecting foraging, breeding, and migration.[87]

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.[88] 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.[89] According to recent modeling from Cornell and NOAA, the highly endangered NARW is particularly vulnerable to masking effects from airguns and other sources given the acoustic and behavioral characteristics of its calls.[90] 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 PEIS. 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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[85] *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).

[86] Clark, C.W., and Gagnon, G.C., *Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales*, INTL WHALING COMM'N (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).

[87] See, *e.g.*, Blackwell, S.B., Nations, C.S., McDonald, T.L., Greene, Jr., C.R., Thode, A.M., Guerra, M., and Macrander, M., *Effects of airgun sounds on bowhead whale calling rates in the Alaskan Beaufort Sea*, MARINE MAMMAL SCIENCE 29(4): E342-E365 (2013); Castellote, M., Clark, C.W., and Lammers, M.O., *Acoustic and behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise*, BIOLOGICAL CONSERVATION 147: 115-122 (2012); Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., *Seismic surveys negatively affect humpback whale singing activity off Northern Angola*, PLoS ONE 9(3): e86464. doi:10.1371/journal.pone.0086464 (2014).

[88] 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*, INTL WHALING COMM'N (2009) (IWC Sci. Comm. Doc. SC/61/E10).

[89] *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), www.okeanos-stiftung.org/okeanos/download.php?id=19.

[90] 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).

The proposed survey area will overlap with right whale habitat off the coasts of Florida and Georgia, as well as areas off the North Carolina coast where NARWs have been sighted. Given the enormous distances over which baleen whales are affected, the present time-area closures developed by BOEM are plainly inadequate to protect right whales and other endangered baleen whales.[91] While the Record of Decision under the PEIS restricts CGG's ability to conduct seismic testing in existing NARW critical habitat,[92] this critical habitat does not include important calving grounds for the species. The recent proposal to add two areas to the existing critical habitat designation for NARWs, including calving grounds off North Carolina's coast, demonstrates that CGG must adopt additional mitigation measures to protect NARW and their critical habitat.

The enforceable policies of the State's coastal management plan include important protections for endangered species and their habitat. Specifically, the plan provides that coastal complex areas and natural and cultural resource areas must be protected and maintained for the preservation of endangered and threatened species.[93] The impacts to marine mammals and their critical habitat are adverse and substantial, and are inconsistent with the enforceable policies of the State's coastal management plan. DCM must consider marine mammals and their critical habitat on the State's coast and in offshore waters in making its consistency determination. Additionally, CGG's failure to provide information on the impact of the proposed activities on marine mammals has left DCM with insufficient information to review the applicant's consistency determination, and DCM should object to the determination on that basis.

D. <u>The cumulative impacts of proposed seismic surveys, together with other such surveys and other reasonably foreseeable activities off the North Carolina coast, must be considered.</u>

CGG's certification provides minimal information regarding impacts to marine wildlife and coastal habitat. Moreover, CGG completely failed to address cumulative impacts of seismic testing on North Carolina coastal resources. BOEM is currently considering eight applications to conduct seismic testing in the Atlantic Ocean with largely overlapping survey areas.[94] While DCM has received only three certifications for consistency to date, the remaining applications to BOEM will go through the consistency process if they move forward. As noted in detail above, the impact of one seismic survey is substantial. Indeed, the cumulative impact of eight seismic

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[91] The Record of Decision under the PEIS requires using protected species observers ("PSOs") and passive acoustic monitoring ("PAM") devices to monitor for marine mammals and sea turtles as mitigation measures. Seismic testing is expected to go on twenty-four hours per day, seven days per week during the testing period, during which time PSOs may not be on duty due to darkness or other conditions. During these times, only PAMs would be in use. Implementing only one method of observation does not account for the behavior changes caused by the airguns discussed above. As discussed above, one of the many negative impacts of seismic testing on marine mammals is that testing may discontinue vocalization, meaning PAMs could not detect the species. Unless CGG commits to using PSOs and PAMs simultaneously, their efforts will be insufficient to mitigate impacts to marine mammals in the survey area.

[92] *See Record of Decision: Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement* 3 (2014), http://www.boem.gov/Record-of-Decision-Atlantic-G-G/.

[93] 15A N.C. Admin. Code 7H.0501, .0506.

[94] *Currently Submitted Atlantic OCS Region Permits*, BUREAU OF OCEAN AND ENERGY MGMT., http://www.boem.gov/Currently-submitted-Atlantic-OCS-Region-Permits/ (last visited Feb. 25, 2015).

surveys on marine and coastal resources of the State will put marine life and coastal resources at great risk. All applicants must evaluate the full scope of the impact of seismic testing off North Carolina's coast, including the cumulative impact of seismic survey activity by all applicant companies, in their certifications for consistency with the State's coastal management plan. CGG failed to provide adequate information regarding impacts of seismic activities, including cumulative impacts. DCM should request this analysis before making a final decision regarding the CGG's consistency certifications. If this cumulative analysis is not provided to DCM, DCM should object to CGG's consistency determination on the basis of a lack of information.

III. CONCLUSION

We appreciate the Division scheduling a public hearing on CGG's, Spectrum Geo's, and GX Technology's applications to conduct seismic activities off our coast. We respectfully request that DCM hold a public hearing on any additional proposals to conduct testing off the State's coast. Seismic surveys are controversial, impact numerous stakeholders, and are highly technical in nature; members of the public must have a sufficient opportunity to fully understand and weigh in on this proposal's potential impacts to ecologically and economically significant resources. Further, we ask DCM to consider extending the public comment period to allow for additional public input.

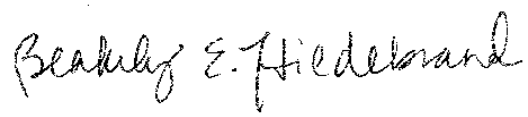
Seismic testing is the first step toward the development of offshore oil resources. The impacts of offshore drilling in deep water on fish, endangered species, marine mammals, and wildlife habitat are well documented. SELC and the undersigned are strongly opposed to the exploration and development of offshore oil and gas off North Carolina's coast because of the substantial risks oil and gas exploration and development poses to the State's valuable coastal resources and the coastal way of life.

CGG's proposed activities do not comply with the enforceable policies of North Carolina's coastal management program and will not be conducted in a manner consistent with the State's program. We respectfully request that the DCM object to CGG's certification that its activities are consistent with the State's coastal management plan. North Carolina's coast is home to a rich diversity of natural resources and a biologically diverse ecosystem, including valuable fish species, marine mammals, and endangered species and essential habitat for these species. These natural resources are an essential part of the State's coastal economy and our State's coastal heritage and cannot be put at risk.

Thank you for your consideration of these comments.

Sincerely,

Sierra B. Weaver
Senior Attorney
Southern Environmental Law Center



Blakely E. Hildebrand
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CC:
Brian Buzby, Executive Director, North Carolina Conservation Network
Matthew Starr, Upper Neuse Riverkeeper, Sound Rivers, Inc.
Travis Graves, Lower Neuse Riverkeeper, Sound Rivers, Inc.
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Jane Davenport, Senior Staff Attorney, Defenders of Wildlife
Kristen Monsell, Staff Attorney, Center for Biological Diversity
Michael Jasny, Director, Marine Mammal Protection, Natural Resources Defense Council

Attachments (2)

EXHIBIT D

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 843-720-5270 | 463 KING STREET, SUITE B CHARLESTON, SC 29403-7204 | Facsimile 843-414-7039

March 12, 2015

VIA E-MAIL AND U.S. MAIL, RETURN RECEIPT REQUESTED

Mr. Curtis Joyner
South Carolina Department of Health and Environmental Control
Office of Ocean and Coastal Resource Management
1362 McMillan Ave, Suite 400
Charleston, South Carolina 29405
joynercm@dhec.sc.gov

Re: Proposed Consistency Certification for Spectrum Geo Inc. Atlantic 2D Geophysical Survey; Notice No. CZC-15-0061; BOEM Application E14-006

Dear Mr. Joyner:

The Southern Environmental Law Center ("SELC") submits these comments on behalf of the South Carolina Coastal Conservation League, Natural Resources Defense Council, South Carolina Wildlife Federation, Conservation Voters of South Carolina, Waccamaw Riverkeeper, Charleston Waterkeeper, the Charleston Chapter of The Surfrider Foundation, and the Southern Alliance for Clean Energy on the proposal by Spectrum Geo Inc. ("Spectrum") to collect two-dimensional ("2D") geophysical seismic data offshore of South Carolina. Our organizations are profoundly concerned about Spectrum's intention to conduct high-intensity seismic surveys off of South Carolina's coast because of the significant environmental harms presented by seismic exploration, as well as the potentially catastrophic impacts of offshore oil drilling. During federal consistency review, South Carolina has an important opportunity to protect its coastal resources from seismic exploration, as well as the potential dangers of offshore oil development.

As described more fully below, we do not believe Spectrum's proposal is consistent with South Carolina's federally-approved coastal management program ("CMP") for the following reasons:

- Spectrum's proposal would result in undue harm to marine mammals, including the critically-endangered North Atlantic right whale;
- Spectrum's proposal fails to adequately protect sea turtles and would result in undue harm to these threatened and endangered species;
- Spectrum's proposal would result in significant adverse impacts to South Carolina's fisheries and fish habitat; and
- The long-range, cumulative impacts of Spectrum's proposal, as well as the other pending seismic survey proposals and potential future oil and gas drilling, threaten the sustainability of South Carolina's coastal ecosystem and economy, and will provide little, if any, economic benefit.

- Spectrum has failed to provide any information whatsoever about the project's long-range, cumulative effects.

In light of the enforceable policies of South Carolina's CMP, the special resources it is designed to protect, and the threats to those resources from this proposed activity, we believe that Spectrum's proposal is inconsistent with South Carolina's CMP and OCRM should therefore object to Spectrum's consistency certification. At a minimum, OCRM should find that Spectrum has not provided sufficient information to demonstrate that its proposal *is* consistent with the CMP.

I. Legal and Factual Background

The federal Coastal Zone Management Act of 1972 ("CZMA") was passed by Congress to "promote comprehensive and coordinated planning for coastal zone development and preservation between states and the federal government."[1] The CZMA articulates a number of policy objectives, including "to preserve, protect . . . and restore or enhance the resources of the Nation's coastal zone; [and] to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and aesthetic values as well as to needs for economic development."[2] Coastal states have "substantial and significant interests in the protection, management, and development" of resources in the exclusive economic zone that are best served by state involvement in plans that impact coastal resources and the development of state coastal management plans.[3] Under the CZMA, each coastal state may adopt a coastal zone management plan that provides for "the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone" and "management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters," among other objectives.[4]

In accordance with the CZMA, in 1977, South Carolina enacted the Coastal Tidelands and Wetlands Act (known as the "South Carolina Coastal Zone Management Act").[5] The Act recognized that "[t]he coastal zone is rich in a variety of natural, commercial, recreational and industrial resources of immediate and potential value to the present and future well-being of the State," as well as that "[t]he coastal zone and the fish, shellfish, other living marine resources and wildlife therein, may be ecologically fragile and consequently extremely vulnerable to destruction by man's alterations."[6] The Act required the South Carolina Department of Health

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[1] *Conservation Law Found. v. Watt*, 560 F. Supp. 561, 574 (D. Mass. 1983), *aff'd sub nom. Com. of Mass. v. Watt*, 716 F.2d 946 (1st Cir. 1983).
[2] 16 U.S.C. § 1452(1)-(2).
[3] *Id.* at § 1451.
[4] *Id.* at § 1452(2)(a)-(b).
[5] S.C. Code Ann. §§ 48-39-10 *et seq*.
[6] *Id*. at § 48-39-20.

and Environmental Control ("DHEC") to develop a comprehensive coastal management program to implement the objectives and policies of both the federal CZMA and South Carolina's CZMA.[7] DHEC was further instructed to "[d]evelop a system whereby the department shall have the authority to review all state and federal permit applications in the coastal zone, and to certify that these do not contravene the [CMP]."[8] One primary goal of the CMP is the "[d]evelopment of a management program that will achieve a rational balance between economic development and environmental conservation of natural resources in the coastal zone of South Carolina."[9]

In determining whether to certify an activity as being consistent with the CMP, DHEC's Office of Ocean and Coastal Resource Management ("OCRM") must consider "[t]he extent and significance of impact on the following aspects of quality or quantity of these valuable coastal resources," including the "destruction of endangered wildlife or vegetation or of significant marine species" and the "degradation of existing water quality standards."[10] Specifically, for activities occurring in the coastal zone, OCRM should not certify an activity as being consistent with the CMP if it will have a significant negative impact on wildlife and fisheries resources, either on the stocks themselves or their habitat, unless overriding socio-economic considerations are involved.[11] Further, "[w]ildlife and fisheries stocks and populations should be maintained in a healthy and viable condition and these resources should be enhanced to the maximum extent possible" and "[c]ritical wildlife and fisheries habitat should be protected and enhanced to the extent possible."[12] OCRM must also consider "[t]he possible long-range, cumulative effects of the project, when reviewed in the context of other possible development and the general character of the area."[13]

It is important to recognize that the CMP does not specifically consider Outer Continental Shelf ("OCS") oil and gas exploration and development activities such as seismic surveys because there was little historical interest in oil and gas development off the coast of South Carolina.[14] Spectrum's proposal and the other impending seismic survey applications are unprecedented in both their scale and their significance of impacts. OCRM must therefore exercise extreme caution as it undertakes this consistency review, and should look to existing state law regulating oil and gas exploration and drilling within state waters for guidance. For example, when it enacted the laws governing these activities within South Carolina's jurisdictional limits, the General Assembly "f[ound] and declare[d] that the highest and best use of the seacoast of the State is as a source of public and private recreation," and

> that the preservation of this use is a matter of the highest urgency and priority, and that such use can only be served effectively by maintaining the coastal waters,

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[7] *Id*. at § 48-39-80.
[8] *Id*.
[9] CMP (July 1979) at III-1.
[10] CMP at III-14.
[11] Policies and Procedures of the CMP (July 1995) at III-41.
[12] *Id*.
[13] CMP at III-14.
[14] *See* CMP at IV-32 ("the likelihood of South Carolina experiencing any significant Outer Continental Shelf (OCS) related activity onshore in the immediate future seems slight").

> estuaries, tidal flats, beaches, and public lands adjoining the seacoast in as close to a pristine condition as possible, taking into account multiple use accommodations necessary to provide the broadest possible promotion of public and private interests.[15]

Further, the transfer of pollutants, such as would occur with oil and gas drilling and transportation, is a "hazardous undertaking" and

> [s]pills, discharges, and escapes of pollutants occurring as a result of procedures involved in the transfer, storage, and transportation of such products pose threats of great danger and damage to the environment of the State, to owners and users of shore front property, to public and private recreation, to citizens of the State and other interests deriving livelihood from marine-related activities, and to the beauty of the coast.[16]

Finally, "[s]uch state interests outweigh any economic burdens imposed upon those engaged in transferring pollutants and related activities," because "the preservation of the public uses referred to herein is of grave public interest and concern to the State in promoting its general welfare, preventing diseases, promoting health, and providing for the public safety."[17]

Clearly, the coastal zone of South Carolina is an ecologically rich area that supports resources of vital importance to all citizens of the state. These resources include federally protected sea turtles, such as federally threatened loggerheads; marine mammals, including dolphins and federally endangered North Atlantic right whales; and productive commercial and recreational fisheries. As OCRM and the National Oceanic and Atmospheric Administration ("NOAA") have recently pointed out, these natural resources are not only ecologically irreplaceable; they are also of vital economic importance. According to OCRM, marine fisheries provide over a billion dollars in economic value to the state, coastal tourism is responsible for approximately half of a $17 billion tourism industry in South Carolina, and the impact of outdoor recreation-related coastal tourism is approximately $7.046 billion.[18] Each year, more than a million residents and 15 million visitors enjoy boating, fishing, and recreating along South Carolina's coast.[19] Beaches are the primary reason that non-residents choose South Carolina as a vacation destination – in 1999, South Carolina's 187 miles of beaches attracted more than 28 million visitors – and South Carolina's coastal resorts account for more than 60 percent of total state tourism revenues.[20] In further support of the ecological and economic value of natural resources off the coast of South Carolina, NOAA explained that in 2011, the National Marine Fisheries Service ("NMFS") determined that recreational fishing created over 3,300 jobs; $115

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[15] S.C. Code Ann. § 48-43-520.
[16] *Id*.
[17] *Id*.
[18] Letter from Rheta DiNovo (OCRM) to Paul Scholz (NOAA) (Aug. 25, 2014).
[19] NOAA, *available at* http://coast.noaa.gov/magazine/2011/03/article3.html?redirect=301ocm (accessed Feb. 11, 2015).
[20] Free, Kathryn, *South Carolina Responds to Beach Erosion: Is Beach Nourishment The Last Line of Defense Against an Armored Coastline?* (Spring 2005), *available at* http://www.law.sc.edu/environmental/papers/200511/elsc/free.pdf (accessed Feb. 11, 2015).

million in income; $307 million in sales; and $185 million in value-added to the state's gross domestic product.[21]

Coastal communities are deeply concerned about the threat posed to these valuable ecological and economic resources, and several have already passed resolutions opposing offshore drilling and the use of seismic airguns to explore for oil and gas off the coast of South Carolina. To date, the communities of Isle of Palms, Folly Beach, Edisto Island, Beaufort, and Port Royal have passed such resolutions. Several additional communities are currently reviewing and considering passing such resolutions. Further, the Mayor of Charleston wrote a letter in 2014 to the President of the U.S. and Secretary of the Department of the Interior urging them to prevent any seismic testing from being conducted off the coast of South Carolina because of the "serious negative impacts to our marine resources that form the foundation of economic vitality for communities all along the Atlantic coast."[22]

Pursuant to its proposal, Spectrum plans to use "seismic airgun arrays" to conduct its survey.[23] The 2D seismic survey would be conducted 24 hours per day, seven days per week during the second quarter of 2015. Two survey vessels towing airguns, starting on opposite sides of the survey area, would collect data simultaneously by releasing intense impulses of compressed air into the water about once every 10-12 seconds. Spectrum estimates that two additional chase or support vessels would also be used for the proposed survey.[24] A large seismic airgun array can produce effective peak pressures of sound higher than those of virtually any other man-made source save explosives;[25] 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.[26] Indeed, the enormous scale of this acoustic footprint has now been confirmed by studies of seismic in numerous regions around the globe. Spectrum's proposal states that it will not conduct seismic testing within state waters, which extend three miles beyond the coastline into the Atlantic Ocean, however, the impacts of seismic testing will undoubtedly be felt in state waters.[27]

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[21] Letter from Jeffrey Payne, Ph.D. (NOAA) to Rheta DiNovo (OCRM) (Nov. 18, 2014) at 7.
[22] Letter from Mayor Riley (Charleston) to President Obama and Secretary Jewell (Apr. 16, 2014), attached as Exhibit A.
[23] Spectrum Proposed Coastal Zone Consistency Determination (hereafter, "Spectrum Proposal") at 3.
[24] *Id*. at 1.
[25] National Research Council, *Ocean Noise and Marine Mammals* (2003).
[26] 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).
[27] BOEM recently announced a five-year draft proposed leasing program for the Mid-Atlantic OCS for the development of oil and gas reserves that includes a 50 mile buffer zone along the Mid and South Atlantic coasts where no leasing will be allowed. *See 2017-2022 OCS Oil and Gas Leasing Program*, BUREAU OF OCEAN AND ENERGY MGMT, http://www.boem.gov/Five-Year-Program-2017-2022/ (accessed Feb. 25, 2015). Seismic testing will occur within the 50 mile buffer zone established in the Draft Proposed Program, within which no oil and gas development may take place.

It is undisputed that sound is a fundamental element of the marine environment. Fish, whales, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators. Spectrum's proposed survey would dramatically degrade the acoustic environment along South Carolina's coast. The noise impacts of seismic surveys pose such a serious threat to the marine ecosystem that on March 5, 2015, a group of seventy-five scientists from around the world sent a letter to President Obama voicing their concern that conducting these activities in the Atlantic "represents a significant threat to marine life throughout the region."[28] In their letter, the scientists describe likely impacts to marine mammals, sea turtles, and fish, and conclude that

> Our expert assessment is that the Department's premise [that seismic activities would only have a negligible impact on marine species and populations] 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.[29]

These concerns from the scientific community further highlight the need to have a thorough understanding of the risks posed by seismic activities before they are allowed to proceed and potentially cause harm to the coastal ecosystem and economy.

Further, before any consistency determination is made, a public hearing on this proposal should be held. As discussed above, seismic surveys are controversial, impact numerous stakeholders, and are highly technical in nature; members of the public must have a sufficient opportunity to fully understand and weigh in on this proposal's potential impacts to ecologically and economically significant resources. For these reasons, we respectfully request that OCRM exercise its discretion under the CMP to hold a public hearing on Spectrum's proposal.

Through the consistency process, a state has the authority to ensure protection of its resources. Any federal activity proposed within or outside of a state's 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."[30] In light of the enforceable policies of the CMP, the special resources it is designed to protect, and the threats to those resources from this proposed activity, we believe that Spectrum's proposal is inconsistent with South Carolina's coastal zone management program, and OCRM should exercise its authority to protect our state's resources.

[28] Letter from Seventy-Five Scientists to President Obama (Mar. 5, 2015), attached as Exhibit B.
[29] *Id*.
[30] 16 U.S.C. § 1456(c)(1)(A).

II. Spectrum's Proposal would result in Undue Harm to Marine Mammals and would be Inconsistent with the CMP.

It is well-established that the high-intensity pulses produced by airguns can cause a range of impacts on marine mammals, including broad habitat displacement, disruption of vital behaviors essential to foraging and breeding, loss of biological diversity, and, in some circumstances, injuries and mortalities.[31] Consistent with their acoustic footprint, most of these impacts are felt on an extraordinarily wide geographic scale – especially on endangered baleen whales, such as right 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.[32] Similar responses, all occurring over enormous areas of ocean, have been seen in these and other baleen whale species in a variety of regions and across behavioral states, affecting foraging, breeding, and migration.[33]

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.[34] 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.[35] According to recent modeling from Cornell and NOAA, the highly endangered North

[31] *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).
[32] 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).
[33] *See, e.g.*, Blackwell, S.B., Nations, C.S., McDonald, T.L., Greene, Jr., C.R., Thode, A.M., Guerra, M., and Macrander, M., *Effects of airgun sounds on bowhead whale calling rates in the Alaskan Beaufort Sea*, MARINE MAMMAL SCIENCE 29(4): E342-E365 (2013); Castellote, M., Clark, C.W., and Lammers, M.O., *Acoustic and behavioural changes by fin whales (Balaenoptera physalus) in response to shipping and airgun noise*, BIOLOGICAL CONSERVATION 147: 115-122 (2012); Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., *Seismic surveys negatively affect humpback whale singing activity off Northern Angola*, PLOS ONE 9(3): e86464.doi:10.1371/journal.pone.0086464 (2014).
[34] 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).
[35] *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,

Atlantic right whale is particularly vulnerable to masking effects from airguns and other sources given the acoustic and behavioral characteristics of its calls.[36] 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 Programmatic Environmental Impact Statement ("PEIS") issued by the Bureau of Ocean and Energy Management ("BOEM").[37] Repeated insult from airgun surveys, over months, 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 off South Carolina.

As indicated above, these impacts are especially concerning for the critically-endangered right whale. The proposed survey area will overlap with the world's only known calving habitat for right whales. Notably, an area off the coast of Georgia and Florida has long been designated as federally protected critical habitat for the species, and NMFS' recent proposal to expand right whale critical habitat encompasses areas off the entire coast of South Carolina.[38] This proposal, as well as numerous other protections for right whales in waters offshore South Carolina demonstrates the need for additional mitigation measures to protect right whales and their critical habitat.[39, 40]

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31 Aug. – 1 Sept., 2009, Monterey, Calif. (2010), available at http://www.okeanos-foundation.org/assets/Uploads/Airgun.pdf (accessed Mar. 9, 2015).

[36] 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).

[37] Bureau of Ocean and Energy Management, Atlantic OCS Proposed Geological & Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement ("PEIS") at xix (April 2014), *available at* http://www.boem.gov/Atlantic-G-G-PEIS/#Final PEIS (accessed Mar. 9, 2015)

[38] *See* 80 Fed. Reg. 9314, 9327 (Feb. 20, 2015).

[39] While we are encouraged that Spectrum is proposing to use mitigation measures such as passive acoustic monitoring and protected species observers, these measures alone will not fully protect marine mammals. For example, Spectrum is proposing to conduct its seismic activities 24 hours a day, but visual observation will be impossible at night and during other periods of poor visibility. Further, the effectiveness of passive acoustic monitoring may be limited by the interference of other sounds in high-traffic areas. And finally, right whale mothers and calves engage in much less vocalization than other right whales, decreasing the effectiveness of passive acoustic monitoring for detecting mother and calf pairs.

[40] Further, in developing its proposed area closures (which have been adopted by Spectrum in this proposal), BOEM relied on historical sighting data of right whales from NMFS and a rigid assumption that approximately 83% of right whales occur within 20 nautical miles of the coast. However, a recent study confirmed that the majority of recorded calls during the peak season of right whale activity (mid-January 2013 through late March 2013) occurred further offshore at marine autonomous recording unit ("MARU") sites 3 (38 nautical miles from shore) and 5 (63 nautical miles from shore) than at MARU sites closer to shore. In other words, the vast majority of right whale detections occurred outside the bounds of the proposed time-area closures. Thus,

Airguns are also 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;[41] and harbor porpoises have been seen to engage in strong avoidance responses fifty miles from an array.[42] Seismic surveys have been implicated in the long-term loss of marine mammal biodiversity off the coast of Brazil.[43] 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.[44]

In sum, it is clear that seismic surveying will have significant adverse impacts on whales and other marine mammals, rendering Spectrum's proposal inconsistent with the CMP.

III. Spectrum's Proposal Fails to Adequately Protect Sea Turtles and Would Result in Undue Harm, which is Inconsistent with the CMP.

Spectrum's proposed survey area overlaps with numerous populations of sea turtles, 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;[45] limiting anthropogenic disturbances to these nesting locations is paramount for the global conservation of this species. As BOEM observed in the PEIS, "…breeding adults, nesting adult females, and hatchlings could be 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."[46] The recovery plan for the Northwest Atlantic population of loggerhead sea turtles also notes that several aspects of oil and

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the spatial protection afforded to right whales by the proposed time-area closures remains inadequate, as it does not reflect the actual habitat use of right whales.

[41] 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).

[42] 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).

[43] 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).

[44] 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.

[45] 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 (accessed Mar. 9, 2015).

[46] PEIS at 2-24.

gas activities, including seismic surveying, threaten these populations.[47] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, which is where much of the energy produced by airguns is concentrated.[48]

It is important to note that in Appendix I to the PEIS, BOEM acknowledges that there is insufficient data and information about the impacts of sound on sea turtles to fully understand the potential risks of seismic surveying, and that more research is necessary in order to develop appropriate noise exposure criteria to reduce the risk of injury or death. The lack of information about potential adverse impacts demonstrates the need to proceed with caution and implement mitigation measures that will be sufficiently protective in order to avoid harm to sea turtles.

We are deeply concerned, therefore, that Spectrum's proposal only contemplates time-area closures for Brevard County, Florida, ignoring the fact that beaches along the South Carolina coast, among others, provide important habitat for nesting sea turtles. South Carolina turtle nests in 2014 included 2,071 loggerheads, 8 greens, and 2 leatherbacks.[49] Charleston County in particular is considered a high density area for nesting sea turtles, and large swaths of the South Carolina coast – including beaches in Georgetown, Charleston, Colleton, and Beaufort counties – have been designated as critical habitat for loggerheads.[50]

Long-term datasets show nesting declines for loggerheads in North Carolina, South Carolina, Georgia, and southeast Florida,[51] 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 seismic surveying 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, all near-coastal waters from Florida through North Carolina, from May 1 through October 31, should be excluded from seismic airgun activity to protect both nesting females and hatchlings. It is unclear why Spectrum will implement time-area closures "to avoid disturbing the large numbers of loggerhead turtles (and hatchlings) that are likely to be present in nearshore waters of Brevard County during turtle nesting and hatchling season,"[52] but will not also afford similar protection to sea turtles in other areas, including the large number nesting along the South Carolina coast.

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[47] Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle at I-52 ("Petroleum seismographic cannons produce intense noise at both high and low frequencies and have the potential to harm sea turtles.").

[48] 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).

[49] SCDNR Sea Turtle Conservation Program, *available at* http://www.seaturtle.org/nestdb/index.shtml?view=2&year=2014 (accessed Feb. 10, 2015).

[50] *See* 79 Fed. Reg. 39756, 39787-91 (July 10, 2014).

[51] NMFS, Loggerhead Sea Turtle (*Caretta caretta*), *available at* http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed Mar. 9, 2015).

[52] Spectrum Proposal at 9.

Additionally, important *Sargassum* habitat should also receive consideration for time-area closures. Large areas of designated critical marine habitat for loggerheads overlap with Spectrum's proposed survey area.[53] Mitigation measures should be developed and implemented to ensure that effects to sea turtles in these areas are also minimized.

OCRM itself raised these concerns in its request to review Spectrum's proposal for consistency with the CMP, stating that "our primary concern relates to the lack of a time-area closure for nesting sea turtles similar to that of the Northern Atlantic Right Whale (NARW) with respect to imminent acoustic sound sources."[54] The agency went on to say that "[i]t seems problematic from a resource management perspective that these sites do not warrant a similar mitigation measure afforded to Brevard County, FL."[55] In making its consistency determination, OCRM must follow-through on these concerns.

In sum, seismic surveying will have significant impacts on sea turtles, rendering Spectrum's proposal inconsistent with the CMP. At the very least, time-area closures should be expanded to include important nesting habitat, as well as *Sargassum* habitat, in order to ensure that endangered and threatened sea turtle populations are adequately protected from the harmful impacts of seismic surveying.

IV. Spectrum's Proposal would result in Negative Impacts to Commercial and Recreational Fisheries and is Inconsistent with the CMP.

Seismic surveying off South Carolina would place the fish and fisheries off the coast at significant risk, thus jeopardizing a substantial component of South Carolina's economy. According to OCRM, marine fisheries provide over a billion dollars in economic value to the state.[56] And recreational fishing contributes significantly to coastal tourism – NOAA explained that in 2011, NMFS determined that recreational fishing created over 3,300 jobs; $115 million in income; $307 million in sales; and $185 million in value-added to the state's gross domestic product.[57]

The South Atlantic OCS contains many areas that have been designated Essential Fish Habitat ("EFH") and/or Habitat Areas of Particular Concern ("HAPC") under the Magnuson-Stevens Fishery Conservation and Management Act.[58] The South Atlantic Fishery Management Council ("SAFMC") has designated EFHs for shrimp, red drum, snapper grouper, spiny lobster, rock shrimp, coastal migratory pelagic, golden crab, spiny lobster, dolphin wahoo, royal red

[53] *See* NMFS, Critical Habitat for the Northwest Atlantic Ocean Loggerhead Sea Turtle DPS, 79 Fed. Reg. 39856, 39892, 39912 (July 10, 2014).
[54] Letter from Rheta DiNovo (OCRM) to Paul Scholz (NOAA) (Aug. 25, 2014).
[55] *Id.*
[56] *Id.*
[57] Letter from Jeffrey Payne, Ph.D. (NOAA) to Rheta DiNovo (OCRM) (Nov. 18, 2014) at 7.
[58] 16 U.S.C. §§ 1801 *et seq.*

shrimp, cobia, and dolphin,[59] and HAPC for shrimp, *Sargassum*, red drum, snapper grouper complex, spiny lobster, coastal migratory pelagic, coral, and dolphin wahoo.[60]

Additionally, the SAFMC has established eight deepwater Marine Protected Areas (MPAs) in the South Atlantic region, off the coast of the Carolinas and Georgia, to protect a portion of the long-lived, "deepwater" snapper grouper species such as snowy grouper, speckled hind, and blueline tilefish.[61] Among the MPAs is the Edisto MPA, designed to protect the fish species that depend on the Charleston Bump.[62] Unique features on South Carolina's OCS, including natural hard bottoms, as well as 37 artificial reefs and five major shipwrecks, similarly support and sustain many resident and migratory fisheries species.[63]

Despite Spectrum's assertion that the proposed activities would have minimal impacts on fisheries, the reality is that seismic surveys would have significant negative consequences for both commercial and recreational fishing industries. 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,[64] 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.[65] Even brief playbacks of predominantly low-

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[59] SAFMC's EFH Designations, *available at* http://safmc.net/EFH/EFH%20Table.pdf (accessed Mar. 9, 2015).

[60] SAFMC, Essential Fish Habitat-Habitat Areas of Particular Concern and Coral Habitat Areas of Particular Concern, *available at* http://safmc.net/EFH/EFH-HAPC%20Table.pdf (accessed Mar. 9, 2015).

[61] *See* SAFMC, Marine Protected Areas, *available at* http://safmc.net/managed-areas/marine-protected-areas (accessed Mar. 9, 2015). A Marine Protected Area, as defined in Presidential Executive Order 13158 (2000), is any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. *Id.*

[62] *Id.*

[63] *See* Sea Grant, Marine Fisheries: Fisheries/Living Marine Resource Program, *available at* http://www.scseagrant.org/Content/?cid=43 (accessed Mar. 9, 2015).

[64] 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).

[65] 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

frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[66] Recent data suggest that loud, low-frequency sound also disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial species.[67] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs and larvae.[68] BOEM acknowledged in the PEIS that airguns may result in changes to "behavioral responses, masking of biologically important sounds, temporary hearing loss, and physiological effects."[69]

In addition to the need to minimize impacts to the important habitat areas described above, we particularly stress the extremely sensitive nature of the Charleston Bump and gyre complex, a unique habitat located southeast of Charleston on the Blake Plateau, which deflects the Gulf Stream offshore in the South Atlantic Bight, resulting in ocean upwelling that brings nutrients to the surface waters. The Charleston Bump and the gyre surrounding it provide a highly productive, nutrient-rich area, supporting and concentrating a food chain from zooplankton to small fish to commercially and recreationally important reef and pelagic fish that prey on them. In addition, this area provides essential nursery habitat for numerous offshore fish species. The slow-growing and long-lived corals that characterize the Charleston Bump are fragile in nature and highly vulnerable to disturbance. Because of of the significant ecological importance of this deepwater coral ecosystem, Governor Sanford expressly requested that President Bush designate the Charleston Bump and its coral reefs a Marine National Monument.[70] Protection of this area is clearly incompatible with the proposed seismic activities.

We also emphasize the fragility and importance of submarine canyons and canyon heads, as 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

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noise on the auditory sensitivity of the fathead minnow, *Pimephales promelas*, *Environmental Biology of Fishes* 63: 203-209 (2002).

[66] 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).

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

[68] 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).

[69] PEIS at xvii.

[70] *See* Petersen, Bo, Will a deep-ocean marvel be preserved?, The Post and Courier (June 7, 2008), *available at* http://www.postandcourier.com/article/20080607/PC1602/306079937 (accessed Mar. 9, 2015).

for bottom-dwelling species.[71] 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.[72] The canyons represent high-value habitat for many other species, and 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.[73] More than 200 species of invertebrates have been identified in the Atlantic submarine canyons and seamounts, including species of black corals, boreal red corals, sponges, and feather-like sea pens.[74] 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.

In sum, Spectrum's proposed seismic activities are in direct conflict with the enforceable policies of the CMP. South Carolina's coastal economy depends on the health of recreational and commercial fisheries, and seismic activities pose an unacceptable threat to the sustainability of these fisheries. OCRM should therefore find Spectrum's proposal to be inconsistent with the CMP.

V. Spectrum Failed to Provide Any Analysis of Long-Range, Cumulative Impacts.

BOEM has received nine applications to conduct seismic survey activities on the Atlantic OCS, seven of which DHEC has requested to review for consistency with the CMP because of their reasonably foreseeable direct impacts to coastal areas of South Carolina. In reviewing projects for consistency with the CMP, OCRM must consider "[t]he possible long-range, cumulative effects of the project, when reviewed in the context of other possible development and the general character of the area."[75] Spectrum's consistency certification contains no information whatsoever about the project's long-range, cumulative effects, and does not even

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[71] 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).

[72] *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://www.coris.noaa.gov/activities/deepcoral_rpt/DeepCoralRpt2007.pdf (accessed Mar. 9, 2015).

[73] 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).

[74] Oceana, There's No Place Like Home: Deep Seafloor Ecosystems of New England and the Mid-Atlantic (2007) at 9, *available at* http://oceana.org/sites/default/files/reports/NewEnglandTrawlReport_low1.pdf (accessed Mar. 9, 2015); Lumsden et al., The state of deep-coral ecosystems, at 200, 203; NRDC, Priority Ocean Areas.

[75] CMP at III-14.

acknowledge the six other seismic survey applications that DHEC has determined will have reasonably foreseeable impacts to the South Carolina coast. This is a major flaw in Spectrum's proposal that should render it inconsistent with the CMP.

If OCRM decides to ignore this serious deficiency and proceed with the consistency determination, Spectrum's failure to provide this information does not relieve OCRM of its obligations under the CMP to consider long-range, cumulative impacts. OCRM must gather the necessary information and undertake its own analysis of the long-range, cumulative impacts of airgun blasting. In its analysis, OCRM must consider the fact that each of the seven of applications submitted to BOEM will include surveying off the coast of South Carolina, and that many, if not all, of these individual survey efforts will be going on at the same time in the same place. Spectrum itself will have multiple survey vessels operating simultaneously, in addition to the numerous vessels being operated by other companies. Because the information obtained in the surveys is deemed proprietary and will not be shared among the companies or with the state or the public, the same areas will likely be blasted over and over again by airguns, greatly amplifying the adverse impacts to marine life. Further, since the information will not be shared with the state regulatory agencies charged with balancing the economic interests of the state with impacts to natural resources, it is unclear how any determination can be made about whether the serious environmental risks posed by these activities will be offset by any potential economic benefit to the citizens of the state.

Finally, OCRM must consider the fact that seismic surveys are the first step towards oil and gas drilling off the coast of South Carolina. The impacts of seismic surveys alone are significant, but the impacts of full-scale oil development will be even more devastating to the marine and coastal environments. These future impacts of the activities that will be facilitated by seismic surveys must be considered as part of OCRM's cumulative impacts analysis.

VI. Conclusion

For all of these reasons, we are deeply concerned about the reasonably foreseeable impacts of Spectrum's proposal – which threaten the ecological and economic integrity of South Carolina's coastal region – and believe it is inconsistent with South Carolina's coastal management program. At a minimum, OCRM should find that Spectrum has not provided sufficient information to demonstrate that its proposal *is* consistent with the CMP. We appreciate the opportunity to submit these comments. Please do not hesitate to contact us if you wish to discuss these comments in greater detail.

[signature page follows]

Sincerely,

Christopher K. DeScherer

Heather A. Murray

cc: Pace Wilber, National Marine Fisheries Service
Jaclyn Daly, National Marine Fisheries Service
Mark Leao, U.S. Fish and Wildlife Service
Kelly Laycock, U.S. Environmental Protection Agency
Bob Perry, South Carolina Department of Natural Resources
Susan Davis, South Carolina Department of Natural Resources
Hamilton Davis, Coastal Conservation League
Michael Jasny, Natural Resources Defense Council
Steve Gilbert, South Carolina Wildlife Federation
Ann Timberlake, Conservation Voters of South Carolina
Paula Reidhaar, Waccamaw Riverkeeper
Andrew Wunderley, Charleston Waterkeeper
Kate Dittloff, Charleston Chapter of The Surfrider Foundation
Chris Carnevale, Southern Alliance for Clean Energy

Exhibit A

City of Charleston
Joseph P. Riley, Jr.
Mayor

April 16, 2014

The President of the United States
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear Mr. President and Secretary Jewell:

I am writing to urge you to halt proposed seismic airgun testing for oil and gas in the Atlantic Ocean. Proposed seismic testing would span from Delaware to Florida, but the impacts would be felt in communities throughout the entire East Coast – potentially harming sea life, ecosystems, fisheries and coastal economies.

The use of airguns to conduct these seismic tests threatens fish populations and profitable fisheries. In fact, airgun noise has been shown to decrease catch rates of certain fisheries. Commercial and recreational fishing off the mid and south Atlantic generate billions annually and supports hundreds of thousands of jobs. The Department of the Interior's assessment ignores the economic impacts the proposed seismic testing will have on fisheries and the fishermen who rely on the oceans for their livelihoods.

Additionally, the type of seismic airgun testing used to search for oil and gas in incredibly harmful and could injure or possibly kill thousands of marine mammals and fish, including the critically endangered North Atlantic right whale. Seismic airguns fire intense blasts of compressed air – almost as loud as explosives – every 10-12 seconds, 24 hours a day, for days to weeks on end. These loud airgun blasts can be heard for many hundreds of miles in the ocean and can drive whales to abandon their habitats, go silent, and cease foraging over vast areas. At shorter distances, airguns cause permanent hearing loss, injury, and even death for whales, dolphins and fish.

Proposed seismic airgun testing will result in serious negative impacts to our marine resources that form the foundation of economic vitality for communities all along the Atlantic coast. We urge your administration to stop this process and focus on ensuring the vitality of vulnerable coastal economies along the Atlantic Coast. We cannot continue to put our ocean environment, beaches, and marine resources and coastal communities at risk.

Most sincerely yours,

Joseph P. Riley, Jr.
Mayor, City of Charleston

JPR,jr/mp

P.O. Box 652 Charleston, South Carolina 29402
843-577-6970 Fax 843-720-3827

Exhibit B

The Cornell Lab of Ornithology
Bioacoustics Research Program

Duke Nicholas School of the Environment
Duke University Marine Lab

New England Aquarium
Protecting the blue planet

March 5, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

Dear Mr. President:

On behalf of 75 marine scientists, we are writing to convey the attached letter of concern over the introduction of seismic oil and gas surveys off the U.S. east coast. The letter is signed by colleagues representing such institutions as Cornell, Duke, the New England Aquarium, Stanford, the University of North Carolina, and Woods Hole Oceanographic Institution, and includes leading experts in marine biology and bioacoustics.

Last July, the Interior Department issued a "framework" for opening its mid- and southeast Atlantic regions to high-energy seismic airgun surveys. As the letter states, however, we believe that the Department has substantially underestimated the impact of this disruptive activity on marine life and has prescribed mitigation that is inadequate to address its significant cumulative effects.

Fundamentally, the ocean is a world of sound. Whales, fish, and other marine species have evolved to use sound as their primary sense, for foraging, breeding and other activities essential to their survival. The high-volume airgun arrays used by the seismic industry are known to disrupt these vital behaviors in a wide range of marine species on extraordinarily large spatial scales.

It is our expert assessment that the activity proposed by the Interior Department "is likely to have significant, long-lasting, and widespread impacts on the reproduction and survival of fish and marine mammal populations in the region." On behalf of ourselves and our colleagues, we therefore respectfully urge you to reconsider the Interior Department's analysis. To proceed otherwise, as the letter states, "is simply not sustainable."

Very truly yours,

Christopher Clark, Ph.D.
Senior Scientist
Bioacoustics Research Program
Cornell University

Scott Kraus, Ph.D.
Vice President of Research
John H. Prescott Marine Laboratory
New England Aquarium

Doug Nowacek, Ph.D.
Repass-Rodgers Chair of Marine
Conservation Technology
Nicholas School of the Environment
and Pratt School of Engineering
Duke University

Andrew J. Read, Ph.D.
Stephen Toth Professor of Marine Biology
Division of Marine Science and
Conservation
Nicholas School of the Environment
Duke University

Aaron Rice, Ph.D.
Science Director
Bioacoustics Research Program
Cornell University

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,

Christopher Clark, Ph.D.
Senior Scientist
Bioacoustics Research Program
Cornell University

Scott Kraus, Ph.D.
Vice President of Research
John H. Prescott Marine Laboratory
New England Aquarium

Doug Nowacek, Ph.D.
Repass-Rodgers Chair of Marine Conservation Technology
Nicholas School of the Environment & Pratt School of Engineering
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EXHIBIT E

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 404-521-9900 | THE CANDLER BUILDING
127 PEACHTREE STREET NE, SUITE 605
ATLANTA, GA 30303-1840 | Facsimile 404-521-9909

March 26, 2015

VIA E-MAIL AND U.S. CERTIFIED MAIL
Ms. Kelie Moore, Federal Consistency Coordinator
Georgia Department of Natural Resources
One Conservation Way
Brunswick, GA 31520
Kelie.Moore@GaDNR.org

Re: Proposed Consistency Certification for Spectrum Geo Inc.'s and GX Technology's Atlantic 2D Geophysical Surveys; BOEM Applications E14-006 and E14-003

Dear Ms. Moore:

The Southern Environmental Law Center ("SELC") submits these comments on behalf of One Hundred Miles, Center for a Sustainable Coast, Altamaha Riverkeeper, Satilla Riverkeeper, Ogeechee Riverkeeper, The Georgia Conservancy, The Initiative to Protect Jekyll Island, GreenLaw, St. Marys EarthKeepers, Inc., The Dolphin Project, Defenders of Wildlife, and Natural Resources Defense Council on the proposals by Spectrum Geo Inc. ("Spectrum") and GX Technology ("GXT") to collect two-dimensional ("2D") geophysical seismic data offshore of Georgia. We are profoundly concerned about Spectrum's and GXT's (collectively, "the Companies") intentions to conduct high-intensity seismic surveys off of Georgia's coast, not only because of the potentially catastrophic impacts of offshore oil drilling, but also because of the significant environmental harms presented by seismic exploration itself.

To protect Georgia's coastal resources and ensure compliance with the State's coastal management plan, we request that the Georgia Coastal Resources Division ("CRD") object and find that the Companies' applications are inconsistent with the enforceable policies of the State's coastal management plan because:

(1) The Companies' proposals would result in unacceptable levels of harm to marine mammals, including the highly endangered North Atlantic right whale and its only known calving grounds, found in waters off Georgia's coast;

(2) The Companies' proposals would result in unacceptable levels of harm to sea turtles and other endangered species found in Georgia and their habitats; and

(3) The Companies' proposals would result in adverse impacts to Georgia's fisheries and fish habitat.

In addition, or alternatively, we request that CRD object to Spectrum's and GXT's findings of consistency on the basis of a lack of information. The Companies failed to address cumulative impacts of seismic testing on Georgia's coastal resources, and they failed to provide adequate information related to the significant impacts of the proposed activities on Georgia's marine mammals and habitat.

I. Legal and Factual Background

BOEM received applications from the Companies to conduct geological and geophysical exploration activities off of Georgia. CRD requested an opportunity to review the Companies' activities for consistency with the enforceable policies of the State's coastal management plan.

A. The CZMA and Georgia's Coastal Management Program and Policies

The federal Coastal Zone Management Act of 1972 ("CZMA") was passed by Congress to "promote comprehensive and coordinated planning for coastal zone development and preservation between states and the federal government."[1] The CZMA articulates a number of policy objectives, including "to preserve, protect . . . and restore or enhance the resources of the Nation's coastal zone; [and] to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development."[2] Coastal states have "substantial and significant interests in the protection, management, and development" of resources in the exclusive economic zone that are best served by state involvement in plans that impact coastal resources and the development of state coastal management plans.[3] Under the CZMA, each coastal state may adopt a coastal zone management plan that provides for "the protection of natural resources, including wetlands, floodplains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone" and "management of coastal development to improve, safeguard, and restore the quality of coastal waters, and to protect natural resources and existing uses of those waters," among other objectives.[4]

The Georgia Coastal Management Program was adopted in 1997 and was created by the Georgia Coastal Management Act.[5] The stated mission of the Georgia Coastal Management Program is "to balance economic development in Georgia's coastal zone with preservation of natural, environmental, historic, archaeological, and recreational resources for the benefit of Georgia's present and future generations."[6] The goals of the Program include the "[d]evelop[ment] and implement[ation] [of] a management program that balances sustainable

[1] *Conservation Law Found. v. Watt*, 560 F. Supp. 561, 574 (D. Mass. 1983) *aff'd sub nom. Com. of Mass. v. Watt*, 716 F.2d 946 (1st Cir. 1983).
[2] 16 U.S.C. § 1452 (1)-(2).
[3] *Id.* at § 1451.
[4] *Id.* at § 1452 (2)(a)-(b).
[5] O.C.G.A. § 12-5-320.
[6] State of Georgia Coastal Management Program and Program Document. 2003. Prepared by the National Oceanic and Atmospheric Administration and the Georgia Department of Natural Resources Coastal Resources Division. p.2.

economic development and natural resource conservation in coastal Georgia,"[7] and "protect[ing] and, where possible, restor[ing] or enhance[ing] the resources of the State's coastal area for this and succeeding generations."[8] With respect to wildlife and fisheries, the Georgia Coastal Management Program seeks to "[p]rovide a coastal zone with finfish, crustaceans, and shellfish populations that will support commercial and sport fisheries on a sustainable basis" and "provide a coastal zone in which wildlife species listed as special concern, threatened, or endangered are recovered to healthy, viable populations."[9]

Through the consistency process, a state has the authority to ensure protection of its resources. Any federal activity proposed within or outside of a state's 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."[10]

Georgia has several enforceable policies applicable to this project, including the Georgia Coastal Management Act, Ga. Code Ann. § 12-5-320 *et seq.*, the Endangered Wildlife Act, *id.* § 27-3-130, and the Game and Fish Code, *id.* § 27-1-1.[11] The Georgia Coastal Management Act intends to provide broad protection to all coastal species and areas. In enacting this statute, the legislature declared that

> the coastal area of Georgia comprises a vital natural resource system; . . . the coastal area of Georgia is the habitat of many species of marine life and wildlife which must have clean waters and suitable habitat to survive; . . . the coastal area provides a natural recreation resource which has become vitally linked to the economy of Georgia's coast and to that of the entire state; that resources within this coastal area are costly, if not impossible, to reconstruct or rehabilitate once adversely affected by human related activities . . . ; [and] that activities and structures in the coastal area must be regulated to ensure that the values and functions of coastal waters and natural habitats are not impaired and to fulfill the responsibilities of each generation as public trustees of the coastal waters and habitats for succeeding generations.[12]

The Endangered Wildlife Act prohibits "[a]ny activities which are intended to harass, capture, kill, or otherwise directly cause death of any protected animal species."[13] The

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[7] *Id.* at 31.
[8] *Id.* at 32.
[9] *Id.* at 34.
[10] 16 U.S.C. § 1456 (c)(1)(A).
[11] *See* CRD Notice at 1 (explaining the enforceable policies relevant to this project). Georgia requested to review all pending seismic applications for consistency with, and potential impacts to, marine mammals protected by the State's Endangered Wildlife Act. *See* Ex. 1 (GA letter requesting review of marine mammal impacts). NOAA's Office of Coastal Resource Management ("OCM") appears to have denied Georgia and other states this review without explanation. *See* Ex. 2 (NOAA letter allowing review of only sea turtle and fisheries impacts). We believe OCM's actions are obfuscatory and illegal, as seismic exploration clearly has reasonably foreseeable impacts on marine mammals off of Georgia (and other Atlantic states)
[12] O.C.G.A. § 12-5-321.
[13] Ga. Comp. R. & Regs. r. 391-4-10-.06(a)(1).

"destruction of the habitat of any protected animal species on public lands is prohibited."[14] North Atlantic right whales, humpback whales, West Indian manatee, and several sea turtle species (loggerheads, leatherbacks, hawksbill, Green, and Kemp's ridley) are all protected by this Act.[15] The Game and Fish Code declares that "hunting and fishing and the taking of wildlife are a valued part of the cultural heritage of the State of Georgia," the custody of all fish and wildlife in the State is vested with the Georgia Department of Natural Resources for management and regulation, and such resources are to be managed for conservation and protection for future generations.[16]

B. Overview of Georgia's Coastal Resources

The coastal zone of Georgia is an ecologically rich area that supports resources of vital importance to all citizens of the state. Georgia's coastal area includes over 100-miles of sandy beaches, primarily located on the seaward side of the state's 14 barrier islands.[17] The waters off of Georgia's coast are home to many special habitats including Gray's Reef National Marine Sanctuary, one of the largest near-shore live-bottom reefs of the southeastern United States and one of only 14 designated National Marine Sanctuaries;[18] a large portion of a federally protected Habitat of Particular Concern for rare deepwater coral species and the fish that depend on them;[19] five coastal National Wildlife Refuges managed for diverse wildlife values by the U.S. Fish and Wildlife Service;[20] the world's only federally protected calving grounds for the critically endangered North Atlantic right whale;[21] and newly designated critical habitat, both nearshore and offshore, for loggerhead sea turtles.[22] A map of Georgia's unique coastal resources is attached as Exhibit 3.

Georgia's waters area also rich in species diversity. Resources include federally protected sea turtles, such as loggerheads; several species of federally protected marine mammals including highly endangered North Atlantic right whales, humpback whales, and manatees; and productive commercial and recreational fisheries. Georgia's waters are also home to estuarine, migratory, and offshore stocks of Bottlenose dolphin.

Georgia's natural resources are not only ecologically irreplaceable, they are also of vital economic importance. DNR estimates that Georgia's coastal tourism generates $2 billion in economic activity annually.[23] Commercial and recreational saltwater fisheries produce $500

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[14] *Id*. at 391-4-10-.06(a)(3).
[15] *See id*. at 391-4-10-.09(1), (3).
[16] Ga. Code Ann. § 27-1-3.
[17] Coastal Regional Commission of Georgia, Regional Important Resources Plan 49 (2012) at 130.
[18] Grays Reef National Marine Sanctuary, available at www.graysreef.noaa.gov.
[19] South Atlantic Fishery Management Council, Deepwater Coral HAPCs, *available at* http://www.safmc.net/managed-areas/deepwater-coral-hapcs (last visited March 17, 2015).
[20] These include the Savannah National Wildlife Refuge, the Harris Neck National Wildlife Refuge, the Wolf Island National Wildlife Refuge, the Wassaw National Wildlife Refuge, and the Blackbeard Island National Wildlife Refuge. Descriptions of each are available at http://www.fws.gov/refuges/refugeLocatorMaps/Georgia.html.
[21] http://www.fisheries.noaa.gov/pr/pdfs/criticalhabitat/n_rightwhale_se.pdf
[22] http://www.nmfs.noaa.gov/mediacenter/2014/07/08_07_loggerheadseaturtlehabitat.html
[23] Email from Spud Woodward, Director, Coastal Resources Division, Georgia Department of Natural Resources, to Bill Sapp, Senior Attorney, Southern Environmental Law Center (Feb. 17, 2015).

million in revenue annually for the state.[24] In 2012, the seafood industry (including commercial harvesters, seafood processors and dealers, importers, seafood wholesalers and distributors, and retail) generated 14,124 jobs, over $1.9 billion in sales, and over $435 million in income in Georgia.[25] In 2011, wildlife watchers (ages 16 and older, whose primary purpose was observing, photographing, or feeding wildlife), spent $1,802,425,000 ($1.8 billion) in Georgia on trip-related expenses and equipment.[26]

II. Discussion – Seismic Testing off of Georgia Will Adversely Impact the State's Valuable Resources and Such Testing is Inconsistent with Enforceable Policies of the State's Coastal Management Plan.

The Companies plan to conduct 2D seismic testing using seismic airgun arrays in the Atlantic Ocean off the coast of Georgia to gather geological and geophysical data for the development of offshore oil and gas resources. Airguns would be towed behind vessels and would release intense impulses of compressed air into the water once every 10-12 seconds. Surveys can be conducted 24 hours per day, 7 days per week and may go on for months on end. While CRD explains that Spectrum plans to conduct surveys between mid-April and mid-November in its public notice on the application, Spectrum is less clear in its February 2015 correspondence, explaining that "[t]he specific time of year the survey will occur is currently unknown as weather conditions and seasonal closures will impact specific survey logistics."[27] GXT plans to conduct its surveys from July through December of 2015.[28] Many of the waters planned for surveying are well inside the 50-mile buffer established by BOEM where no drilling for offshore oil will be allowed, resulting in truly unnecessary impacts.[29]

It is undisputed that sound is a fundamental element of the marine environment. Fish, whales, and other wildlife depend on it for breeding, feeding, navigating, and avoiding predators—in short, for their survival and reproduction—and the Companies' proposed surveys would dramatically degrade the acoustic environment along Georgia's coast. In fact, the noise impacts of seismic surveys are so severe that a group of 75 scientists from around the world recently sent a letter to the President of the United States to voice their concern that these surveys would result in "over 20 million seismic shots" in the Atlantic and "represent[] a significant threat to marine life throughout the region."[30] In their letter, the scientists describe likely impacts to marine mammals, sea turtles, and fish, and conclude that

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[24] *Id*.
[25] National Marine Fisheries Service, Fisheries Economics of the United States 2012, NOAA Technical Memorandum NMFS-F/SPO-137, at 105 (Feb. 2014), available at https://www.st.nmfs.noaa.gov/st5/publication/index.html.
[26] U.S. Fish & Wildlife Service, 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation—Georgia 3–4 (revised Feb. 2014), available at http://www.census.gov/prod/2013pubs/fhw11-ga.pdf.
[27] Spectrum Consistency Determination, Letter of February 11, 2015 to Kelie Moore (CRD) at 3. Moreover, Spectrum's application for a permit to conduct seismic testing to BOEM did not contain a similar time limitation for surveys in Georgia waters. *Id.* (stating survey start dates as November 2014 and end date as November 2015).
[28] GX Consistency Determination at 3.
[29] BOEM Map depicting 50-Mile Buffer, available at http://www.boem.gov/2017-2022-DPP-Lower-48-States-Program-Areas/ (last visited March 11, 2015). For example, Spectrum's entire survey proposes airgun surveys in waters from 3-30 miles offshore of Georgia's coast.
[30] Letter from Seventy-Five Scientists to President Obama (Mar. 5, 2015), attached as Exhibit 4.

> Our expert assessment is that the Department's premise [that seismic activities would only have a negligible impact on marine species and populations] 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.[31]

The concern with seismic surveys does not end with scientists. Coastal communities are deeply worried about the threats posed to their resources, and several have passed resolutions opposing offshore drilling and the use of seismic airguns to explore for oil and gas off the coast of Georgia.[32]

A. Seismic activity off of Georgia's coast will adversely and significantly impact the State's marine mammal populations and is therefore inconsistent with the State's Coastal Management Plan and Endangered Wildlife Act.

Thirty-four marine mammal species occur within the areas the Companies have proposed for surveying.[33] Two endangered whale species, the North Atlantic right whale and humpback whale, are also listed as endangered under the Georgia Endangered Wildlife Act and occur in Georgia state waters. As noted previously in footnote 11, Georgia requested to review all pending seismic applications for potential impacts to marine mammals protected by the State's Endangered Wildlife Act. NOAA's Office of Coastal Resource Management ("OCM") appears to have denied Georgia and other states this review without explanation. We believe OCM's actions are obfuscatory and illegal, as seismic exploration clearly has reasonably foreseeable impacts on marine mammals off of Georgia (and other Atlantic states). Furthermore, the Companies' failure to include information and a determination related to marine mammals has left Georgia with a lack of information to fully review these consistency certifications. In any event, we provide our comments on impacts to marine mammals in this letter because the state should not ignore impacts on these important resources protected by enforceable state policies.

The North Atlantic right whale is "the world's most critically endangered large whale species and one of the world's most endangered mammals."[34] Only 300 to 400 North Atlantic right whales remain, and, each fall, females return to the waters off Georgia and Florida to give birth to their calves before migrating north to their feeding grounds in the spring. As the species' only known calving grounds, the area offshore of southern Georgia and northern Florida is vital to the population. For this reason, the site has been designated as critical habitat pursuant to the federal Endangered Species Act, and regulations have been adopted in adjacent waters to protect

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[31] *Id.*

[32] To date, the communities of Tybee Island and St. Mary's Georgia have passed resolutions against seismic testing in Georgia waters. Other communities in Georgia are considering similar resolutions, and a huge number of communities bordering on the Atlantic areas where seismic testing is allowed have enacted such resolutions. *See* Oceana Coastal Resolution Toolkit, available at http://usa.oceana.org/seismic-airgun-testing/coastal-resolution-toolkit (last visited March 11, 2015).

[33] PEIS for Atlantic G&G at Table 4.4.

[34] *See* 73 Fed. Reg. 60,173 (Oct. 10, 2008).

right whales from their leading threats of fishing gear entanglement and ship collisions.[35] The National Marine Fisheries Service ("NMFS") has repeatedly stated "the loss of even a single individual [right whale] may contribute to the extinction of the species," and "preventing the mortality of one adult female a year" may alter this outcome.[36]

The distribution of humpback whales is more poorly understood. While some portion of the population overwinters in the Northeast and along the Mid-Atlantic coast (as far south as Virginia), another portion of the population migrates to the West Indies to mate and calve.[37] Migration routes are poorly understood, but humpback whales have been sighted in state and federal waters within 30km of the Georgia coast during winter and spring.[38] "It is unknown whether these whales are wayward migrants, winter residents, or both."[39]

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.[40] 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.[41] Similar responses, all occurring over enormous areas of ocean, have been seen in these and other baleen whale species in a variety of regions and across behavioral states, affecting foraging, breeding, and migration.[42] In 2012, seismic testing was stopped in certain areas of the Gulf of Mexico due to concerns over impacts to bottlenose dolphin calves and mother-calf bonding[43]

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[35] *See* 59 Fed. Reg. 28,793 (June 3, 1994); 73 Fed. Reg. at 60,187-89 (imposing seasonal speed limits for vessels in an area of the Southeast that expands beyond critical habitat boundaries); 72 Fed. Reg. 34,632, 34,636 (June 25, 2007) (imposing seasonal restrictions on gillnet fishing in a "substantial and core portion of the right whale calving area" that expands beyond critical habitat boundaries).

[36] 69 Fed. Reg. 30,857, 30,858 (June 1, 2004); *see also* 73 Fed. Reg. at 60,176 ("[T]he population can sustain no deaths or serious injuries due to human causes if its recovery is to be assured."); 66 Fed. Reg. 50,390, 50,392 (Oct. 3, 2001) ("[T]he loss of even one right whale, particularly a reproductively active female, may reduce appreciably the likelihood of the survival and recovery of this species.").

[37] Ex. 1, September 4, 2014 GA CRD Comment letter on SeaBird Exploration Americas Permit Number E14-002.

[38] *Id.*

[39] *Id.*

[40] *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).

[41] Clark, C.W., and Gagnon, G.C., *Considering the temporal and spatial scales of noise exposures from seismic surveys on baleen whales*, INTL WHALING COMM'N (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).

[42] *See, e.g.*, Blackwell, S.B., Nations, C.S., McDonald, T.L., Greene, Jr., C.R., Thode, A.M., Guerra, M., and Macrander, M., *Effects of airgun sounds on bowhead whale calling rates in the Alaskan Beaufort Sea*, MARINE MAMMAL SCIENCE 29(4): E342-E365 (2013); Castellote, M., Clark, C.W., and Lammers, M.O., *Acoustic and*

Similarly, airgun noise can 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.[44] 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.[45] According to recent modeling from Cornell University 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.[46] 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 Atlantic OCS Geological and Geophysical Programmatic Environmental Impact Statement ("PEIS"). 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.

The Companies' proposed survey areas overlap with right whale critical habitat off the coast of Georgia, as Spectrum has not definitively explained when it plans to conduct surveys in proximity to the calving grounds and GXT plans to survey during the calving season.[47] Given the enormous distances over which baleen whales are affected, the present time-area closures developed by BOEM and proposed by the Companies are plainly inadequate to protect right whales and other endangered baleen whales.[48] While the Record of Decision under the PEIS restricts the Companies' ability to conduct seismic testing in existing right whale critical

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*behavioural changes by fin whales (*Balaenoptera physalus*) in response to shipping and airgun noise*, BIOLOGICAL CONSERVATION 147: 115-122 (2012); Cerchio, S., Strindberg, S., Collins, T., Bennett, C., and Rosenbaum, H., *Seismic surveys negatively affect humpback whale singing activity off Northern Angola*, PLoS ONE 9(3): e86464. doi:10.1371/journal.pone.0086464 (2014).

[43] *See Lousiana Seismic Testing Stopped after Sick, Dead Dolphin Found*, THE HUFFINGON POST, April 2, 2012, available at http://www.huffingtonpost.com/2012/04/02/louisiana-seismic-testing-stopped_n_1397119.html.

[44] 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*, INTL WHALING COMM'N (2009) (IWC Sci. Comm. Doc. SC/61/E10).

[45] *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), www.okeanos-stiftung.org/okeanos/download.php?id=19.

[46] 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).

[47] *See* p.5, note 27.

[48] The Companies propose using protected species observers ("PSOs") and passive acoustic monitoring ("PAM") devices to monitor for marine mammals and sea turtles as mitigation measures. Seismic testing is expected to go on twenty-four hours per day, seven days per week during the testing period, during which time PSOs may not be on duty due to darkness or other conditions. During these times, only PAMs would be in use. Implementing only one method of observation does not account for the behavior changes caused by the airguns discussed above. As discussed above, one of the many negative impacts of seismic testing on marine mammals is that testing may discontinue vocalization, meaning PAMs could not detect the species. Unless the Companies commit to using PSOs and PAMs simultaneously, their efforts will be insufficient to mitigate impacts to marine mammals in the survey area.

habitat,[49] this does not go far enough. As CRD itself has stated in commenting on seismic applications, "the spatial extent of the proposed time-area closure is not sufficient for airgun surveys given the distance that airgun sound energy is predicted to travel."[50] In fact, CRD has recommended a 10-nautical-mile buffer around right whale time-area closures for all airgun surveys.[51] Yet the Companies' proposals do not contain such a buffer. This is critically important because "right whales are frequently observed east of the proposed time-[area closure] boundaries,"[52] and because, as mentioned earlier, airgun sound energy travels great distances.

The enforceable policies of the State's coastal management plan include important protections for endangered species and their habitat. Specifically, the plan provides that the coastal zone should "maintain[] diverse indigenous wildlife populations at viable and sustainable levels" and "provide a coastal zone in which wildlife species listed as special concern, threatened, or endangered are recovered to healthy viable populations."[53] Moreover, the Endangered Wildlife Act prohibits "[a]ny activities which are intended to harass, capture, kill, or otherwise directly cause death of any protected animal species."[54] The "destruction of the habitat of any protected animal species on public lands is prohibited."[55]

The impacts to marine mammals and their critical habitat from seismic testing are adverse and substantial, and are inconsistent with the enforceable policies of the State's coastal management plan. Likewise, there is no question that seismic testing will result in harassment of species protected by Georgia's Endangered Wildlife Act in violation of that act. For similar reasons, Georgia has previously objected to sonar training exercises occurring outside of the calving grounds conducted by the Navy.[56] In objecting to such training, Georgia explained that

> If sound is likely to propagate from the [Navy training] and into the right whale calving grounds, the potential for cumulative negative impacts on individual right whales and their habitat should be considered. Breeding females return to the waters off Georgia and northeast Florida [] every 3-5 years to calve. Immature right whales often return to the calving grounds each winter during the first few years of their lives. These individual whales may remain in waters off Georgia and Florida for extended periods (3-4 months). As such, the potential for cumulative impacts on individual whales should not be discounted.[57]

Similarly, here, CRD must consider the impacts to marine mammals and their critical habitat in making its consistency determination, should object to Spectrum's and GXT's

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[49] *See Record of Decision: Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement* 3 (2014), http://www.boem.gov/Record-of-Decision-Atlantic-G-G/.
[50] Ex. 1, GA CRD Comment Letter of September 4, 2014 on Seabird Exploration Permit at 4.
[51] *Id.*
[52] *Id.* (citing Gowan and Ortega-Ortiz 2014).
[53] Georgia Coastal Management Plan Document Part II, p. 34.
[54] Ga. Comp. R. & Regs. r. 391-4-10-.06(a)(1).
[55] *Id.* at 391-4-10-.06(a)(3).
[56] *See* GA DNR Objection to Navy's Proposed Consistency Determination for Undersea Warfare Training Range, October 27, 2008, attached as Ex.5.
[57] *Id.*

consistency certifications, and find this project inconsistent with the State's plan and enforceable policies.

B. Seismic activity off of Georgia's coast will adversely and significantly impact sea turtles and sea turtle critical habitat, and is therefore inconsistent with the State's Coastal Management Plan.

The Companies' proposed survey areas overlap with numerous populations of endangered species on Georgia's coast and offshore waters, including populations of and critical habitat for sea turtles. Georgia is home to many species of sea turtles, including the green turtle, hawksbill turtle, Kemp's ridley turtle, leatherback turtle, and loggerhead turtle.[58] In 2014, endangered sea turtles dug 1,205 nests on the Georgia coast, including 1,201 nests by loggerheads, 2 nests by green sea turtles, and 2 nests by leatherbacks.[59] Nesting activity on the Georgia coast began in early May and ended in mid-October.[60] While the last nest appeared in August, the last emergence of hatchlings in 2014 occurred in mid-October.[61]

Beaches in Camden, Chatham, Liberty, and McIntosh counties have been designated as critical nesting habitat for loggerheads, and those beaches represent over 80 percent of loggerhead nesting in Georgia based on nest monitoring data from 2006 to 2011.[62] Specifically, 69.3 miles of beaches on Little Tybee Island, Wassaw Island, Ossabaw Island, St. Catherine's Island, Blackbeard Island, Sapelo Island, Little Cumberland Island, and Cumberland Island have been designated as critical nesting habitat.[63] The National Marine Fisheries Service has also designated the waters surrounding these islands as critical nearshore reproductive habitat, and waters further offshore of Georgia as critical Sargassum habitat.[64]

The United States and Oman represent the majority of nesting sites for loggerhead sea turtles worldwide;[65] limiting anthropogenic disturbances to these nesting locations is paramount for the global conservation of this species. As BOEM observed in the PEIS, ". . . breeding adults, nesting adult females, and hatchlings could be 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."[66] The recovery

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[58] *Endangered and Threatened Species of Georgia,* U.S. FISH AND WILDLIFE SVC, http://www.fws.gov/athens/endangered/teherps.html (last visited March 17, 2015).
[59] http://www.seaturtle.org/nestdb/index.shtml?view=3&year=2014
[60] *Id*.
[61] *Id.*
[62] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle,79 Fed. Reg. 39,756¬¬, 39,757, 39,764 (Jul. 10, 2014) (codified at 50 C.F.R. 17.95(c)).
[63] *Id*. at 39783, Table 1.
[64] 50 C.F.R. section 226.223(a)(10)-(13).
[65] *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle* (Caretta caretta) Second Revision (2008), U.S. FISH AND WILDLIFE SVC AND NAT'L MARINE FISHERIES SVC. I-2 (Dec. 2008), www.nmfs.noaa.gov/pr/pdfs/recovery/turtle_loggerhead_atlantic.pdf [hereinafter *Recovery Plan*].
[66] *PEIS*, *supra* note 44, at 2-24. It is important to note that in Appendix I to the PEIS, BOEM acknowledges that there is insufficient data and information about the impacts of sound on sea turtles to fully understand the potential risks of seismic surveying, and that more research is necessary in order to develop appropriate noise exposure criteria to reduce the risk of injury or death. The lack of information about potential adverse impacts demonstrates

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.[67] And recent analysis of sea turtle hearing confirms that loggerheads and other sea turtles have their greatest acoustic sensitivity below 400 Hz, which is where much of the energy produced by airguns is concentrated.[68] Given these findings, along with the global significance of the region for loggerheads, all important habitats for endangered and threatened sea turtles within the Companies' proposed survey area should be avoided.

We are deeply concerned that the Companies' proposal[69] contemplates time-area closures only for Brevard County, Florida, ignoring the fact that beaches along the Georgia coast, among others, provide important habitat for nesting sea turtles. Loggerhead sea turtles received extensive critical habitat protection along the beaches and off the coast of Georgia in 2014, yet this fact appears to have been largely ignored.[70]

Long-term datasets show nesting declines for loggerheads in North Carolina, South Carolina, Georgia, and southeast Florida.[71] Nesting sea turtles and hatchlings could be disturbed or injured by seismic surveying in any of these locations through an increase in vessel traffic, accidental oil discharges, and noise propagation from the use of airguns.[72] For these reasons, all near-coastal waters from Florida through North Carolina from May 1 through October 31 should be excluded from seismic airgun activity to protect both nesting sea turtles and hatchlings. It is unclear why the Companies will implement time-area closures "to avoid disturbing the large numbers of loggerhead turtles (and hatchlings) that are likely to be present in nearshore waters of Brevard County during turtle nesting and hatchling season,"[73] but will not also afford similar protection to sea turtles in other areas, including the nesting areas along the Georgia coast. Additionally, large areas of designated critical habitat, including important "foraging habitat, internesting (between nest-laying events) habitat, breeding habitat, overwintering habitat, and migratory habitat for adult loggerheads," overlap with the Companies' proposed survey area.[74]

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the need to proceed with caution and implement mitigation measures that will be overly protective in order to avoid harm to sea turtles.

[67] *Recovery Plan*, *supra* note 59, at I-52 ("Petroleum seismographic cannons produce intense noise at both high and low frequencies and have the potential to harm sea turtles.").

[68] 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); *see also* Scientist Letter, Ex. 4, explaining that "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."

[69] Only Spectrum mentions this time area closure. GX does not reference any time area closures.

[70] Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle, 79 Fed. Reg. 39756, 38756 (July 10, 2014). It is important to note that the U.S. Fish and Wildlife Service designated additional habitat for the loggerhead sea turtle after the BOEM completed the final PEIS for geophysical and geographic activities in the Atlantic OCS.

[71] *Loggerhead Sea Turtle* (Caretta caretta), NAT'L MARINE FISHERIES SVC, *available at* http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed May 2012).

[72] *PEIS*, *supra* note 44, at 4-91-96.

[73] Spectrum Application, at 9; GXT Application at 4 (indicating that GXT would observe established time-area closures required by the PEIS but only discussing marine mammal mitigation).

[74] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle (Caretta caretta), 78 Fed. Reg. 18,000, 18,004 (March 25, 2013).

Mitigation measures should be developed and implemented to ensure that effects to sea turtles in these areas are also minimized.

In sum, seismic surveying will have significant impacts on sea turtles, rendering the Companies' proposal inconsistent with the Georgia coastal management plan. At the very least, time-area closures should be expanded to include important nesting habitat, as well as foraging and migrating habitat, in order to ensure that endangered and threatened sea turtle populations are adequately protected from the harmful impacts of seismic surveying.

The enforceable policies of the State's coastal management plan include important protections for endangered species and their habitat. Specifically, the plan provides that the coastal zone should "maintain[] diverse indigenous wildlife populations at viable and sustainable levels" and "provide a coastal zone in which wildlife species listed as special concern, threatened, or endangered are recovered to healthy viable populations."[75] Moreover, as mentioned previously, the Endangered Wildlife Act prohibits "[a]ny activities which are intended to harass, capture, kill, or otherwise directly cause death of any protected animal species."[76] The "destruction of the habitat of any protected animal species on public lands is prohibited."[77] The impacts to sea turtles and their critical habitat—both nearshore and offshore—from seismic testing are adverse and substantial and are inconsistent with the enforceable policies of the State's coastal management plan. CRD should object to Spectrum's and GXT's consistency determinations and find this project inconsistent with the State's plan and enforceable policies.

C. Seismic activity off of Georgia's coast will adversely and significantly impact the State's fisheries and fish habitat and is therefore inconsistent with the State's Coastal Management Plan.

Seismic surveying off Georgia would place the fish and fisheries off the coast at significant risk, thus jeopardizing a substantial component of Georgia's economy. As explained above, the value of commercial and recreational saltwater fisheries in the state of Georgia is $500 million.[78] In 2012, the seafood industry (including commercial harvesters, seafood processors and dealers, importers, seafood wholesalers and distributors, and retail) generated 14,124 jobs, over $1.9 billion in sales, and over $435 million in income in Georgia.[79]

The South Atlantic OCS contains many areas that have been designated Essential Fish Habitat ("EFH") and/or Habitat Areas of Particular Concern ("HAPC") under the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801 *et seq*. The South Atlantic Fishery Management Council has designated EFHs for shrimp, red drum, snapper grouper, spiny lobster, rock shrimp, coastal migratory pelagic, golden crab, spiny lobster,

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[75] Georgia Coastal Management Plan Document Part II, p. 34.
[76] Ga. Comp. R. & Regs. r. 391-4-10-.06(a)(1).
[77] *Id*. at 391-4-10-.06(a)(3).
[78] *See supra*, note 24.
[79] National Marine Fisheries Service, Fisheries Economics of the United States 2012, NOAA Technical Memorandum NMFS-F/SPO-137, at 105 (Feb. 2014), available at https://www.st.nmfs.noaa.gov/st5/publication/index.html.

dolphin wahoo, royal red shrimp, cobia, and dolphin,[80] and HAPC for shrimp, *Sargassum*, red drum, snapper grouper complex, spiny lobster, coastal migratory pelagic, coral, and dolphin wahoo.[81]

Additionally, the South Atlantic Fishery Management Council has established eight deepwater Marine Protected Areas (MPAs) in the South Atlantic region, off the coast of the Carolinas and Georgia, to protect a portion of the long-lived, "deepwater" snapper grouper species such as snowy grouper, speckled hind, and blueline tilefish.[82] Among the MPAs is the Georgia MPA, a mud-bottom habitat in waters 295 to 984 feet deep designed to protect species such as snowy grouper and golden tilefish. This area is occasionally fished commercially for snapper grouper species but lies east of an area called the "Triple Ledge" that is an important area for commercial fishermen.[83]

Despite the Companies' assertions that the proposed activities would have minimal impacts on fisheries, the reality is that seismic surveys would have significant negative consequences for both commercial and recreational fishing industries. 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,[84] 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.[85] Even brief playbacks of predominantly low-frequency noise from speedboats have been shown to significantly impair the ability of some fish species to forage.[86] Recent data suggest that loud, low-frequency sound also disrupts chorusing in black drum fish, a behavior essential to breeding in this commercial species.[87] Several studies indicate that airgun noise can kill or decrease the viability of fish eggs

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[80] S. Atlantic Fishery Mgmt. Council, South Atlantic Fishery Management Council's EFH Designations, http://www.safmc.net/Portals/0/EFH/EFH%20Table.pdf.

[81] S. Atlantic Fishery Mgmt. Council, Essential Fish Habitat-Habitat Areas of Particular Concern and Coral Habitat Areas of Particular Concern, http://www.safmc.net/Portals/0/EFH/EFH-HAPC%20Table.pdf.

[82] *See* S. Atlantic Fishery Mgmt. Council, Marine Protected Areas, http://www.safmc.net/managed-areas/marine-protected-areas. A Marine Protected Area (MPA), as defined in Presidential Executive Order 13158 in 2000, is any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. *Id.*

[83] *Id.*

[84] 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).

[85] 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).

[86] 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).

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

and larvae.[88] BOEM acknowledged in the PEIS that airguns may result in changes to "behavioral responses, masking of biologically important sounds, temporary hearing loss, and physiological effects."[89]

The Companies themselves concede that seismic testing will have physiological and behavioral impacts on fish and may create user conflicts with commercial and recreational fishermen.[90] Disturbances in designated habitat areas, including EFHs, EFH-HAPCs, and MPAs could affect local fish abundance by deterring foraging, refuge, and spawning activities in preferred habitat areas.[91]

The impact of seismic testing on the State's fisheries extends beyond physical damage to the fish and fish habitat. Spectrum and GXT survey vessels have the potential to disrupt recreational and commercial fishing operations and diving operations that occur in offshore waters. The PEIS suggests that seismic testing activity will interrupt commercial fishing activities by damaging bottom founded fishing gear and interfering with other settling fishing gear,[92] and may require recreational fishermen to divert themselves away from a preferred fishing location.[93]

The Companies' proposed activities are in direct conflict with the enforceable policies of the Georgia Coastal Management Plan, including the Plan's objective of providing a "coastal zone with finfish, crustaceans, and shellfish populations that will support commercial and sport fisheries on a sustainable level."[94] The Companies' proposal is also inconsistent with Georgia's Game and Fish Code, which is designed to preserve the fishery resources for public use as "a valued part of the cultural heritage of the State of Georgia."[95] CRD should object to Spectrum's and GXT's consistency determinations and find the Companies' proposals to be inconsistent with the State's Coastal Management Plan and enforceable policies.

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[88] 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).

[89] *Atlantic OCS Proposed Geological & Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement*, BUREAU OF OCEAN AND ENERGY MGMT xix (April 2014), available at http://www.boem.gov/Atlantic-G-G-PEIS/#Final PEIS.

[90] *See, e.g.,* Spectrum Georgia Consistency Determination at 16-17.

[91] *See id.* at 16; Appendix J of PEIS (citing studies).

[92] *PEIS* at 2-31.

[93] *Id.* at xvii-xviii.

[94] Georgia Coastal Management Plan at Part II, p. 34.

[95] O.C.G.A. 27-1-3(a); *see also id.* at (b) ("Wildlife is held in trust by the state for the benefit of its citizens and shall not be reduced to private ownership except as specifically provided for in this title. All wildlife of the State of Georgia is declared to be within the custody of the department for purposes of management and regulation in accordance with this title.")

D. The Companies Fail to Address Long-Range, Cumulative Impacts of Seismic Testing.

Importantly, the Companies failed to address cumulative impacts of seismic testing on Georgia's coastal resources. In fact, the Companies' applications provide minimal information regarding impacts to marine wildlife and habitat. BOEM is currently considering nine applications to conduct seismic testing in the Atlantic Ocean with largely overlapping survey areas.[96] While CRD has received only four certifications for consistency to date, the remaining applications to BOEM will go through the consistency process if they move forward. As noted in detail above, the impact of one seismic survey is substantial. Indeed, the cumulative impact of nine seismic surveys on marine and coastal resources of the State will put marine life and coastal resources at great risk. All applicants must evaluate the full scope of the impact of seismic testing off of Georgia's coast, including the cumulative impact of seismic survey activity by all applicant companies, in their certifications for consistency with the State's coastal management plan. Neither Spectrum nor GXT provided adequate information regarding impacts of seismic activities, including cumulative impacts.

CRD should object on the basis of lack of information and request this analysis before making a final decision regarding the Companies' consistency certifications. Moreover, CRD should consider the cumulative impacts of nearby Navy training, including exercises conducted pursuant to Atlantic Fleet Active Sonar Training and on the Undersea Warfare Training Range. As CRD has acknowledged repeatedly in commenting on Navy proposals in the past, "the potential for cumulative negative impacts on individual right whales and their habitat should be considered,"[97] which also supports finding these projects to be inconsistent with Georgia's Coastal Management Plan.

III. Conclusion

We respectfully request that CRD exercise its discretion to hold a public hearing on the Companies' proposals. Before any consistency determination is made, a public hearing on this proposal should be held. Seismic surveys are controversial, impact numerous stakeholders, and are highly technical in nature; members of the public must have a sufficient opportunity to fully understand and weigh in on this proposal's potential impacts to ecologically and economically significant resources.

Seismic testing is the first step toward the development of offshore oil resources. The impacts of offshore drilling in deep water on fish, endangered species, marine mammals, and wildlife habitat are well documented. SELC is strongly opposed to the exploration and development of offshore oil and gas off Georgia's coast because of the substantial risks oil and gas exploration and development pose to the State's valuable coastal resources and the coastal way of life.

Spectrum's and GXT's proposed activities do not comply with the enforceable policies of Georgia's Coastal Management Program and will not be conducted in a manner consistent with

[96] *Currently Submitted Atlantic OCS Region Permits*, BUREAU OF OCEAN AND ENERGY MGMT., http://www.boem.gov/Currently-submitted-Atlantic-OCS-Region-Permits/ (last visited Feb. 25, 2015).
[97] *See* Ex. 5 at 2.

the State's program. We respectfully request that the CRD object to the certifications issued by Spectrum and GXT for seismic testing off Georgia's coast. Georgia's coast is home to a rich diversity of natural resources and a biologically diverse ecosystem, including valuable fish species, marine mammals, and endangered species and essential habitat for these species. These natural resources are an essential part of the State's coastal economy and our State's coastal heritage, and cannot be put at risk.

Thank you for your consideration of these comments.

Sincerely,

Catherine M. Wannamaker
Senior Attorney
Southern Environmental Law Center

Exhibit 1

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
COASTAL RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

A.G. 'SPUD' WOODWARD
DIRECTOR

September 4, 2014

Ms. Margaret Davidson, Acting Director
Office of Ocean and Coastal Resource Management
National Oceanic and Atmospheric Administration
1305 East-West Highway (N/ORM3)
Silver Spring, Maryland 20910-3281

Mr. Mathew Padon
Seabird Exploration Americas, Inc.
820 Gessner Suite #1275
Houston, Texas 77024

Brian J. Cameron, Jr.
Bureau of Ocean Energy Management
1201 Elmwood Park Blvd., GM 623 E
New Orleans, LA 70123

RE: Notification of Request to Review BOEM G&G Application, SeaBird Exploration Americas, Inc. Permit Number E14-002, Atlantic OCS Region, for Consistency with Georgia's Coastal Management Program Under the Coastal Zone Management Act

Dear Ms. Davidson, Mr. Padon, and Mr. Cameron:

Staff of the Georgia Coastal Management Program (GCMP) is in receipt of an Application for Permit to Conduct Geological or Geophysical Exploration for Mineral Resources or Scientific Research on the Outer Continental Shelf submitted to the Bureau of Ocean Energy Management (BOEM) by SeaBird Exploration Americas, Inc. The application describes the proposed activity as geophysical exploration for mineral resources to be conducted in the South Atlantic Planning Area with a single source air gun array long offset single streamer (10,000') acquiring 2D Seismic, Gravity, Magnetics and Ecosounder data without the use of explosive charges. The applicant states that marine mammal observers and PAM will be utilized continually throughout the program, no bottom disturbances are proposed, soft starts will be employed, and chase vessels will guide shipping and fishing around the program as needed.

Geological and geophysical activities permitted by BOEM through the Outer Continental Shelf Lands Act (43 U.S.C. 1334 *et seq.*) adjacent to State waters are not Listed Activities of the GCMP but have reasonably foreseeable effects to Georgia's coastal uses and/or resources. Georgia requests that the NOAA/OCRM Director (the Director) approve this request to review the above referenced unlisted activity for consistency with GCMP.

GEORGIA COASTAL RESOURCES AND USES:

MARINE MAMMALS:

Thirty-four marine mammal species occur within the SeaBird Exploration Americas Permit Number E14-002 proposed survey activity area, including six whale species that are listed as endangered under the Endangered Species Act (PEIS Table 4.4). Two endangered whale species, the North Atlantic right whale (*Eubalaena glacialis*) and humpback whale (*Megaptera novaeangliae*), are also listed as endangered under the GCMP enforceable policy Georgia Endangered Wildlife Act (O.C.G.A §27-3-130) and occur in Georgia state waters.

North Atlantic Right Whales

North Atlantic right whales are among the most endangered whale species, with a population numbering as few as 455 whales (Waring et al. 2014). Waters along the Southeast U.S. coast are the primary wintering grounds and only known calving grounds for the species. Protection of the whales and their calving habitat is critical to the species' recovery. Spatially, right whales inhabit waters from the Southeast U.S. shoreline to approximately 30 nautical miles (nmi) from shore (Keller et al. 2012, Gowan and Ortega-Ortiz 2014). Little survey effort has been conducted beyond 30 nmi, so the extent to which right whales occur in deeper waters along the continental shelf and waters east of the shelf break is unknown. Temporally, right whale are present along the South Carolina and northern Georgia coast from November 1 to April 30 annually, and along the southern Georgia and Florida coast from November 15 to April 15. Right whales have been documented along the North Carolina coast during winter (McLellan et al. 2004), but the spatiotemporal distribution off North Carolina and the Mid-Atlantic coast is not well understood (Schick et al. 2009). Re-sightings of individual right whales along the South east coast show that right whales may reside in Southeast U.S. waters for weeks or months at a time, and pass across state and federal boundaries (GADNR and Florida Fish and Wildlife Conservation Commission, *unpublished data*). Vessel collisions and entanglement in fishing gear are the primary causes of right whale mortality. Other threats include habitat degradation, anthropogenic sound sources, contaminants and climate change (Waring et al. 2014).

Humpback Whales

Approximately 11,500 humpback whales inhabit waters throughout the North Atlantic Ocean (Waring et al. 2014). These whales spend the summer months foraging in waters throughout the North Atlantic from Norway to the Gulf of Maine. Each winter a portion of the population migrates south to the West Indies to mate and calve. Other humpbacks overwinter along the Northeast and Mid-Atlantic coast, as far south as Virginia (Swingle et al. 1993, Barco et al. 2002). Migration routes are poorly understood, so the spatiotemporal distribution of humpback whales throughout the G&G area of interest is not known. Small numbers of humpback whales, primarily juveniles, have been sighted in state and federal waters within 30 km of the Georgia and northeast Florida coast during winter and spring (GADNR and FFWCC, *unpublished data*). It is unknown whether these whales are wayward migrants, winter residents, or both. In either case, individual humpback whales have been re-sighted in the Southeast U.S. over periods of weeks, in federal and in state waters (GADNR and FFWCC, *unpublished* data). Vessel collisions, fisheries entanglements and habitat degradation are the

primary impacts to humpback whales in the North Atlantic Ocean. Other threats include habitat degradation, anthropogenic sound sources and contaminants (Waring et al. 2014).

SEA TURTLES:
Sea turtles are found in Georgia's coastal waters year round. The species composition and abundance of sea turtles varies seasonally based on water temperature and migratory patterns. The shallow continental shelf waters off the Georgia coast are important developmental foraging habitat for juvenile loggerhead, Kemp's Ridley and green sea turtles. Juvenile sea turtles are less abundant in winter when they move offshore to warmer waters near the edge of the Gulf Stream. Leatherback turtles are found in Georgia's coastal waters during the winter months foraging on jellyfish. Leatherback densities increase in the spring (April-May) as they migrate along our coast on their way to feed in the north Atlantic during the summer. During the nesting season (April through August), loggerhead nesting females are concentrated within 10 miles of shore. Loggerheads nest an average of 4.5 times per season on a 9-13 day cycle. Loggerhead turtles remain relatively inactive during the inter-nesting period while they prepare for each nesting cycle (ovulate and shell eggs, return to nesting beach).

MARINE AND ANADROMOUS FISHES:
There are over 130 federally/regional/state managed fish and sharks species that occur within the SeaBird Exploration Americas Permit Number E14-002 proposed survey activity area, including four species with at least a portion of their population protected under the Endangered Species Act.

Shortnose Sturgeon
The Shortnose Sturgeon, (*Acipenser brevirostrum)* occur in nearly every major river system along the U.S. eastern seaboard and ranges from the St. John River (New Brunswick) in Canada to the St. Johns River (Florida) in Florida. It was exploited throughout its range until the 1950's and has been listed as endangered thoughout its range since March 11, 1967. Shortnose inhabit slow moving riverine waters or nearshore marine waters, and migrating periodically into faster moving fresh water areas to spawn. In Georgia, they have been documented in Altamaha, Ogeechee, and Savannah Rivers. Threats include construction of dams resulting in loss of suitable habitat, pollution of northeastern river systems, habitat alterations from discharges, dredging or disposal of material into rivers, and related development activities involving estuarine/ riverine mudflats and marshes .

Atlantic Sturgeon
The Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)* is a long-lived (60 years), estuarine dependent, anadromous species. Adults spawn in freshwater in the spring and early summer and spend most of their lives in estuarine and marine waters, at depths of 10-50 m, on gravel and sand substrates. Atlantic sturgeon were historically present in 38 U.S. rivers from St. Croix, ME to the Saint Johns River, FL. Presently the species is present in 32 of these rivers, and spawning in 20 of them. The Altamaha River (GA) has one of the healthiest and most stable populations on the East Coast. Overfishing from the 1950's through 1990's have reduced the populations of this long-lived species, resulting in a harvest moratorium in 1998, and a ESA

listing of endangered for all distinct population segments (DPS), including the South Atlantic, by 2012. Encounter rates of Atlantic Sturgeon from coastal fishery monitoring surveys continues to increase annually. GADNR's Ecological Monitoring Trawl Survey regularly captures sub-adults during routine offshore sampling (0 – 6 nm) during the winter months (December to March).

Scalloped Hammerhead Shark

The Scalloped Hammerhead is a large coastal pelagic predator with global distribution. It ranges in depths from those regularly found in estuaries (2-10 m) to those common at seamounts (> 1000 m). The species has six distinct population segments (DPS's). The Eastern Altantic DPS is listed as endangered while the Central and Southwest Atlantic DPS is threatened. Presently there Northwest Atlantic and Gulf of Mexico DPS (area associated with SeaBird Exploration Americas Permit Number E14-002 proposed survey activity), has no protection under ESA. GA DNR Staff have recently secured a research grant to examine the distribution, prevalence, and abundance of scalloped hammerheads in Georgia's estuarine and coastal waters.

Smalltooth Sawfish

The smalltooth sawfish (*Pristis pectinata)* occurs within the proposed SeaBird Exploration Americas Permit Number E14-002proposed survey activity area. However, its U.S. range and critical habitat is limited to the southern tip of Florida with no impact in Georgia's state and adjacent offshore waters.

REASONABLY FORESEEABLE EFFECTS AND G&G PEIS ALTERNATIVE B MITIGATION MEASURES:

MARINE MAMMALS:

SeaBird Exploration Americas Permit Number E14-002 proposed activities with the potential to impact Georgia protected marine mammal resources include: 1) harassment and injury from active acoustic sound sources, 2) harassment from vessel, aircraft and equipment noise, and 3) mortality, injury or harassment from vessel traffic. BOEM G&G PEIS Alternative B implements vessel speed restriction, time-area closures and spatial segregation of seismic airgun surveys to mitigate potential impacts to marine mammal resources. GCMP supports these measures. However, expansion of these measures, and additional measures, are needed to mitigate the immediate and cumulative impacts of TGS's proposed activities.

Surveys Using Airguns

We commend BOEM for expanding time-area closure under Alternative B to protect North Atlantic right whales. Spatiotemporal separation of right whales and G&G activities is the simplest and most effective way to mitigate impacts to right whales and their habitat. This approach will also protect humpback whales in Southeast U.S. waters during winter and early spring. However, the spatial extent of the proposed time-area closure is not sufficient for airgun surveys given the distance that airgun sound energy is predicted to travel (2.8-8.3 nmi at levels up to 160 re 1 µPa; PEIS, Table 2-6). BOEM appears to recognize this problem and necessitates that airgun surveys "would be required to remain at a distance such that received levels at [the time-closure area closure boundary] do not exceed the Level B harassment

threshold, as determined by field verification or modeling" (PEIS, page 2-9). However, the PEIS does not state how "field verification and modeling" would be accomplished in practice. If the Director approves this request for review, GCMP would recommend that a simpler and more effective approach would be to require a 10 nmi buffer around right whale time-area closure boundaries for all airgun surveys. A 10 nmi airgun buffer is also appropriate since right whales are frequently observed east of the proposed time-closure area boundaries (Gowan and Ortega-Ortiz 2014).

Vessel Impacts

GCMP commends BOEM for requiring vessel speed restrictions within right whale time-area closures. Doing so should reduce the probability of vessel-related whale mortality and injury (Conn and Silber 2013). However, we remain concerned that TGS's proposed activities may lead to a cumulative increase in vessel traffic and noise in the Southeast U.S. right whale habitat. If the Director approves this request for review, GCMP would recommend that all vessels: (1) have a properly installed and operational Automatic Identification System (AIS) on board and (2) provide their vessel name, AIS identification numbers and BOEM permit number to NMFS prior to entering any time-area closure. Doing so would allow NMFS to monitor cumulative impacts associated with increased vessel traffic in the Southeast U.S. right whale habitat.

Critical Habitat

NMFS is in the process of revising the boundaries of the Southeast U.S. right whale critical habitat. While the spatial extent of forthcoming boundaries are not known at this time, two studies (Keller et al. 2012, Gowan and Ortega-Ortiz 2014) have shown that right whale occurrence in the Southeast U.S. is strongly associated with water depth and sea surface temperature. As such, we anticipate that critical habitat boundaries will be expanded and may include all coastal waters along the South Carolina, Georgia and northeast Florida coast from shore to a depth of 25 m (approximately 25-30 nautical miles east from shore off Georgia and South Carolina; approximately 10-25 nautical miles east of shore off northeast Florida). Several G&G PEIS mitigation measures are tied to the current critical habitat boundary. If the Director approves this request for review GCMP would recommend expansion of the spatial extent of these measures to correspond with the revised critical habitat boundaries when new boundaries are established.

SEA TURTLES:

The effects of air gun arrays used during geophysical seismic surveys on sea turtles are not well known. Petroleum seismographic cannons produce intense noise at frequencies within the auditory sensitivity of sea turtles. Pressure waves from air gun arrays used during geophysical testing is not likely to cause death or life-threatening injury to sea turtles. In addition, it is not likely to result in permanent destruction of habitat or permanent displacement of sea turtles from foraging habitats. However, controlled studies on captive turtles showed increased swim speed and erratic behavior when sea turtles were subjected to air gun frequencies and sound levels (Ohara and Wilcox 1990). During the nesting season (April through August), loggerhead nesting females are concentrated within 10 miles of shore and are known to be relatively inactive while they produce eggs for nesting. Seismic

surveys during the nesting season could result in increased movement of nesting females and disrupt physiological processes necessary for reproduction. If the Director approves this request for review GCMP would recommend surveys be designed to eliminate noise in the near shore area (< 10 nm from shore) from April 1 through August 30 to ensure loggerhead nesting activity is not disrupted.

MARINE AND ANADROMOUS FISHES:
SeaBird Exploration Americas Permit Number E14-002 proposed activities with the potential to impact Georgia fishes include: 1) harassment and injury from active acoustic sound sources, 2) harassment from vessel, aircraft and equipment noise, 3) mortality, injury or harassment from vessel traffic, and 4) mortality and injury from entanglement in equipment, trash and debris. All fishes may be temporarily displaced by survey activities. These impacts will be negligible unless they disrupt spawning behavior or reduce food sources (forage species). Of the four ESA protected fish species, Atlantic Sturgeon may be the most likely impacted by vessel traffic and potential vessel strikes.

BOEM and SeaBird Exploration Americas have 15 days from receipt of this notice to provide comments to the Director regarding this request to review SeaBird Exploration Americas permit application number E14-002. The Director shall issue a decision within 30 days of receipt of this notice to BOEM, SeaBird Exploration Americas and GCMP unless the Director extends the decision deadline after consultation with affected parties. SeaBird Exploration Americas may avoid these delays by submitting a consistency certification and other necessary information as outlined in 15 CFR §930.57 and 15 CFR §930.58 directly to GCMP. Please feel free to contact Clay George, Wildlife Biologist, at Clay.George@gadnr.org to discuss protected species aspects; Pat Geer, Marine Fisheries Program Manager, at Pat.Geer@gadnr.org to discuss fisheries aspects; or Kelie Moore, Federal Consistency Coordinator, at Kelie.Moore@gadnr.org to discuss procedural aspects of this request.

Sincerely,

A.G. "Spud" Woodward
Director

SW/km

cc: Kerry Kehoe, NOAA OCRM via e-mail
Clay George, GaDNR/WRD via e-mail
Pat Geer, GaDNR/CRD/NMF via e-mail

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Exhibit 2

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

Mr. A.G. "Spud" Woodward
Director, Coastal Resources Division
Georgia Department of Natural Resources
One Conservation Way
Brunswick, GA 31520-8686

NOV 18 2014

Re: Request to Review Authorizations for Geological and Geophysical Surveys in Federal Waters in the Mid- and South Atlantic

Dear Mr. Woodward:

Thank you for your request to review the federal applications by several companies to the Department of the Interior's Bureau of Ocean Energy Management (BOEM) to conduct Geological and Geophysical (G&G) surveys in federal waters offshore of the Mid- and South Atlantic states (includes 2D and 3D seismic surveys and non-seismic gradiometry aerial surveys).[1] [2] You requested that the National Oceanic and Atmospheric Administration's (NOAA's) Office for Coastal Management[3] approve South Carolina's review of the applications from TGS (E14-001), SeaBird (E14-002), GXT (E14-003), CGG (E14-005) and Spectrum (E14-006) as unlisted activities under the Coastal Zone Management Act (CZMA) § 307(c)(3)(A) (16 U.S.C. § 1456(c)(3)(A)), and NOAA's regulations at 15 C.F.R. Part 930, Subpart D.

For the reasons stated below, the Office for Coastal Management approves the State of Georgia's request to review the G&G applications for TGS (E14-001), SeaBird (E14-002), GXT (E14-003), CGG (E14-005) and Spectrum (E14-006) as unlisted activities for federal consistency with the federally approved Georgia coastal management program. The Office for Coastal Management has determined that these activities, if permitted, would have reasonably foreseeable effects on coastal uses or resources of Georgia's coastal zone. Therefore, TGS, SeaBird, GXT, CGG and Spectrum must prepare and submit to the Georgia Department of Natural Resources' Coastal Resources Division a certification that the activity will be conducted consistent with the federally approved enforceable policies of the Georgia coastal management program, including the submission of necessary data and information required by 15 C.F.R. § 930.58. BOEM may not authorize the G&G surveys until either Georgia concurs with the

[1] Letters from A.G. "Spud" Woodward, Director, Coastal Resources Division, to Ms. Margaret Davidson, Acting Director, Office of Ocean and Coastal Resource Management (Aug. 22, 2014, and Sept. 4, 2014).

[2] Eight companies have submitted nine applications to BOEM: TGS, Seabird, GXT, Western, CGG, Spectrum, PGS and ARKeX. The BOEM Outer Continental Shelf Lands Act (OCSLA) permit numbers are E14-001 to E14-009.

[3] NOAA's Office for Coastal Management was formerly the Office of Ocean and Coastal Resource Management and the Coastal Services Center; these two offices were integrated in September 2014 into the Office for Coastal Management.

consistency certification or Georgia's concurrence is presumed.[4] The Office for Coastal Management's approval of the Georgia request to review the G&G surveys does not address whether the activity is consistent with the enforceable policies of the Georgia coastal management program. Rather, the Office for Coastal Management's approval merely authorizes Georgia's review under CZMA § 307(c)(3)(A) and NOAA's regulations at 15 C.F.R. Part 930, Subpart D.

CZMA UNLISTED ACTIVITY REVIEW REQUESTS

Federal license or permit activities that are listed in a state's federally approved coastal management program and that would occur within a state's coastal zone are subject to federal consistency review.[5] Listed activities are presumed to have coastal effects and provide notice to applicants and federal agencies that the activity is subject to state federal consistency review. If an activity is unlisted or outside of the geographic scope of state CZMA federal consistency review approved by the Office for Coastal Management, a state must request approval from the Office for Coastal Management to review the activity.[6] The request must be submitted within 30 days of receiving notice of the application, and must notify the applicant, relevant federal agency, and the Office for Coastal Management that the state intends to review the activity and demonstrate that the activity would have reasonably foreseeable effects on the coastal uses or resources of the state; otherwise a state waives its right to review the unlisted activity.[7]

The Office for Coastal Management must either approve or deny a state's request to review an unlisted activity for consistency. The applicant and federal agency have 15 days from receipt of a state's request to provide comments to the Office for Coastal Management. The Office for Coastal Management will make a decision usually within 30 days of receipt of a state's request, although NOAA's regulations allow for extensions. Due to the number and complexity of simultaneous state G&G unlisted activity requests, the Office for Coastal Management extended its review on September 19, 2014, for all of the pending review requests to November 18, 2014.

In considering a state's request to review an unlisted activity, the Office for Coastal Management first determines if there are any threshold issues to address (e.g., timeliness of a state's request). Then, the Office for Coastal Management will decide whether the proposed activity will have reasonably foreseeable effects on any land or water use or natural resource of the state's coastal zone.[8] The federal agency may not authorize the activity unless the Office for Coastal Management denies the state's request or, if the Office for Coastal Management approves the state's request, the state concurs with the applicant's consistency certification.[9] If the state objects to the consistency certification and the applicant appeals the state's objection to the Secretary of Commerce, pursuant to 15 C.F.R. Part 930, Subpart H, and the Secretary overrides

[4] For the review of unlisted activities a state's concurrence is presumed if the state does not issue a decision within six months from receipt of the original federal agency notice to the state, or within three months from receipt of the applicant's consistency certification, whichever period terminates last. 15 C.F.R. § 930.54(e).

[5] 15 C.F.R. § 930.53.

[6] 15 C.F.R. §§ 930.53 and 930.54.

[7] *Id.*

[8] 15 C.F.R. § 930.54(c).

[9] 15 C.F.R. § 930.54(d).

the state's objection, then the federal agency may authorize the activity.[10] [11]

PROJECT DESCRIPTION

BOEM has nine pending permit applications under the Outer Continental Shelf Lands Act (OCSLA) for G&G surveys in federal waters in the Mid- and South Atlantic.[12] These surveys are for the purpose of identifying potential areas for oil and gas exploration. Most of the G&G applications identify a large "Area of Interest" where surveys would be conducted and many of those areas overlap.

Three types of surveys are proposed: 2D (two-dimensional) seismic surveys; a 3D (three-dimensional) seismic survey; and an airborne gravitational gradiometry survey. Georgia has requested review of the 2D surveys proposed by TGS, SeaBird, GXT, CGG and Spectrum (E14-006).

2D seismic surveys use compressed air to emit acoustic energy pulses whose refraction from the seabed are recorded by hydrophones that are towed on streamers behind a ship. The proposed seismic sources are of the type and volume frequently used in the Gulf of Mexico and around the world. Ships conducting 2D surveys are typically 30-90 m (98-295 ft) long and tow an array of airguns 100-200 m (328-656 ft) behind the ship. Following behind the source array is a single streamer approximately 5-12 km (3.1-7.5 mi) long. The ship tows this apparatus at a speed of approximately 3-5 knots. Approximately every 10-15 seconds, the air source array is activated. The spacing between track lines that the ship navigates can be 1-10 kilometers.[13]

The seismic surveys may take approximately 6 months to complete. In addition to the seismic survey vessel, there is usually at least one support vessel, which supports the seismic vessel by, among other things, acting as a lookout to ensure safe marine operations through monitoring and maintaining lines of communication with any incoming or surrounding traffic. There is also usually at least one supply vessel to provide for resupplying while the seismic vessel is operating.

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[10] The Secretary has delegated CZMA appeal decision authority to the NOAA General Counsel regarding threshold issues (i.e., issues related to whether an appeal meets the form and timeliness requirements set forth by regulation), and to the Under Secretary for Oceans and Atmosphere for substantive appeal decisions.

[11] During the Office for Coastal Management's review of a state's unlisted activity request and a state's CZMA consistency review, the authorizing federal agency continues to review the project under its statutory and regulatory authority and may deny the activity.

[12] BOEM subsequently received a tenth application from TDI-Brooks International, Inc. (E14-010), but that application is not subject to this request and the Office for Coastal Management's decision.

[13] Letter by email from Karen St. John, Group VP, International Association of Geophysical Contractors, to Paul M. Scholz, Acting Director, Office of Ocean and Coastal Resource Management (Sept. 3, 2014).

DISCUSSION

1. The Timeliness of the State's Request to Review the G&G Applications

During the Summer of 2014, the Office for Coastal Management coordinated with BOEM, the Mid- and South Atlantic coastal states and the applicants to ensure that applicable states were uniformly notified of the G&G applications to avoid uncertainty as to when requests for approval to review were due to the Office for Coastal Management. Both the Office for Coastal Management and BOEM included each other in briefings for states and survey applicants. In August 2014, in coordination with the Coastal States Organization (CSO), the Office for Coastal Management conducted a briefing for states on the submission process for requesting review approval and establishing reasonably foreseeable effects. In coordination with the International Association of Geophysical Contractors (IAGC), the Office for Coastal Management conducted a briefing for survey applicants on the approval process for state reviews, the CZMA review process if state requests are approved, and the type of operational information that would be helpful from the surveyors in commenting on state requests. In addition, at the Office for Coastal Management's suggestion, on September 12, 2014, the IAGC and its members held a briefing for CSO and its members on the various types of surveys and their operations.

The CZMA Federal Consistency regulations at 15 C.F.R. § 930.54(a)(1) require that state requests to review unlisted activities be made within 30 days of notice of the activity. The computation of time for notice by email begins with the date of receipt.

On July 23, 2014, the Georgia coastal management program was contacted by a representative of TGS through an email message in regard to their project application (E14-001). This contact served as notice to the state for the TGS (E14-001) application. On August 5, 2014, BOEM notified Georgia and other states of the pending G&G applications. This served as notice to the state for applications E14-002 to E14-009.

The Georgia coastal management program requested approval by the Office for Coastal Management to review as an unlisted activity the application for TGS on August 22, 2014, and the applications for SeaBird, GXT, CGG and Spectrum (E14-006) on September 4, 2014. The Office for Coastal Management finds that the state's request to review the applications as unlisted activities is timely.

2. Whether the Proposed Activity Has Reasonably Foreseeable Effects on Any Land or Water Use or Natural Resource of the State's Coastal Zone

With the exception of the PGS and ARKeX applications, the G&G applications pending before BOEM do not describe the specific areas in which G&G surveys will be conducted. The applications include maps with delineations of broad expanses of Areas of Interest somewhere within which surveys may be conducted. In information submitted to the Office for Coastal Management, TGS, SeaBird, GXT, CGG, Spectrum, PGS and ARKeX provided more specific information on the location of their projects or the closest points to the shores of those states which have requested to review the surveys. Without more specific information on the location of projects, it must be presumed that the surveys will be conducted within any and all parts of the

Areas of Interest, except where an applicant has provided more specific geographic descriptions. If a state shows reasonably foreseeable effects within an Area of Interest proposed by an applicant, the entire project and any activity throughout the entire proposed Area of Interest is subject to review by the state.

In order to grant a state request to review an unlisted activity, the Office for Coastal Management must find that the state has shown that there are reasonably foreseeable effects to uses or resources of the coastal zone of the state.[14] Effects include direct, indirect and cumulative effects; effects to resources as well as coastal uses.[15] The activity, resources, uses and effects can occur within and outside of the coastal zone.[16] That finding is based on the analysis of coastal effects provided by the state, comments received on the state's request, the application before the federal agency, any National Environmental Policy Act (NEPA) documents and other environmental evaluations related to the federal applications and other information the Office for Coastal Management determined was needed to assess the states' coastal effects arguments. Findings of effects in regards to a particular activity must also consider proposed and required mitigation measures, as in this instance where the Programmatic Environmental Impact Statement (PEIS)[17] for surveys in the Mid- and South Atlantic includes specific mitigation measures and recognizes that the applicable protection standards under the Marine Mammal Protection Act may require additional mitigation to prevent harm to species. The burden of asserting and adequately supporting an effects arguments lies with the states. In meeting that burden, a state request must persuasively address any arguments countering its assertion of effects.

Seven states have requested approval by the Office for Coastal Management to review some or all of the nine G&G permit applications. These states are New York, Delaware, Maryland, North Carolina, South Carolina, Georgia and Florida.[18] The Office for Coastal Management reviewed each state's unlisted activity request to determine if a state was able to demonstrate that there would be reasonably foreseeable coastal effects. However, because there were multiple permit applications and several state requests for the same activities in the same Areas of Interest, the Office for Coastal Management also evaluated coastal effects by looking at the totality of the arguments within the states' requests. In reviewing the states' requests, the Office for Coastal Management recognizes that if one state makes a persuasive argument in regard to effects, and that finding would be applicable to another state, the Office for Coastal Management should recognize that effect in another state even if that other state's effects argument was not as persuasive. Nonetheless, a finding that a proposed survey may have reasonably foreseeable effects for one state does not relieve another state from the burden of showing that it has a specific interest in a specific area that would be affected.

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[14] 15 C.F.R. § 930.54(c).

[15] 15 C.F.R. § 930.11(g).

[16] *See* 16 U.S.C. § 1456(c)(3)(A), 15 C.F.R. § 930.11(g), and 65 Fed. Reg. 77124-77175, 77130 (Dec. 8, 2000), for the geographic scope of federal consistency.

[17] Final Programmatic Environmental Impact Statement (PEIS) for Atlantic OCS Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas (OCS EIS/EA BOEM 2014-001) [hereinafter PEIS].

[18] New Jersey and Virginia were notified of the G&G permit applications and the deadlines for submitting unlisted activity requests to the Office for Coastal Management, but did not submit a request.

All of the proposed activities would be conducted in federal waters. For the Office for Coastal Management to find that an activity in federal waters may have reasonably foreseeable effects, a state must show that the impact from an activity will have a reasonably foreseeable effect to coastal uses and resources of the state. A state must show that it has a specific interest that may be affected by the activity. The Office for Coastal Management interprets a state's burden to demonstrate coastal effects to mean that a mere assertion that an activity in federal waters will have an impact is insufficient to make a finding of reasonably foreseeable coastal effects. Likewise, a state's effects analysis must provide more than general assertions of impacts or that resources or uses are "important," or should be reviewed because of the proximity of an activity to state coastal uses or resources; there must be a causal connection between the activity and coastal effects. Moreover given the availability of space in the broad expanse of federal waters, a state must show that this interest lies in specific areas within federal waters due to distinguishing characteristics of those areas (e.g., a specific area used by commercial fishermen).[19]

Sea Turtles

One concern raised by Georgia relates to sea turtles, which congregate in the waters offshore of the state to nest on Georgia beaches. During nesting season, loggerhead nesting females concentrate within 10 miles of Georgia's shore and are relatively inactive while producing eggs. The shallow continental shelf waters off the Georgia coast are important developmental foraging habitat for juvenile loggerhead, Kemp's Ridley and green sea turtles.[20] Leatherback densities increase in the spring as they migrate along the state's coast to feed in the north Atlantic during the summer.[21] Unlike Brevard County, Florida, the PEIS does not provide for a sea turtle time-area closure for areas offshore Georgia and recognizes that the sea turtle time-area closure would not mitigate potential impacts to other nesting beaches within the Area of Interest.[22]

The PEIS says that seismic airgun surveys conducted off of heavily used nesting beaches during the nesting season could temporarily displace breeding and nesting adult turtles and potentially disrupt time-critical activities.[23] The PEIS also acknowledges that increased noise levels could impact nesting success and the relative sex ratios of hatchlings and cause auditory injury. The detection of sea turtles by visual monitoring during seismic airgun surveys can be problematic since turtles spend most of their life below the sea surface and can be difficult to detect when on the surface, particularly during periods of elevated sea states or low visibility.[24] Although the PEIS concludes that deaths or life-threatening injuries are not expected, it does state that temporary or permanent threshold shifts in sea turtles may occur. Since sea turtles may use sound

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[19] To ensure that the importance of specific geographic location information to the Office for Coastal Management's consideration of unlisted activity requests was understood, the Office for Coastal Management requested such information from interested parties on October 6, 2014, with a submittal deadline of October 17, 2014.

[20] Letters from A.G. "Spud" Woodward, Director, Coastal Resources Division, to Ms. Margaret Davidson, Acting Director, Office of Ocean and Coastal Resource Management (Aug. 22, 2014, and Sept. 4, 2014).

[21] *Id.*

[22] *Id.*

[23] PEIS, *supra* note 17, at 4-93.

[24] *Id.*

for navigation, locating prey, avoiding predators, environmental awareness and communicating, permanent threshold shifts could impact these abilities.[25] Based on this information, the Office for Coastal Management finds that there are reasonably foreseeable effects to sea turtles navigation to and from land for nesting in Georgia.

Commercial and Recreational Fisheries

Georgia did not raise effects arguments that seismic surveys may have reasonably foreseeable effects to commercial and recreational fishing. However, as noted above, reasonably foreseeable effects to these activities will be recognized where another state's effects analysis makes it apparent that another state has an interest in those uses within specific areas of the federal waters offshore of the state.

Commercial and recreational fishing throughout the states of the Mid- and South Atlantic contribute to local and regional economies. According to the National Marine Fisheries Service (NMFS), the value of commercial landings within the Area of Interest offshore of Georgia during 2012 was over $8M.[26] Recreational and tournament fishing in federal waters also contribute to local economies where marinas, charter fleets, restaurant and lodging establishments are concentrated. A NMFS assessment of the economic contributions of recreational and tournament fishing to the economy of Georgia in 2011 found that recreational fishing created over 3,200 jobs; $135 million in income; $345 million in sales; and $217 million in value-added to the state's gross domestic product.[27]

Located offshore of Georgia is the Gray's Reef National Marine Sanctuary, which supports up to 150 fish species and is a popular site for recreational fishing and boating.[28] In addition, the Georgia Marine Protected Area, located approximately 69 nm southeast of the mouth of the Wassaw Sound, Georgia, is recreationally fished for pelagic species such as tunas and dolphin. This area lies east of an area called the "Triple Ledge" that is an important area for commercial fishermen.[29]

Although the findings of studies of the impacts of seismic surveys to fish catch vary, catch reductions of nearly 70 percent have been found for a period of at least five days.[30]

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[25] *Id.* at 4-89 and 4-93.

[26] PEIS, *supra* note 17, at Tables-72 (Table 4-30).

[27] Sabrina J. Lovell, et al., *The Economic Contribution of Marine Angler Expenditures in the United States, 2011,* NOAA Technical Memorandum NMFS-F/SPO-134 (Sept. 2013), *available at* http://www.st.nmfs.noaa.gov/economics/publications/marine-angler-expenditures/marine-angler-2011 (last visited Oct. 28, 2014).

[28] PEIS, *supra* note 17, at 4-13.

[29] *Id.* at 4-187.

[30] A. Engås, et al., *Comparative trials for cod and haddock using commercial trawl and longline at two different stock levels,* Journal of the Northwest Atlantic Fishery Science 19:83-90 (1993); A. Engås, et al., Effects of seismic shooting on local abundance and catch rates of cod (*G. morhua*) and haddock (*M. aeglefinus*), Canadian Journal of Fisheries and Aquatic Science 53:2238-2249 (1996); *cf.* G. La Bella, et al., *First Assessment of Effects of Air-Gun Seismic Shooting on Marine Resources in the Central Adriatic Sea,* Society of Petroleum Engineers, Inc. (1996).

In addition to the potential for catch reductions, the space and operational requirements of survey vessels may create potential conflicts with other vessels and uses. Vessels towing streamers during 2D and 3D seismic surveys follow pre-plotted track lines and have limited maneuverability during data acquisition. Survey operators attempt to keep a zone around the source vessel and its towed streamer arrays clear of other vessel traffic. The size of the area to be kept clear of other vessels is typically 8.5 km (4.6 nautical miles (nm)) long and 1.2 km (0.6 nm) wide, covering a total of 1,021 hectares (2,520 acres) of sea surface. While the U.S. Coast Guard issues a Local Notice to Mariners for areas where seismic surveys will take place, no official exclusion zones are established or enforced. Data acquisition takes place day and night and may continue for days, weeks, or months, depending on the size of the survey area.[31]

Given the nature of the proposed surveys, the Areas of Interest, and existing uses, the Office for Coastal Management finds that there are reasonably foreseeable effects to coastal fishing uses of Georgia from seismic survey operations including potential user conflicts and catch reductions.

The finding of reasonably foreseeable effects is not a determination that those user conflicts will occur. The finding is a determination that there is a reasonably foreseeable potential for user conflicts that could affect fishing uses and catches. The finding of reasonably foreseeable effects is also not a determination that seismic survey operations are incompatible with fishing. The purpose of the CZMA review process is to ensure that the state's interests, as embodied in the state's enforceable policies, are recognized so that activities authorized by federal agencies are conducted in a manner that is consistent with those policies.

CONCLUSION

Seismic surveys occurring in specific areas in the federal waters offshore of Georgia may have reasonably foreseeable effects on coastal uses (commercial and recreational fishing) and coastal resources (sea turtle nesting).

Based on the Areas of Interest described in the publicly available applications and supplemental information provided by the applicants,[32] TGS, SeaBird, GXT, CGG and Spectrum (E14-006), seismic survey activities may occur in areas in the federal waters identified by Georgia as areas where sea turtles congregate and migrate to shore, and commercial and recreational fishing are concentrated. As discussed above, these surveys could have reasonably foreseeable coastal effects.

Based upon a review of the information presented by Georgia, the applicants and BOEM, the Office for Coastal Management approves the state's request to review the proposed G&G surveys for the following BOEM applications: TGS (E14-001), SeaBird (E14-002), GXT (E14-003), CGG (E14-005) and Spectrum (E14-006). BOEM may not authorize activities under these permit applications until a consistency certification has been submitted to the Georgia Department of Health and Environmental Control's Division of Ocean and Coastal Resource

[31] PEIS, *supra* note 17, at 3-32.

[32] BOEM Atlantic Pending Surveys Map, http://www.boem.gov/Atlantic-Pending-Permit-Map/ (last visited Nov. 3, 2014).

Management by each applicant, and the state has either found the proposed activities to be consistent or presumptively waived its review authority. Pursuant to 15 C.F.R. § 930.54(e), the state's decision will be due three months after receipt of the applicant's consistency certification and necessary data and information.[33]

Please contact David Kaiser, Senior Policy Analyst, Office for Coastal Management, at 603-862-2719, or Kerry Kehoe, Federal Consistency Specialist, Office for Coastal Management, at 301-563-1151, if you have any questions.

Sincerely,

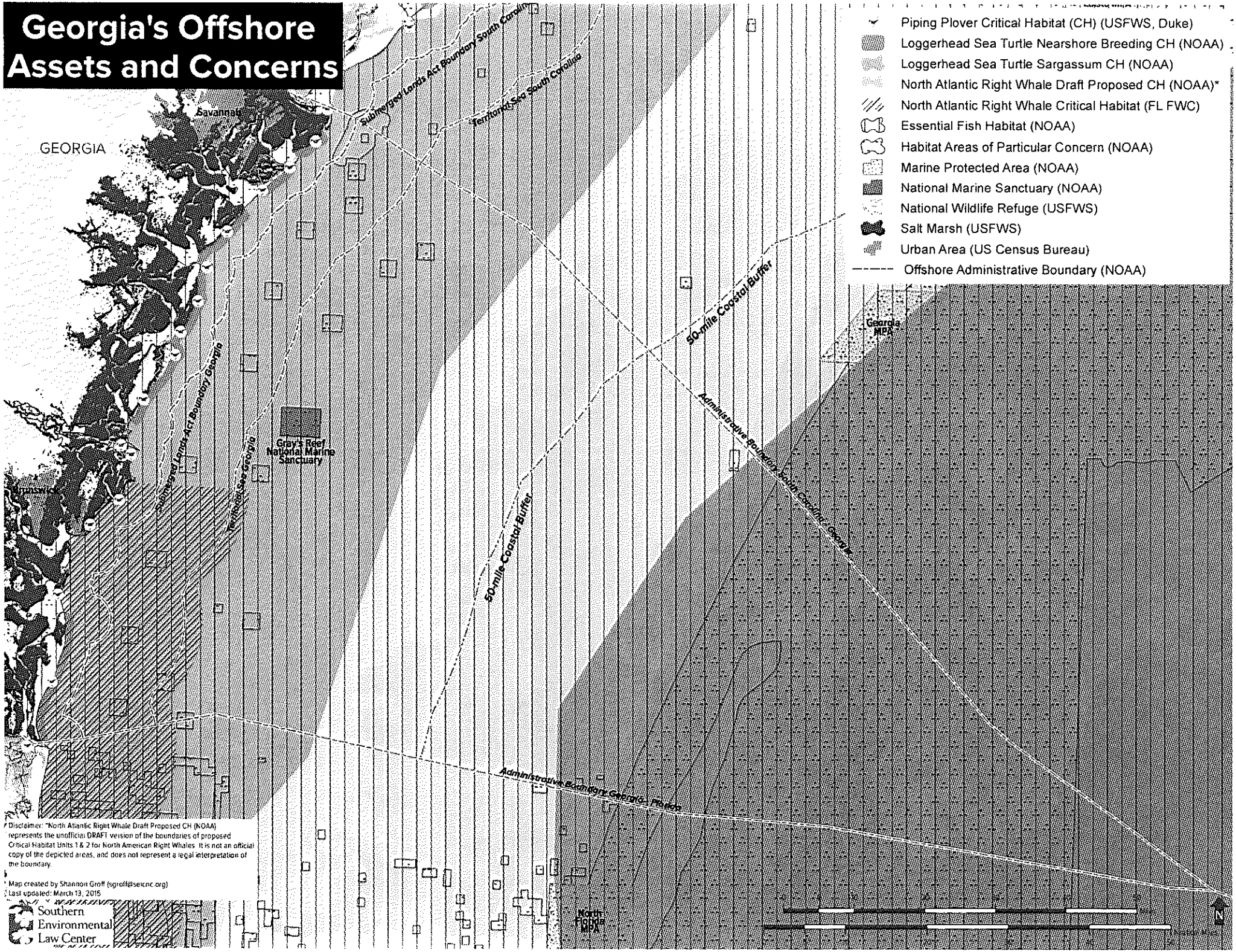
Jeffrey L. Payne, Ph.D.
Acting Director

cc:
Gabrielle Rolland, TGS
Matthew Padon, SeaBird
Daniel Virobik, GXT
Steve Chang, Western
J. Mayville, Western
Michael Whitehead, CGG
Knut Fostad, Spectrum
Michael Saunders, Spectrum
David Lippett, PGS
Gary Morrow, PGS
Ian Lambert, ARKeX
Brian Cameron, BOEM
Benjamin Laws, NMFS/OPR

[33] *See* 15 C.F.R. § 930.54(e).

Exhibit 3

Georgia's Offshore Assets and Concerns



* Disclaimer: "North Atlantic Right Whale Draft Proposed CH (NOAA) represents the unofficial DRAFT version of the boundaries of proposed Critical Habitat Units 1 & 2 for North American Right Whales. It is not an official copy of the depicted areas, and does not represent a legal interpretation of the boundary.

Map created by Shannon Groff (sgroff@selcnc.org)

Last updated: March 13, 2015

Southern Environmental Law Center

Exhibit 4

The Cornell Lab of Ornithology
Bioacoustics Research Program

Duke | Nicholas School of the Environment
Duke University Marine Lab

New England Aquarium
Protecting the blue planet

March 5, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

Dear Mr. President:

On behalf of 75 marine scientists, we are writing to convey the attached letter of concern over the introduction of seismic oil and gas surveys off the U.S. east coast. The letter is signed by colleagues representing such institutions as Cornell, Duke, the New England Aquarium, Stanford, the University of North Carolina, and Woods Hole Oceanographic Institution, and includes leading experts in marine biology and bioacoustics.

Last July, the Interior Department issued a "framework" for opening its mid- and southeast Atlantic regions to high-energy seismic airgun surveys. As the letter states, however, we believe that the Department has substantially underestimated the impact of this disruptive activity on marine life and has prescribed mitigation that is inadequate to address its significant cumulative effects.

Fundamentally, the ocean is a world of sound. Whales, fish, and other marine species have evolved to use sound as their primary sense, for foraging, breeding and other activities essential to their survival. The high-volume airgun arrays used by the seismic industry are known to disrupt these vital behaviors in a wide range of marine species on extraordinarily large spatial scales.

It is our expert assessment that the activity proposed by the Interior Department "is likely to have significant, long-lasting, and widespread impacts on the reproduction and survival of fish and marine mammal populations in the region." On behalf of ourselves and our colleagues, we therefore respectfully urge you to reconsider the Interior Department's analysis. To proceed otherwise, as the letter states, "is simply not sustainable."

Very truly yours,

Christopher Clark, Ph.D.
Senior Scientist
Bioacoustics Research Program
Cornell University

Scott Kraus, Ph.D.
Vice President of Research
John H. Prescott Marine Laboratory
New England Aquarium

Doug Nowacek, Ph.D.
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Andrew J. Read, Ph.D.
Stephen Toth Professor of Marine Biology
Division of Marine Science and
Conservation
Nicholas School of the Environment
Duke University

Aaron Rice, Ph.D.
Science Director
Bioacoustics Research Program
Cornell University

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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Cornell University

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John H. Prescott Marine Laboratory
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Founder and President
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Marine Biologist

Wendy Dow Piniak, Ph.D.
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Randy R. Reeves, Ph.D.

Chairman
IUCN/ SSC Cetacean Specialist Group
International Union for the Conservation of Nature

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Scottish Marine Institute

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Exhibit 5

Georgia Department of Natural Resources

2 Martin Luther King, Jr. Drive, SE, Suite 1252 East, Atlanta, Georgia 30334-9000
Noel Holcomb, Commissioner
Phone: (404) 656-3500
Fax: (404) 656-0770

October 27, 2008

Naval Facilities Engineering Command Atlantic
ATTENTION: Code EV22LL (USWTR OEIS/EIS PM)
6506 Hampton Boulevard
Norfolk, Virginia 23508-1278

RE: Georgia Federal Consistency Determination Objection – Navy Undersea Warfare Training Range

Dear Sir or Madam:

Staff of the Georgia Coastal Management Program (GCMP) as well as the Georgia Department of Natural Resources' Wildlife Resources Division (GDNR WRD) and the Coastal Resources Division (GDNR CRD) has reviewed your September 12, 2008 Draft Undersea Warfare Training Range (USWTR) Environmental Impact Statement (DEIS)/Overseas Environmental Impact Statement (OEIS). The GDNR recognizes the difficult situation that the Navy faces in balancing its national defense imperative with protection of our ocean resources. However, we are concerned that USWTR activities may negatively impact marine mammal species, including the endangered North Atlantic right whale. North Atlantic right whales are among the most endangered baleen whale species. The waters offshore of Georgia and northeast Florida are the only known calving ground for the species. Protection of the right whale calving habitat is critical for population recovery.

Project Description

The purpose of the proposal is to implement an anti-submarine warfare (ASW) training range in the Jacksonville operating area (JAX OPAREA) to support ASW training exercises. The geographic scope of the DEIS/OEIS includes approximately 500 NM^2 of airspace, seaspace and seabed, and a narrow strip of seabed between the range and the shoreline where a single interconnect cable would be located. Sites in the JAX, Charleston, Cherry Point (North Carolina) and Virginia Capes OPAREAs are being considered; the JAX OPAREA site is the preferred alternative. The proposal would place up to 300 active/passive transducer nodes and interconnecting cables on the ocean floor to create an undersea ASW training range. The array would be connected to existing shore-based communication infrastructure via a cable that would lie on the seafloor or be buried 1-3 ft in the seabed. Once installed, training exercises would involve combinations of submarines, surface vessels and aircraft. Approximately 470 training events would be conducted per year, lasting 2-6 hours per event. Potential environmental impacts fall into the following categories: 1) project installation, 2) non-acoustic operations (e.g. vessel maneuvers) and 3) acoustic operations (ASW training will involve use of mid-frequency active sonar). Because installation is presumed to be of short duration, our concerns pertain primarily to proposed ASW operations.

Comments and Recommendations

- Given the importance of Georgia and Florida coastal waters to endangered North Atlantic right whales, and given the proximity of the proposed USWTR range to the right whale calving grounds, our chief recommendation would normally be that the Navy avoid conducting USWTR activities between November 15 and April 15 each year (i.e. when right whales are present off Georgia and Florida). Unfortunately this option has been explicitly eliminated from consideration in the DEIS/OEIS. We urge the Navy to reconsider this decision. Avoiding or significantly reducing the scope of ASW activities between November 15 and April 15 would be the simplest way to reduce potential impacts to right whales and right whale habitat.
- Installation of the range should occur between April 15 and November 15 to avoid impacting North Atlantic right whales.
- We question the accuracy of the Acoustic Effects Analysis given how little is known about the density of marine mammal species inhabiting the project area. The marine mammal density data at the heart of the analysis (i.e. Navy OPAREA Density Estimates) are spatially and temporally coarse in scale, and therefore inappropriate for fine-scale analysis that was conducted in the DEIS/OEIS. Rather, we recommend that comprehensive marine mammal surveys be conducted within the proposed USWTR area across all seasons in order to calculate accurate season-specific estimates of marine mammal density. This point is particularly important for North Atlantic right whales because the density of right whales beyond 30 NM of shore is unknown. Accurate right whale density estimates for waters beyond 30 NM are needed in order to predict impacts to right whales. The revised density estimates should be incorporated into the Acoustic Effects Analysis prior to publication of the Final EIS; they should also be considered by NMFS prior to issuing a Letter of Authorization (LOA) or consulting with the Navy under Section 7 of the Endangered Species Act (ESA).
- The Navy estimated the annual "Acoustic Footprint" and exposure levels in its Acoustic Effects Analysis, but did not present this information in the DEIS/OEIS. This information is needed to assess the environmental impacts of the project and should be included in the Final EIS.
- The maximum distance at which Level B harassment will occur from sonar sources is not provided in the DEIS/OEIS. This is particularly important given the proximity of the USWTR project area to the right whale calving ground. The Navy should address whether sonar energy will propagate from the USWTR and into areas inhabited by right whales. This information should be included in the Final EIS; it should also be considered by NMFS prior to issuing a LOA or consulting with the Navy under Section 7 of the ESA.
- If sound is likely to propagate from the USWTR and into the right whale calving grounds, the potential for cumulative negative impacts on individual right whales and their habitat should be considered. Breeding females return to the waters off Georgia and northeast Florida to every 3-5 years to calve. Immature right whales often return to the calving grounds each winter during the first few years of their lives. These individual whales may remain in waters off Georgia and Florida for extended periods (3-4 months). As such, the potential for cumulative impacts on individual whales should not be discounted.
- The Navy's Integrated Comprehensive Monitoring Program (ICMP) should include a program for monitoring the long-term acoustic effects of USWTR activities on the project area and the adjacent right whale calving grounds. This program should be implemented in cooperation with NMFS and independent researchers.
- The Navy's emphasis on posting vessel lookouts as the primary operational means of avoiding marine mammal impacts is insufficient. Marine mammals are difficult to detect

visually—even by trained observers. The probability of detecting marine mammals at night and in periods of inclement weather is even lower. Greater emphasis should be placed on real-time passive acoustic detection and visual detection of marine mammals by air prior to onset of USWTR activities.

- The right whale-specific vessel mitigation measures in the DEIS/OEIS would apply only to the Southeast U.S. critical habitat and an adjacent 5 NM-wide "associated area of concern." Right whales inhabit a much larger area than this. Research has shown that right whales utilize most waters within 30 nautical miles of the Georgia and northeast Florida. As stated above, right whales may also utilize waters beyond 30 NM of shore; further research is needed to address this question. Right whale-specific mitigation measures should apply to all areas inhabited by right whales—not just the currently delineated Southeast U.S. critical habitat.
- Navy vessels should travel at 10 knots (or minimum safe speed) while transiting through waters inhabited by right whales between November 15 and April 15. Exercises requiring greater vessel speeds should be conducted outside the right whales season or in locations where right whales are not present. Contrary to the Navy's contention in the DEIS/OEIS, vessel speed limits are not arbitrary. The best available science indicates that whale mortality and serious injury is significantly reduced at speeds of 10 knots or less.

Northern right whales are protected under both the Georgia Endangered Wildlife Act and the Federal Endangered Species Act. Proposed actions that do not mitigate right whale impacts to the maximum practicable extent are not consistent with Georgia's Coastal Management Program. The Program **objects** to your federal consistency determination unless the Recommendations outlined above are incorporated into the final environmental impact statement.

The GDNR appreciates the opportunity to comment on this proposal. We look forward to continued cooperation with the Navy on this and other issues. If you have any technical questions, please contact Clay George at (912) 262-3336 or clay.george@dnr.state.ga.us.

Sincerely,

Noel Holcomb

cc: David Kaiser, NOAA OCRM
Dan Forster, GDNR WRD
Susan Shipman, GDNR CRD

EXHIBIT F

The Cornell Lab of Ornithology
Bioacoustics Research Program

Duke Nicholas School of the Environment
Duke University Marine Lab

New England Aquarium
Protecting the blue planet

March 5, 2015

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

Dear Mr. President:

On behalf of 75 marine scientists, we are writing to convey the attached letter of concern over the introduction of seismic oil and gas surveys off the U.S. east coast. The letter is signed by colleagues representing such institutions as Cornell, Duke, the New England Aquarium, Stanford, the University of North Carolina, and Woods Hole Oceanographic Institution, and includes leading experts in marine biology and bioacoustics.

Last July, the Interior Department issued a "framework" for opening its mid- and southeast Atlantic regions to high-energy seismic airgun surveys. As the letter states, however, we believe that the Department has substantially underestimated the impact of this disruptive activity on marine life and has prescribed mitigation that is inadequate to address its significant cumulative effects.

Fundamentally, the ocean is a world of sound. Whales, fish, and other marine species have evolved to use sound as their primary sense, for foraging, breeding and other activities essential to their survival. The high-volume airgun arrays used by the seismic industry are known to disrupt these vital behaviors in a wide range of marine species on extraordinarily large spatial scales.

It is our expert assessment that the activity proposed by the Interior Department "is likely to have significant, long-lasting, and widespread impacts on the reproduction and survival of fish and marine mammal populations in the region." On behalf of ourselves and our colleagues, we therefore respectfully urge you to reconsider the Interior Department's analysis. To proceed otherwise, as the letter states, "is simply not sustainable."

Very truly yours,

Christopher Clark, Ph.D.
Senior Scientist
Bioacoustics Research Program
Cornell University

Scott Kraus, Ph.D.
Vice President of Research
John H. Prescott Marine Laboratory
New England Aquarium

Doug Nowacek, Ph.D.
Repass-Rodgers Chair of Marine
Conservation Technology
Nicholas School of the Environment
and Pratt School of Engineering
Duke University

Andrew J. Read, Ph.D.
Stephen Toth Professor of Marine Biology
Division of Marine Science and
Conservation
Nicholas School of the Environment
Duke University

Aaron Rice, Ph.D.
Science Director
Bioacoustics Research Program
Cornell University

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,

Christopher Clark, Ph.D.
Senior Scientist
Bioacoustics Research Program
Cornell University

Scott Kraus, Ph.D.
Vice President of Research
John H. Prescott Marine Laboratory
New England Aquarium

Doug Nowacek, Ph.D.
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Sylvia Frey, Ph.D.

Director, Science & Education
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Director Marine Mammal Research
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Dipl. Biol. Sven Koschinski
Meereszoologie, Germany

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Sean McQuilken
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Cooperative Institute for Marine Resources Studies
Oregon State University

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Professor (ret.)
University of Alaska

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Professor Emeritus of Ocean Space and Human Activity
International Centre for Integrated Assessment and Sustainable Development
Maastricht University, The Netherlands

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Ocean Conservation Research

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Dalhousie University

George M. Woodwell, Ph.D.
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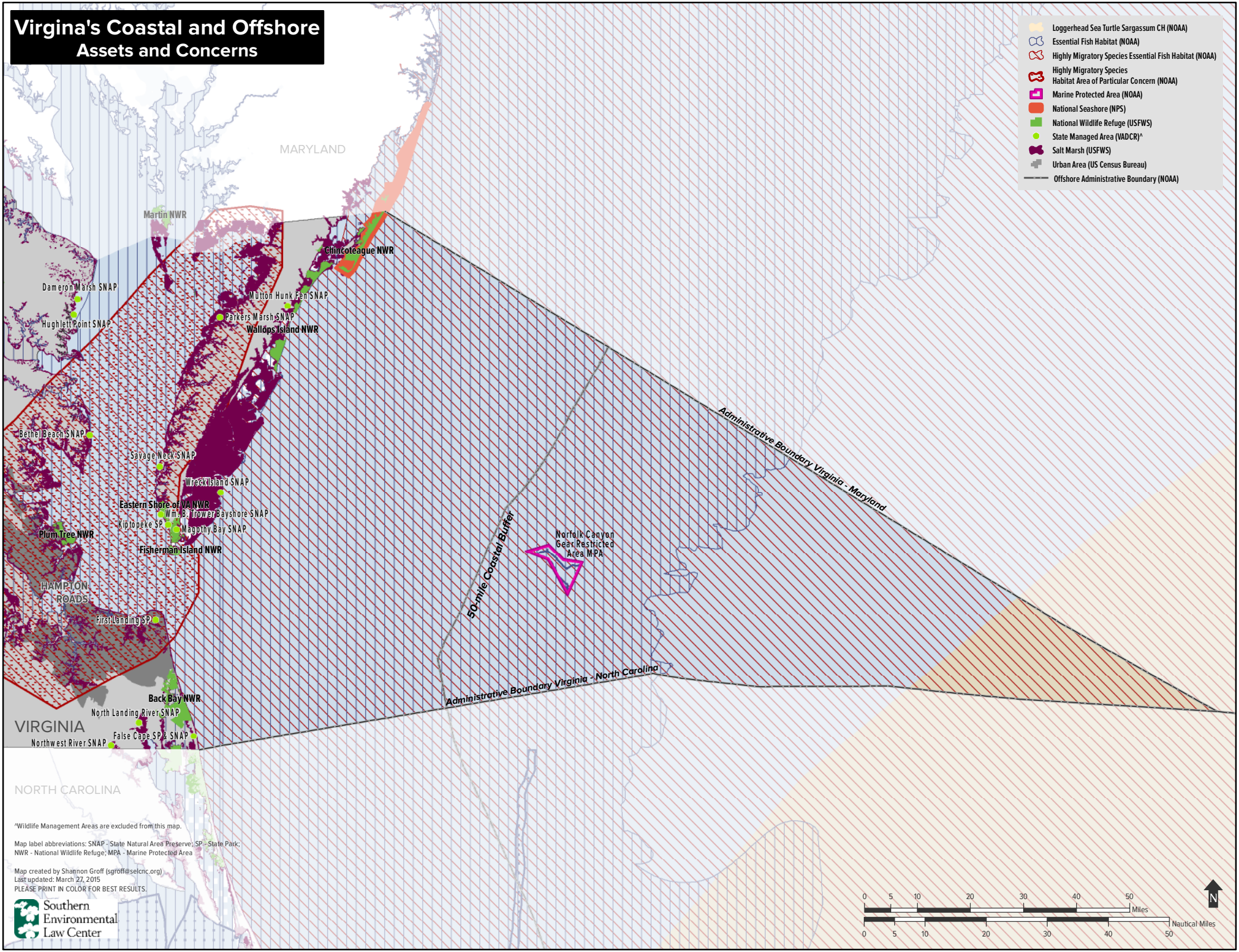
Woods Hole Research Center

EXHIBIT G

Virgina's Coastal and Offshore
Assets and Concerns



^Wildlife Management Areas are excluded from this map.

Map label abbreviations: SNAP - State Natural Area Preserve; SP - State Park; NWR - National Wildlife Refuge; MPA - Marine Protected Area

Map created by Shannon Groff (sgroff@selcnc.org)
Last updated: March 27, 2015
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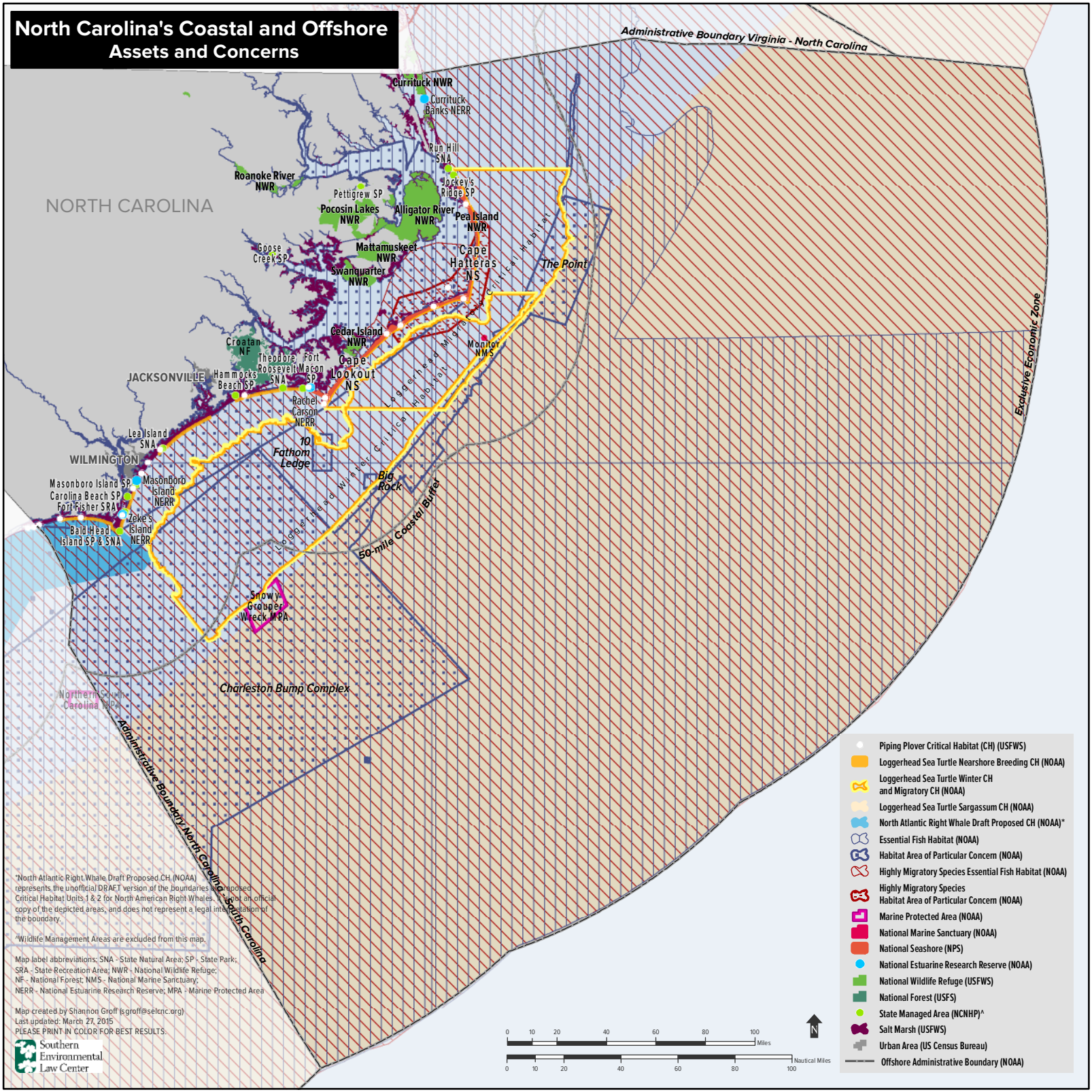
Southern Environmental Law Center

North Carolina's Coastal and Offshore Assets and Concerns



*North Atlantic Right Whale Draft Proposed CH (NOAA) represents the unofficial DRAFT version of the boundaries of proposed Critical Habitat Units 1 & 2 for North American Right Whales. It is not an official copy of the depicted areas, and does not represent a legal interpretation of the boundary.

^Wildlife Management Areas are excluded from this map.

Map label abbreviations: SNA - State Natural Area; SP - State Park; SRA - State Recreation Area; NWR - National Wildlife Refuge; NF - National Forest; NMS - National Marine Sanctuary; NERR - National Estuarine Research Reserve; MPA - Marine Protected Area

Map created by Shannon Groff (sgroff@selcnc.org)
Last updated: March 27, 2015
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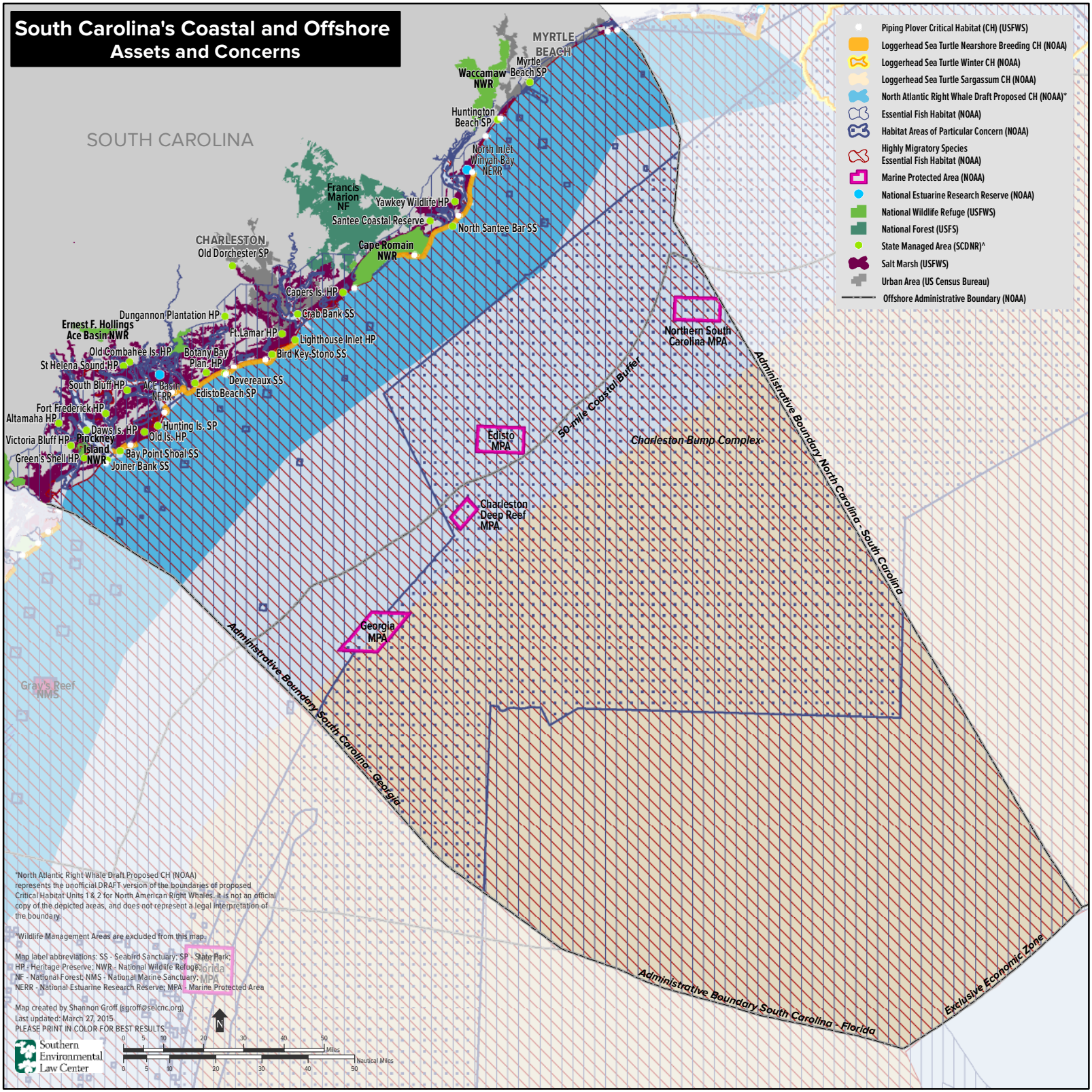
South Carolina's Coastal and Offshore Assets and Concerns
SOUTH CAROLINA
MYRTLE BEACH
Myrtle Beach SP
Waccamaw NWR
Huntington Beach SP
North Inlet Winyah Bay NERR
Francis Marion NF
Yawkey Wildlife HP
Santee Coastal Reserve
North Santee Bar SS
Cape Romain NWR
CHARLESTON
Old Dorchester SP
Capers Is. HP
Crab Bank SS
Dungannon Plantation HP
Ernest F. Hollings Ace Basin NWR
Ft. Lamar HP
Lighthouse Inlet HP
Old Combahee Is. HP
Botany Bay Plan. HP
Bird Key-Stono SS
St Helena Sound HP
South Bluff HP
ACE Basin NERR
Devereaux SS
Edisto Beach SP
Fort Frederick HP
Altamaha HP
Hunting Is. SP
Daws Is. HP
Old Is. HP
Victoria Bluff HP
Pinckney Island NWR
Bay Point Shoal SS
Green's Shell HP
Joiner Bank SS
Gray's Reef NMS
Northern South Carolina MPA
Edisto MPA
Charleston Deep Reef MPA
Georgia MPA
50-mile Coastal Buffer
Charleston Bump Complex
Administrative Boundary North Carolina - South Carolina
Administrative Boundary South Carolina - Georgia
Administrative Boundary South Carolina - Florida
Exclusive Economic Zone
Piping Plover Critical Habitat (CH) (USFWS)
Loggerhead Sea Turtle Nearshore Breeding CH (NOAA)
Loggerhead Sea Turtle Winter CH (NOAA)
Loggerhead Sea Turtle Sargassum CH (NOAA)
North Atlantic Right Whale Draft Proposed CH (NOAA)*
Essential Fish Habitat (NOAA)
Habitat Areas of Particular Concern (NOAA)
Highly Migratory Species Essential Fish Habitat (NOAA)
Marine Protected Area (NOAA)
National Estuarine Research Reserve (NOAA)
National Wildlife Refuge (USFWS)
National Forest (USFS)
State Managed Area (SCDNR)^
Salt Marsh (USFWS)
Urban Area (US Census Bureau)
Offshore Administrative Boundary (NOAA)
*North Atlantic Right Whale Draft Proposed CH (NOAA) represents the unofficial DRAFT version of the boundaries of proposed Critical Habitat Units 1 & 2 for North American Right Whales. It is not an official copy of the depicted areas, and does not represent a legal interpretation of the boundary.
^Wildlife Management Areas are excluded from this map.
Map label abbreviations: SS - Seabird Sanctuary; SP - State Park; HP - Heritage Preserve; NWR - National Wildlife Refuge; NF - National Forest; NMS - National Marine Sanctuary; NERR - National Estuarine Research Reserve; MPA - Marine Protected Area
Florida MPA
Map created by Shannon Groff (sgroff@selcnc.org)
Last updated: March 27, 2015
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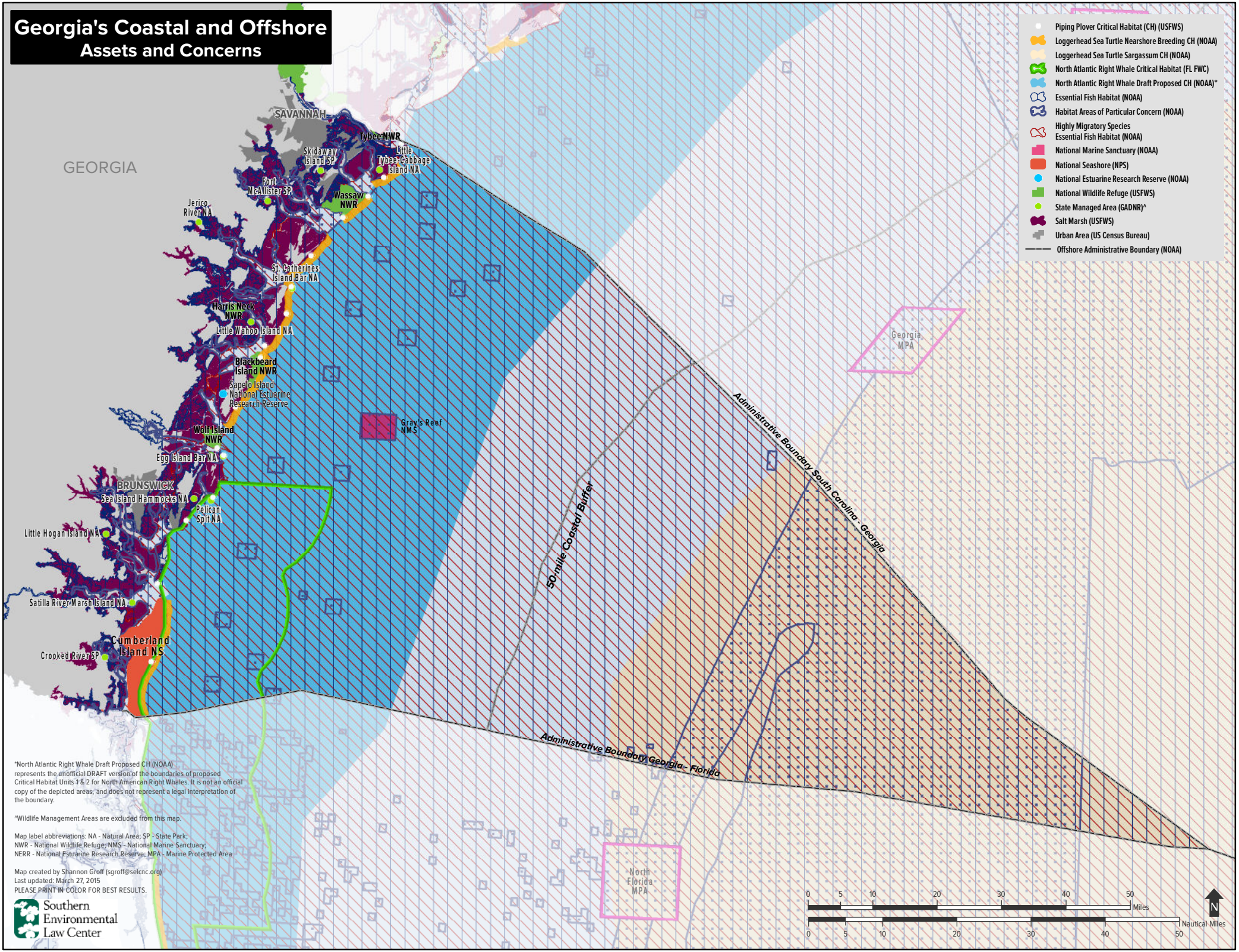
Southern Environmental Law Center
N
0 5 10 20 30 40 50 Miles
0 5 10 20 30 40 50 Nautical Miles

Georgia's Coastal and Offshore Assets and Concerns



*North Atlantic Right Whale Draft Proposed CH (NOAA) represents the unofficial DRAFT version of the boundaries of proposed Critical Habitat Units 1 & 2 for North American Right Whales. It is not an official copy of the depicted areas, and does not represent a legal interpretation of the boundary.

^Wildlife Management Areas are excluded from this map.

Map label abbreviations: NA - Natural Area; SP - State Park; NWR - National Wildlife Refuge; NMS - National Marine Sanctuary; NERR - National Estuarine Research Reserve; MPA - Marine Protected Area

Map created by Shannon Groff (sgroff@selcnc.org)
Last updated: March 27, 2015
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Southern Environmental Law Center

EXHIBIT H

SOUTHERN ENVIRONMENTAL LAW CENTER

Telephone 919-967-1450 | 601 WEST ROSEMARY STREET, SUITE 220 CHAPEL HILL, NC 27516-2356 | Facsimile 919-929-9421

April 21, 2015

Submitted via www.regulations.gov

Kim Damon-Randall
Assistant Regional Administrator, Protected Resources Division
Greater Atlantic Regional Office
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Re: Comments on Proposed Designation of Right Whale Critical Habitat: NOAA-NMFS-2014-0085

Dear Ms. Damon-Randall,

The Southern Environmental Law Center submits the following comments on behalf of the Virginia Conservation Network, North Carolina Wildlife Federation, North Carolina Conservation Network, North Carolina League of Conservation Voters, South Carolina Wildlife Federation, Conservation Voters of South Carolina, Coastal Conservation League, Surfrider Charleston, Waccamaw Riverkeeper, Dolphin Project, and Altamaha Riverkeeper in support of the National Marine Fisheries Service ("NMFS") proposal to expand critical habitat for the highly endangered North Atlantic right whale, 80 Fed. Reg. 9314 (Feb. 20, 2015). While the best available science warrants expansion of critical habitat for the species throughout its Atlantic Coast range in order to meet the conservation and recovery goals of the Endangered Species Act ("ESA"), 16 U.S.C. §§ 1531-1544, these comments will focus on the waters offshore Virginia, North Carolina, South Carolina, and Georgia, where our organizations are based. Our groups encourage NMFS to move forward expeditiously with the proposed expansion of designated critical habitat for the right whale's only known calving grounds from the existing area offshore Florida and Georgia, 59 Fed. Reg. 28,793 (June 3, 1994), northward into the waters off the coasts of South Carolina and North Carolina. We also encourage NMFS to reevaluate its decision not to designate as critical habitat the only known migratory corridor between the species' northern feeding and breeding grounds and its southern calving habitat.

Protection of the habitat essential to the survival and recovery of the North Atlantic right whale is especially important in light of the Administration's recent proposal to open the Atlantic to oil and gas leasing for the first time in 30 years. It is a significant omission for NMFS to identify oil and gas activities as potentially requiring management considerations or protections for foraging habitat included as Unit 1, 80 Fed. Reg. at 9330, but not as potentially affecting the calving habitat included as Unit 2. Just like the other activities identified by the agency as potentially affecting Unit 2 may hinder the right whale's use of the area for the essential life activities it is being designated to protect, oil and gas activities—including seismic testing,

drilling, vessel traffic, construction of infrastructure, and industrialization of the coast—may similarly render difficult or impossible the use of these waters by right whale mothers and calves, the most vulnerable and important members of this species. *Id*. at 9331.

I. Background

At the time of listing, NMFS is required to designate critical habitat "to the maximum extent prudent and determinable." 16 U.S.C. § 1533(a)(3)(A). Refusal to designate critical habitat is authorized under ESA regulations only if designation would not be beneficial to the species or might increase the threat of taking or other human activity, or if the biological needs of the species are not well enough known to permit designation. 50 C.F.R. § 424.12. Designation of critical habitat must be made "on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat." 16 U.S.C. § 1533(b)(2). The Secretary may exclude an area from critical habitat if she determines that "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned." *Id.*

Critical habitat shall include "the specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." 16 U.S.C. § 1532(5)(A). Critical habitat must also include areas outside the area occupied by the species at the time of listing if such areas are "essential for the conservation of the species." *Id*. "Conservation" is in turn defined as "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 chapter are no longer necessary." *Id*. § 1532(3). This definition of conservation, and thus the requirements for critical habitat, have been construed by the courts to be broader than simply avoiding jeopardy to the species, instead requiring steps to promote the recovery of the species. *See, e.g., Gifford Pinchot Task Force v. U.S. Fish and Wildlife Serv.*, 378 F.3d 1059 (9th Cir. 2004); *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 524 F.3d 917 (9th Cir. 2007). Further, "the designation of critical habitat serves as the principal means for conserving an endangered species, by protecting not simply the species, but also the ecosystem upon which the species depends." *Ctr. for Biological Diversity v. Norton*, 240 F. Supp. 2d 1090, 1101 (D. Ariz. 2003); *see also Conservation Council for Hawaii v. Babbitt*, 2 F. Supp. 2d 1280 (D. Haw. 1998) (stating that designating critical habitat "provides substantial, additional protection for a species beyond the consultation requirement").

Sections 3(5)(A)(i) and 4(a)(3) of the ESA and their implementing regulations at 50 C.F.R. § 424.12 require NMFS, when determining areas to propose as critical habitat, to consider areas containing the physical and biological features that are essential to the conservation of the species and may require special management considerations or protections. These features are the specific primary constituent elements (PCEs)—laid out in the appropriate quantity and spatial arrangement for the conservation of the species—and they include, but are not limited to:

(1) Space for individual and population growth, and for normal behavior;
(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;

(3) Cover or shelter;
(4) Sites for breeding, reproduction, [or] rearing of offspring . . . ; and
(5) Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

50 C.F.R. § 424.12(b). Any one or more of the identified PCEs sufficient to support the life-history processes of the species may qualify an area for designation as critical habitat.

Critical habitat was originally designated for the northern right whale in 1994, following the listing of the species as endangered in 1970. 59 Fed. Reg. 28,793 (June 3, 1994). The original designation included small areas offshore New England, Georgia and Florida as critical habitat for feeding and calving areas, respectively. While the North Atlantic population has seen growth in recent years, as well as the implementation of significant measures to address threats to the species, it remains one of "the world's most critically endangered large whale species and one of the world's most endangered mammals." 73 Fed. Reg. 60,173 (Oct. 10, 2008).

Increasing threats to the species due to further industrialization of the Eastern Seaboard, as well as an increase in information about the species' use of this habitat, make expansion of critical habitat necessary and appropriate to ensure the continued survival and recovery of the species. Notably, much of the well-accepted and widely used data that support this expansion were produced or compiled by NMFS itself, and NMFS has stated on numerous occasions that this information warrants the expansion of right whale critical habitat to include the species' essential habitat areas. *See, e.g*., 72 Fed. Reg. 34632, 34636 (June 25, 2007) (characterizing the area from the southern border of North Carolina through central Florida as a "core portion of the right whale calving area"); 75 Fed. Reg. 61690, 61691 (Oct. 6, 2010) (determining that "it is timely and appropriate to revise the 1994 designation of critical habitat . . . ").

II. NMFS Should Expeditiously Expand North Atlantic Right Whale Critical Habitat

As NMFS explains in its proposal, the 2005 Recovery Plan identifies four biological behaviors "critical to the overarching recovery objectives of increased survival and population growth: (1) Feeding, (2) calving, (3) migration and (4) breeding." 80 Fed. Reg. at 9316. NMFS has identified the physical and biological features necessary for the first two of these behaviors, yet found that there is insufficient information for designation of habitat for migration and breeding. We address both the biological features and the need for special management measures for right whale calving and migration in the sections below.

A. NMFS Should Finalize its Proposal for Unit 2: Calving Habitat

The only known calving habitat for North Atlantic right whales occurs along the southeastern coast of the United States. *Id*. at 9319. Recent aerial surveys indicate that calving and nursing occur from northeastern Florida and southeastern Georgia as far north as North Carolina. Importantly, the members of the species that use these waters are reproductive females—"the most valuable portion of this species' population"—and their newborn calves. *Id.* The key physical features of right whale calving habitat are calm sea surface conditions, warmer

sea surface temperatures, and water depths of 6 to 28 meters. *Id*. NMFS explains that these features "likely provide an energy benefit to both lactating mothers and calves"; provide for a decreased likelihood of separation between mothers and calves, which is likely to be fatal for newborns; and provide an optimum range of thermal tolerances for both mothers and calves. *Id*. at 9320. Mother-calf pairs are likely to move through the South Atlantic Bight to select optimal combinations of these factors depending on weather and the age of the calves. *Id*. at 9322.

It is clear from the best available science that the area of critical importance to calving right whales, as confirmed by sightings of calving right whales and newborn calves, is far larger than the current limited boundaries of critical habitat in the southeastern United States where the northern boundary of critical habitat lies at the Georgia/South Carolina border. The model developed by Good best delineates these important physical features and comports with the data showing pregnant females and newborn calves using and relying on habitat well northward into the waters off the coast of North Carolina.

In its most recent final and draft Marine Mammal Stock assessments for North Atlantic right whales, NMFS states that systematic surveys conducted off the coast of North Carolina during the winters of 2001 and 2002 sighted at least eight calves, "suggesting the calving grounds may extend as far north as Cape Fear," North Carolina. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2013, NOAA Technical Memorandum NMFS-NE-228 (July 2014), *available at* http://www.nmfs.noaa.gov/pr/sars/pdf/ao2013_tm228.pdf. Four of these calves were not sighted by surveys conducted further south and one of the mothers photographed was new to researchers. McLellan, W.A., E. Meagher, L. Torres, G. Lovewell, C. Harper, K. Irish, B. Pike, and A.D. Pabst, Presented at the 15th Biennial Conference on the Biology of Marine Mammals: Winter right whale sightings from aerial surveys of the coastal waters of the US Mid-Atlantic (2004).

More recent media reports also document the presence of newborns off the coast of North Carolina. In December 2008, for example, a newborn right whale stranded off the coast of Avon, North Carolina. It was likely born in this area, as it appeared to be less than a week old and a necropsy revealed that it had failed to thrive. *See* Irene Nolan, *Two more whales wash up on seashore beaches*, ISLAND FREE PRESS, Dec. 24, 2008, www.islandfreepress.org/2008Archives/12.16.2008-BabyRightWhaleWashesAshoreInAvon.html. In addition, a female right whale nicknamed "Calvin" is believed to have given birth twice offshore North Carolina, in the years 2004 and 2008, with one of the instances apparently just off the coast of Wrightsville Beach, North Carolina. *See* Gareth McGrath, *Right whale makes encore appearance off Wrightsville Beach*, STAR NEWS ONLINE, Dec. 30, 2008, http://www.starnewsonline.com/article/20081230/ARTICLES/812300287. This same female was also first seen in 2015 with a calf off the coast of North Carolina. This may indicate preferential use of calving habitat well to the north of the current calving critical habitat. *News from the 2015 Right Whale Calving Season*, RIGHT WHALE RESEARCH BLOG (Mar. 24, 2015), http://rightwhales.neaq.org/2015/03/news-from-2015-right-whale-calving.html?m=1. Likewise, two mothers with small calves were seen off the coast of North Carolina in March of 2014. NMFS, Searchable database: North Atlantic Right Whale Sightings, http://www.nefsc.noaa.gov/psb/surveys/.

B. Unit 2 May Require Special Management Considerations

As noted above, not only must critical habitat areas include the biological features essential to the conservation of the species, but they also can only be designated if they "*may* require special management considerations." 16 U.S.C. § 1532(5)(A) (emphasis added). Unit 2 clearly may require special management considerations to address the threats to the right whale's critical habitat. Among the activities that the agency lists that could have an adverse impact on the essential features of critical habitat in Unit 2 and thus require special management are offshore energy development, large-scale offshore aquaculture operations, and global climate change.

In discussing offshore energy development, NMFS acknowledges that the "[i]nstallation and operation of offshore energy development facilities are not likely to negatively impact the preferred ranges of sea surface roughness, sea surface temperatures, or water depths, in that it will not result in lowering or raising the available value ranges for these features." 80 Fed. Reg. at 9331. However, installation and operation of these technologies may fragment large, contiguous areas containing the optimum ranges of all essential features that are necessary for right whale calving and rearing. *Id.* The agency goes on to say that aquaculture facilities "could force whales to abandon these areas . . . by acting as a barrier, or limiting the whales' ability to move about, and find and use the optimal combinations of essential features necessary for successful calving and rearing." *Id.*

These same considerations apply to oil and gas activities, which NMFS did not identify as potentially requiring special management measures in Unit 2. First, oil and gas rigs and supportive structures could themselves act as the type of barriers NMFS identifies with regard to other activities. While BOEM's proposed 50-mile buffer for oil and gas leasing in the 2017-2022 program would most likely place these drilling rigs outside the critical habitat area, the state of North Carolina and other interests have requested the removal or reduction of this barrier, which could bring oil and gas development closer to shore and the right whale habitat for both calving and migration. Second, significant vessel traffic and infrastructure development is likely to occur in the calving grounds (and migratory corridor) regardless of the buffer for leasing. Third, the types of discharges and pollution identified as potentially impacting the food resources of Unit 1 could also affect the small and vulnerable newborn calves in Unit 2.

Critically, NMFS has also failed to mention the potential impacts of noise on right whale mothers and calves and their need to stay together during the calving and nursing season and their migration north. The need for noise levels to remain below those that would cause abandonment of critical habitat has previously been recognized by NMFS in its designation of critical habitat for other sound dependent marine mammals. *See, e.g.*, Designation of Critical Habitat for Cook Inlet Beluga Whale, 69 Fed. Reg. 20180 (Apr. 11, 2011). Such considerations are critical for these most important and vulnerable members of the North Atlantic right whale population at the time right after birth, during nursing and their first migration to the species' northern feeding grounds.

Noise from oil and gas activities in this area could be significant, including most notably and immediately seismic surveys that have been proposed for the coast of Delaware through Florida. If approved, oil companies would tow arrays of high-volume seismic airguns that fire

intense pulses of compressed air approximately every twelve seconds around the clock for weeks or months on end in order to evaluate the oil and gas resources available for extraction. It is well established that the high-intensity pulses produced by airguns can cause a range of deleterious 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 injuries and mortalities. *See* Letter from Seventy-Five Scientists to President Obama (Mar. 5, 2015), *available at* http://news.neaq.org/2015/03/full-text-letter-urging-president-to.html (expressing concern that these surveys would: result in "over 20 million seismic shots" in the Atlantic; "represent[] a significant threat to marine life throughout the region"; and "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 . . .").

Consistent with their acoustic footprint, most of these impacts are felt on an extraordinarily wide geographic scale, especially by endangered baleen whales, whose vocalizations and acoustic sensitivities overlap with the enormous low-frequency energy that airguns blast into the water. According to recent modeling from scientists at Cornell University and NOAA, North Atlantic right whales are particularly vulnerable to masking effects from airguns given the acoustic and behavioral characteristics of their calls. 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).

In its Record of Decision for Atlantic Outer Continental Shelf Geological and Geophysical Activities in the Mid- and South Atlantic Planning Areas, the Bureau of Ocean Energy Management selected Alternative B in part because it "would reduce the risk of acoustic and vessel strike impacts to [North Atlantic right whales] and some other marine mammals by precluding certain surveys in a portion of the [Area of Interest] during certain times of the year." *See* Record of Decision, *available at* http://www.boem.gov/Record-of-Decision-Atlantic-G-G/. These additional mitigation measures largely key off of designated critical habitat and should logically be expanded to any extension of critical habitat protections in order to protect this area that is essential to the conservation of mother and calf right whales.

Finally, there exists a real risk of oil spills from oil and gas activities off the coast of the southeastern United States. NMFS acknowledges this in the Northeast, where whales are actively feeding, but impacts to vulnerable newborn calves and lactating mothers could be present in this area as well. Abandonment of an area is also a concern with regard to this risk. Oil spills do not respect arbitrary boundaries such as the proposed offshore leasing buffer or designated critical habitat, and discharges could well affect right whales that inhabit and transit through these waters.

C. NMFS Should Designate Migratory Habitat

NMFS acknowledges that right whales migrate seasonally between their Northeast foraging habitats and their Southeast calving grounds, each of which is currently designated as critical habitat for the species and proposed for expansion. As discussed above, migration is one

of the four biological behaviors that NMFS has identified as being critical to the recovery objectives of increased survival and population growth for right whales. 80 Fed. Reg. at 9316. The regular transit of right whales through the shallow nearshore waters in these areas places them at risk of death and injury in these heavily trafficked and increasingly industrialized areas. There is no other route between their northern feeding areas and their southern calving ground that meets the conditions available in the corridor currently used (i.e, shallow, minimal slope, nearshore). Just as with the southern calving grounds, protection of this area is especially important for mothers and calves, the "most biologically valuable portion of the species' population." *Id*. at 9319.

NMFS' claim that it cannot currently identify any specific physical or biological features that define migratory habitat undervalues the data in the studies that NMFS presented, as well as other data the agency has relied upon in other rulemakings regarding protections for North Atlantic right whales. With regard to documented movements of the animals in the mid-Atlantic, the agency's summary in the Federal Register relies primarily on a single study of the broad movements of two tagged animals to conclude that not all right whales migrate within 30 miles of shore, the distance referenced in the petition as proposed critical habitat. While not all right whales are found within 30 miles of the coast, the tagging data from Schick show that the tagged whales were primarily found within 30 miles of the coast of the mid-Atlantic and only appeared to travel significantly farther from shore when rounding the proverbial corner between the Delaware Bay area toward Block Island Sound. In addition, a recently published report of the tagging of two right whales in 2014 showed a similar nearshore travel pattern, with all movements occurring on the narrow shelf to Chesapeake Bay and only moving farther offshore and northward of that area where the shelf is broader. *See* Russ Andrews, R., C. George, K. Jackson, T. Martinez, T. Pitchford and B. Zoodsma, Satellite tagging of North Atlantic right whales: Development and application of improved tag attachment methods, ALASKA SEALIFE CENTER (updated Mar. 13, 2015), *available at* http://www.alaskasealife.org/New/research/index.php?page=sat_tagging.php.

With regard to identifying biological features essential to the conservation of the species along its migratory route, Knowlton found that 93 percent of all sightings are within 25 fathoms of water and 80.5 percent of sightings are within 15 fathoms of water, indicating reliable physical parameters that are likely features for the mid-Atlantic migratory corridor. *See* Knowlton, Amy R., J.B. Ring, and B. Russell, Right Whale Sightings and Survey Effort in the Mid Atlantic Region: Migratory Corridor, Time Frame, and Proximity to Port Entrances (July 2002), *available at* http://www.greateratlantic.fisheries.noaa.gov/shipstrike/ssr/midatanticreportrFINAL.pdf. Again, the agency dismisses this finding as being effort-biased. Such a dismissal of this information in making a determination that there are no physical features to define the migratory corridor is arbitrary and capricious, and fails to comply with the agency's mandates under the ESA to rely on the best available scientific data in designating critical habitat.

D. Migratory Habitat May Require Special Management Considerations

For all of the reasons discussed above, migratory habitat may also require special management considerations. Ensuring that mothers and calves are not disturbed as they transit the Mid-Atlantic on their way to the southern calving grounds is essential to the conservation of

the species. This area and the essential life activities that occur there may well be impacted by the activities NMFS has identified for Unit 2, as well as by oil and gas activities, vessel traffic, and other federal actions.

III. NMFS Should Not Exclude Areas from Critical Habitat Based on Economic or Other Impacts

In addition to the requirements listed above, the ESA also requires the NMFS to "[take] into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat." 16 U.S.C. § 1533(b)(2). The ESA allows NMFS, but *does not require it* to exclude an area from critical habitat if "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat." *Id.* No area may be excluded from critical habitat designation if its exclusion will result in the extinction of the listed species. *Id.* The regulations also specify that only the impact of proposed or ongoing activities in the area may be considered, implying that overly speculative impacts should not be considered in the cost-benefit analysis. 50 C.F.R. § 424.19.

NMFS has not proposed to exclude any areas from designation based on economic impacts at this time, yet we anticipate the agency will receive requests for exclusion during the current comment period, based largely on misperceptions about the impact of critical habitat designation. We anticipate and expect that NMFS will subject any requests for exclusion to a thorough public review, including notice and opportunity for comment, just as it has its critical habitat proposal. As NMFS is well aware, designation of critical habitat does not on its own directly impose any burdens on state or local governments, businesses, or individuals. The greatest impact of critical habitat designation is the requirement for consultation on activities authorized, funded, or carried out by a federal agency to ensure that such activities will not result in destruction or adverse modification of critical habitat, i.e., affecting it in a way that will significantly impair its conservation functions. As NMFS has already been consulting on the impact of federal agency actions to right whales themselves for decades, any incremental burden during consultation is likely to be minimal.

Furthermore, we encourage NMFS to fully consider the positive economic benefits of critical habitat designation, including, in particular, the tourism benefits of right whale habitat protection. NMFS should consider the directly relevant work of John Loomis on the economic benefits of southern sea otter protection in California. John B. Loomis, *Estimating recreation and existence values of sea otter expansion in California using benefit transfer*, COASTAL MANAGEMENT 34(4):387-404 (2004). The beneficiaries to be considered in this analysis include all individuals in the country who derive value from the knowledge that right whales exist and are maintained for future generations. Thus, even if only a relatively small share of the total U.S. population holds passive use values for right whales, the total number of beneficiaries is still likely to be large in absolute terms. *See generally* John B. Loomis, *Vertically summing public good demand curves: An empirical comparison of economic and political jurisdictions*, LAND ECONOMICS 76(2): 312-321 (2000) (finding that even small changes in the population of a threatened or endangered species can generate large welfare impacts).

IV. Conclusion

Thank you for your consideration of these comments. In closing, our organizations strongly support the proposed designation of critical habitat for North Atlantic right whales. We further urge NMFS to expand its proposal to include additional areas that will provide for the conservation of the species based on the best scientific evidence currently available. Please contact me if you have any questions regarding these comments. We look forward to working with you to complete the designation of critical habitat for the right whale.

We anticipate that NMFS will receive requests for exclusion during the current public comment period, based largely on misperceptions about the impact of critical habitat designation. Should NMFS arbitrarily choose to reverse course and exclude areas based on economic impacts, we anticipate and expect that NMFS will subject any requests for exclusion to a thorough public review, including notice and opportunity for comment. In any such analysis, NMFS should fully consider the positive economic benefits of right whale critical habitat designation, including, in particular, the tourism benefits from protecting the right whale's habitat. Finally, as NMFS correctly acknowledges, all of the current critical habitat, as well as the proposed expansion, is *occupied* habitat. Thus, any Section 4(b)(2) analysis should weigh even more heavily against exclusion.

Sincerely,

Sierra B. Weaver
Senior Attorney