UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Environmental Assessment for Issuance of a Permit [File No. 15415] for Visual Stimuli Research on North Atlantic Right Whales

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Location:	North Atlantic Ocean – Northeast United States

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue a three-year scientific research permit for takes of marine mammals in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq.*) and the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq.*). Permit No. 15415 would authorize harassment of North Atlantic right whales (*Eubalaena glacialis*) along the U.S. Atlantic coast from New York to Maine. Activities would include close approach by vessel to observe and photograph right whales. The purpose of the research is to evaluate the effectiveness of visual deterrents on right whale behavior to reduce entanglement in fishing gear.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 Description of Action

In response to receipt of an application for a scientific research permit from Scott Kraus, Ph.D., New England Aquarium, NMFS proposes to issue Permit No. 15415 authorizing "takes"[1] by Level B harassment[2] of marine mammals in the wild pursuant to:

- the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq.*),
- the regulations governing the taking and importing of marine mammals (50 CFR Part 216),
- the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq.*), and
- the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

1.1.1 Purpose and Need

The primary purpose of the permit is to provide an exemption from the take prohibitions under the MMPA and ESA to allow "takes" by Level B harassment of marine mammals, including endangered species, for *bona fide*[3] scientific research. The need for issuance of the permit is related to NMFS' mandates under the MMPA and ESA. Specifically, NMFS has a responsibility to implement both the MMPA and the ESA to protect, conserve, and recover marine mammals and threatened and endangered species under its jurisdiction. The MMPA and ESA prohibit takes of marine mammals and threatened and endangered species, respectively, with only a few very specific exceptions, including for scientific research and enhancement purposes. Permit issuance criteria require that research activities are consistent with the purposes and policies of these federal laws and will not have a significant adverse impact on the species or stock.

1.1.2 Need for Proposed Research and Research Objectives

Under the ESA and MMPA, NMFS is responsible for the conservation and recovery of most endangered and threatened marine mammals. Scientific research is an important means of gathering valuable information about these species and is necessary to conserve them and promote their recovery. The purpose of the research is to evaluate the effectiveness of visual deterrents on right whale behavior to reduce entanglement in fishing gear. The research proposed is a priority of the Atlantic Large Whale Take Reduction Team (ALWTRT). Implementation of this project

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[1] Under the MMPA, "take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." [16 U.S.C. 1362(18)(A)] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The term "harm" is further defined by regulations (50 CFR §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering."

[2] "Harass" is defined by regulation (50 CFR §216.3) as "Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment)."

[3] The MMPA defines bona fide research as "scientific research on marine mammals, the results of which – (A) likely would be accepted for publication in a refereed scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems."

would provide some indication to NMFS and the ALWTRT whether this is a bycatch reduction approach that warrants additional research and development. This work needs to be done on right whales because the limited data suggests that visual capabilities are unique to each species, so that visual testing on other species would not provide a realistic assessment of the role vision plays in right whale entanglements. The proposed research would contribute to ongoing photo-identification, disentanglement, and behavioral research.

1.2 Other EA/EIS that Influence Scope of this EA

NMFS has completed recent EAs demonstrating that the kind of research activities proposed do not have a potential for significant adverse impacts on the quality of the human environment and do not have adverse effects on ESA-listed North Atlantic right whales that are the subject of the research permit. Each of those EAs supported a finding of no significant impact (FONSI), and was accompanied by an ESA section 7 Biological Opinion concluding that the permitted research is not likely to jeopardize the continued existence of North Atlantic right whales or result in adverse modification of critical habitat. NEPA documents that influence the scope of this EA are:

- Environmental Assessment On the Issuance of Two Scientific Research Permits for Aerial and Vessel Surveys of North Atlantic Right Whales, FONSI signed September 2010 [File Nos. 14233 and 14603].
- Environmental Assessment On the Issuance of a Scientific Research Permit to the National Marine Fisheries Service Northeast Fisheries Science Center [Responsible Party: Dr. Nancy Thompson] to Conduct Research on Marine Mammals in the North Atlantic Ocean, FONSI signed January 2008 [File No. 775-1875].
- Environmental Assessment On Issuance Of Permits For Aerial And Vessel Surveys Of Marine Mammals In The Western North Atlantic, FONSI signed April 2005 [multiple File Nos.].
- On October 17, 2005, NMFS issued a notice of intent to voluntarily prepare an EIS (70 FR 60285) for issuance of permits for research on Northern right whales, in order to consider long-range planning needs and efficiencies in the permitting process. In accordance with NEPA and its implementing regulations at 40 CFR Section 1506.1, nothing precludes NMFS from issuing permits in the interim while the EIS is being developed.

1.3 Scoping Summary

The purpose of scoping is to:

- identify the issues to be addressed,
- identify the significant issues related to the proposed action,
- identify and eliminate from detailed study the non-significant issues,
- identify and eliminate issues that have been covered by prior environmental review, and
- identify the concerns of the affected public and Federal agencies, states, and Indian tribes.

The Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) do not require that a draft EA be made available for public comment as part of the scoping process. However, this draft EA is

available for review and comment concurrent with the requisite public comment period for the permit application.

The MMPA and its implementing regulations governing issuance of special exception permits for scientific research (50 C.F.R. §216.33) require that, upon receipt of a valid and complete application for a new permit, and the preparation of any NEPA documentation that has been determined initially to be required, NMFS publish a notice of receipt in the *Federal Register*. The notice summarizes the purpose of the requested permit, includes a statement about whether an EA or EIS was prepared, and invites interested parties to submit written comments concerning the application.

The application was made available for public review and comment for 30 days and provided to the Marine Mammal Commission pursuant to 50 CFR §216.33 (d)(2). No substantive comments from the public were received.

1.4 Applicable Laws and Necessary Federal Permits, Licenses, and Entitlements

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action, as well as who is responsible for obtaining them. Even when it is the applicant's responsibility to obtain such permissions, NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action.

1.4.1 National Environmental Policy Act

NEPA was enacted in 1969 and is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS' issuance of permits for research represents approval and regulation of activities. Although NEPA does not dictate substantive requirements for permits, licenses, etc., it requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the CEQ's implementing regulations (40 CFR Parts 1500-1508).

Through NOAA Administrative Order (NAO) 216-6, NOAA established agency procedures for complying with NEPA and the implementing regulations issued by CEQ. NAO 216-6 specifies that issuance of scientific research permits under the MMPA and ESA are categorically excluded from further environmental review, except under extraordinary circumstances.
NMFS must prepare an EA or EIS when a proposed action:

- is the subject of public controversy based on potential environmental consequences,
- has uncertain environmental impacts or unknown risks,
- establishes a precedent or decision in principle about future proposals,
- may result in cumulatively significant impacts, or
- may have an adverse effect upon endangered or threatened species or their habitats.

While issuance of scientific research permits is typically subject to a categorical exclusion, as described in NAO 216-6, NMFS is preparing an EA for this action to provide a more detailed analysis of effects to ESA-listed species. This EA is prepared in accordance with NEPA, its implementing regulations, and NAO 216-6.

1.4.2 Endangered Species Act

Section 9 of the ESA, as amended, and Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption such as by a permit. Permits to take ESA-listed species for scientific purposes, or for the purpose of enhancing the propagation or survival of the species, may be granted pursuant to section 10(a)(1)(A) of the ESA.

NMFS has promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and has produced application instructions approved by the Office of Management and Budget (OMB) that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA.

Section 10(d) of the ESA stipulates that, for NMFS to issue permits under Section 10(a)(1)(A) of the ESA, the Agency must find that the permit: was applied for in good faith; if granted and exercised will not operate to the disadvantage of the species; and will be consistent with the purposes and policy set forth in Section 2 of the ESA.

Section 2 of the ESA sets forth the purposes and policy of the Act. The purposes of the ESA are to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in Section 2(a) of the ESA. It is the policy of the ESA 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 the ESA. In consideration of the ESA's definition of conserve, which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary for its continued existence (i.e., the species is recovered), exemption permits issued pursuant to Section 10 of the ESA are for activities that are likely to further the conservation of the affected species.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or adversely modify critical habitat. NMFS issuance of a permit affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402)

1.4.3 Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the United States (including territorial seas) with a few exceptions. Permits for *bona fide* scientific research on marine mammals, or to enhance the survival or recovery of a species or stock, issued pursuant to section 104 of the MMPA are one such exception. These permits must specify the number and species of animals that can be taken, and designate the manner (method, dates, locations, etc.) in which the takes may occur. NMFS has sole jurisdiction for issuance of such permits and authorizations for all species of cetacean, and for all pinnipeds except walrus[4].

NMFS may issue a permit or authorization pursuant to section 104 of the MMPA to an applicant who submits with their application information indicating that the taking is required to further a bona fide scientific purpose. An applicant must demonstrate to NMFS that the taking will be consistent with the purposes of the MMPA and applicable regulations. If lethal taking of a marine mammal is requested, the applicant must demonstrate that a non-lethal method of conducting research is not feasible. NMFS must find that the manner of taking is "humane"[5] as defined in the MMPA. In the case of proposed lethal taking of a marine mammal from a stock listed as "depleted" NMFS must also determine that the results of the research will directly benefit the species or stock, or otherwise fulfill a critically important research need.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has produced OMB-approved application instructions that prescribe the procedures (including the form and manner) necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA.

1.4.4 National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA; 32 U.S.C. 1431 *et seq.*) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance. The National Marine Sanctuary Program (NMSP), operating under the NMSA and administered by NOAA's National Ocean Service (NOS) has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. Obtaining special use permits is the responsibility of individual researchers. However, as a courtesy, the Office of Protected Resources consults with NOS when proposed research would occur in or near a National Marine Sanctuary.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs and related mitigation of each alternative. One alternative is the "No Action" alternative where the proposed permit would not be issued. The No Action alternative is the baseline for rest of the analyses. The Proposed Action alternative

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[4] The U.S. Fish and Wildlife Service has jurisdiction for walrus, polar bears, sea otters, and manatees.

[5] The MMPA defines humane in the context of the taking of a marine mammal, as "that method of taking which involves the least possible degree of pain and suffering practicable to the mammal involved."

represents the research proposed in the submitted application for a permit with standard permit terms and conditions specified by NMFS.

2.1 Alternative 1 – No Action

Under the No Action alternative, Permit No. 15415 would not be issued. This alternative would not affect any existing NMFS research permits or future requests for permits or amendments. Current research permits would remain active and NMFS would continue to evaluate new permit requests as they are received, including requests from the applicant.

2.2 Alternative 2 – Proposed Action (Issuance of Permit with Standard Conditions)

Under the Proposed Action alternative, a three-year research permit would be issued for activities proposed by the applicant. The permit would include terms and conditions standard to such permits as issued by NMFS. Proposed activities would include close vessel approach for behavioral observations, monitoring, and photo-identification of target animals and incidental harassment of conspecifics, should it occur, and are summarized here. For additional information see the application.

Research Summary

The work proposed for this permit is focused on evaluating juvenile and adult right whale visual capabilities, to determine whether the sensory and behavioral capabilities of right whales can be used to avoid fishing gear interactions. Based on initial anatomical studies conducted by others, Dr. Kraus plans to develop colored visual stimuli to determine if right whales are responsive to various color and light characteristics. These stimuli would mimic rope and consist of colored rigid pipes, placed in the water near the travelling path of the whale. The proposed research would seek to identify those characteristics (color and/or pattern) which might be used to help whales avoid entanglements at depth and in conditions of poor visibility. Should certain visual characteristics prove effective at helping right whales avoid underwater ropes, those characteristics might be incorporated into fishing gear, thereby reducing or eliminating the rate of bycatch and mortality in fishing gear. Takes would be authorized for the Level B harassment of whales for researchers to approach animals within 100 yards to photo-identify, observe or monitor animals as needed. However, it should be noted that during trials the research vessel would be at least 100 yards from the animal, consistent with NMFS Northeast Region's wildlife viewing guidelines, for the majority of the encounter. Proposed take numbers are listed in Table 1.

Table 1. Proposed Annual Takes of Juvenile and Adult Right Whales along the U.S. East Coast from New York Harbor to the Maine-Canada border.

SPECIES	PROPOSED TAKE	TAKE ACTION	PROCEDURES	DETAILS
Whale, right, North Atlantic	200	Harass	Incidental harassment; Observation, monitoring; Observations, behavioral; Photo-id; Photograph/Video	Seasons: April to May and September to October. Some individuals may be taken up to 5 times annually.

Duration
Beginning in 2011 the proposed research would take place from April to May and from September to October annually for three years. It is the applicant's intent to conduct the trials in two years but the permit would authorize the work for three years in the event that the study cannot be completed in two.

Action Area
Research would occur in U.S. coastal waters of the North Atlantic from New York Harbor to the Maine-Canada border. This would include waters of the Gulf of Maine, Cape Cod Bay and New York Bight. Most research would occur in the spring in Cape Cod Bay, since it offers the potential to observe right whales travelling at the surface, and to evaluate behavioral responses by looking for changes in whales' paths near rope mimics. However, other opportunities in other locations throughout the action area may be used to test this gear in the vicinity of surface-swimming right whales.

Methods

Testing the effects of visual stimuli on right whales
Rope mimics would be created out of rigid PVC pipe that is approximately the same diameter as rope. The PVC would be painted with the test colors selected in advance, and based upon the findings of Dr. Jeff Fasick's (2010) work currently underway on light frequency sensitivity and visual pigments in right whales. Tests would include fluorescence, which converts light from one wavelength to another, and can increase visual contrast by producing 'extra bright' colors, similar to the effect seen in orange traffic cones or safety vests. In addition, Dr. Kraus plans to test two illumination patterns: 1) a steady glow and 2) low-intensity flashing LED lights. PVC lengths would be 4 m or longer, greater than a right whale's mouth opening (ca 3 meters) to ensure that no whale would get its mouth or flipper entangled in the rope mimic.

In one version of the illuminated rope mimic, Dr. Kraus would use a paint form of the glow-in the dark compound that he incorporated in rope developed four years ago. This compound is inert underwater, glows for 24 hours after a 5 minute sunlight exposure, and is a green/yellow color. As an alternative, Dr. Kraus would test a rope mimic with 1 to 5 watt blinking LED lights either embedded inside it, or drilled into the side of it. PVC is translucent, so a small portion of the pipe would glow on both sides of the LED regardless of attachment. LEDs would be spaced between one and five meters apart. LEDs come in a variety of colors, so color selection would be made based upon Dr. Fasick's work.

Deployment of the rope mimics would involve weighting one end and attaching a float at the other end, so that the whale is presented with the equivalent of a vertical buoy line near the surface. Mimics would be retrieved after each trial.

Trials would be conducted from the 46' R/V Galatea, an inboard diesel powered Jarvis-Newman, which has been re-configured for whale research, with a fly-bridge for observations, a quiet low-cavitation propeller and low emissions exhaust systems. To test the effects of different color visual stimuli on right whale behavior, Dr. Kraus would work in the evening at twilight, using binoculars and when needed, night vision equipment to monitor whale behavior. Night vision

equipment would be used to observe right whales, with effectiveness out to about 200 meters. Experimental presentations of colored and illuminated rope mimics would take place within 200 meters of the boat. Where possible, the rope mimics would be placed at a right angle in front of the trajectory of the whale (or group of whales) by dropping it from the observation vessel at least 100 m in front of the whale while travelling at a slow speed. The vessel would travel about 100 yards past the drop point, stop, and shut down, at an observation point approximately 100 yards perpendicular from the estimated path of the whale. Most right whales appear oblivious to the presence of idling vessels, so the applicant does not anticipate any response to this maneuver. When whales are at the surface, attempts would be made to work with whales traveling on relatively straight lines. Individual whales would be photographically identified to eliminate or account for duplicative sampling of the same individuals. Non-deployment control trials also would be conducted and designed to duplicate the rope-mimic deployment trials as much as possible, so as to distinguish the whale response to the boat from the rope mimics. Data would be collected on respiration rates throughout each trial. Whale turning angles (which represent the whale's change of direction to avoid the rope-mimic stimulus) would be recorded using GPS positioning and inclinometers to determine each surfacing location for each whale during each trial.

The applicant proposes to conduct 20 trials per day (10 pairs of 2 treatments—a control and trial with the rope mimic). Dr. Kraus would test a different color/stimulus each day for up to a maximum of 10 days each year. The preliminary plan is to test three different colors and 2 different illumination sources (one steady glow, one flashing LED system). There would be equal numbers of trials for each type of visual stimulus presentation (each color), and control trials with no rope-mimic deployed. He anticipates needing up to 10 days at sea to account for variability in weather and whale behavior to accomplish the study.

Dr. Kraus expects a trial to last approximately 10 minutes (range of 5-15 minutes per trial) from the rope mimic placement to the whale/mimic encounter. If all 10 trials cannot be completed in a single day, researchers would continue the work into the next day. A total of 200 Level B takes per year (one control and one test trial for ten trials = 20/day times 10 days = 200 takes/year) would be authorized. Dr. Kraus does not intend to approach whales within 100 yards, however, he would need a take for each control trial, because researchers cannot predict the path that the whale would take, and they would be photographing each whale in the experiment. Authorized takes would also cover the incidental harassment of any conspecifics that may come within 100 yards of the vessel during research.

In the second year of the study, researchers would adjust colors, color patterns, and/or illumination patterns to refine and confirm the findings from year one. This may also be used to test particular age classes. For example, juveniles appear to be more prone to entanglements, and it is necessary to determine if this is due to naive behavior, poor navigation skills, or curiosity. Analyses would use standard statistical methods to determine the significance of the observed responses to the visual stimuli.

Minimization measures

The applicant noted the following measures that would minimize the potential for harassment or harm to animals during research. Researchers would only target juvenile or adult right whales.

Observations would occur from a vessel that is shut down and stationary, to minimize any potential boat effect on the behavior of the whales, and to maximize boat stability for those observations. In all boat maneuvers during this experiment, particularly those designed to set in place the visual stimuli, vessel speeds would be a constant idle, with no rapid turns or acceleration.

If the vessel needs to approach a whale for identification purposes, boat speeds would be constant and at an idle, and vessel encounter trajectories would be from the side and slowly convergent. These methods habituate the whale to the immediate presence of the vessel, and cause minimal (if any) alteration of behavior.

The visual stimuli would be rigid small diameter PVC pipes that are painted with different colors, and equipped with a float at one end and a small weight at the other. Each pipe would be too long to fit in a whale's mouth, and rigid, so it cannot wrap around any appendages. In any encounter between whale and stimulus, these pipes would simply bounce off the whale.

In addition, disturbance to animals would be minimized during close vessel approaches by:

- Approaching at minimal speeds from beside the animal.
- Using caution when approaching females with calves.
- Coordinating fieldwork by email and phone with other research groups including Provincetown Center for Coastal Studies and NMFS Northeast Fisheries Science Center.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the alternatives on the environment are discussed in Chapter 4.

The proposed activities would occur in U.S. waters of the North Atlantic from New York Harbor to the Maine-Canada border.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

Economic and social factors are listed in the definition of effects in the NEPA regulations. However, the definition of human environment states that "economic and social effects are not intended by themselves to require preparation of an EIS." An EA must include a discussion of a proposed action's economic and social effects when these effects are related to effects on the natural or physical environment. The social and economic effects of the proposed action mainly involve the effects on the people involved in the research, as well as any industries that support the research, such as charter vessels, and suppliers of equipment needed to accomplish the research. There are no significant social or economic impacts of the proposed action related to significant natural or physical environmental effects, so no further analyses were completed.

3.2 PHYSICAL ENVIRONMENT

3.2.1 National Marine Sanctuaries

All holders of NMFS' scientific research permits conducting work within a National Marine Sanctuary are required to obtain appropriate authorizations from and coordinate the timing and location of their research with NOAA's NMSP to ensure that the research would not adversely impact marine mammals, birds or other animals within the sanctuaries. In addition, permit actions including those in the proposed action are sent to the NMSP for review if research is to occur in sanctuary waters. Under the proposed action, activities might occur in the Stellwagen Bank National Marine Sanctuary.

Stellwagen Bank National Marine Sanctuary

The Gerry E. Studds Stellwagen Bank NMS, at the mouth of Massachusetts Bay between Cape Cod and Cape Ann, is important to North Atlantic right whales as a feeding ground and migratory path along the eastern coast of North America. This 842 square mile sanctuary is also important to the local economy, particularly regarding its use by the shipping, fishing, and whale-watching industries. In addition to its importance to right whales, Stellwagen Bank is important habitat for a variety of marine species including leatherback and loggerhead sea turtles, humpback and fin whales, harbor porpoises, Atlantic white-sided dolphins, harbor and gray seals, numerous fish species (*e.g.*, basking sharks, Atlantic bluefin tuna, Atlantic cod, winter flounder), 40 species of sea birds (*e.g.*, Wilson's storm petrel, shearwaters, northern fulmar, and northern gannets, terns, gulls and, in the winter, alcids and large numbers of black-legged kittiwakes), and a variety of invertebrates (*e.g.*, sea scallops, northern lobster, sponges, soft corals, anemones, sea stars, sand dollars and sea urchins, marine worms, and squid). Water depths range from 65 ft on the southwest corner to depths of about 600 ft in deep passages to the northeast. Massachusetts Basin on the western side of the sanctuary levels off at about 300 ft in depth, while the top of the bank averages about 100 to 120 ft.

3.2.2 Designated Critical Habitat

The ESA provides for designation of "critical habitat" for listed species and includes physical or biological features essential to the conservation of the species. Critical habitats may require special management considerations or protection. Critical habitat designations affect only federal agency actions or federally funded or permitted activities. Research would be conducted in North Atlantic right whale critical habitat in the Northeast Atlantic.

Great South Channel (GSC)

The GSC is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, Massachusetts. The channel is bordered on the west by Cape Cod and Nantucket Shoals, and on the east by Georges Bank. The average depth is 175m with a maximum depth to about 200m to the north. The V-shaped 100-m isobath effectively delineates the steep drop-off from Nantucket Shoals and Georges back to the deeper basins. On the southwestern fringe of the GSC lies the GSC Sliver Restricted Area, a region established as a Marine Managed Area in 1977. Both the GSC and the Sliver Region are subjected to fisheries management and lie within the Mandatory Ship Reporting System boundaries.

The GSC is one of the most used cetacean habitats off the northeastern United States (Kenney & Winn 1986). The late winter/early spring mixing of warmer shelf waters with the cold Gulf of Maine water funneled through the channel causes a dramatic increase in faunal productivity in the area (Sherman et al. 1987). This increase in zooplankton fauna, the main food source for baleen whales, attracts an abundance of mysticetes to the GSC region. Three "high-use" shipping corridors and numerous fisheries operate within the GSC, making ship-strikes and fishing gear entanglements major threats to baleen whale survival in this region.

Cape Cod Bay (CCB)

CCB is a large embayment on the U.S. Atlantic Ocean off the state of Massachusetts bounded on three sides by Cape Cod and the Massachusetts coastline from Plymouth, MA, south. To the north, CCB opens to Massachusetts Bay and the Gulf of Maine. CCB has an average depth of about 25 m (82 ft) and a maximum depth of about 65 m (213 ft). The deepest area of CCB is in the northern section, bordering Massachusetts Bay.

The general water flow is counter-clockwise, running from the Gulf of Maine south into the western half of CCB, over to eastern CCB, and back into the Gulf of Maine through the channel between the north end of Cape Cod (Race Point) and the southeast end of Stellwagen Bank, a submarine bank that lies just north of Cape Cod. Flow within the bay is driven by density gradients caused by freshwater river run-off from the Gulf of Maine (Franks and Anderson 1992; Geyer et al. 1992) and by a predominantly westerly wind.

Thermal stratification occurs in the bay during the summer months. Surface water temperatures typically range from 0 to 19°C throughout the year. Salinity is fairly stable at around 31-32 ppt. Much of the bottom is comprised of unconsolidated sediments, with finer sediments occurring in the deeper waters (Davis 1984). In shallow areas, or where there is sufficient current, sediments tend to be coarser.

The late winter/early spring zooplankton fauna of CCB consists primarily of copepods, represented predominantly by two species, *Arcartia clausi* and *A. tonsa*. Samples taken in the daytime indicated greater densities of copepods at greater depths. The copepod *Calanus finmarchicus* is found throughout inshore CCB waters at densities of 100 individuals per cubic meter from April through June (Mayo and Marx 1990). Mayo and Marx (1990) found that the density of surface zooplankton samples collected in the path of feeding right whales during mid-winter was significantly higher than for the samples taken where whales were absent (median = 3,904 organisms/m^3). The threshold value below which feeding by northern right whales is not likely to occur in CCB is approximately 1,000 organisms/m^3 (Mayo and Marx 1990). CCB, like the GSC, is a primary feeding ground for the right whales, most likely because of the high densities of zooplankton species found there.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 Target Species

ESA-listed North Atlantic right whales would be targeted for study under the proposed action, and these species are considered part of the affected biological environment. NMFS publishes annual Stock Assessment Reports (SARs) for the marine mammals under its jurisdiction, which describe

the distribution, abundance, productivity, and annual human-caused mortality for those species. The 2009 Atlantic SAR (Waring et al. 2009) contains the most recent information on North Atlantic right whales and is available in PDF format at www.nmfs.noaa.gov. A brief description of the species is summarized below; additional information on the status of these species can be found in the NMFS Recovery Plan (2005). All marine mammal stocks/species listed under the ESA are also considered depleted under the MMPA.

North Atlantic Right Whale

The western North Atlantic stock of right whales range from their winter calving grounds in coastal waters of the southeastern United States to their spring feeding and nursery grounds in New England waters and northward to the Bay of Fundy and the Scotian shelf in summer. However, the location of a large segment of the population is unknown during winter, and data from a limited number of satellite-tagged whales suggests an extended range, at least for some individuals.

At least five major habitats or congregation areas are identified for this stock of right whales: the coastal waters of the southeastern United States, the Great South Channel, Cape Cod and Massachusetts Bays, the Bay of Fundy, and the Scotian Shelf. Like most mysticetes, right whales fast during the winter calving season and feed predominantly during spring, summer, and fall (Clapham 2004). They may also feed opportunistically while migrating. Right whales are large whales that grow to at least 10 m long, weigh at least 20 tons, and have baleen plates instead of teeth to trap and filter prey from the water column. They primarily feed on copepods but also consume other zooplankton. Researchers estimate that right whales consume as much as 2,000 pounds of zooplankton per day (Kraus and Mallory 2003). Right whales are usually found alone or in small groups, although large aggregations may occur on the feeding grounds.

Right whale populations worldwide were brought to extremely low levels by hunting over the last five centuries (Brownell et al. 1986). Right whales in the North Atlantic were the first to be reduced (Reeves et al. 2007), and remain at low numbers and low growth rates (< 2 percent) despite international protection. The western North Atlantic population is estimated to include at least 345 individuals (Waring et al. 2009) but birth interval data and population models suggest that the population declined in the 1990s (Caswell et al. 1999; Fujiwara et al. 2001). Calving has increased since 2001, although North Atlantic right whale calving rates are still only two-thirds of comparable southern hemisphere right whale populations (Frasier et al. 2007). The size of the stock relative to the Optimum Sustainable Population is extremely low and the stock is considered to be critically endangered.

No evidence of echolocation has ever been reported in a baleen whale (Beamish 1978). Researchers working on right whales suspect that vision is the primary mode of sensory detection for prey finding and near-field navigation. However, only anatomical studies of baleen whale eyes have been conducted; the first study of a right whale eye is being conducted by Jeff Fasick who is examining the rod and cone visual pigments from a stranded right whale eyeball and determining the absorption maxima of the wavelengths, or colors, that will give right whales the highest level of contrast to their normal visual perception. Studies on eyesight have been done on dolphins (Dawson 1980; Fasick and Robinson 1998; 2000; Fasick et al. 1998; 2002), and limited extrapolations based upon anatomical features have been made to large baleen whales (Madsen and Herman 1980). Cetaceans generally appear to have adapted well to the wavelength absorption

characteristics of the ocean, and have developed light-gathering and enhancement methods, retained high levels of resolution acuity, and developed special pupillary and retinal mechanisms to adjust to different light levels and above/below water vision requirements. In the only study on a comparable animal, Haldiman and Tarpley (1993) reported that the eye anatomy of bowhead whales (*Balaena mysticetus*) is similar to all other cetaceans that have been studied, although Fasick's work has shown that each species evaluated to date has specific adaptations with regard to light frequency and bandwidth sensitivity, and possibly resolution capabilities (Fasick, pers. comm. 2010). In sum, the absence of evidence for regular acoustic cues suggests that right whales are fairly dependent upon vision for navigation, feeding, and behavioral actions.

3.3.2 Non-Target Species

In addition to the target species, a wide variety of non-target species could be found within the action area, including marine mammals, invertebrates, fish, and sea birds. Merely being present within the action area does not necessarily mean a marine organism will be affected by the proposed action. Research is not directed at these species and researchers would not attempt to approach them. Mitigation measures would be employed to avoid harassing non-target species (e.g., not approaching non-target species and suspending activities while non-target marine mammals are within the trial area).

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 EFFECTS OF ALTERNATIVE 1: No Action

No action, i.e., denial of the permit request, would eliminate potential risk to target species from the proposed research activities. This alternative would prevent the researchers from collecting valuable information on North Atlantic right whales that would directly address research needs identified in the NMFS recovery plan for right whales and provide important information to help conserve, manage, and recover the North Atlantic right whale as required by the ESA, MMPA, and implementing regulations.

Even if the requested permit is not issued, North Atlantic right whales within the action area would still be exposed to vessel traffic and anthropogenic effects, including existing and future permitted scientific research.

4.2 EFFECTS OF ALTERNATIVE 2: Issue permit with standard conditions

The proposed action would allow research involving Level B harassment to be conducted on North Atlantic right whales. These activities may result in short-term behavioral responses by individuals, but would not be expected to result in stock- or species-level effects.

The issue most relevant to this analysis is the potential for negative impacts on the target species. It is important to recognize that an adverse effect on a single individual or a small group of animals

does not translate into an adverse effect on the population or species unless it results in reduced reproduction or survival of the individual(s) that causes an appreciable reduction in the likelihood of survival or recovery for the species. In order for the proposed action to have an adverse effect on a species, the exposure of individual animals to the research activities would first have to result in:

- direct mortality,
- serious injury that would lead to mortality, or
- disruption of essential behaviors such as feeding, mating, or nursing, to a degree that an individual's likelihood of successful reproduction or survival was substantially reduced.

That mortality or reduction in the individual's likelihood of successful reproduction or survival would then have to result in a net reduction in the number of individuals of the species. In other words, the loss of the individual or its future offspring would not be offset by the addition, through birth or emigration, of other individuals into the population. That net loss to the species would have to be reasonably expected, directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of the listed species in the wild.

Effects of Directed Research on Cetaceans

Level B harassment, as defined by the MMPA, would occur during close vessel approach for behavioral observations, photo-identification, monitoring and during visual stimulus testing. The effects of similar activities have been analyzed in past EAs for right whale research (see Chapter 1.2) and their associated Biological Opinions, and it has been repeatedly determined that this type of activity could lead to short-term behavioral disturbance of marine mammals, but that there would be no significant impact from issuance of scientific research permits authorizing these activities. The effects of close vessel approach conducted under the proposed action are not expected to differ from those previously analyzed.

Behavioral responses would be expected to vary from no response to diving, tail slapping, or changing direction. With experienced vessel drivers, any potential effects of vessel approach should be short-lived and minimal. These short-term behavioral responses would not likely lead to mortality, serious injury, or disruption of essential behaviors such as feeding, mating, or nursing to a degree that the individual's likelihood of successful reproduction or survival would be substantially reduced. Annual reports submitted by current and past permit holders indicate that conduct of activities resulting in Level B harassment has not led to mortality, serious injury, or disruption of essential behaviors such as feeding, mating, or nursing.

Rope mimics would not remain in the water and would be similar to a buoy which whales encounter in the marine environment on a routine basis. While little data exists on the visual perception of right whales, NMFS would not expect the temporary placement of the rope mimic in the water to result in more than short-term behavioral responses by target animals. Animals would be expected to either avoid and move around the mimic or could potentially bump into it at a low travelling speed. Based on the size of the mimic relative to the size of the target animals, physical contact with the mimic is not likely to cause injury or be life-threatening. The rope mimic was specifically designed to not pose an entanglement risk to the target whales.

In addition to the mitigation measures identified by the applicants and described in Chapter 2.2, the permit, if issued, would contain conditions requiring the applicants to retreat from animals if behaviors indicate the approach may be interfering with reproduction, pair bonding, feeding, or other vital functions.

Overall, NMFS expects that the Proposed Action would not exceed short-term stress and discomfort of individual animals. As similar activities have occurred for at least a decade and the population has been steadily increasing during that time, no long-term effects would be anticipated. The activities would not be expected to have any additional effects that have not been previously analyzed. The short-term behavioral responses that might result from research activities would not likely lead to mortality, serious injury, or disruption of essential behaviors such as feeding, mating, or nursing, to a degree that the individual's likelihood of successful reproduction or survival would be substantially reduced. In addition, conditions and mitigation measures would be placed in the permit to further limit the potential for negative effects from these activities.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

As summarized below, NMFS has determined that the proposed research is consistent with the purposes, policies, and applicable requirements of the MMPA, ESA, and NMFS regulations. NMFS issuance of the permit would be consistent with the MMPA and ESA.

4.3.1 Endangered Species Act

This section summarizes conclusions resulting from consultation as required under section 7 of the ESA. The consultation was performed after the public comment period for the Proposed Action to ensure that no relevant issues or information are overlooked during the initial scoping process summarized in Chapter 1. For the purpose of the consultation, the draft EA represents NMFS' assessment of the potential biological impacts.

4.3.2 Marine Mammal Protection Act

The applicant submitted an application which included responses to all applicable questions in the application instructions. The requested research is consistent with applicable issuance criteria in the MMPA and NMFS implementing regulations. The views and opinions of scientists or other persons or organizations knowledgeable of the marine mammals that are the subject of the application or of other matters germane to the application wasconsidered following the close of the public comment period.

The permit would contain standard terms and conditions stipulated in the MMPA and NMFS's regulations. As required by the MMPA, the permit would specify: (1) the effective date of the permit; (2) the number and kinds (species and stock) of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate. Other terms and conditions deemed appropriate relate to minimizing potential adverse impacts of specific activities, coordination among permit holders to reduce unnecessary duplication and harassment, monitoring of impacts of research, and reporting to ensure permit compliance.

4.3.3 National Marine Sanctuaries Act

If necessary, the applicant would obtain permits required to conduct research in the Sanctuaries within the action area. NMFS requested that NMSP staff review the application for potential impacts to Sanctuary resources. In reviewing Dr. Kraus' application, NMSP staff responded that they have no concerns about the action and support the proposed research.

4.4 COMPARISON OF ALTERNATIVES

The Proposed Action would authorize takes by Level B harassment for North Atlantic right whales. The proposed action does not represent a substantial increase in the harassment of the species in the action area over that authorized by current scientific research permits. The potential for adverse impacts on the human environment is not greater under the proposed action than under the No Action alternative.

4.5 MITIGATION MEASURES

In addition to the measures identified by the applicant and otherwise considered "good practice or protocol", all NMFS marine mammal research permits contain conditions intended to minimize the potential adverse effects of the research activities on the animals. These conditions are based on the type of research authorized, the species involved, information in the literature and from the researchers about the effects of particular research techniques and the responses of animals to these activities.

A full list of conditions is available in the permit; conditions would include:

- Minimizing impacts to mothers and calves.
- Requirements for Researchers to suspend permitted activities in the event serious injury or mortality of protected species occurs or authorized take is exceeded.
- Requirements for Researchers to exercise caution when approaching animals and retreating if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

The Permit Holder would also be required to notify the appropriate Assistant Regional Administrators for Protected Resources in the NMFS Regions where field work would be conducted, and to coordinate planned activities with other permitted researchers conducting similar activities in the area.

4.6 UNAVOIDABLE ADVERSE EFFECTS

The mitigation measures imposed by permit conditions are intended to reduce, to the maximum extent practical, the potential for adverse effects of the research on the targeted species as well as any other species that may be incidentally harassed.

4.7 CUMULATIVE EFFECTS

Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which

agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

North Atlantic right whales in the proposed study areas are regularly exposed to human activities. A summary of the identified anthropogenic activities that may impact right whales is presented here to assess the potential for cumulatively significant impacts resulting from the proposed action. Impacts may be chronic as well as sporadic effects like behavioral changes that can stress the animal and ultimately lead to increased vulnerability to parasites and disease. The net effect of disturbance is dependent on the size and percentage of the population affected, the ecological importance of the disturbed area to the animals, the parameters that influence an animal's sensitivity to disturbance or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin 1980).

Considering the nature of the proposed research activities, the minimal, temporary harassment that target animals would experience, the mitigation measures that would be employed, and that these types of research activities are not novel in the marine environment, the proposed research would contribute a negligible increment over and above the effects of the baseline activities currently occurring in the marine environment where the proposed research would occur. The following activities have been identified as factors that may impact North Atlantic right whales.

4.7.1 Shipping and Ship Strikes

Ship strikes are responsible for the majority of human-caused right whale mortalities (Knowlton and Kraus 2001; Jensen and Silber 2003; NMFS 2005b). As such, ship strikes are a primary factor in the lack of recovery of the species. In waters off the U.S. and Canadian East Coast, several major shipping corridors overlap with, or are adjacent to, right whale habitat and migratory routes and pose a grave threat to these animals. Presumably, right whales are either unable to detect approaching vessels or ignore them if they are involved in important activities such as feeding, nursing, or mating. On the other hand, given the density of ships and the distribution of right whales, overlap is nearly inevitable, thereby increasing the probability of a collision, even if one entity or the other is actively trying to avoid a collision. Additionally, right whales are very buoyant and slow swimmers, which may make it difficult for them to avoid oncoming vessels, even if they are aware of a vessel's approach. Similarly, it is difficult to detect a right whale from the bow of the ship because of its dark coloration, and it maintains a low profile while swimming (WWF 2005, as cited in USCG and Environmental Resources Management Inc. 2006).

NMFS published a database in 2003 of all known ship strikes to large whales worldwide. Although this database is perhaps the most comprehensive one available, it cannot be considered exhaustive and almost certainly underestimates the actual number of strikes, because not all ship strikes are documented. Based on a recent estimate of the mortality rate and records of ship strikes to large whales, scientists estimate that less than a quarter (17 percent) of ship strikes are actually detected (Kraus et al. 2005). Collisions occur off almost every U.S. coastal state, but strikes are most common along the East Coast. More than half (56 percent) of the recorded ship strikes from 1975 to 2002 occurred off the coasts of the Northeast United States and Canada, while the mid-Atlantic and SEUS areas each accounted for 22 percent (Jensen and Silber 2003). Records from Knowlton and Kraus' (2001) account of right whale deaths show similar results: of 15 confirmed

ship strikes in the western North Atlantic (including Canada) from 1970 to 1999, nine (60 percent) occurred in the Northeast, and three (20 percent) occurred in both the mid-Atlantic and Southeast.

Records of deaths from 1970 to 1999 indicate that ship strikes were responsible for over one-third (16 out of 45, or 35.5 percent) of all confirmed right whale mortalities (Knowlton and Kraus 2001). The authors also noted two possibly fatal; and seven nonfatal ship strike injuries during this time period. Another study conducted over a similar period, 1970 to 2002, examined 30 (18 adults and juveniles and 12 calves) out of 54 reported right whale mortalities from Florida to Canada (Moore et al. 2004). Human interaction (ship strike or gear entanglement) was evident in 14 of the 18 adults examined, and trauma, presumably from vessel collision, was apparent in ten out of 14 cases. Trauma was also present in four out of 12 calves; although the cause of death was more difficult to determine in these cases. In 14 cases, the assumed cause of death was vessel collision, and an additional four deaths were attributed to entanglement. The cause of death was undetermined in the other 12 cases (Moore et al. 2004).

A NMFS reference document on mortality and serious injury determinations for large whales contains 50 reports of right whale events from 1999 to 2003, including five right whale mortalities resulting from ship strike, which represent 27.8 percent of the 18 verified right whale mortalities from 1999-2003 (Cole et al. 2005). More recently, NMFS documented 58 reports of right whale events from 2003 to 2007, including nine mortalities and two serious injuries from confirmed ship strikes. These nine mortalities represent 45 percent of the 20 verified right whale mortalities from 2003-2007 (Glass et al. 2009).

Many types and sizes of vessels have been involved in ship strikes, including container/cargo ships/freighters, tankers, steamships, U.S. Coast Guard (USCG) vessels, U.S. Navy vessels, cruise ships, ferries, recreational vessels, fishing vessels, whale watching vessels, and other vessels (Jensen and Silber 2003). Vessel speed (when recorded) at the time of a large whale collision has ranged from two to 51 knots (Jensen and Silber 2003). Vessels can be damaged during ship strikes; of the 13 records that include vessel damage, all of these vessels were traveling at a speed of at least 10 knots (Jensen and Silber 2003). Occasionally, collisions with large whales have even harmed or killed humans on board the vessel. A summary paper on ship collisions and whales by Laist et al. (2001), reported that of 28 recorded collisions causing lethal or severe injuries to whales, 89 percent involved vessels traveling at 14 knots or faster, and the remaining 11 percent involved vessels traveling at 10 to 14 knots. None occurred at speeds below ten knots, although there is a predicted 45 percent chance of death or serious injury to the whale at ten knots (Pace and Silber 2005).

4.7.2 Conservation Efforts

To aid the recovery of right whales, NMFS has implemented measures to manage human activities that pose threats to the species, including ship strikes and fisheries interactions. Concern has been raised over the possible adverse effects of whale-watching activities on right whale aggregations, particularly in Cape Cod Bay and the lower Bay of Fundy. While adverse effects from this activity are possible, there are no data that conclusively establish adverse effects beyond the possibility of ship strikes. Furthermore, whale-watching in these regions is typically focused on other large whale species since a federal regulation (50 CFR 224.103) prohibits vessels from approaching right whales in U.S. Atlantic waters within 500 yards (460 m). There are a few exceptions to this

regulation, such as permitted researchers, but whale-watching vessels must maintain the 500-yard distance. As a result, most effects from whale-watching activities are likely limited to behavioral changes or perhaps relatively small changes in distribution. Given the above-mentioned regulations on vessel approaches to right whales, the potential for temporary, perhaps relatively minor, effects has been reduced. However, relatively recent collisions between whale-watching boats and a humpback (2001) and a minke whale (1998) indicate that much more serious consequences (e.g., death or serious injury) are also possible. Each NMFS region issues guidelines for viewing whales.

In November 2006, NMFS established a set of recommended vessel routes in four locations to reduce the likelihood of collisions in key right whale habitats. More recently, in October 2008, NMFS issued new regulations to reduce the likelihood of vessel collisions with North Atlantic right whales. The regulations implement speed restrictions of 10 knots or less for vessels 65 ft (19.8 m) and greater in certain areas and at certain times of the year along the U.S. Atlantic seaboard that correspond to right whale occurrence. Exempted from the rule are State enforcement vessels and U.S. government vessels that will be expected to adhere to guidance provided under ESA Section 7 consultations. The rule also contains a provision exempting vessels from speed restrictions in poor sea and weather conditions, thereby ensuring safe vessel maneuverability under those special conditions. The rule also provides for establishment of temporary, voluntary dynamic management areas (DMAs) in times and/or areas where the seasonal management measures are not in effect, and where whales occur. In these locations, mariners would have the option to cross through the DMA at a speed no greater than 10 knots or route around the area.

To address entanglement in fishing gear, NMFS established the Atlantic Large Whale Take Reduction Team. This team developed a plan to reduce the incidental serious injury and mortality of right, humpback, fin, and minke whales in the South Atlantic shark gillnet fishery, the Gulf of Maine and Mid-Atlantic lobster trap/pot fishery, the Mid-Atlantic gillnet fishery, and the Gulf of Maine sink gillnet fishery. For instance, NMFS requires fishermen to use sinking groundlines in commercial trap/pot and gillnet fisheries to reduce entanglements with right whales.

4.7.3 Fishing Gear Entanglement

Entanglement in fishing gear is another common anthropogenic cause of right whale mortality and serious injury. Because right whale occurrence can overlap with frequented fishing areas, gear entanglements are common and can cause death by drowning or serious injuries such as lacerations, which in turn can lead to severe infections. Most right whale entanglements appear to be with gillnets, lobster pots, crab pots, seines, fish weirs, and aquaculture equipment (NMFS 2005a). Because right whales are skimmers and feed by swimming with their mouth agape, it is quite common for gear to become entangled amongst the baleen plates in their mouths. Entanglements of juveniles are particularly dangerous because wrapped line can become imbedded in tissue as the whale grows, cause infections, and/or restrict growth.

From 2003 to 2007, four of 15 records of right whale mortalities or serious injuries resulted from entanglements or fishery interactions; during this time period there were also at least four documented cases of entanglements for which the intervention of disentanglement teams averted a likely serious-injury determination (Waring et al. 2009). In January 1997, NMFS changed the

classification of two lobster pot fisheries (the Gulf of Maine and the U.S. mid-Atlantic) from Category III to Category I based on the number of large whales entangled by lobster pot gear during the time period of 1990 to 1994 (62 FR 33, January 2, 1997). A fishery qualifies as a Category I if the annual mortality and serious injury of a marine mammal stock in that fishery is greater than or equal to 50 percent of the PBR level, whereas a Category III fishery is a fishery where the annual mortality and serious injury is less than or equal to one percent of the PBR level (16 U.S.C. § 1387).

Although entanglements do not always result in death or serious injury, they pose a serious threat to North Atlantic right whales. Analysis of the North Atlantic Right Whale Catalog[6] indicates that 61.6 percent of the overall population shows physical evidence of entanglements, such as scars (Hamilton et al. 1998), and between 10 and 28 percent of whales experience entanglements each year (Knowlton et al. 2001). Injuries and entanglements that are not initially lethal may result in a gradual weakening of entangled individuals, making them more vulnerable to some other direct cause of mortality (Kenney and Kraus 1993). For example, entanglement may reduce a whale's ability to maneuver, making it more susceptible to ship strikes. Entanglement-related stress may decrease an individual's reproductive success or reduce its life span, which may in turn depress population growth.

Records of deaths from 1970 to 1999 indicate that three out of 45 (6.7 percent) were due to entanglement in fishing gear (Knowlton and Kraus 2001). The authors also noted eight possibly fatal and 20 nonfatal ship strike injuries during this time period. A NMFS reference document on mortality and serious injury determinations for large whales contains 50 reports of right whale events from 1999 to 2003, including three right whale mortalities and seven reports of serious injury resulting from entanglement. These three mortalities represent 16.7 percent of the 18 verified right whale mortalities from 1999-2003 (Cole et al. 2005). From 2003 to 2007, 20 right whale entanglement events were confirmed, three of which resulted in mortality and one serious injury (Glass et al. 2009).

The number of deaths attributed to fishing gear interactions may be grossly underestimated. In many cases, veterinarians and researchers are unable to determine a cause of death from a whale carcass. Another possibility is that some whales become entangled, drown, and fail to resurface, so their carcasses are never recovered and examined.

4.7.4 Habitat Degradation

A continued threat to the coastal habitat of the right whale in the western North Atlantic is the undersea exploration and development of mineral deposits, as well as the dredging of major shipping channels. Offshore oil and gas activities have been proposed off the coast of the mid- and south-Atlantic U.S. (NMFS 2005b), but NMFS is not aware of any current plans to explore or develop oil resources in this region. If these activities occur, there may be consequent adverse effects to the right whale population by vessel movements, noise, spills, or effluents. These activities may possibly result in disturbance of the whales or their prey and/or disruption of the habitat and should be subject to ESA Section 7 consultations.

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[6] The Right Whale Catalog is a database of whale sightings and photographs maintained by the New England Aquarium.

Right whales also frequent coastal waters where dredging and its associated disposal operations occur on a regular basis, such as along the SEUS coast. The U.S. Army Corps of Engineers (USACE) has responsibility/oversight for many of these dredging and disposal operations and has consulted with NMFS under Section 7 of the ESA on these activities. As a result, engaging in dredging operations and related activities requires protective measures such as posting lookouts on dredge vessels and adherence to recommended precautionary guidelines for operations to reduce the risk of collision.

Discharge from municipal, industrial, and non-point sources, dredging activities, dredge spoil disposal, and sewage disposal may degrade essential habitat in Massachusetts Bay and northern CCB.

4.7.5 Noise

A review of impacts of noise of all types on marine mammals is provided by Richardson et al. (1995). Noise, as defined by Richardson et al. (1995), is a sound that impairs reception of signals of interest that affects the animal in a way that interrupts normal behavior. Although certain species of large whales have shown behavioral changes to anthropogenic noise sources in the marine environment, there have been few studies of the effects of anthropogenic noise on right whales specifically. In general, the impact of noise from shipping or industrial activities on the communication, behavior, and distribution of right whales remains unknown. Several of the activities described in this section also have the possibility of creating a noise nuisance to right whales.

Noise from ships is one of the biggest problems facing right whales related to their hearing abilities. Even though research indicates that right whales should be able to hear vessels, they do not appear to avoid vessels. Several researchers have confirmed that right whales should be able to hear approaching vessels, which emit sounds in a range they can perceive. Parks (2003) established that whales have the ability to locate a sound and even remember where it originated from for around 20 minutes after the sound stops. Masking and habituation are two phenomena that may help to explain right whale behavior regarding vessels and other anthropogenic sounds.

Background ambient noise, or underwater noise, including that produced by human activities (e.g., dredging, shipping, seismic exploration, and drilling for oil), may interfere with or mask the ability of a marine mammal to detect sound signals, such as calls from other animals (Richardson et al. 1995). There are many sources of low frequency noises from human activities that overlap with the low frequency calls of mysticetes. To compensate and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson et al. 1995).

Masking may also prevent right whales from being able to detect and avoid approaching vessels because they might not be able to distinguish the sound of an approaching ship from the ambient noise in the ocean. This hypothesis has not been tested. Areas with continuous loud distant shipping may mask the sound of individual ships until they are too close to the whales (Terhune and Verboom 1999), which may make right whales more susceptible to ship strikes.

Research has been conducted on the effects of vessel noise on certain species of large whales yet there are still unknowns about right whale hearing capacities. Research suggests that right whale

hearing is concentrated in the low frequency range, thus some high frequency noise such as propellers might not be detected (Terhune and Verboom 1999). Large vessels cause the most lethal and serious injury to whales and also produce low frequency sounds which may interfere with right whale hearing (Koschinski 2002).

The ability of a right whale to detect a vessel is related to a variety of factors including bottom reflections, frequency of sounds, location of the whale with respect to the vessel, and its depth in the water column. Multipath propagation of vessel noise may confuse the whale as to the direction the ship is going and generally is problematic with low frequency noise. Ships generate higher noise levels towards the stern of the boat than in front of the bow, and even louder noises directly under the ship, so there might be instances in which a whale would not actually hear a vessel until after it has passed. Ship noises are not as loud near the surface as they are five to ten meters beneath, due to the reflective nature of the surface (Terhune and Verboom 1999). This is known as the Lloyd-mirror effect, which is amplified in the low frequency range, in calm sea states, and when the source and/or receiver are near the surface (Richardson et al. 1995). Therefore, in certain conditions, a whale might be less likely to hear a vessel when the whale is at or near the surface, where it is at a high risk of being struck by a vessel.

Habituation is a phenomenon whereby whales may not respond to anthropogenic sources of noise, such as vessel noise, because they have become accustomed to continuous noise in certain areas. For example, right whales may become habituated to vessel noise in areas of heavy vessel traffic and as a result, are less reactive to the approaching ships.

Attempts have been made to try to better understand the connection between the hearing abilities of right whales, vessel noise, and the incidence of ship strikes. One study utilized an archival DTAG to record whale behavioral reaction to an alert signal, vessel noise, other whale social sounds, and a silent control (Nowacek et al. 2004). The whales did not have a significant response to any of the signals other than an alert signal broadcast ranging from 500 to 4,500 Hz. In response to the alert signal, whales abandoned current foraging dives, began a high power ascent, remained at or near the surface for the duration of the exposure, and spent more time at subsurface depths of one to ten meters (Nowacek et al. 2004). This increased time just below the surface could substantially increase their risk of ship strike because whales are susceptible to being struck but are not visible at the surface. The consequences of the whales' altered behavior, aside from increased risk of ship strike, are reduced foraging time and an excess use of energy, a problem for an endangered species. The whale's lack of response to a vessel noise stimulus from a container ship and from passing vessels indicated that whales were unlikely to respond to the sounds of approaching vessels even when they could hear them (Nowacek et al. 2004).

A second study that utilized a DTAG had similar results. The scientists played a recording of a tanker using an underwater sound source and observed no response to a tagged whale 600 m away (Johnson and Tyack 2003). This non-avoidance behavior could be an indication that right whales have become habituated to the vessel noise in the ocean and therefore do not feel the need to respond to the noise or may not perceive it as a threat. These various hypotheses aside, it has not been established why the species is so susceptible to strikes. Also, caution should be used when extending study results from deep water environs to shallow water environs, for example, in the

SEUS. (See section 4.7.1 for a more detailed discussion about the threat of ship strikes on right whale survival.)

It is unknown to what extent noise may disturb or otherwise affect right whales. It appears that whale behavior and the type of activity in which they are engaged influence right whale sensitivity to, and tendency to avoid, noise disturbance and vessel activity (Watkins 1986; NMFS 1991), but more studies are needed. Additional factors aside from masking and habituation may also interfere with a whales' ability to hear approaching vessels.

4.7.6 Contaminants

Two studies on contaminants in right whales, using samples obtained from remote biopsy sampling, indicate a range of total PCBs from 80 to 1,000 ng/g wet weight, i.e., in the parts per billion range (Moore et al. 1998; Woodley et al. 1991). These samples appear to be relevant to the whole animal given that lipid-normalized contaminant burden is comparable between different blubber depths and locations in large whales (Gauthier et al. 1997). No obvious geographic trends were evident in samples from South Africa, South Georgia, CCB, and Bay of Fundy, Canada (Moore et al. 1998). In contrast, most odontocete (i.e., toothed whales, porpoises, and dolphins) values were in the parts per million range (Aguilar and Borrell 1996). Organic chemical contaminants have been regarded as of less significance for mysticetes than odontocetes and are not considered primary factors in slowing the recovery of any stocks of large whale species (O'Shea and Brownell 1994). This is especially true for planktivorous baleen whales such as right whales, given their lower accumulated contaminant burdens as compared to other marine mammals. However, assessment of contaminant body burden ignores toxic non-halogenated aromatic hydrocarbons (polynuclear aromatic hydrocarbons: PAH) from crude oil and combusted fossil fuels that do not bioaccumulate. Such compounds are metabolized, induce their effects, and are mostly excreted. Contaminant impact is therefore insufficiently assayed by blubber burden analysis of parent compounds alone.

Right whales may be exposed to a variety of anthropogenic chemical contaminants throughout their range, which can lead to reproductive dysfunction. Theoretically, a loss of genetic diversity can lead to "inbreeding depression," where inbreeding adversely affects a population's reproduction and recruitment rates. Genetic factors might be affected by external factors, including toxic chemicals and poor nutrition (Reeves et al. 2001).

Pollutants may also affect phytoplankton and zooplankton populations in a way that decreases the density and abundance of specific zooplankton patches on which northern right whales feed. In addition, pollution may affect the feeding patterns and habitat use of other components of the marine ecosystem, which in turn could impact food and habitat availability for the right whale. A study conducted by Doucette et al. (2006) suggests that the trophic transfer of marine algal toxins is a factor contributing to the recovery failure of the North Atlantic right whale.

4.7.7 Climate and Ecosystem Change

There is a close linkage between right whale foraging and the physical forcing processes that concentrate prey in the oceanic environment (Kenney et al. 2001). Interannual, decadal, and longer time-scale variability in climate can alter the distribution and biomass of prey available to right whales. For example, decade-scale climatic regime shifts have been related to changes in

zooplankton in the North Atlantic (Fromentin and Planque 1996). Decadal trends in the North Atlantic Oscillation (NAO) (Hurrell 1995) can affect the position of the Gulf Stream (Taylor et al. 1998) and other circulation patterns in the North Atlantic that may be important to right whales. The effects of climate-induced shifts in productivity, biomass, and species composition of zooplankton on the foraging success of right whales have received little attention. Such shifts in community structure and productivity may alter the distribution and occurrence of foraging right whales in coastal habitats and affect their reproductive potential as well.

"The North Atlantic Oscillation is a complex climatic phenomenon in the North Atlantic Ocean (especially associated with fluctuations of climate between Iceland and the Azores). It is characterized predominantly by cyclical fluctuations of air pressure and changes in storm tracks across the North Atlantic."[7] The NAO index measures the difference in sea-level pressure between the subtropical high (Azores) and the subpolar (Iceland) low. The climactic change caused by the NAO can have an impact on right whale foraging. During a positive phase[8] in the 1980s, slope water temperatures were warmer than average in the Gulf of Maine, and *C. finmarchicus* abundance was relatively high. Modeling studies indicate that the stable calving rates of right whales in the 1980s were related to the high abundance of *C. finmarchicus* during this time (Greene et al. 2003). Then a decrease in the NAO index in the mid-1990s resulted in low *C. finmarchicus* abundance in the late 1990s, which coincided with declining calving rates from 1993 to 2001 (Greene et al. 2003).

Data from Gulf of Maine Ocean Observing System (GoMOOS) Buoy N (in the Northeast Channel) can provide forecasts of right whale births based on water temperature at the buoy. As mentioned above, the NAO affects water temperatures in the Atlantic Ocean and specifically, the Gulf of Maine. Water temperatures in turn, influence right whales' food supply, which affects reproduction and the number of calves born. "After a positive [NAO] index, whale food becomes plentiful, and right whales produce many calves. After a negative NAO index, food becomes scarce, resulting in few calves being born" (GoMOOS 2006). Based on these data, 13 births were predicted for 2006 and 16 for 2007; 19 and 23 births were reported for these years, respectively (Table 3).

4.7.8 Military Activities

Although no evidence conclusively links military activities in the North Atlantic to impacts on right whales, activities such as underwater explosions and military exercises in this ocean basin have the potential for disturbing, injuring, or killing these and other whales.

In early 1996, six right whale deaths were documented. Five (one attributed to a ship strike) occurred in waters adjacent to the SEUS critical habitat. Navy facilities adjacent to the critical habitat use offshore areas for gunnery exercises. Because several of the carcasses were found near a U.S. Navy gunnery range, it was suspected that some deaths were related to underwater explosions, and there was concern that Navy activities may have been involved in some deaths.

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[7] http://www.cpc.ncep.noaa.gov/data/teledoc/nao.shtml

[8] A positive phase occurs when subtropical pressures are higher than normal and subpolar pressures are lower than normal, resulting in above average temperatures in the eastern US (http://www.cpc.ncep.noaa.gov/data/teledoc/nao.shtml).

However, no such link was established. Although a link to military activities was not established, the Navy entered into consultation with NMFS under Section 7 of the ESA on the potential effect of some of its operations on protected species, as described in Appendix A of the Recovery Plan (NMFS 2005b). In addition, Navy activities that introduce loud sounds into the marine environment are required to be reviewed to ensure compliance with those provisions of the MMPA regarding the incidental harassment of marine mammals. The Navy has made a number of significant modifications to its operations to facilitate protection of right whales in their critical habitat in the SEUS. NMFS and the Navy both understand the need to continue to keep an open dialogue and to evaluate ways to mitigate possible environmental impacts of naval operations throughout the eastern seaboard.

Upon request by the Navy pursuant to Section 101(a)(5)(A) of the MMPA,in 2009 NMFS promulgated 5-yr regulations governing the take of marine mammals incidental to Navy training, maintenance, and research, development, testing, and evaluation activities to be conducted in the along the Atlantic and Gulf of Mexico coasts in the Atlantic Fleet Active Sonar Training (AFAST) Study Area, and issued an associated 1-yr letter of authorization (LOA). These Navy activities, which are considered military readiness activities, may incidentally take marine mammals present within the AFAST Study Area by exposing them to sound from mid-frequency or high frequency active sonar or to underwater detonations at levels that NMFS associates with the take of marine mammals. For right whales, NMFS expects the Navy's activities may result in Level B Harassment in the form of avoidance of the source, temporary changes in vocalizations or dive patterns, temporary avoidance of an area, temporary disruption of feeding or migrating, and - in very few individuals – a relatively mild temporary loss of hearing sensitivity. Annual LOAs issued under these regulations authorize the take of individuals of 39 species of marine mammals, including right whales. In 2010, the Navy was authorized to take 733 right whales, by Level B harassment only, and NMFS would anticipate authorizing approximately the same numbers of annual take through January 2014, when the regulations expire. The regulations and LOAs include mitigation measures to reduce adverse impacts to marine mammals, including several measures specifically directed at right whales (e.g., a reduction of certain types of exercises in right whale critical habitat and measures to reduce the likelihood of ship strikes), as well as a robust monitoring plan to help further determine the effects that MFAS/HFAS has on marine mammals.

4.7.9 Energy Development

Steady increases in oil prices and a desire to decrease U.S. dependence on foreign sources of oil have led to the development of alternative energy projects in U.S. waters. These include wind farms, tidal turbines, and liquefied natural gas installations. Another factor driving some of these projects is the desire to find cleaner, more environmentally-friendly sources from which to derive and maintain our energy needs.

Wind Farms

Currently, NMFS has issued one Incidental Harassment Authorization (IHA) for activities related to offshore wind energy. Bluewater Wind LLC plans to install two meteorological towers off the coast of Delaware and New Jersey in 2011 to collect wind resource data needed to support development of offshore wind parks. The current IHA allows for Level B harassment of marine mammals during the impact pile driving required for installation (75 CFR 61426, October 5, 2010), but does not authorize any take of right whales.

In 2001, Cape Wind Associates, LLC filed a permit application with the USACE, New England District, in anticipation of constructing a wind park located on Horseshoe Shoals in Nantucket Sound, Massachusetts. The proposed park would consist of 130 offshore wind turbine generators with a maximum potential electric output of approximately 454 megawatts (MW). The installation would require a 30 kilovolt submarine transmission cable to transmit the electricity to a centrally located electric service platform (71 CFR 30693, May 30, 2006).

According to a study conducted by ESS Group Inc. (2006), the construction and existence of the Cape Wind park will have a minimal impact on right whale feeding. The primary feeding grounds for many whales found in the study area, including right whales, are located further offshore from Nantucket Sound at locations such as Stellwagen Bank, CCB, and the Gulf of Maine. The bathymetric and oceanographic features that favor dense aggregations of whale prey species are not developed in Nantucket Sound to the same extent that they are farther north, around Stellwagen Bank, Jeffrey's Ledge, Browns and Baccaro Banks, and in the GSC (Kenney and Winn 1986). "Historically and at present, Nantucket Sound does not appear to be an important area for these species of whales" (ESS Group Inc. 2006). NMFS concluded Section 7 consultation in 2008 and the Biological Opinion did not anticipate any take of large whales. However, consultation will likely be reinitiated in late 2010 or early 2011 due to right whale sightings in the area.

NMFS also anticipates applications for other wind energy projects to be submitted for the proposed Block Island Wind Farm (Deepwater Wind Block Island, LLC), the Atlantic City Offshore Wind Energy Project (Fishermen's Atlantic City Windfarm, LLC), and the University of Maine Deepwater Offshore Wind Test Site. The Deepwater and Fishermen's projects would have no more than eight wind turbines installed off the Atlantic coast.

The possible effects of wind turbines on marine mammals differ depending on the location of the structures (i.e. < 20 m or 20 to 100 m depth). Dangers can be posed to the animals both during the construction and the operating phases of the projects. The possibilities for acoustic harassment will be greater during the construction/pile-driving phase (Madsen et al. 2006). Based on a review of airgun studies, Madsen et al. (2006) noted that right whales may demonstrate avoidance responses to transient signals from the pile-driving above some 120 dB (RMS) re 1 μPa. "Thus, pile-driving has the potential to affect right whales over very large ranges, depending on the propagation conditions" (Madsen et al. 2006). However, to date, there have been few studies that examine the effects of pile-driving or other high-level, low-frequency impulsive sounds on marine mammals. Similarly, no studies have been conducted to determine the effects of turbine noise on baleen whales. The data suggest that the noise emitted from the turbines may affect right whales up to a few kilometers away; however, the behavioral effects are likely to be minor (USACE 2004; Madsen et al. 2006).

Other potential impacts to marine mammals during the construction and/or operational phases of the project include increased vessel traffic, which pose both a noise threat and a ship strike threat, elevated total suspended solids, habitat shift from structure-oriented to non-structure oriented system once the monopiles are removed, submarine vibrations, and electromagnetic/thermal emissions from submarine cables and inner-array cables (USACE 2004). The Cape Wind Project DEIS (USACE 2004) also indicates some potential indirect impacts: prey mortality and/or

displacement and bioaccumulation from consuming contaminated prey. As more of these wind parks are built in marine environments, studies will need to be done to understand the full range of effects the noise of such operations will have on right whales.

Liquefied Natural Gas Installations

Liquefied Natural Gas (LNG) will be an increasingly important supply component to meet domestic demand for natural gas. According to the Federal Energy Regulatory Commission (FERC) website (http://www.ferc.gov/industries/lng.asp#skipnavsub), approximately 40 LNG terminals are either before FERC or being discussed by the LNG industry. Six terminals are already operating along the eastern seaboard, Puerto Rico, and Alaska. Of the 16 facilities currently under FERC jurisdiction, 12 are land-based. Two of the most recently constructed LNG Deepwater Ports licensed by the USCG/Maritime Administration (MARAD) are located off of Boston, MA near Stellwagen Bank NMS.

Northeast Gateway Energy Bridge, LLC (NEG) submitted a proposal for a LNG facility approximately 13 miles south-southeast of the city of Gloucester, MA in Massachusetts Bay waters (71 FR 29211, May 19, 2006). NMFS has issued several IHAs for the construction, operation, and repair and maintenance of the NEG Port facility. The most recent IHA was issued on August 27, 2010, and expires on August 31, 2011. NMFS intends to issue regulations and subsequent LOAs for the continued operation and maintenance of the NEG facility to cover a five-year period from September 2011 to September 2016. Neptune LNG, LLC also submitted a proposal to the USCG/MARAD to construct an installation 22 miles northeast of Boston, Massachusetts in the Federal waters of the Outer Continental Shelf (70 FR 58729, October 7, 2005). NMFS has issued several IHAs for the construction, operation, and repair and maintenance of the Neptune Port facility. The most recent IHA was issued on July 12, 2010, to cover operations and repair and maintenance activities. It expires on July 11, 2011. NMFS is currently in the process of promulgating 5-year regulations to cover operation and repair/maintenance activities of the Neptune LNG port facility from July 2011 through July 2016. Both of these facilities are located in areas deemed as primary late winter/early spring feeding habitat for the western North Atlantic right whale.

According to the EIS prepared by the USCG and its contracting company, Environmental Resources Management, Inc. (2006), right whales have the potential to be affected by construction activities as the result of physical harassment, vessel strikes, alteration to habitat, acoustic harassment, alteration of prey species abundance and distribution, and entanglement. However, the findings in the EIS (USCG and Environmental Resources Management Inc. 2006) indicate that impacts from these activities will be minimal, especially when mitigation measures are employed. The greatest risk from these activities is the increased chance of ship strikes because of the increased vessel traffic in the area, especially during the construction phase. NMFS and the National Ocean Service noted other potential impacts to the USCG during the comment period for the DEIS: ingestion of marine debris, fuel spills, impingement and entrainment during ballast water intake (including prey species), and bioaccumulation of contaminants. NMFS issued Biological Opinions (Neptune, January 12, 2007; NEG, February 5, 2007) for each facility. Both documents state that construction and operation of each deepwater port are likely to adversely affect but are not likely to jeopardize the continued existence of the North Atlantic right whale. Consultation was reinitiated for the Neptune Port in March 2010 to analyze the impacts to ESA-

listed species from repair and maintenance activities. In a Biological Opinion issued on July 12, 2010, NMFS concluded that the operation of the Neptune LNG deepwater port, including required maintenance and repair work, is likely to adversely affect, but is not likely to jeopardize the continued existence of the North Atlantic right, humpback, fin, and sei whale. Additionally, during the MMPA IHA issuance process, NMFS determined that construction and operation of the LNG facilities will have only a negligible impact on the North Atlantic right whale population.

4.7.10 Other Scientific Research Permits and Authorizations

Marine mammals have been the subject of field studies for decades. The primary purpose of most research is to monitor populations and gather data for behavioral and ecological studies.

Over time, NMFS has issued dozens of permits for the take of marine mammals throughout the North Atlantic by harassment from a variety of activities, including aerial and vessel surveys, photo-identification, remote biopsy sampling, and attachment of scientific instruments. The number of research permits and associated takes by harassment indicate a high level of research effort relative to the population size of some endangered marine mammal species throughout the North Atlantic. This is due, in part, to intense interest in developing appropriate management and conservation measures to recover these species. One permit, NMFS Marine Mammal Health and Stranding Response Program (MMHSRP), File No. 932-1905, authorizes takes of stranded or distressed marine mammals, including the disentanglement and health assessment of large whales.

In addition to the MMHSRP permit, eleven permits authorize research on North Atlantic right whales (see Table 2). These permits authorize research for five years in contrast to the Proposed Action which would be valid for three years. NMFS also is processing three other permit requests to conduct right whale research in the North Atlantic (File Nos. 14450, 15488 and 13927).

Based on annual permit reports and the nature of field work, NMFS expects that for the foreseeable future, Permit Holders will continue to have a portion of authorized takes that are not used each year due to a host of factors, such as weather, funding, whale sightings, etc. Therefore, although additional takes of right whales may be authorized during the next five years, NMFS expects that the Proposed Action would not significantly change the cumulative level of research effort on North Atlantic right whales and that potential impacts to the right whale population over the next three years would remain similar to that authorized by existing permits.

None of the current permits or new requests involves activities that are likely to result in the serious injury or mortality of an animal and no such incidences have been reported by permitted right whale researchers. Hence, the number of takes proposed by the applicant, when added, cumulatively, to the currently authorized research activities in the action area, is not expected to result in a significant adverse impact on North Atlantic right whales or any other endangered species.

Table 2: NMFS Scientific Research Permits Authorizing Take of North Atlantic Right Whales

	Permit Holder	Level A		Level B	Expiration
		1-6 mo	> 6 mo	all ages	
current permits	GADNR (549-1759)*	-	-	200	5/1/2011
	SEFSC (779-1633-01)*	-	-	100	6/30/2011
	UNCW/Pabst (948-1692)	-	-	200	5/31/2011
	WHOI/Baumgartner (1058-1733-01)	-	135	300	5/31/2012
	NJ DEP (10014)	-	-	50	12/31/2012
	NEFSC (775-1875)	35; 25 after GA DNR**	65	600	1/15/2013
	WCNE (605-1904-01)	-	-	75	2/15/2013
	Ocean Alliance (13545)	-	-	20	2/15/2015
	Nowacek (14791)	-	80	90	7/30/2015
	PCCS (14603)	-	20	1,050	9/30/2015
	Kraus (14233)	20	30	2,000	9/30/2015
pending applications	Hain (13927)	-	-	60	-
	SEFSC (14450)	-	-	50	-
	GA DNR (15488)	20	50	350	-
	Kraus (15415) [Proposed Action]	-	-	200	-
	Annual Total	**65**	**380**	**5,045**	

* Permit would expire upon issuance of a pending action.
**Includes 5 takes for suction cup tagging. 30 takes for biopsy sampling would reduce to 20 if No. 15488 is issued.
Gray rows indicate permits that would be replaced by pending permits.

In addition, all permits issued by NMFS for research on marine mammals contain conditions requiring the Permit Holders to coordinate their activities with the NMFS regional offices and other Permit Holders conducting research on the same species in the same areas, and, to the extent possible, share data to avoid unnecessary duplication of research and disturbance of animals. More specifically, research on North Atlantic right whales, including the Proposed Action, is closely coordinated by the NMFS Northeast Regional Office and the North Atlantic Right Whale Consortium, a group of non-government and government organizations and individuals in the United States and Canada who share the common goals to research, protect, and ultimately conserve this species.

Members of the Consortium contribute to two major, centralized datasets: the "Sightings database" and the "Identification database". The Sightings database contains records of thousands of sightings of right whales in the North Atlantic Ocean, as well as sightings of many other species of whales, dolphins, sea turtles, seals, and large fishes. The Identification database contains all known photographed sightings of right whales since 1935 and any record that can lead to an individual identification, including "sightings" with skin or fecal samples collected from un-photographed whales. In addition, several other databases contain biological data on right whales, including genetics, which link data to individuals in the Identification database. Collectively, these databases represent a scientific resource, and access to the data for scientific, educational, conservation and management purposes is encouraged and not limited to contributors. These databases not only promote collaboration among researchers but minimize harassment of individual right whales by allowing researchers to target known data gaps, such as photographic and genetic identification, of animals within the population. For example, upon approaching a whale, researchers can determine whether it is an individual that already has been photographed or sampled, thereby preventing unnecessary or duplicative sampling and harassment. Sighting information is also provided through the Sighting Advisory System, limiting repeated harassment of individuals in the population.

NMFS acknowledges that repeated disturbance of some individual right whales could occur during research. However, in the event that repeated disturbance occurs, NMFS expects that the temporary harassment of individuals would dissipate (within minutes) before animals could be targeted for research by another Permit Holder. Further, NMFS has taken steps to limit repeated harassment and avoid unnecessary duplication of effort through permit conditions requiring coordination among Permit Holders. NMFS continues to monitor the effectiveness of these conditions in avoiding unnecessary repeated disturbances, and would do so for the Proposed Action, if approved.

It is also important to note that the target right whales are migratory and may transit in and out of U.S. waters. NMFS does not have jurisdiction over the activities of individuals conducting field studies in other nations' waters and cumulative effects from all scientific research on these species beyond the Proposed Action area cannot be fully assessed. However, where possible, NMFS attempts to collaborate with foreign governments to address management and conservation of transboundary ESA-listed species.

4.7.11 Summary of Cumulative Effects

All of the issues noted above are likely to have some level of impact on marine mammal populations in the Proposed Action area, particularly where ESA-listed (endangered and threatened) and MMPA depleted species are involved. Historically North Atlantic right whales were hunted to near extinction, and, despite being under protection for 70 years, the population remains small. Human activities continue to impact right whales in the proposed action area; the most common threats to this species remain entanglement in fishing gear and vessel collisions which have the potential to seriously injure or kill whales.

Conservation efforts, research, and recent regulations are aimed at eliminating these threats and have positive benefits for right whales, reducing the number of animals killed and seriously injured by ship strikes and fishing gear interactions. It is too early to measure the value of some of these

measures; however, the threat to whales from shipping is the lowest it has been in the last 50 years due to a number of changes in shipping traffic rules. Other impacts, such as habitat degradation, energy development, and noise, may temporarily harass individual right whales but are not likely to be life threatening.

Although right whales are impacted by a number of human activities, it is important to note that these activities are not occurring simultaneously on the same individuals of a population/stock on a daily basis and most human impacts are not known to cause serious injury or mortality of right whales. Further, right whales are not exposed to all human activities at all times, particularly given this species' migratory nature. The short-term stresses (separately and cumulatively when added to other stresses right whales face in the environment) resulting from the proposed research activities would be expected to be minimal to targeted right whales. Behavioral reactions suggest that harassment is brief, lasting minutes, before animals resume normal behaviors. NMFS expects any effects of harassment to dissipate before animals could be harassed by other human activities.

Significant cumulative impacts are not expected because no serious injury or mortality is expected (resulting in no direct loss of animals from the population) nor an appreciable reduction in the fecundity of target individuals. Therefore, the proposed research would contribute a negligible increment of harassment over and above the effects of the baseline activities currently occurring in the marine environment of the proposed action area over the life of the permits. Though the effects of repeated or chronic disturbance from scientific research activities should not be dismissed, the potential long-term benefits and value of information gained on these species also must be considered. The proposed research would provide valuable information on right whale biology and ecology which in turn may be used to improve their management and reduce the effects of human activities to this species.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

This document was prepared by Amy Hapeman with the Permits, Conservation and Education Division of NMFS' Office of Protected Resources in Silver Spring, Maryland.

Agencies Consulted
Marine Mammal Commission
National Marine Sanctuaries Program

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