APPENDIX J
COASTAL ZONE MANAGEMENT ACT COMPLIANCE – NEW JERSEY

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

December 22, 2014

Ms. Virginia KopKash
Assistant Commissioner
Land Use Management
State of New Jersey
Department of Environmental Protection
P.O. Box 420
Mail Code: 401-07B
Trenton, New Jersey 08625-0420

RE: Consistency Determination for a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015

Dear Ms. KopKash:

In 2014, National Science Foundation (NSF) funded a research project proposed by lead Principal Investigator (PI) Dr. Gregory Mountain of Rutgers University and collaborators Drs. J. Austin, C. Fulthorpe, and M. Nedimovic of University of Texas Austin to study sea level rise in the Atlantic Ocean off of the coast of New Jersey which included a marine geophysical survey. NSF's environmental compliance, including all federal regulatory obligations, was completed for the research activity on July 1, 2014, and the survey commenced. Unfortunately due to mechanical issues with the vessel, the survey was unable to be completed during the effective periods of the Incidental Harassment Authorization (IHA) and Incidental Take Statement (ITS) issued for the survey. NSF is interested in rescheduling the research survey for a 30 day period during June-August 2015, approximately the same time frame as originally planned and authorized in 2014. According to National Marine Fisheries Service (NMFS), a new IHA is required to reschedule the survey in 2015. As such, per the Coastal Zone Management Act (CZMA), Subpart D, the state of New Jersey has the opportunity to review unlisted federal license or permit activities for consistency. NSF contacted New Jersey Department of Environmental Protection (NJDEP) on October 15, 2014 to confirm the State's interest in reviewing the unlisted activity and NJDEP confirmed interest. NSF has prepared a Draft Amended Environmental Assessment (EA) (Attachment 1) to address NSF's requirements under the National Environmental Policy Act (NEPA) of 1969, as amended, for the proposed NSF federal action and in support of other necessary regulatory processes.

The proposed collaborative research objectives and efforts remain unchanged from those planned in 2014. The proposed research efforts would include the collection and analysis of data on the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to the present. Despite their existence being clearly indicated in sediment

cores recovered during International Ocean Discovery Program (IODP) Expedition 313, features such as river valleys cut into coastal plain sediments, now buried under a kilometer (km) of younger sediment and flooded by today's ocean, cannot be resolved in existing 2-D seismic data to the degree required to map shifting shallow-water depositional settings in the vicinity of clinoform rollovers. To achieve the project's goals, the PIs propose to use a 3-D seismic reflection survey to map sequences around existing IODP Expedition 313 drill sites and analyze their spatial/temporal evolution. Objectives that would then be met include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea level; and determining the amplitudes and timing of global sea-level changes during the mid-Cenozoic era.

The proposed seismic survey would be conducted on the NSF-owned research vessel (R/V) *Marcus G. Langseth (Langseth)*, which is operated on our behalf by Columbia University's Lamont-Doherty Earth Observatory (L-DEO). The proposed activity is not related to energy resources or facilities, including oil and gas exploration, development, production, or lease sales, and therefore is not subject to Bureau of Ocean Energy Management regulatory jurisdiction pursuant to the Outer Continental Shelf Lands Act. The proposed activity is also not related to ocean mining.

Although NSF does not anticipate effects on the coastal resources of New Jersey as a consequence of the proposed research activity, due to the circumstances surrounding the 2014 survey and New Jersey's expressed interest in reviewing the proposed 2015 survey, NSF has chosen to submit this Consistency Determination. Due to these unique circumstances, NSF does not consider this to be precedent setting in that all future NSF seismic surveys would require a Consistency Determination but would rather depend on the unique circumstances associated with each site specific survey.

The attached NSF Consistency Determination for the proposed seismic survey is based on review of the proposed activity's conformance with New Jersey's Coastal Management Program enforceable policies, which are contained in the Coastal Zone Management rules (N.J.A.C. 7:7E), the Coastal Permit Program rules, (N.J.A.C. 7:7), the Freshwater Wetlands Protection Act rules, (N.J.A.C. 7:7A), Stormwater Management rules, (N.J.A.C. 7:8), New Jersey Pollutant Discharge Elimination Systems rules, (N.J.A.C. 7:14A, Subchapters 1, 2, 5, 6, 11, 12, 13, 15, 16, 18, 19, 20, 21, 24 and 25), and the Hackensack Meadowlands District Zoning Regulations (N.J.A.C. 19:4 portions of Subchapters 2, 3, 4, 5, 7, 8 and 9). The Hackensack Meadowlands Reclamation and Development Act, (N.J.S.A. 13:17), Freshwater Wetlands Protection Act, (N.J.S.A. 13:9B), the law concerning the transportation of dredged materials containing polychlorinated biphenyls (PCBs), (N.J.S.A. 13:19-33), and the Department's dredging technical manual titled, "The Management and Regulation of Dredging Activities and Dredged Material Disposal in New Jersey's Tidal Waters" are additional enforceable policies that NSF reviewed. Support for this Consistency Determination is provided through analysis included in the Draft Amended EA prepared pursuant to NEPA for the proposed activity (Attachment 1). The proposed activity is consistent (to the maximum extent practicable) with the enforceable policies of New Jersey's Coastal Management Program.

Pursuant to 15 CFR 930.41, the New Jersey Coastal Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR Section 930.41(b). If New Jersey does not provide a response to NSF within 60 days of receipt of NSF's Consistency Determination, then the State's concurrence will be presumed (15 CFR 930.41(a)).

Should you have any questions about the information provided, please feel free to contact me at hesmith@nsf.gov or (703) 292-7713.

Sincerely,

Holly Smith
Environmental Compliance Officer

Attachment 1: Draft Amended Environmental Assessment for a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015

cc: Elizabeth Semple, NJDEP
John Gray, NJDEP
Megan Brunatti, NJDEP
Kerry Kehoe, NOAA Office of Ocean and Coastal Resource Management

NSF COASTAL ZONE MANAGEMENT ACT (CZMA)
CONSISTENCY DETERMINATION

This document provides the New Jersey (NJ) Coastal Management Program (CMP) with the National Science Foundation's (NSF) Consistency Determination pursuant to the CZMA implementing regulations at 15 CFR Part 930, Subpart C for a collaborative research project entitled, "Community-Based 3-D Imaging That Ties Clinoform Geometry to Facies Successions and Neogene Sea-Level Change." The research proposal has been reviewed under the NSF merit review process and identified as an NSF program priority to meet NSF's critical need to foster a better understanding of Earth processes. The information in this Consistency Determination is provided in accordance with 15 CFR 930.31(c) and 930.39.

The collaborative research activity is proposed to be conducted during the period June-August 2015 and would include a marine geophysical survey in the Atlantic Ocean off the coast of New Jersey. The proposed research activity was funded entirely by NSF and would be led by lead Principal Investigator (PI) Dr. Gregory Mountain (Rutgers University) and collaborating PIs Drs. Jamie Austin, Craig Fulthorpe, and Mladen Nedimovic (University of Texas at Austin).

NSF prepared an Environmental Assessment (EA) for the research activity to take place in 2014. NSF's environmental compliance, including all federal regulatory obligations, was completed for the research activity on July 1, 2014, and the survey commenced. Due to mechanical issues with the vessel, the survey was unable to be completed during the effective periods of the Incidental Harassment Authorization (IHA) and Incidental Take Statement (ITS) issued for the survey. Pursuant to the National Environmental Policy Act, as amended, NSF has prepared a Draft Amended EA to evaluate the potential impacts on the human and natural environment associated with the proposed activity to occur in summer 2015, including to endangered and threatened species listed under the Endangered Species Act (ESA) and marine mammals protected by the Marine Mammal Protection Act (MMPA). The Draft Amended EA identifies and includes analyses for any differences between the 2014 and proposed 2015 research activity. The Draft Amended EA, entitled, "Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015", was prepared on our behalf by LGL Limited Environmental Research Associates (LGL) (Attachment 1). The Draft Amended EA tiers to the Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (NSF/USGS PEIS, 2011) and the 2014 Final EA and Finding of No Significant Impact (FONSI) issued by NSF (Attachment 1), and incorporates by reference the Biological Opinion, Essential Fish Habitat concurrence letter, Incidental Harassment Authorization, and Final Environmental Assessment, and FONSI issued by the National Marine Fisheries Service in 2014. The conclusions from the Draft Amended EA were used to inform the Division of Ocean Sciences (OCE) management of potential environmental impacts of the proposed activity. OCE concurs with the Draft Amended EA's findings that implementation of the proposed activity would not have a significant impact on the environment. OCE will continue to review information between now and the time of the issuance of the Final Amended EA and, if any contrary conclusion is reached during this timeframe regarding environmental impacts, we will immediately notify you of such a conclusion. The proposed research activity is not related to oil and gas exploration,

development, production, or lease sales, and, therefore, is not subject to Bureau of Ocean Energy Management regulatory jurisdiction pursuant to the Outer Continental Shelf Lands Act (OCSLA).

The purpose of the proposed collaborative research activity is to collect and analyze data on the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to present. Despite their existence being clearly indicated in sediment cores recovered during International Ocean Discovery Program (IODP) Expedition 313, features such as river valleys cut into coastal plain sediments, now buried under a kilometer (km) of younger sediment and flooded by today's ocean, cannot be resolved in existing 2-D seismic data to the degree required to map shifting shallow-water depositional settings in the vicinity of clinoform rollovers. To achieve the project's goals, the lead and collaborating PIs, propose to use a 3-D seismic reflection survey to map sequences around existing IODP Expedition 313 drill sites and analyze their spatial/temporal evolution. Objectives that would then be met include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea level; and determining the amplitudes and timing of global sea-level changes during the mid-Cenozoic era. The research objectives remain the same as those described for the 2014 survey. The proposed seismic survey would be conducted on the NSF-owned research vessel (R/V) *Marcus G. Langseth* (*Langseth*), which is operated on our behalf by Columbia University's Lamont-Doherty Earth Observatory (L-DEO) through a Cooperative Agreement entered into in 2012.

The proposed marine seismic survey would take place within the Exclusive Economic Zone of the U.S. (EEZ) and outside of NJ state waters, for approximately (~) 30 days during summer 2015. The proposed survey area is located in the Atlantic Ocean, ~25–85 kilometers (km) off the coast of NJ (Fig. 1). Water depths in the survey area are ~20–75 meters (m). The proposed full-fold 3-D box/survey area is defined by the coordinates at the four corners (including turns and run-in and run-out of each line): 39:38:00°N, 73:44:36°W; 39:43:12°N, 73:41:00°W; 39:25:30°N, 73:06:12°W; and 39:20:06°N, 73:10:06°W. Although the proposed survey area is near the Northwest Atlantic Detailed Analysis Area (NW Atlantic DAA) described in the NSF/USGS PEIS, it does not include intermediate and deep-water depths. The proposed research activity would avoid the North Atlantic right whale migration period. The survey location would be the same as analyzed for the 2014 survey.

The procedures to be used for the survey would be the same as those proposed for the 2014 survey and similar to those used during previous seismic surveys by L-DEO and would use conventional seismic methodology. The survey would involve one source vessel, the *Langseth* and potentially one support vessel. The *Langseth* would deploy two pairs of subarrays of 4 airguns as an energy source; the subarrays would fire alternately, with a total volume of ~700 inch (in)^3. The receiving system would be a passive component of the proposed activity and would consist of a system of hydrophones: four 3000-m hydrophone streamers at 75-m spacing, or preferentially, a combination of two 3000-m hydrophone streamers and a Geometrics P-Cable system. As the airgun array is towed along the survey lines, the hydrophone streamers would receive the returning acoustic signals and transfer the data to the on-board processing system.

A total of ~4900 km of 3-D survey lines, including turns, would be conducted in an area 12 x 50 km with a line spacing of 150 m in two 6-m wide race-track patterns (Attachment 1, Figure 1). There would be additional seismic operations in the survey area associated with airgun testing and repeat coverage of any areas where initial data quality is sub-standard. In our calculations (Attachment 1, § IV Proposed Action (1)(e)), 25% has been added for those additional operations. The survey parameters noted here support the proposed research goals and therefore differ from the NW Atlantic DAA survey parameters presented in the NSF/USGS PEIS. The same amount of surveying proposed for 2015 was analyzed for the 2014 survey. Because of mechanical/equipment issues on the survey vessel along with weather issues (including Hurricane Arthur) in 2014, the full 3-D array of equipment could not be deployed. Given equipment limitations, only ~61 hours (h) of seismic survey data were collected in 2014, with only ~43 h at full power (700 in^3) on survey tracklines. Of the 43 h of data collected, ~22 h were of substandard data quality as a result of equipment damage from rough seas. However, the existing data did allow confirmation that the smaller 700-in^3 source array was suitable for the project, thus eliminating potential use of the larger 1400-in^3 array originally proposed in 2014.

In addition to the operations of the airgun array, a multibeam echosounder (MBES) and a sub-bottom profiler (SBP) would also be operated from the *Langseth* continuously throughout the survey, however not during transit. All planned geophysical data acquisition activity would be conducted by L-DEO with on-board assistance by the scientists who have proposed the study. The vessel would be self-contained, and the crew would live aboard the vessel with potential personnel transfer on/off the *Langseth* by a small support vessel. No anchoring or installments of equipment are planned to occur as part of the proposed research survey.

Monitoring and mitigation measures would be implemented during the survey, including use of Protected Species Visual Observers (PSVOs), Passive Acoustic Monitoring (PAM), exclusion zones calculated for each airgun source and tow depths, speed or course alterations, power or shut downs, and ramp-up procedures (Attachment 1, § II Proposed Action (3)). In addition, the airgun source would be shut down at any distance for North Atlantic right whales due to their critical status and for any large concentrations of marine mammals encountered. Ultimately, should the project move forward, any monitoring and mitigation measures required by an IHA and ITS issued pursuant to the MMPA and ESA, respectively, would be implemented.

Consultations

NSF has initiated consultations with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA, and the ship operator of the *Langseth* is seeking an IHA under the MMPA for the survey. NSF will also consult on Essential Fish Habitat (EFH) pursuant to the Magnuson Stevens Act. The proposed activity is not related to oil and gas exploration, development, production, or lease sales, and therefore is not subject to Bureau of Ocean Energy Management regulatory jurisdiction pursuant to the OCSLA.

Potential Effects to New Jersey Coastal Resources

During preparation of the Draft Amended EA and in accordance with the CZMA (16 USC §1451, *et seq.*), NSF considered whether the proposed activity would have any effect on coastal uses or resources of the state of NJ. Potential impacts of the seismic survey on the environment, if any, would be primarily a result of the operation of the airgun array. The increased underwater

noise may result in avoidance behavior by marine mammals, sea turtles, seabirds, and fish, and other forms of disturbance. At most, effects on marine mammals may be interpreted as falling within the MMPA definition of "Level B Harassment" for those species managed by NMFS. No long-term or significant effects would be anticipated on individual marine mammals, sea turtles, seabirds, fish, the populations to which they belong, or their habitats as a result of this proposed action. Mitigation measures proposed in the Draft Amended EA for the survey are consistent with those required by NMFS for the 2014 survey and would reduce potential risks to marine species (Attachment 1, § II Proposed Action (3) and § IV(1)(d)). The marine seismic survey, which would be conducted outside of state waters, would not preclude fisheries vessels from operating within or around the survey area. A safe distance, however, would need to be kept between the *Langseth* and other vessels to avoid entanglement with the towed seismic equipment (Attachment 1, § IV Proposed Action (2)(c)). L-DEO would use Notice to Mariners broadcasts to alert mariners, including fishermen and scuba divers, of the survey activity. During the proposed seismic survey, only a small fraction of the survey area would be ensonified by the source array at any given time (Attachment 1, § IV(4)) and the distance in which Level B harassment may be anticipated from the vessel is only 6.1 km from the source and would remain substantially outside of state waters. Disturbance to fish species would be short-term, and localized, and would not be significant on commercial and recreational fisheries (Attachment 1, § IV Proposed Action (2)(c)). No fish kills or injuries were observed during 2014 survey activity (Attachment 1, § IV(2)(c)). Given the proposed activity, including the short duration of the survey, temporary nature of potential impacts to marine species, and distance from the survey to the coastal zone, impacts on marine species within state waters are only remotely possible (i.e., if an animal near the vessel moved into state waters). Access to NJ beaches and fisheries in state waters would not be impeded by the proposed marine-based activity. Although not anticipated, any potential space-use conflicts with commercial or recreational fisheries activities outside of state waters would be avoided through communications. During 2014 survey activity no actively operating fisheries vessels were encountered by the *Langseth* within the survey area (Attachment 1, § IV Proposed Action (2)(c)).

No significant impacts on shipwrecks and dive sites, including the one known dive site within the survey area, would be anticipated. Airgun sounds would have no effects on solid structures, and no deployments of gear are anticipated during the survey. The only potential effects could be temporary displacement of fish and invertebrates from the site within the survey area. (Attachment 1, § IV Proposed Action (5))

Significant impacts on, or conflicts with, divers or diving activities would be avoided through communication with the diving community before and during the survey and publication of a Notice to Mariners about operations in the area. In particular, dive operators with dives scheduled on the shipwreck *Lillian* during the survey would be contacted directly. That dive site represents only a very small percentage of the recreational dive sites in New Jersey waters. During 2014 survey activity, L-DEO coordinated with local dive shops and no actively operating scuba vessels were encountered by the *Langseth* within the survey area (Attachment 1, § IV Proposed Action (5)).

New Jersey Enforceable Policies

NSF reviewed New Jersey's enforceable policies and responds to the following enforceable policies that it considers potentially relevant:

1- **N.J. A.C. 7:7E-3.3 Surf clam areas**
2- **N.J. A.C. 7:7E-3.4 Prime fishing areas**
3- **N.J. A.C. 7:7E-3.12 Submerged infrastructure routes**
4- **N.J. A.C. 7:7E-3.13 Shipwreck and artificial reef habitats**
5- **N.J. A.C. 7:7E-3.36 Historic and archaeological resources**
6- **N.J. A.C. 7:7E-3.38 Endangered or threatened wildlife or plant species habitats**
7- **N.J. A.C. 7:7E-3.39 Critical wildlife habitats**
8- **N.J. A.C. 7:7E-3.50 Lands and waters subject to public trust rights**
9- **N.J. A.C. 7:7E-6.3 Secondary impacts**
10- **N.J.A.C. 7: 7E-8.2 Marine fish and fisheries**
11- **N.J.A.C. 7:7E-8.11 Public Access**

NSF Proposed Research Activity

Based upon the following information, data and analysis, the NSF finds that the proposed research activity is consistent to the maximum extent practicable with the enforceable policies of the New Jersey Coastal Management Program.

1- **N.J.A.C. 7:7E-3.3 Surf clam areas:** "The surf clam (*Spisula solidissima*) fishery is one of New Jersey's most valuable fisheries. More than 80% of the total Mid-Atlantic and New England area catch of surf clams are landed in New Jersey. An annual inventory is conducted in New Jersey territorial waters to provide current information on the status of the resource. This information is used to develop various management measures such as establishing season harvest quotas and conservation zones." (Source: http://www.state.nj.us/dep/fgw/shelhome.htm)

   The survey activity is proposed to take place ~25–85 km (~14–46 nautical miles (n.mi).) off the coast of New Jersey, outside of New Jersey state coastal waters and within the EEZ. The proposed research activity would not include any development which would result in the destruction, condemnation, or contamination of surf clam areas within NJ state waters. The proposed research activity would not involve any anchoring of equipment or instrumentation on the sea floor. Potential effects from the proposed research activity on invertebrates are described in § 3.2.4 and § 3.3.4 and Appendix D of the NSF/USGS PEIS and in the Draft Amended EA (Attachment 1, § IV). While the proposed survey site would be located in surf clam area, the area of the proposed survey would be relatively small, ~600 km^2 (~324 $n.mi.^2$). The overall area of NJ marine waters from shore to the EEZ encompasses ~210,768 km^2 (~113,805 $n.mi.^2$). Thus the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ (600 km^2/210,768 km^2). The survey area plus the largest mitigation zone (6.1 km) would represent less than one percent (0.77%) of the area of waters from the NJ shore to the EEZ (1630 km^2/210,768 km^2). Significant impacts, if any, on surf clams would not be anticipated by the proposed research activity. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.3 concerning surf clam areas.

2- N.J.A.C. 7:7E-3.4 Prime fishing areas: Effects of seismic sound on marine fish and their fisheries are discussed in § 3.2.4 and § 3.3.4 and Appendix D of the NSF/USGS PEIS. Relevant new studies on the effects of sound on marine fish and fisheries that have been published since the release of the NSF/USGS PEIS are summarized in the Draft Amended EA (Attachment 1, § IV Proposed Action (2)). The newly available information did not affect the outcome of the effects assessment as presented in the NSF/USGS PEIS. The NSF/USGS PEIS concluded that there could be changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of a high-energy acoustic source, but that there would be no significant impacts of NSF-funded marine seismic research on populations and associated EFH. The NSF/USGS PEIS also concluded that seismic surveys could cause temporary, localized reduced fish catch to some species, but that effects on commercial and recreation fisheries were not significant.

The survey activity is proposed to take place ~25–85 km (~14–46 n.mi.) off the coast of New Jersey, outside of New Jersey state coastal waters and within the EEZ. The proposed activity would be located outside of New Jersey state waters and would not include any development or construction. The proposed survey site would overlap slightly with areas identified in New Jersey's Specific Sport Ocean Fishing Grounds. The area of the proposed survey, however, is relatively small, ~600 km^2 (~324 $n.mi.^2$). The overall area of NJ marine waters from shore to the EEZ encompasses ~210,768 km^2 (~113,805 $n.mi.^2$). Thus the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ (600 km^2/210,768 km^2). The survey area plus the largest mitigation zone (6.1 km) would represent less than one percent (0.77%) of the area of waters from the NJ shore to the EEZ (1630 km^2/210,768 km^2). As noted previously, fishing activities would not be precluded from operating in the proposed survey area. Any impacts to fish species would be anticipated to occur very close to the survey vessel, outside of NJ state waters, and would be temporary in nature.

Most commercial fish catches by weight (almost all menhaden) and most recreational fishing trips off the coast of New Jersey (87% in 2013) occur in waters within 5.6 km from shore, although the highest-value fish (e.g., flounder and tuna) are caught offshore. The closest distance between the proposed survey and shore is >25 km, so interactions between the proposed survey and recreational and some commercial fisheries would be relatively limited. Also, most of the recreational fishery "hotspots" described in the Draft Amended EA (Attachment 1 § III, Fisheries (2)) are to the north or south of the proposed survey area; however, there are several hotspots located within or very near the northwestern corner of the survey area. Two possible conflicts are the *Langseth*'s streamer entangling with fixed fishing gear and temporary displacement of fishers within the survey area, although it is relatively small (12 x 50 km). Fishing activities could occur within the survey area; however, a safe distance would need to be kept from the *Langseth* and the towed seismic equipment. Conflicts would be avoided and, therefore, impacts would be negligible, through communication with the fishing community and publication of a Notice to Mariners about operations in the area. No fisheries activities except vessels in transit were observed in the survey area during the ~13 days that the Langseth was there in July 2014. Due to the location, short duration, and nature of activity, it would not be anticipated that the proposed activity

would have an effect on local economies that commercial and recreational fisheries contribute, such as marinas, charter fleets, restaurants, and lodging establishments.

Given the proposed research activity, no significant impacts on marine invertebrates, marine fish, their EFH, and their fisheries would be anticipated. In decades of seismic surveys carried out by the *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related fish or invertebrate injuries or mortality. No fish kills or injuries were observed during 2014 survey activity (Attachment 1, § IV Proposed Action (2)(c)). Furthermore, past seismic surveys in the proposed survey area (2002, 1998, 1996, 1990) did not result in noticeable effects on commercial or recreational fish catches, based on a review of multi-year NMFS fish catch data in the months when seismic surveys were undertaken. (Attachment 1, § IV Proposed Action (2)(c))

The proposed research activity does not involve those activities listed in 7:7E-3.4 as prohibited: sand or gravel submarine mining or disposal or domestic or industrial wastes. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.4 concerning prime fishing areas.

3- **N.J.A.C. 7:7E-3.12 Submerged infrastructure routes:** The survey activity is proposed to take place ~25–85 km (~14–46 n.mi.) off the coast of New Jersey, outside of New Jersey state coastal waters and within the EEZ. The proposed research activity would be located outside of New Jersey state coastal waters. The research activity is planned to occur near the surface of the water; no anchoring or installments of equipment are planned. The research activity would not be expected to interact with any submerged infrastructure or maintenance operations. The proposed research activity, therefore, would not be anticipated to have any impacts on submerged infrastructure routes or increase the likelihood of infrastructure damage or breakage, or interfere with maintenance operations. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.12 concerning submerged infrastructure routes.

4- **N.J.A.C. 7:7E-3.13 Shipwreck and artificial reef habitats:** The survey activity is proposed to take place ~25–85 km (~14–46 n.mi.) off the coast of New Jersey, outside of New Jersey state coastal waters and within the EEZ. Research activity is planned to occur near the surface of the water; no anchoring or installments of equipment are planned as part of the proposed research survey. The research activity would not be expected to interact with any shipwrecks or artificial reef habitats. Locations of shipwrecks in and around the survey area were considered in the Draft Amended EA. One shipwreck, a known dive site, is in or near the survey area: the *Lillian* (Galiano 2009; Fisherman's Headquarters 2014; NOAA 2014a) (Attachment 1, § III). Shipwrecks are discussed in the Draft Amended EA in § III and IV.

No significant impacts from the proposed research activity on dive sites, including shipwrecks, would be anticipated. Airgun sounds would have no effects on solid structures. The only potential effects could be temporary displacement of fish and invertebrates from the structures. Significant impacts on, or conflicts with, divers or diving activities would be avoided through communication with the diving community before and during the survey and publication of a

Notice to Mariners about operations in the area. In particular, dive operators with dives scheduled on the shipwreck *Lillian* during the survey would be contacted directly. That dive site represents only a very small percentage of the recreational dive sites in New Jersey waters. No dive vessels were observed in the survey area during the ~13 days that the Langseth was there in July 2014. No impacts to shipwrecks or artificial reef habitats would be anticipated from the proposed research activity. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.13 concerning shipwrecks and artificial reef habitats.

5- **N.J.A.C. 7:7E-3.36 Historic and archaeological resources:** As noted in the Draft Amended EA (Attachment 1, § III) and above, aside from the one possible shipwreck (the *Lillian*), there are no known cultural (including prehistoric) resources in the proposed Project area. As noted above, no significant impacts on dive sites, including shipwrecks, would be anticipated. Airgun sounds would have no effects on solid structures. The only potential effects could be temporary displacement of fish and invertebrates from the structures. The proposed research activity would not involve any development or scientific recording, removal, or recovery of historic and archaeological resources. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.36 concerning historic and archaeological resources.

6- **N.J.A.C. 7:7E-3.38 Endangered or threatened wildlife or plant species habitats:** The NJ coastal zone, "is an aquatic region that includes the NJ portion of the Delaware and Raritan bays. It also includes the portion of the Atlantic Ocean within NJ's jurisdiction, which is defined as the area within 3-nautical miles of the NJ shoreline. This region supports commercially valuable shellfish resources as well as a number of fish species of commercial and recreational importance. Over half of NJ's Federal listed species are found exclusively within this region, including several species of whales and sea turtles. The endangered shortnose sturgeon is also found within Delaware Bay. Waters of the Delaware Bay are also critical habitat to one of the largest populations of horseshoe crab in the world. During the summer, near-shore Atlantic Ocean waters are calving and nursery grounds for bottlenose dolphins while many additional species utilize these waters as a migratory corridor." (Source: http://www.state.nj.us/dep/fgw/ensp/landscape/lp_report_3_1.pdf)

The proposed research activity would be located outside of the NJ coastal zone and within the EEZ. The proposed research activity may have impacts to federally listed endangered and threatened species (Attachment 1, § III). Since the proposed activity may have an effect on federally listed endangered and threatened species, NSF and L-DEO would consult with NMFS and USFWS to ensure compliance with federal regulations including the MMPA and ESA. Monitoring and mitigation measures would be employed to avoid or further reduce any potential impacts to endangered and threatened species (Attachment 1, § II Proposed Action (3) and § IV Proposed Action (1)(d)).

The Draft Amended EA, which tiers to the NSF/USGS PEIS, analyzed the potential impacts to endangered and threatened species, and their habitats, that may occur within the proposed survey area during the summer season (Attachment 1, § IV). The findings of the Draft Amended EA concluded that although there may be potential effects to endangered and

threatened species within the survey area, they would be short term and temporary and would not have significant impacts to individuals or their populations. Additionally, the proposed research activity would not have adverse effects, direct or secondary (indirect), to endangered or threatened species' habitats. The 2014 survey activity, which was analyzed for a larger source than that currently proposed for 2015, resulted in the issuance of all necessary federal authorizations to proceed; this outcome further supported the conclusion that the proposed research activity would not have significant impacts on marine species or their habitats. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.38 concerning endangered or threatened wildlife or plant species habitats.

7- **N.J.A.C. 7:7E-3.39 Critical wildlife habitats:** The proposed research activity would be located outside of the NJ coastal zone and within the EEZ. The proposed research activity may have impacts on federally listed endangered and threatened species (Attachment 1, § III); however, no areas of special critical wildlife habitat have been identified within the survey area except for EFH. The proposed survey area is not located within any designated special areas such as rookeries, ecotones, or colonial waterbird habitat. Since the proposed activity may have an effect on federally listed endangered and threatened species, NSF and L-DEO are consulting with NMFS and USFWS to ensure compliance with federal regulations including the MMPA and ESA.

No temporary or permanent development would occur as a result of the proposed research activity. As described in the Draft Amended EA (Attachment 1, § IV), minimal, if any, effects on and interference with endangered and threatened species habitat would be anticipated. The proposed survey location has been selected to meet the scientific objectives proposed by the PIs. As described in the Draft Amended EA (Attachment 1, § II Proposed Action (1)), the survey site location is a unique siliciclastic passive margin which has the potential to elucidate the timing and amplitude of eustatic change during the "Ice House" period of Earth history. The proposed research would tie to and build upon research previously conducted at the survey site and allow for the acquisition of a 3-D seismic volume of the inner-middle shelf of the NJ margin. For these reasons, alternative site locations would not meet research goals and therefore would not be feasible.

The proposed research activity includes a suite of monitoring and mitigation measures. These monitoring and mitigation measures include standard monitoring and mitigation measures established by the NSF/USGS PEIS and include special mitigation measures for North Atlantic Right whales. They are described in detail in the NSF/USGS PEIS (Section 2.4.4.1) and in the Draft Amended EA (Attachment 1, § II Proposed Action (3) and § IV Proposed Action (1)(d)). These monitoring and mitigation measures are conservative and have been approved by NMFS and USFWS for other US academic research seismic surveys, including the 2014 survey off of NJ. NSF and L-DEO would adhere to any monitoring and mitigation measures required by regulatory agencies, including those defined in an IHA and ITS for the survey. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.39 concerning critical wildlife habitats.

8- **N.J.A.C. 7:7E-3.50 Lands and waters subject to public trust rights:** Lands and waters subject to public trust rights are tidal waterways and their shores, including both lands now or formerly below the mean high water line, and shores above the mean high water line. Tidal waterways and their shores are subject to the Public Trust Doctrine and are held in trust by the State for the benefit of all the people, allowing the public to fully enjoy those lands and waters for a variety of public uses. Public trust rights include public access which is the ability of the public to pass physically and visually to, from and along the ocean shore and other waterfronts subject to public trust rights and to use these lands and waters for activities such as navigation, fishing and recreational activities including, but not limited to, swimming, sunbathing, surfing, sport diving, bird watching, walking, and boating. Public trust rights also include the right to perpendicular and linear access. The proposed research activity includes no development. The proposed research activity would be outside of NJ public trust areas and would not impede public access to lands and waters subject to public trust rights. Due to the distance from shore to the survey site, the activity would have no impact on the viewshed from the coast. Space-use conflict may occur with fishermen or divers within the survey area, however, through coordination efforts, any space-use conflicts should be minimized or eliminated. In 2014, the *Langseth* encountered no fishing vessels actively operating within the survey area (Attachment 1, § IV Proposed Action (2)(c)), and coordination with scuba divers eliminated any potential space-use conflicts (Attachment 1, § IV Proposed Action (5)). Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-3.50 concerning lands and waters subject to public trust right.

9- **N.J.A.C. 7:7E-6.3 Secondary impacts:** The proposed research activity would not involve any development, nor would it be anticipated to encourage secondary development impacts. The proposed research activity would be temporary and of short duration and would occur outside of NJ coastal waters and within the EEZ. It would not involve any construction or installment of temporary or permanent structures. Accept for possible supply and personnel transfers at sea, the *Langseth* would be self-contained, and the scientific complement, technicians, and crew would live aboard the vessel. Due to the location, short duration, and nature of activity, it would not be anticipated that the proposed activity would have an effect on local economies that commercial and recreational fisheries contribute, such as marinas, charter fleets, restaurants, and lodging establishments. Although there may be future seismic research activities proposed within the survey area in the future, at the present time, no activities are currently planned. Additionally, the proposed research activity would not be anticipated to promote any other types of development activities, such as oil and gas exploration; the area is outside of the Bureau of Ocean Energy Management (BOEM) Outer Continental Shelf Mid-Atlantic and South Atlantic Planning Areas to conduct Geological and Geophysical Activities (Attachment 1, § IV Proposed Action (6)(f)). The proposed research activity would elucidate a small, shallow area of the shelf that has already been drilled for research purposes. Seismic surveys in support of research activities have occurred in the survey area in the recent past (2002, 1998, 1996, 1990). Additionally, NJDEP conducted a seismic survey (boomer/sparker source) in 1985 off the coast of New Jersey (Attachment I, § IV Proposed Action (6)(f)). Oil and gas activities in the proposed survey area have not resulted from these similar research seismic surveys. Therefore, it would not be logical to assume that the proposed research seismic survey would result in oil and gas development

(Attachment 1, § IV Proposed Action (6)(f)). For these reasons, secondary impacts from additional development as a result of the proposed research activity would not be anticipated. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-6.3 concerning secondary impacts.

10- **N.J.A.C. 7:7E-8.2 Marine fish and fisheries:** As noted above, effects of seismic sound on marine fish and their fisheries are discussed in § 3.2.4 and § 3.3.4 and Appendix D of the NSF/USGS PEIS. Relevant new studies on the effects of sound on marine fish and fisheries that have been published since the release of the NSF/USGS PEIS are summarized in the Draft Amended EA (Attachment 1, § IV Proposed Action (2)). The newly available information did not affect the outcome of the effects assessment as presented in the NSF/USGS PEIS. The NSF/USGS PEIS concluded that there could be changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of a high-energy acoustic source, but that there would be no significant impacts of NSF-funded marine seismic research on populations and associated EFH. The NSF/USGS PEIS also concluded that seismic surveys could cause temporary, localized reduced fish catch to some species, but that effects on commercial and recreation fisheries were not significant.

As noted in the Draft EA (Attachment 1, § IV Proposed Action (2) (c)), most commercial fish catches by weight (almost all menhaden) and most recreational fishing trips off the coast of New Jersey (87% in 2013) occur in waters within 5.6 km from shore, although the highest-value fish (e.g., flounder and tuna) are caught offshore. The closest distance between the proposed survey and shore is >25 km, so interactions between the proposed survey and recreational and some commercial fisheries would be relatively limited. Also, most of the recreational fishery "hotspots" described in § III of the Draft Amended EA are to the north or south of the proposed survey area; however, there are several hotspots located within or very near the northwestern corner of the survey area. Two possible conflicts are the *Langseth*'s streamer entangling with fixed fishing gear and temporary displacement of fishers within the survey area, although it is relatively small (12 x 50 km). Fishing activities could occur within the survey area; however, a safe distance would need to be kept from the *Langseth* and the towed seismic equipment. Through communication with the fishing community and publication of a Notice to Mariners about operations in the area, conflicts would be avoided and, therefore, impacts would be negligible. No fisheries activities except vessels in transit were observed in the survey area during the ~13 days that the Langseth was there in July 2014.

The survey is proposed to take place ~25–85 km (~14–46 n.mi.) off the coast of New Jersey. The area of the proposed survey is relatively small, ~600 km^2 (~324 $n.mi.^2$). The overall area of NJ marine waters from shore to the EEZ encompasses ~210,768 km^2 (~113,805 $n.mi.^2$). Thus the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ (600 km^2/210,768 km^2). The survey area plus the largest mitigation zone (6.1 km) would represent less than one percent (0.77%) of the area of waters from the NJ shore to the EEZ (1630 km^2/210,768 km^2). The seismic survey is proposed to take place for ~30 days within the June to August timeframe in 2015. As noted previously, fishing activities would not be precluded from operating in the proposed survey area. Any impacts to fish species would occur very close to the survey vessel and would be temporary. No fish kills

or injuries were observed during 2014 survey activity (Attachment 1, § IV Proposed Action (2)(c)).

Monitoring and mitigation measures would be employed to avoid or further reduce any potential impacts to endangered and threatened species (Attachment 1, § II Proposed Action (3) and § IV Proposed Action (1)(d)). Given the proposed activities, no significant impacts on marine invertebrates, marine fish, their EFH, and their fisheries would be anticipated by the proposed activities. In decades of seismic surveys carried out by the *Langseth* and the *Ewing*, PSOs and other crew members have seen no seismic sound-related fish or invertebrate injuries or mortality. Furthermore, past seismic surveys in the proposed survey area (2002, 1998, 1996, 1990) did not result in noticeable effects on commercial or recreational fish catches, based on a review of multi-year NMFS fish catch data in the months when seismic surveys were undertaken. Thus, it would not be anticipated that the proposed activity would have an effect on local economies that commercial and recreational fisheries contribute, such as marinas, charter fleets, restaurants, and lodging establishments.

NSF consulted for the survey activity in 2014 with the NMFS Greater Atlantic Regional Fisheries Office under the Magnuson-Stevens Act for EFH. The NMFS Greater Atlantic Regional Fisheries Office concluded that the activity may at some level adversely affect EFH, however, no specific conservation measures were identified for the activity (Attachment 1, § IV Proposed Action (8)). NSF will consult again with the NMFS Greater Atlantic Regional Fisheries Office for EFH for the proposed 2015 survey activity.

Impacts on New Jersey coastal fishery resources are possible, however, unlikely given the proposed research activity, including the temporary duration, distance to the coastal zone, and the monitoring and mitigation measures that would be employed. The proposed activity would occur outside of New Jersey State waters and ~25-85 km from shore. Access to New Jersey coastal zone marine fisheries would not be precluded by survey activities; any potential space-use conflict would be avoided through communications during survey activities. During the proposed seismic survey, only a small fraction of the survey area would be ensonified at any given time. Disturbance to fish species would be short-term, and fish would return to their pre-disturbance behavior once the seismic activity ceased. (Attachment 1, § IV Proposed Action (2)). Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-8.2 concerning marine fish and fisheries.

11- N.J.A.C. 7:7E-8.11 Public Access: The survey activity is proposed to take place ~25–85 km (~14–46 n.mi.) off the coast of NJ and would not prohibit public access to NJ coastal waters, including fisheries, beaches, trails, etc. Given the distance to shore the only main human-related activities with which the proposed activity might interfere would be fishing, scuba diving, and ship traffic transiting through the area. These activities would not, however, be precluded from occurring during the survey effort; coordination may be required to avoid space-use conflicts. The proposed activity would be located outside of New Jersey state waters where the majority of recreational fishing occurs. The proposed survey site would overlap slightly with areas identified in New Jersey's Specific Sport Ocean Fishing Grounds. The area of the proposed survey, however, is relatively small, ~600 km^2 (~324 $n.mi.^2$). The

overall area of NJ marine waters from shore to the EEZ encompasses ~210,768 km^2 (~113,805 $n.mi.^2$). Thus the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ (600 km^2/210,768 km^2). The survey area plus the largest mitigation zone (6.1 km) would represent less than one percent (0.77%) of the area of waters from the NJ shore to the EEZ (1630 km^2/210,768 km^2). There is only one known scuba diving site within the survey area. Coordination with local dive shops would avoid space-use conflicts. A Notice to Mariners would be used to alert vessels operating and transiting through the area of the research activities and to avoid entanglement with gear. No temporary or permanent construction would be conducted at the survey site to inhibit future access to the site or to the NJ coastal zone. Survey activity in 2014 resulted in no known space-use conflicts and no issues with public access to the NJ coastal zone. Therefore, the proposed activity is consistent to the maximum extent practicable with New Jersey's enforceable policy found at 7:7E-8.11 concerning public access.

Required State and Local Permits

No state, county, and local permits are necessary for the proposed activity.

Conclusion

The proposed would not have any significant impacts to coastal resources. Therefore, the proposed activity is consistent, to the maximum extent practicable, with the enforceable policies of New Jersey's federally approved coastal management program.

Pursuant to CFR 930.41, the New Jersey Coastal Management Program has 60 days from the receipt of this letter in which to concur with or object to this Consistency Determination, or to request an extension under 15 CFR Section 930.41(b). The State's concurrence will be presumed if the States' response is not received by NSF on the 60th day from receipt of this Determination.

The States' response should be sent via email to:

Holly Smith
National Science Foundation
Division of Ocean Sciences
4201 Wilson Blvd.
Room 725
Arlington, VA 22230
Email: hesmith@nsf.gov

Attachment 1: Draft Environmental Assessment for a Marine Geophysical Survey by the R/V *Marcus G. Langseth* off New Jersey, Summer 2015

Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015

Prepared for

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LGL Report TA8349-3

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ABSTRACT

The State University of New Jersey at Rutgers (Rutgers), with funding from the U.S. National Science Foundation (NSF), proposes to conduct a high-energy, 3-D seismic survey on the R/V *Marcus G. Langseth* in the northwest Atlantic Ocean ~25–85 km from the coast of New Jersey in summer 2015. The NSF-owned *Langseth* is operated by Columbia University's Lamont-Doherty Earth Observatory (L-DEO) under an existing Cooperative Agreement. Although the *Langseth* is capable of conducting high energy seismic surveys using up to 36 airguns with a discharge volume of 6600 in^3, the proposed seismic survey would only use a small towed subarray of 4 airguns with a total discharge volume of ~700 in^3. The seismic survey would take place outside of U.S. state waters within the U.S. Exclusive Economic Zone (EEZ) in water depths ~20–75 m.

NSF, as the funding agency, has a mission to "promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…". The proposed seismic survey would collect data in support of a research proposal that has been reviewed under the NSF merit review process and identified as an NSF program priority. It would provide data necessary to study the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to present and enable follow-on studies to identify the magnitude, time, and impact of major changes in sea level.

The survey was originally proposed for implementation in 2014. NSF environmental compliance, including all federal statutory and regulatory obligations, was completed for the survey on 1 July 2014, and the survey commenced. Because of mechanical issues with the vessel, the survey was unable to be completed during the effective periods set forth in the Incidental Harassment Authorization (IHA) and Incidental Take Statement (ITS) issued for the survey. According to the U.S. National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), although the survey has not changed from what was approved in 2014, a new IHA will be required to conduct the same survey during a rescheduled time in 2015. This Draft Amended Environmental Assessment (Draft Amended EA) has been prepared on behalf of NSF pursuant to the National Environmental Policy Act (NEPA) to address any impacts associated with the rescheduled time for the survey, and in support of other necessary regulatory processes, including the IHA process.

As operator of the *Langseth*, L-DEO has requested an Incidental Harassment Authorization (IHA) from the U.S. National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) to authorize the incidental, i.e., not intentional, harassment of small numbers of marine mammals should this occur during the seismic survey. The analysis in the Draft Amended EA also supports the IHA application process and provides information on marine species not addressed by the IHA application, including seabirds and sea turtles that are listed under the U.S. Endangered Species Act (ESA), including candidate species. As analysis on endangered/threatened species was included, the Draft Amended EA is being used to support ESA Section 7 consultations with NMFS and U.S. Fish and Wildlife Service (USFWS). The Draft Amended EA will also be used in support of consultation with NMFS Greater Atlantic Regional Fisheries Office for Essential Fish Habitat (EFH) under the Magnuson-Stevens Act. Alternatives addressed in this Draft Amended EA consist of a corresponding program at a different time with issuance of an associated IHA and the no action alternative, with no IHA and no seismic survey. This document tiers to the Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (June 2011) and Record of Decision (June 2012), referred to herein as PEIS. It also tiers to the Final EA for the proposed survey off New Jersey dated 1 July 2014. The proposed survey area off the coast of New Jersey is near one of the detailed

analysis areas (DAAs) in the PEIS; however, this Draft Amended EA and the 2014 Final EA were prepared because a different energy source level and configuration would be used for the proposed survey, and the proposed survey covers only shelf waters whereas the DAA was on the shelf and slope. Additionally, this Draft Amended EA addresses the differences from and updates to the Final EA for the 2014 survey.

Numerous species of marine mammals inhabit the proposed survey area off the coast of New Jersey. Several of these species are listed as ***endangered*** under the U.S. Endangered Species Act (ESA): the sperm, North Atlantic right, humpback, sei, fin, and blue whales. Other ESA-listed species that could occur in the area are the ***endangered*** leatherback, hawksbill, green, and Kemp's ridley turtles and roseate tern, and the ***threatened*** loggerhead turtle and piping plover. The ***endangered*** Atlantic sturgeon and shortnose sturgeon could also occur in or near the study area. ESA-listed ***candidate species*** that could occur in the area are the cusk, dusky shark, and great hammerhead shark.

Potential impacts of the seismic survey on the environment would be primarily a result of the operation of the airgun array. A multibeam echosounder and sub-bottom profiler would also be operated. Impacts would be associated with underwater noise, which could result in avoidance behavior by marine mammals, sea turtles, seabirds, and fish, and other forms of disturbance. An integral part of the planned survey is a monitoring and mitigation program designed to minimize potential impacts of the proposed activities on marine animals present during the proposed research, and to document as much as possible the nature and extent of any effects. Injurious impacts to marine mammals, sea turtles, and seabirds have not been proven to occur near airgun arrays, and are not likely to be caused by the other types of sound sources to be used. However, despite the relatively low levels of sound emitted by the subarray of airguns, a precautionary approach would still be taken. The planned monitoring and mitigation measures would reduce the possibility of any effects.

As was the case with the approved 2014 survey, protection measures designed to mitigate the potential environmental impacts to marine mammals and sea turtles would include the following: ramp ups; typically two, but a minimum of one dedicated observer maintaining a visual watch during all daytime airgun operations; two observers 30 min before and during ramp ups during the day and at night; no start ups during poor visibility or at night unless at least one airgun has been operating; passive acoustic monitoring (PAM) via towed hydrophones during both day and night to complement visual monitoring (unless operational issues prevent it or the system and back-up system are both damaged during operations); and power downs (or if necessary shut downs) when marine mammals or sea turtles are detected in or about to enter designated exclusion zones. L-DEO and its contractors are committed to applying these measures in order to minimize potential effects on marine mammals and sea turtles and other environmental impacts.

With the planned monitoring and mitigation measures, unavoidable impacts to each species of marine mammal and sea turtle that could be encountered would be expected to be limited to short-term, localized changes in behavior and distribution near the seismic vessel. At most, effects on marine mammals may be interpreted as falling within the U.S. Marine Mammal Protection Act (MMPA) definition of "Level B Harassment" for those species managed by NMFS. No long-term or significant effects would be expected on individual marine mammals, sea turtles, seabirds, fish, the populations to which they belong, or their habitats.

LIST OF ACRONYMS

~	approximately
ADCP	Acoustic Doppler current profiler
ALWTRP	Atlantic Large Whale Take Reduction Plan
AMVER	Automated Mutual-Assistance Vessel Rescue
BOEM	Bureau of Ocean Energy Management
CETAP	Cetacean and Turtle Assessment Program
CITES	Convention on International Trade in Endangered Species
CZMA	Coastal Zone Management Act
DAA	Detailed Analysis Area
dB	decibel
DoN	Department of the Navy
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ESA	(U.S.) Endangered Species Act
EZ	Exclusion Zone
FAO	Food and Agriculture Organization of the United Nations
FM	Frequency Modulated
GIS	Geographic Information System
h	hour
hp	horsepower
HRTRP	Harbor Porpoise Take Reduction Plan
Hz	Hertz
IHA	Incidental Harassment Authorization (under MMPA)
in	inch
IOC	Intergovernmental Oceanographic Commission of UNESCO
IODP	Integrated Ocean Drilling Program
IUCN	International Union for the Conservation of Nature
kHz	kilohertz
km	kilometer
kt	knot
L-DEO	Lamont-Doherty Earth Observatory
LFA	Low-frequency Active (sonar)
m	meter
min	minute
MBES	Multibeam Echosounder
MFA	Mid-frequency Active (sonar)
MMPA	(U.S.) Marine Mammal Protection Act
ms	millisecond
NEPA	(U.S.) National Environmental Policy Act
NJ	New Jersey
NEFSC	Northeast Fisheries Science Center
NMFS	(U.S.) National Marine Fisheries Service
NRC	(U.S.) National Research Council

NSF	National Science Foundation
OBIS	Ocean Biogeographic Information System
OCS	Outer Continental Shelf
OEIS	Overseas Environmental Impact Statement
OAWRS	Ocean Acoustic Waveguide Remote Sensing
p or pk	peak
PEIS	Programmatic Environmental Impact Statement
PI	Principal Investigator
PTS	Permanent Threshold Shift
PSO	Protected Species Observer
PSVO	Protected Species Visual Observer
RL	Received level
rms	root-mean-square
R/V	research vessel
s	second
SAR	U.S. Marine Mammal Stock Assessment Report
SBP	Sub-bottom Profiler
SCUBA	Self contained underwater breathing apparatus
SEFSC	Southeast Fisheries Science Center
TTS	Temporary Threshold Shift
SEL	Sound Exposure Level
SPL	Sound Pressure Level
UNEP	United Nations Environment Programme
U.S.	United States of America
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
USN	U.S. Navy
μPa	microPascal
vs.	versus
WCMC	World Conservation Monitoring Centre

I. PURPOSE AND NEED

The purpose of this Draft Amended EA is to provide the information needed to assess the potential environmental impacts associated with the use of a 4-airgun subarray during the proposed seismic survey off the coast of New Jersey. The survey was originally proposed for implementation in 2014. NSF environmental compliance, including all federal legal and regulatory obligations, was completed for the project on 1 July 2014, and the survey commenced. Because of mechanical issues with the vessel, the survey was unable to be completed during the effective periods of the Incidental Harassment Authorization (IHA) and Incidental Take Statement (ITS) issued for the survey. According to NMFS, a new IHA Application is required to reschedule the survey in 2015.

This Draft Amended EA was prepared pursuant to the National Environmental Policy Act (NEPA), and tiers to the Programmatic Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS) for Marine Seismic Research funded by the National Science Foundation or Conducted by the U.S. Geological Survey (NSF and USGS 2011) and Record of Decision (NSF 2012), referred to herein as the PEIS. It also tiers to the Final EA for the proposed survey off New Jersey dated 1 July 2014. The proposed survey area off the coast of New Jersey is near one of the detailed analysis areas (DAAs) presented in the PEIS; however, a different energy source level and configuration would be used for the proposed survey, and the proposed survey covers only shelf waters whereas the DAA was on the shelf and slope. This Draft Amended EA was prepared to consider the survey proposed for 2015, provide updates, and address differences in the analysis prepared for the 2014 survey and the PEIS DAA. The Draft Amended EA provides details of the proposed action at the site-specific level and addresses potential impacts of the proposed seismic survey on marine mammals, as well as other species of concern in the area, including sea turtles, seabirds, fish, and invertebrates. The Draft Amended EA will be used in support of an application for an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS), and re-initiation of Section 7 consultations under the Endangered Species Act (ESA). The IHA would allow for non-intentional, non-injurious "take by harassment" of small numbers of marine mammals during the proposed seismic survey directed by Rutgers in the Atlantic Ocean off New Jersey. The Draft Amended EA will also be used in support of consultation with NMFS Greater Atlantic Regional Fisheries Office for Essential Fish Habitat (EFH) under the Magnuson-Stevens Act.

To be eligible for an IHA under the U.S. Marine Mammal Protection Act (MMPA), the proposed "taking" (with mitigation measures in place) must not cause serious physical injury or death of marine mammals, must have negligible impacts on the species and stocks, must "take" no more than small numbers of those species or stocks, and must not have an unmitigable adverse impact on the availability of the species or stocks for legitimate subsistence uses.

Mission of NSF

NSF was established by Congress under the National Science Foundation Act of 1950 (Public Law 810507, as amended) and is the only federal agency dedicated to the support of fundamental research and education in all scientific and engineering disciplines. Further details on the mission of NSF are described in § 1.2 of the PEIS.

Purpose of and Need for the Proposed Action

As noted in the PEIS, § 1.3, NSF has a continuing need to fund seismic surveys that enable scientists to collect data essential to understanding complex Earth processes recorded in sediments on and beneath the ocean floor. The purpose of the proposed action is to collect data across existing Integrated Ocean Drilling Program (IODP) Expedition 313 drill sites on the inner-middle shelf of the New Jersey continental margin

to reveal the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to the present. Features such as river valleys cut into coastal plain sediments, now buried under a km of younger sediment and flooded by today's ocean, cannot be identified and traced with existing 2-D seismic data, despite their existence being clearly indicated in sediment cores recovered during IODP Expedition 313. These and other erosional and depositional features would be imaged using 3-D seismic data and would enable follow-on studies to identify the magnitude, time, and impact of major changes in sea level. The proposed seismic survey would collect data in support of a research proposal that has been reviewed under the NSF merit review process and identified as an NSF program priority to meet NSF's critical need to foster an understanding of Earth processes.

Background of NSF-funded Marine Seismic Research

The background of NSF-funded marine seismic research is described in § 1.5 of the PEIS.

Statutory and Regulatory Setting

The statutory and regulatory setting of this Draft Amended EA is described in § 1.8 of the PEIS, including the

- National Environmental Protection Act (NEPA);
- Marine Mammal Protection Act (MMPA);
- Endangered Species Act (ESA);
- Magnuson-Stevens Act for Essential Fish Habitat (EFH); and
- Coastal Zone Management Act (CZMA).

II. ALTERNATIVES INCLUDING PROPOSED ACTION

In this Draft Amended EA, three alternatives are evaluated: (1) the proposed seismic survey and issuance of an associated IHA, (2) a corresponding seismic survey at an alternative time, along with issuance of an associated IHA, and (3) no action alternative. Additionally, two alternatives were considered but were eliminated from further analysis. A summary table of the proposed action, alternatives, and alternatives eliminated from further analysis is provided at the end of this section.

Proposed Action

The project objectives and context, activities, and mitigation measures for Rutger's planned seismic survey are described in the following subsections. The proposed action remains the same as described for the 2014 survey, except where noted.

(1) Project Objectives and Context

Rutgers plans to conduct a 3-D seismic survey using the L-DEO operated R/V *Marcus G. Langseth* (*Langseth*) on the inner-middle shelf of the New Jersey continental margin (Fig. 1). As noted previously, the goal of the proposed research is to collect and analyze data on the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to present. Despite their existence being clearly indicated in sediment cores recovered during IODP Expedition 313, features such as river valleys cut into coastal plain sediments, now buried under a km of younger sediment and flooded by today's ocean, cannot be resolved in existing 2-D seismic data to the degree required to map shifting shallow-water depositional settings in the vicinity of clinoform rollovers. To achieve the project's goals, the lead Principal Investigator (PI), Dr. G. Mountain (Rutgers University), and collaborating PIs Drs. J.

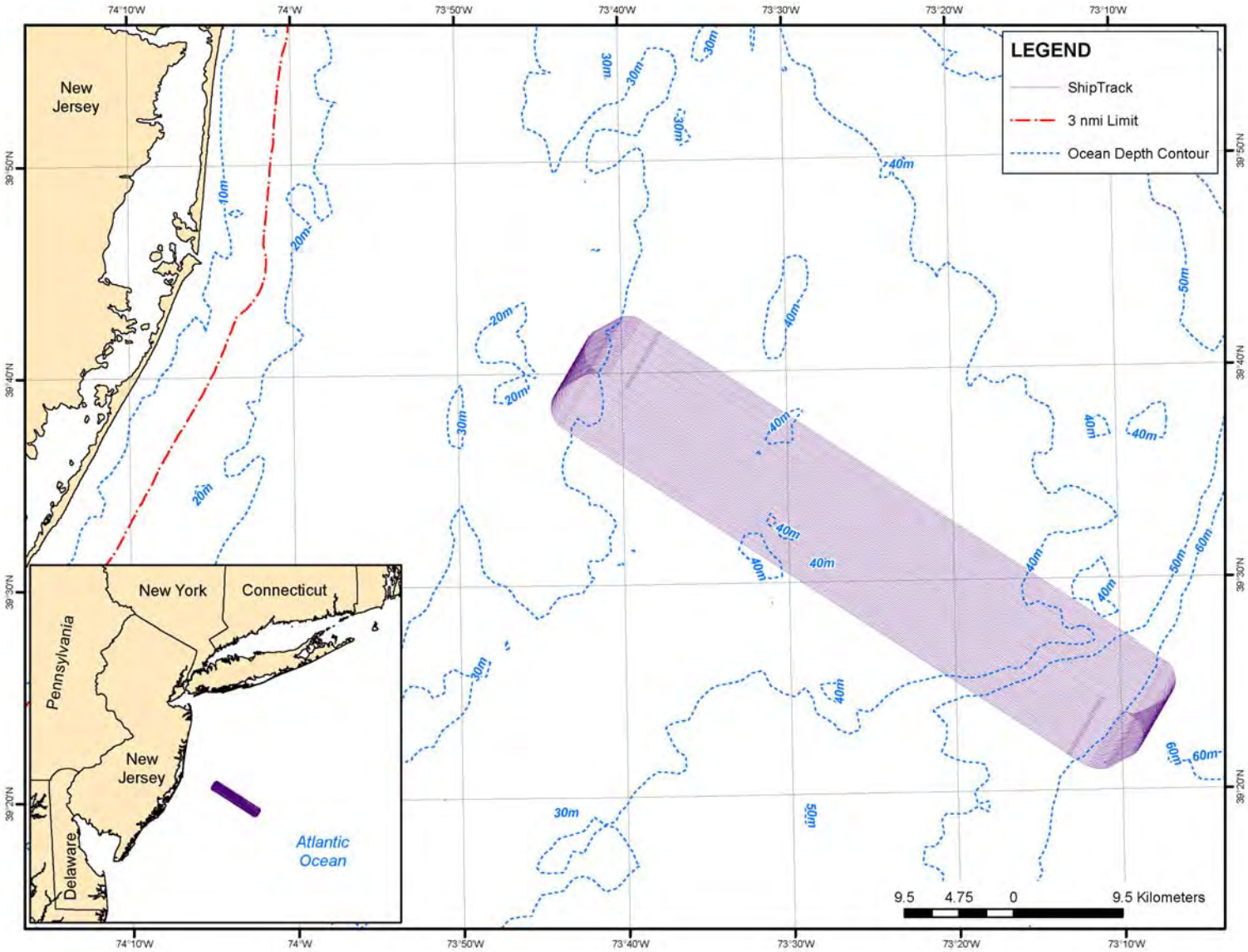

Figure 1. Location of the proposed seismic survey in the Atlantic Ocean off the coast of New Jersey.

Austin, C. Fulthorpe, and M. Nedimović (University of Texas at Austin), propose to use a 3-D seismic reflection survey to map sequences around existing IODP Expedition 313 drill sites and analyze their spatial/temporal evolution. Objectives that would then be met include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea level; and determining the amplitudes and timing of global sea-level changes during the mid-Cenozoic. The project objectives remain the same as those described for the 2014 survey.

(2) Proposed Activities

(a) Location of the Activities

The proposed full-fold 3-D box/survey area is located in the Atlantic Ocean, ~25–85 km off the coast of New Jersey (Fig. 1). This area is defined by the coordinates at the four corners (including turns and run-in and run-out of each line): 39:38:00°N, 73:44:36°W; 39:43:12°N, 73:41:00°W; 39:25:30°N, 73:06:12°W; and 39:20:06°N, 73:10:06°W.

Water depths across the survey area are ~20–75 m. The seismic survey would be conducted outside of state waters and within the U.S. EEZ, and is scheduled to occur for ~30 days during June–August 2015. Although the proposed survey area is near the NW Atlantic DAA described in the PEIS, it does not include intermediate- and deep-water depths. The survey location would be the same as that for the 2014 survey.

(b) Description of the Activities

The procedures to be used for the survey would be the same as those proposed for the 2014 survey and similar to those used during previous NSF-funded seismic surveys and would use conventional seismic methodology. The survey would involve one source vessel, the *Langseth*, which is owned by NSF and operated on its behalf by Columbia University's L-DEO through a Cooperative Agreement entered into in 2012, and one support vessel. The *Langseth* would deploy two pairs of subarrays of 4 airguns as an energy source; the subarrays would fire alternately, with a total volume of ~700 in^3. The receiving system would be a passive component of the proposed activity and would consist of a system of hydrophones: four 3000-m hydrophone streamers at 75-m spacing, or preferentially, a combination of two 3000-m hydrophone streamers and a Geometrics P-Cable system. As the airgun array is towed along the survey lines, the hydrophone streamers would receive the returning acoustic signals and transfer the data to the on-board processing system.

A total of ~4900 km of 3-D survey lines, including turns, would be shot in an area 12 x 50 km with a line spacing of 150 m in two 6-m wide race-track patterns (Fig. 1). There would be additional seismic operations in the survey area associated with airgun testing and repeat coverage of any areas where initial data quality is sub-standard. In our calculations [see § IV(3)], 25% has been added for those additional operations. The survey parameters noted here support the proposed research goals and therefore differ from the NW Atlantic DAA survey parameters presented in the PEIS. The same transect lengths and area of survey proposed for 2015 was analyzed for the 2014 survey. Because of mechanical/equipment issues on the survey vessel along with weather issues (including Hurricane Arthur), the full 3-D array of equipment could not be deployed. Given equipment limitations, only ~61 h of seismic survey data were collected in 2014, with only ~43 h at full power (700 in^3) on survey tracklines. Of the 43 h of data collected, ~22 h were of substandard data quality because of equipment damage from rough seas. However, the existing data did allow confirmation that the smaller 700-in^3 source array was suitable for the project, thus eliminating potential use of the larger 1400-in^3 array originally proposed in 2014.

In addition to the operations of the airgun array, a multibeam echosounder (MBES) and a sub-bottom profiler (SBP) would be operated from the *Langseth* continuously throughout the survey, but not during transits. All planned geophysical data acquisition activities would be conducted with on-board assistance by

the scientists who have proposed the study. The vessel would be self-contained, and the crew would live aboard the vessel with some personnel transfer on/off the *Langseth* by a small vessel.

(c) Schedule

The *Langseth* would depart from New York, NY, and spend ~8 h in transit to the proposed survey area. Setup, deployment, and streamer ballasting would take ~3 days. The seismic survey would take 30 days plus 2 contingency days, and the *Langseth* would spend one day for gear retrieval and transit back to New York. The survey would be conducted during summer (June–August) 2015. Operations could be delayed or interrupted because of a variety of factors including equipment malfunctions and weather-related issues, but use of the airguns would not occur outside of the effective IHA period.

(d) Vessel Specifications

The *Langseth* is described in § 2.2.2.1 of the PEIS. The vessel speed during seismic operations would be ~4.5 kt (~8.3 km/h).

The support vessel would be a multi-purpose offshore utility vessel similar to the *Northstar Commander*, which is 28 m long with a beam of 8 m and a draft of 2.6 m. It is powered by a twin-screw Volvo D125-E, with 450 hp for each screw.

(e) Airgun Description

During the survey, the airgun array to be used would be the full 4-string array with most of the airguns turned off (see § II 3(a) for an explanation of the source level selection). The active airguns would be 4 airguns in one string on the port side forming Source 1, and 4 airguns in one string on the starboard side forming Source 2. These identical port and starboard sources would be operated in "flip-flop" mode, firing alternately as the ship progresses along the track, as is common for 3-D seismic data acquisition. Thus, the source volume would not exceed 700 in^3 at any time. Whereas the full array is described and illustrated in § 2.2.3.1 of the PEIS, the smaller subarrays proposed for this survey are described further in Appendix A. The subarrays would be towed at a depth of 4.5 or 6 m. The shot interval would be ~5-6 s (~12.5 m). Because the choice of the precise tow depth would not be made until the survey because of sea and weather conditions, we have assumed the use of 6 m for the impacts analysis and take estimate calculations, as that results in the farthest sound propagation. Mitigation zones have been calculated for the source level and tow depths, (see below and Appendix A, Table A2), and during operations the relevant mitigation zone would be applied.

During the attempted survey in 2014, the 700-in^3 airgun array was determined to be sufficient to image the geological targets of research interest. Thus, the 1400-in^3 array proposed as an operational possibility in the 1 July 2014 Final EA has been eliminated from the analysis in this Draft Amended EA.

(f) Additional Acoustical Data Acquisition Systems

Along with the airgun operations, two additional acoustical data acquisition systems would be operated during the survey, but not during transits: a multibeam echosounder (MBES) and sub-bottom profiler (SBP). The ocean floor would be mapped with the Kongsberg EM 122 MBES and a Knudsen Chirp 3260 SBP. These sources are described in § 2.2.3.1 of the PEIS.

(3) Monitoring and Mitigation Measures

Standard monitoring and mitigation measures for seismic surveys are described in § 2.4.4.1 of the PEIS and are described to occur in two phases: pre-cruise planning and during operations. The following sections describe the efforts during both stages for the proposed actions.

(a) Planning Phase

As discussed in § 2.4.1.1 of the PEIS, mitigation of potential impacts from the proposed activities begins during the planning phase of the proposed activities. Several factors were considered during the planning phase of the proposed activities, including

1. Energy Source—Part of the considerations for the proposed survey was to evaluate whether the research objectives could be met with a smaller energy source than the full, 36-airgun, 6600-in^3 *Langseth* array, and it was decided that the scientific objectives could be met using an energy source comprising 4 airguns (total volume 700 in^3 volume) towed at a depth of ~4.5 or 6 m. Two such subarrays of 4 airguns would be used alternately (flip-flop mode); one would be towed on the port side, the other one on the starboard side. Thus, the source volume would not exceed 700 in^3 at any time. We have assumed in the impacts analysis and take estimate calculations the use of the 4-airgun array towed at 6 m as that would result in the farthest sound propagation. Based on the research goals and current knowledge of environmental conditions in the survey area based on 2014 activities, the 1400-in^3 source level proposed for possible use in 2014 is no longer viewed necessary and has not been included in this analysis. For the DAA off the coast of New Jersey included in the PEIS, the energy source level analyzed was a pair of 45/105-in^3 GI guns, however this source level was not viewed as adequate for meeting the research goals of the proposed survey.
2. Survey Timing—The PIs worked with L-DEO and NSF to identify potential times to carry out the survey taking into consideration key factors such as environmental conditions (i.e., the seasonal presence of marine mammals, sea turtles, and seabirds), weather conditions, equipment, and optimal timing for other proposed seismic surveys using the *Langseth*. Some marine mammal species are expected to occur in the area year-round, so altering the timing of the proposed project likely would result in no net benefits for those species. Some migratory species are expected to be farther north at the time of the survey, so the survey timing is beneficial for those species.
3. Mitigation Zones—During the planning phase, mitigation zones for the proposed survey were calculated based on modeling by L-DEO for both the exclusion zone (EZ) and the safety zone; these zones are given in Table 1 and Appendix Table A2. A more detailed description of the modeling process used to develop the mitigation zones can be found in Appendix A. Received sound levels in deep water have been predicted by L-DEO for the 4-airgun array and the single Bolt 1900LL 40-in^3 airgun that would be used during power downs. Scaling factors between those arrays and the 18-airgun, 3300-in^3 array, taking into account tow depth differences, were developed and applied to empirical data for the 18-airgun array in shallow water in the Gulf of Mexico from Diebold et al. (2010). The use of the 4-airgun array towed at 6 m is assumed in the impacts and take estimate analysis as that would result in the farthest sound propagation. During actual operations, however, the corresponding mitigation zone would be applied for the selected source level. The 1 July 2014 Final EA included mitigation zones and take calculations for a 1400-in^3 array, however, that source level has been determined to be unnecessary and is not included in this analysis.

   Table 1 shows the 180-dB EZ and 160-dB "Safety Zone" (distances at which the rms sound levels are expected to be received) for the mitigation airgun and the 4-airgun subarray. The 160 and 180-dB re 1 μPa_{rms} distances are the criteria currently specified by NMFS (2000) for cetaceans. The 180-dB distance has also been used as the EZ for sea turtles, as required by NMFS in most other recent seismic projects per the IHAs. Per the Biological Opinion issued in 2014 (Appendix C of the 1 July 2014 Final EA), a 166-dB distance would be used for Level B takes for sea turtles. Per the IHA for this survey issued in 2014 (Appendix D of the 1 July

TABLE 1. Predicted distances to which sound levels ≥180 and 160 dB re 1 μPa_{rms} would be received during the proposed 3-D survey off New Jersey, using a 4-airgun, 700-in^3 subset of 1 string at 4.5- or 6-m tow depth and the 40-in^3 airgun. Radii are based on scaling described in the text of Appendix A and Figures A2 to A6, and the assumption that received levels on an rms basis are, numerically, 10 dB higher than the SEL values.[1]

Source and Volume	Water Depth	Predicted RMS Radii (m)	
		180 dB	160 dB
4-airgun subarray (700 in^3) @ 4.5 m	<100 m	378	5240
4-airgun subarray (700 in^3) @ 6 m	<100 m	439	6100
Single Bolt airgun (40 in^3) @ 6 m	<100 m	73	995

2014 Final EA), the Exclusion Zone was increased by 3 dB (thus operational mitigation would be at the 177-dB isopleth), which adds ~50% to the power-down/shut-down radius. NSF does not view this overly precautionary approach appropriate, and it is not included here. A recent retrospective analysis of acoustic propagation of *Langseth* sources in a coastal/shelf environment from the Cascadia Margin off Washington suggests that predicted radii (using an approach similar to that used here) for *Langseth* sources were 2–3 times larger than measured in shallow water, so in fact were very conservative (Crone et al. 2014).

Southall et al. (2007) made detailed recommendations for new science-based noise exposure criteria. In December 2013, NOAA published draft guidance for assessing the effects of anthropogenic sound on marine mammals (NOAA 2013a), although at the time of preparation of this Draft Amended EA, the date of release of the final guidelines and how they would be implemented are unknown. As such, this Draft Amended EA has been prepared in accordance with the current NOAA acoustic practices, and the procedures are based on best practices noted by Pierson et al. (1998), Weir and Dolman (2007), Nowacek et al. (2013), and Wright (2014).

Enforcement of mitigation zones via power and shut downs would be implemented in the Operational Phase, as noted below unless otherwise prescribed by the IHA.

(b) Operational Phase

Marine species, including marine mammals and sea turtles, are known to occur in the proposed survey area. However, the number of individual animals expected to be approached closely during the proposed activities would be relatively small in relation to regional population sizes. To minimize the likelihood that potential impacts could occur to the species and stocks, monitoring and mitigation measures proposed during the operational phase of the proposed activities, which are consistent with the PEIS and past IHA requirements, include

1. monitoring by protected species visual observers (PSVOs) for marine mammals, sea turtles, and seabirds;

[1] Sound sources are primarily described in sound pressure level (SPL) units. SPL is often referred to as rms or "root mean square" pressure, averaged over the pulse duration. Sound exposure level (SEL) is a measure of the received energy in a pulse and represents the SPL that would be measured if the pulse energy were spread evenly over a 1-s period.

2. passive acoustic monitoring (PAM);
3. PSVO data and documentation;
4. mitigation during operations (speed or course alteration; power-down, shut-down, and ramp-up procedures; and special mitigation measures for rare species, species concentrations, and sensitive habitats).

The proposed operational mitigation measures are standard for all high energy seismic cruises, per the PEIS, and therefore are not discussed further here. Special mitigation measures were considered for this cruise. Although it is very unlikely that a North Atlantic right whale would be encountered, the airgun array would be shut down if one is sighted at any distance from the vessel because of the species' rarity and conservation status. It is also unlikely that concentrations of large whales of any species would be encountered, but if so, they would be avoided.

With the proposed monitoring and mitigation provisions, potential effects on most if not all individuals would be expected to be limited to minor behavioral disturbances. Those potential effects would be expected to have negligible impacts both on individual marine mammals and on the associated species and stocks. Ultimately, survey operations would be conducted in accordance with all applicable U.S. federal regulations and IHA requirements.

Alternative 1: Alternative Survey Timing

An alternative to issuing the IHA for the period requested and to conducting the project then would be to conduct the project at an alternative time, such as late spring or early fall (avoiding the North Atlantic right whale migration season) implementing the same monitoring and mitigation measures as under the Proposed Action, and requesting an IHA to be issued for that alternative time. An evaluation of the effects of this Alternative Action is given in § IV.

Alternative 2: No Action Alternative

An alternative to conducting the proposed activities is the "No Action" alternative, i.e., do not issue an IHA and do not conduct the research operations. If the research is not conducted, the "No Action" alternative would result in no disturbance to marine mammals because of the absence of the proposed activities. Although the No-Action Alternative is not considered a reasonable alternative because it does not meet the purpose and need for the Proposed Action, per CEQ regulations it is included and carried forward for analysis in § IV.

Alternatives Considered but Eliminated from Further Analysis

(1) Alternative E1: Alternative Location

The New Jersey (NJ) continental margin has for decades been recognized as among the best siliciclastic passive margins for elucidating the timing and amplitude of eustatic change during the "Ice House" period of Earth history, when glacioeustatic changes shaped continental margin sediment sections around the world. There is a fundamental need to constrain the complex forcing functions tying evolution and preservation of the margin stratigraphic record to base-level changes. This could be accomplished by following the transect strategy adopted by the international scientific ocean drilling community. This strategy involves integration of drilling results with seismic imaging. In keeping with this strategy, the proposed seismic survey would acquire a 3-D seismic volume encompassing the three existing IODP Expedition 313 (Exp313) drill sites on the inner-middle shelf of the NJ margin. Exp313, the latest chapter in the multi-decade Mid-Atlantic Transect, represents the scientific community's best opportunity to link excellently sampled and logged late Paleogene-Neogene prograding clinoforms to state-of-the-art

3-D images. Exp313 borehole data would provide lithostratigraphy, geochronology, and paleobathymetry. 3-D seismic imaging would put these sampled records in a spatially accurate, stratigraphically meaningful context. Such imagery would allow researchers to map sequences around Exp313 sites with a resolution and confidence previously unattainable, and to analyze their spatio-temporal evolution.

No other scientific ocean drilling boreholes are available on the NJ shelf or elsewhere that provide such high sediment recoveries and high-quality well logs as those of Exp313. The need to tie the proposed 3-D survey to Exp313 drill sites means that it is not possible to conduct the survey in a different area. Also, positioning a 3-D volume requires broad coverage by pre-existing 2-D seismic data. Such data, collected over more than two decades, are readily available on the NJ shelf. Furthermore, the proposed research underwent the NSF merit review process, and the science, including the site location, was determined to be meritorious.

(2) Alternative E2: Use of Alternative Technologies

As described in § 2.6 of the PEIS, alternative technologies to the use of airguns were investigated to conduct high-energy seismic surveys. At the present time, these technologies are still not feasible, commercially viable, or appropriate to meet the Purpose and Need. Additional details about these technologies are given in the Final USGS EA (RPS 2014).

Table 2 provides a summary of the proposed action, alternatives, and alternatives eliminated from further analysis.

III. AFFECTED ENVIRONMENT

As described in the PEIS, Chapter 3, the description of the affected environment focuses only on those resources potentially subject to impacts. Accordingly, the discussion of the affected environment (and associated analyses) has focused mainly on those related to marine biological resources, as the proposed short-term activities have the potential to impact marine biological resources within the proposed Project area. These resources are identified in Section III, and the potential impacts to these resources are discussed in Section IV. Initial review and analysis of the proposed Project activities determined that the following resource areas did not require further analysis in this Draft Amended EA:

- *Air Quality/Greenhouse Gases*—Project vessel emissions would result from the proposed activities; however, these short-term emissions would not result in any exceedance of federal Clean Air standards. Emissions would be expected to have a negligible impact on the air quality within the survey area;
- *Land Use*—All proposed activities would be in the marine environment. Therefore, no changes to current land uses or activities in the Project area would result from the proposed Project;
- *Safety and Hazardous Materials and Management*—No hazardous materials would be generated or used during proposed activities. All Project-related wastes would be disposed of in accordance with federal and international requirements;
- *Geological Resources (Topography, Geology and Soil)*—The proposed Project would result in no displacement of soil and seafloor sediments. Proposed activities would not adversely affect geologic resources as no impacts would occur;
- *Water Resources*—No discharges to the marine environment are proposed within the Project area that would adversely affect marine water quality. Therefore, there would be no impacts to water resources resulting from the proposed Project activities;
- *Terrestrial Biological Resources*—All proposed Project activities would occur in the marine environment and would not impact terrestrial biological resources;

Table 2. Summary of Proposed Action, Alternatives Considered, and Alternatives Eliminated

Proposed Action	Description
Proposed Action: Conduct a marine geophysical survey and associated activities in the Atlantic Ocean off New Jersey	Under the Proposed Action, a 3-D seismic reflection survey would take place in the Atlantic Ocean off New Jersey during the summer of 2015. When considering transit; equipment deployment, maintenance, and retrieval; weather; marine mammal activity; and other contingencies, the proposed activities would be expected to be completed in ~34 days. The standard monitoring and mitigation measures identified in the NSF PEIS would apply and are described in further detail in this document (§ II [3]), along with any additional requirements identified by regulating agencies. All necessary permits and authorizations, including an IHA, were requested and received from regulatory bodies in 2014 and would be requested again for 2015.
Alternatives	Description
Alternative 1: Alternative Survey Timing	Under this Alternative, the survey operations would be conducted at a different time of the year, such as late spring or early fall. The standard monitoring and mitigation measures identified in the NSF PEIS would apply. These measures are described in further detail in this document (§ II [3]) and would apply to survey activities conducted during an alternative survey time period, along with any additional requirements identified by regulating agencies as a result of the change. All necessary permits and authorizations, including an IHA, would be requested from regulatory bodies.
Alternative 2: No Action	Under this Alternative, no proposed activities would be conducted and seismic data would not be collected. No permits and authorizations, including an IHA, would be requested from regulatory bodies, as the Proposed Action would not be conducted.
Alternatives Eliminated from Further Analysis	Description
Alternative E1: Alternative Location	The survey location has been specifically identified because of the data available for that location, including borehole data from three IODP Expedition 313 drill sites that would provide lithostratigraphy, geochronology, and paleobathymetry, and broad coverage by pre-existing 2-D seismic data. The proposed 3-D seismic imaging would put these sampled records in a spatially accurate, stratigraphically meaningful context. Such imagery would allow researchers to map sequences around the drill sites with a resolution and confidence previously unattainable, and to analyze their spatio-temporal evolution. Furthermore, the proposed science underwent the NSF merit review process, and the science, including the site location, was determined to be meritorious. Thus, conducting the proposed survey at a different location was eliminated from further consideration.
Alternative E2: Alternative Survey Techniques	Under this alternative, alternative survey techniques would be used, such as marine vibroseis, which could potentially reduce impacts on the marine environment. Alternative technologies were evaluated in the PEIS, § 2.6. At the present time, however, these technologies are still not feasible, commercially viable, or appropriate to meet the Purpose and Need. NSF currently owns the *Langseth*, and its primary capability is to conduct seismic surveys; no other viable technologies are available to NSF. Thus, this Alternative was eliminated from further consideration.

- *Socioeconomic and Environmental Justice*—Implementation of the proposed Project would not affect, beneficially or adversely, socioeconomic resources, environmental justice, or the protection of children. No changes in the population or additional need for housing or schools would occur. Because of the location of the proposed activity and distance from shore, human activities in the area around the survey vessel would be limited to SCUBA diving, commercial and recreational fishing activities and other vessel traffic. Fishing, SCUBA diving, vessel traffic, and potential impacts are described in further detail in §§ III and IV. Additionally, there is a marine mammal watching industry in New Jersey. Because of the distance from shore to the proposed survey site, it would be unlikely that marine mammal watching boat tours would coincide with the proposed survey site or be impacted by

the proposed activities. Most activities are conducted within ~20 km of the coast, with the majority occurring closer inshore. Some boat tours occur well south (~100 km) of the proposed survey area around Cape May and in Delaware Bay. Some dolphin watching cruises take place off Atlantic City fairly close to shore. Tours typically are ~1.5–3 h long. Although marine mammals around the seismic survey may avoid the vessel during operations, this behavior would be of short duration and temporary. Given the distance from shore to the proposed activities, the likely distance from any of the few marine mammal watching activities, and the short and temporary duration of any potential impacts to marine mammals, it would be unlikely that the marine mammal watching industry would be affected by the proposed activities and, therefore, this issue is not analyzed further in this assessment. Furthermore, no whale watching vessels were encountered by the *Langseth* during the ~13 days the vessel was in the survey area in 2014. No other socioeconomic impacts would be anticipated as a result of the proposed activities;

- *Visual Resources*—No visual resources would be anticipated to be negatively impacted as the area of operation is significantly outside of the land and coastal view shed; and
- *Cultural Resources*—With the following possible exceptions, there are no known cultural resources in the proposed Project area. One shipwreck, a known dive site, is in or near the survey area (see Fig. 2 in § III): the *Lillian* (Galiano 2009; Fisherman's Headquarters 2014; NOAA 2014a). Shipwrecks are discussed further in § IV. Airgun sounds would have no effects on solid structures; no significant impacts on shipwrecks would be anticipated (§ IV). No impacts to cultural resources would be anticipated.

Physical Environment and Oceanography

The water off the U.S. east coast consists of three water masses: coastal or shelf waters, slope waters, and the Gulf Stream. Coastal waters off Canada, which originate mostly in the Labrador Sea, move southward over the continental shelf until they reach Cape Hatteras, NC, where they are entrained between the Gulf Stream and slope waters. North of Cape Hatteras, an elongated cyclonic gyre of slope water that forms because of the southwest flow of coastal water and the northward flowing Gulf Stream is present most of the year and shifts seasonally relative to the position of the north edge of the Gulf Stream. Slope water eventually merges with the Gulf Stream water. The Gulf Stream flows through the Straits of Florida and then parallel to the continental margin, becoming stronger as it moves northward. It turns seaward near Cape Hatteras and moves northeast into the open ocean.

The shelf waters off New Jersey are part of the Mid-Atlantic Bight, which includes shelf waters from Cape Hatteras, NC, to southern Cape Cod. The shelf is dominated by a sandy to muddy-sandy bottom (Steimle and Zetlin 2000; USGS 2000 *in* DoN 2005). The shelf off New Jersey slopes gently and uniformly seaward to the shelf-slope transition 120–150 km offshore in water depths 120–160 m (Carey et al. 1998 *in* GMI 2010). The shelf edge off New Jersey is incised by the Hudson Canyon to the north and the Wilmington Canyon to the south. Several smaller canyons also occur along the shelf edge. The Hudson Canyon is the largest canyon off the east coast of the U.S. The proposed survey area is entirely on the shelf.

The shelf waters off New Jersey become stratified in the spring as the water warms, and are fully stratified throughout the summer, i.e., warmer, fresher water accumulates at the surface and denser, colder, more saline waters occur near the seafloor. The stratification breaks down in fall because of mixing by wind and surface cooling (Castelao et al. 2008). Summer upwelling occurs off New Jersey, where nutrient-rich cold water is brought closer to the surface and stimulates primary production (Glenn et al. 2004; NEFSC 2013a). The primary production of the northeast U.S. continental shelf is

1536 mg C/m^2/day (Sea Around Us 2013). The salinity of shelf water usually increases with depth and is generally lower than the salinity of water masses farther offshore primarily because of the low-salinity input from rivers and estuaries.

There are numerous artificial reefs in shelf waters off New Jersey, including materials such as decommissioned ships, barges, and reef balls or hollow concrete domes (Steimle and Zetlin 2000; Figley 2005); these reefs can provide nursery habitat, protection, and foraging sites to marine organisms. Since 1984, more than 3500 of these artificial patch reefs have been constructed off New Jersey (Figley 2005).

Protected Areas

Several federal Marine Protected Areas (MPAs) or sanctuaries have been established ~500 km north of the proposed survey area, primarily with the intention of preserving cetacean habitat (Hoyt 2005; CetaceanHabitat 2013). These include the Cape Cod Bay Northern Right Whale Critical Habitat Area, the Great South Channel Northern Right Whale Critical Habitat Area east of Cape Cod, the Gerry E Studds Stellwagen Bank National Marine Sanctuary in the Gulf of Maine, and Jeffrey's Ledge, a proposed extension to the Stellwagen Bank National Marine Sanctuary. The Monitor National Marine Sanctuary is located to the southeast of Cape Hatteras, North Carolina. There are also five state Ocean Sanctuaries in Massachusetts waters including Cape Cod, Cape Cod Bay, Cape and Islands, North Shore, and South Essex Ocean Sanctuaries (Mass.Gov 2013). These sanctuaries include most Massachusetts state waters except for the area east of Boston. In addition, three Canadian protected areas also occur in the Northwest Atlantic for cetacean habitat protection, including the Bay of Fundy Right Whale Conservation Area, Roseway Basin Right Whale Conservation Area, and Gully Marine Protected Area off the Scotian Shelf. The proposed survey is not located within or near any federal, state, or international MPA or sanctuary.

The Harbor Porpoise Take Reduction Plan (HPTRP) is intended to reduce the interactions between harbor porpoises and commercial gillnets in four management areas: waters off New Jersey, Mudhole North, Mudhole South, and Southern Mid Atlantic (NOAA 2010b). The HPTRP is not relevant to this EA because harbor porpoises are not expected to occur in the survey area.

Marine Mammals

Thirty-one cetacean species (6 mysticetes and 25 odontocetes) could occur near the proposed survey site (Table 3). Six of the 31 species are listed under the U.S. Endangered Species Act (ESA) as ***Endangered***: the North Atlantic right, humpback, blue, fin, sei, and sperm whales. In fact, only five species were observed during the 13-day cruise in 2014, including one humpback whale, plus one unidentified baleen whale and one unidentified dolphin (Ingram et al. 2014). An additional four cetacean species, although present in the wider western North Atlantic Ocean, likely would not be found near the proposed survey area between ~39–40°N because their ranges generally do not extend as far north (Clymene dolphin, *Stenella clymene*; Fraser's dolphin, *Lagenodelphis hosei*; melon-headed whale, *Peponocephala electra*; and Bryde's whale, *Balaenoptera brydei*). Although the secondary range of the beluga whale (*Delphinapterus leucas*) may range as far south as New Jersey (Jefferson et al. 2008), and there have been at least two sightings off the coast of New Jersey (IOC 2013), this species is not included here as it is unlikely to be encountered during the proposed survey. Similarly, no pinnipeds are included; harp seals (*Pagophilus groenlandicus*) and hooded seals (*Cystophora cristata*) are rare in the proposed survey area, and gray (*Halichoerus grypus*) and harbor seals (*Phoca vitulina*) have a more northerly distribution during the summer (DoN 2005) and are therefore not expected to occur there during the survey. No pinnipeds were observed during the 13-day cruise in 2014. Information on grey, harbor, and harp seals is included in the 2014 NMFS EA for this project, and is incorporated into this Draft Amended EA by reference as if fully set forth herein (Appendix E of the 1 July 2014 Final EA).

TABLE 3. The habitat, occurrence, regional population sizes, and conservation status of marine mammals that could occur in or near the proposed survey area in the Northwest Atlantic Ocean off New Jersey.

Species	Habitat	Occurrence in survey area in summer	Regional/SAR abundance estimates[1]	ESA[2]	IUCN[3]	CITES[4]
Mysticetes						
North Atlantic right whale	Coastal and shelf	Rare	455 / 455[5]	EN	EN	I
Humpback whale	Mainly coastal, banks	Common	11,600[6] / 823[7]	EN	LC	I
Minke whale	Mainly coastal	Rare	138,000[8] / 20,741[9]	NL	LC	I
Sei whale	Mainly offshore	Uncommon	10,300[10] / 357[11]	EN	EN	I
Fin whale	Slope, pelagic	Uncommon	26,500[12] / 3522[5]	EN	EN	I
Blue whale	Coastal, shelf, pelagic	Rare	855[13] / 440[5]	EN	EN	I
Odontocetes						
Sperm whale	Pelagic	Common	13,190[14] / 2288[15]	EN	VU	I
Pygmy sperm whale	Off shelf	Uncommon	N.A. / 3785[16]	NL	DD	II
Dwarf sperm whale	Off shelf	Uncommon	N.A. / 3785[16]	NL	DD	II
Cuvier's beaked whale	Pelagic	Uncommon	N.A. / 6532[17]	NL	LC	II
Northern bottlenose whale	Pelagic	Rare	N.A. / N.A.	NL	DD	II
True's beaked whale	Pelagic	Rare	N.A. / 7092[18]	NL	DD	II
Gervais' beaked whale	Pelagic	Rare	N.A. / 7092[18]	NL	DD	II
Sowerby's beaked whale	Pelagic	Rare	N.A / 7092[18]	NL	DD	II
Blainville's beaked whale	Pelagic	Rare	N.A. / 7092[18]	NL	DD	II
Rough-toothed dolphin	Mainly pelagic	Rare	N.A. / 271[5]	NL	LC	II
Bottlenose dolphin	Coastal, offshore	Common	N.A / 89,080[19]	NL^	LC	II
Pantropical spotted dolphin	Mainly pelagic	Rare	N.A. / 3333[5]	NL	LC	II
Atlantic spotted dolphin	Mainly coastal	Common	N.A. / 44,715[5]	NL	DD	II
Spinner dolphin	Coastal, pelagic	Rare	N.A. / N.A.	NL	DD	II
Striped dolphin	Off shelf	Uncommon	N.A. / 54,807[5]	NL	LC	II
Short-beaked common dolphin	Shelf, pelagic	Common	N.A. / 173,486[5]	NL	LC	II
White-beaked dolphin	Shelf <200 m	Rare	10s–100s of 1000s[20] / 2003[5]	NL	LC	II
Atlantic white-sided dolphin	Shelf and slope	Uncommon	10s–100s of 1000s[21] / 48,819[5]	NL	LC	II
Risso's dolphin	Mainly shelf, slope	Common	N.A. /18,250[5]	NL	LC	II
False killer whale	Pelagic	Extralimital	N.A. / N.A.	NL	DD	II
Pygmy killer whale	Mainly pelagic	Rare	N.A. / N.A.	NL	DD	II
Killer whale	Coastal	Rare	N.A. / N.A.	NL*	DD	II
Long-finned pilot whale	Mainly pelagic	Uncommon	780K[22] / 26,535[5]	NL†	DD	II
Short-finned pilot whale	Mainly pelagic	Uncommon	780K[22] / 21,515[5]	NL	DD	II
Harbor porpoise	Coastal	Rare	~500K[23] / 79,883[24]	NL	LC	II

N.A. = Data not available or species status was not assessed.
[1] SAR (stock assessment report) abundance estimates are from the 2013 U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments (Waring et al. 2014) as noted, and regional abundance estimates are for the North Atlantic regions as noted.
[2] U.S. Endangered Species Act; EN = Endangered, NL = Not listed
[3] Codes for IUCN classifications from IUCN Red List of Threatened Species (IUCN 2013): EN = Endangered; VU = Vulnerable; LC = Least Concern; DD = Data Deficient
[4] Convention on International Trade in Endangered Species of Wild Fauna and Flora (UNEP-WCMC 2013): Appendix I = Threatened with extinction; Appendix II = not necessarily now threatened with extinction but may become so unless trade is closely controlled
[5] Estimate for the Western North Atlantic Stock (Waring et al. 2014)
[6] Best estimate for the western North Atlantic in 1992–1993 (IWC 2013)
[7] Minimum estimate for the Gulf of Maine stock (Waring et al. 2014)
[8] Best estimate for the North Atlantic in 2002–2007 (IWC 2013)

[9] Estimate for the Canadian East Coast Stock (Waring et al. 2014)
[10] Estimate for the Northeast Atlantic in 1989 (Cattanach et al. 1993)
[11] Estimate for the Nova Scotia Stock (Waring et al. 2014)
[12] Best estimate for the North Atlantic in 2007 (IWC 2013)
[13] Estimate for the central and northeast Atlantic in 2001 (Pike et al. 2009)
[14] Estimate for the North Atlantic (Whitehead 2002)
[15] Estimate for the North Atlantic Stock (Waring et al. 2014)
[16] Combined estimate for pygmy and dwarf sperm whales, Western North Atlantic Stock (Waring et al. 2014)
[17] Estimate for the Western North Atlantic Stock (Waring et al. 2014)
[18] Combined estimate for *Mesoplodon* spp. Western North Atlantic stocks (Waring et al. 2014)
[19] Combined estimate for the Western North Atlantic Offshore Stock and the Northern Migratory Coastal Stock (Waring et al. 2014)
[20] High tens to low hundreds of thousands in the North Atlantic (Reeves et al. 1999a)
[21] Tens to low hundreds of thousands in the North Atlantic (Reeves et al. 1999b)
[22] Estimate for both long- and short-finned pilot whales in the central and eastern North Atlantic in 1989 (IWC 2013)
[23] Estimate for the North Atlantic (Jefferson et al. 2008)
[24] Estimate for the Gulf of Maine/Bay of Fundy Stock (Waring et al. 2014)
* Killer whales in the eastern Pacific Ocean, near Washington state, are listed as endangered under the U.S. ESA but not in the Atlantic Ocean.
^ The Western North Atlantic Coastal Morphotype stocks, ranging from NJ to FL, are listed as depleted under the U.S. Marine Mammal Protection Act, as are some other stocks to the south of the proposed survey area.
† Considered a strategic stock.

General information on the taxonomy, ecology, distribution and movements, and acoustic capabilities of marine mammals are given in § 3.6.1 and § 3.7.1 of the PEIS. The proposed survey area off New Jersey is near one of the DAAs in the PEIS. The general distributions of mysticetes and odontocetes in this region of the Atlantic Ocean are discussed in § 3.6.2.1 and § 3.7.2.1 of the PEIS, respectively. Additionally, information on marine mammals in this region is included in § 4.2.2.1 of the Bureau of Ocean Energy Management (BOEM) Final PEIS for Atlantic OCS Proposed Geological and Geophysical Activities, Mid-Atlantic and South Atlantic Planning Areas (BOEM 2014). The rest of this section deals with more specific species distribution off the coast of New Jersey. For the sake of completeness, an additional six odontocetes that are expected to be rare or extralimital in the proposed survey area were included here, but were not included in the PEIS.

The main sources of information used here are the 2010 and 2013 U.S. Atlantic and Gulf of Mexico marine mammal stock assessment reports (SARs: Waring et al. 2010, 2014), the Ocean Biogeographic Information System (OBIS: IOC 2013), and the Cetacean and Turtle Assessment Program (CETAP 1982). The SARs include maps of sightings for most species from NMFS' Northeast and Southeast Fisheries Science Centers (NEFSC and SEFSC) surveys in summer 1995, 1998, 1999, 2002, 2004, 2006, 2007, 2008, 2010, and 2011. OBIS is a global database of marine species sightings. CETAP covered 424,320 km of trackline on the U.S. outer continental shelf from Cape Hatteras to Nova Scotia. Aerial and shipboard surveys were conducted over a 39-month period from 1 November 1978 to 28 January 1982. The mid-Atlantic area referred to in the following species accounts included waters south of Georges Bank down to Cape Hatteras, and from the coast out to ~1830 m depth.

(1) Mysticetes

North Atlantic Right Whale (*Eubalaena glacialis*)

The North Atlantic right whale is known to occur primarily in the continental shelf waters off the eastern U.S. and Canada, from Florida to Nova Scotia (Winn et al. 1986; Jefferson et al. 2008). There are five well-known habitats in the northwest Atlantic used annually by right whales (Winn et al. 1986; NMFS 2005). These include the winter calving grounds in coastal waters of the southeastern U.S. (Florida/Georgia); spring feeding grounds in the Great South Channel (east of Cape Cod); late winter/spring feeding grounds and nursery grounds in Massachusetts Bay and Cape Cod Bay; summer/fall feeding and nursery grounds in the Bay of Fundy; and summer/fall feeding grounds on the Nova Scotian

Shelf. In addition, Jeffreys Ledge, off the coast of northern Massachusetts, New Hampshire, and Maine, could be an important fall feeding area for right whales and an important nursery area during summer, especially in July and August (Weinrich et al. 2000). The first three habitats were designated as Critical Habitat Areas by NMFS (1994).

There is a general seasonal north-south migration of the North Atlantic population between feeding and calving areas, but right whales could be seen anywhere off the Atlantic U.S. throughout the year (Gaskin 1982). The seasonal occurrence of right whales in mid Atlantic waters is mostly between November and April, with peaks in December and April (Winn et al. 1986) when whales transit through the area on their migrations to and from breeding grounds or feeding grounds. The migration route between the Cape Cod summer feeding grounds and the Georgia/Florida winter calving grounds, known as the mid-Atlantic corridor, has not been considered to include "high use" areas, yet the whales clearly move through these waters regularly in all seasons (Reeves and Mitchell 1986; Winn et al. 1986; Kenney et al. 2001; Reeves 2001; Knowlton et al. 2002; Whitt et al. 2013).

North Atlantic right whales are found commonly on the northern feeding grounds off the north-eastern U.S. during early spring and summer. The highest abundance in Cape Cod Bay is in February and April (Winn et al. 1986; Hamilton and Mayo 1990) and from April to June in the Great South Channel east of Cape Cod (Winn et al. 1986; Kenney et al. 1995). Throughout the remainder of summer and into fall (June–November), they are most commonly seen farther north on feeding grounds in Canadian waters, with peak abundance during August, September, and early October (Gaskin 1987). Morano et al. (2012) and Mussoline et al. (2012) indicated that right whales are present in the southern Gulf of Maine year-round and that they occur there over longer periods than previously thought.

Some whales, including mothers and calves, remain on the feeding grounds through the fall and winter. However, the majority of the right whale population leaves the feeding grounds for unknown wintering habitats and returns when the cow-calf pairs return. The majority of the right whale population is unaccounted for on the southeastern U.S. winter calving ground, and not all reproductively-active females return to the area each year (Kraus et al. 1986; Winn et al. 1986; Kenney et al. 2001). Other wintering areas have been suggested, based upon sparse data or historical whaling logbooks; these include the Gulf of St. Lawrence, Newfoundland and Labrador, coastal waters of New York and between New Jersey and North Carolina, Bermuda, and Mexico (Payne and McVay 1971; Aguilar 1986; Mead 1986; Lien et al. 1989; Knowlton et al. 1992; Cole et al. 2009; Patrician et al. 2009).

Knowlton et al. (2002) provided an extensive and detailed analysis of survey data, satellite tag data, whale strandings, and opportunistic sightings along State waters of the mid-Atlantic migratory corridor[2], from the border of Georgia/South Carolina to south of New England, including waters in the proposed seismic survey area, spanning the period from 1974 to 2002. The majority of sightings (94%) along the migration corridor were within 56 km of shore, and more than half (64%) were within 18.5 km of shore (Knowlton et al. 2002). Water depth preference was for shallow waters; 80% of all sightings were in depths <27 m, and 93% were in depths <45 m (Knowlton et al. 2002). Most sightings >56 km from shore occurred at the northern end of the corridor, off New York and south of New England. North of Cape Hatteras, most sightings were reported for March–April. Sighting data analyzed by Winn et al. (1986) dating back to 1965 showed that the occurrence of right whales in the mid Atlantic, including the

[2] Multi-year datasets for the analysis were provided by the New England Aquarium, North Atlantic Right Whale Consortium, Oregon State University, Coastwise Consulting Inc., Georgia Department of Natural Resources, University of North Carolina Wilmington, Continental Shelf Associates, CETAP, NOAA, and University of Rhode Island.

proposed survey area, peaked in April and December (Winn et al. 1986). A review of the mid-Atlantic whale sighting and tracking data archive from 1974 to 2002 showed right whale sightings off the coast of New Jersey throughout the year, except during May–June, August, and November (Beaudin Ring 2002).

The Interactive North Atlantic Right Whale Sighting Map showed 32 sightings in the shelf waters off New Jersey between 2006 and 2012 (NEFSC 2013b). Two of these sightings occurred just to the north of the proposed survey site. Three sightings were made in June, and none were made in July. However, two sightings were made during July to the far east of the proposed survey area (NEFSC 2013b). There are also at least eight sightings of right whales off New Jersey in the Ocean Biogeographic Information System (OBIS; IOC 2013), which were made during the 1978–1982 Cetacean and Turtle Assessment Program (CETAP) surveys (CETAP 1982).

Palka (2006) reviewed North Atlantic right whale density in the U.S. Navy NE Operating Area based on summer abundance surveys conducted during 1998–2004. One of the lowest whale densities (including right whales) was found in the mid-Atlantic stratum, which includes the proposed survey area. However, survey effort for this stratum was also the lowest; only two surveys were conducted. No right whales were sighted.

Whitt et al. (2013) surveyed for right whales off the coast of New Jersey using acoustic and visual techniques from January 2008 to December 2009. Whale calls were detected off New Jersey year-round and four sightings were made: one in November, one in December, one in January just to the west of the survey area, and one cow-calf pair in May. In light of these findings, Whitt et al. (2013) suggested expanding the existing critical habitat to include waters of the mid-Atlantic. NMFS (2010) previously noted that such a revision could be warranted, but no revisions have been made to the critical habitat yet.

Federal and Other Action.—In 2002, NMFS received a petition to revise and expand the designation of critical habitat for the North Atlantic right whale. The revision was declined and the critical habitat designated in 1994 remained in place (NMFS 2005). Another petition for a revision to the critical habitat was received in 2009 that sought to expand the currently designated critical feeding and calving habitat areas and include a migratory corridor as critical habitat (NMFS 2010). NMFS noted that the requested revision may be warranted, but no revisions have been made as of June 2014. The designation of critical habitat does not restrict activities within the area or mandate any specific management action. However, actions authorized, funded, or carried out by federal agencies that may have an impact on critical habitat must be consulted upon in accordance with Section 7 of the ESA, regardless of the presence of right whales at the time of impacts. Impacts on these areas that could affect primary constituent elements such as prey availability and the quality of nursery areas must be considered when analyzing whether habitat may be adversely modified.

A number of other actions have been taken to protect North Atlantic right whales, including establishing the Right Whale Sighting Advisory System designed to reduce collisions between ships and right whales by alerting mariners to the presence of the whales (see NEFSC 2012); a Mandatory Ship Reporting System implemented by the U.S. Coast Guard in the right whale nursery and feeding areas (USCG 1999, 2001; Ward-Geiger et al. 2005); recommended shipping routes in key right whale aggregation areas (NOAA 2006, 2007, 2013b); regulations to implement seasonal mandatory vessel speed restrictions in specific locations (Seasonal Management Areas or SMAs) during times when whales are likely present, including ~37 km around points near the Ports of New York/New Jersey (40.495ºN, 73.933ºW) and Philadelphia and Wilmington (38.874ºN, 75.026ºW) during 1 November–30 April (NMFS 2008); temporary Dynamic Management Areas (DMAs) in response to actual whale sightings, requiring gear modifications to traps/pots and gillnets in areas north of 40°N with unexpected right whale aggregations (NOAA 2012a); and a voluntary seasonal (April 1 to July 31) Area to be Avoided in the

Great South Channel off Massachusetts (NOAA 2013b). Furthermore, in its Final PEIS (BOEM 2014), BOEM proposed that no seismic surveys would be authorized within right whale critical habitat from 15 November to April 15, nor within the Mid-Atlantic and Southeast U.S. SMAs from 1 November to 30 April 30. Additionally, G&G seismic surveys would not be allowed in active DMAs. The proposed survey area is not in any of these areas.

North Atlantic right whales likely would not be encountered during the proposed survey.

Humpback Whale (*Megaptera novaeangliae*)

In the North Atlantic, a Gulf of Maine stock of the humpback whale is recognized off the northeastern U.S. coast as a distinct feeding stock (Palsbøll et al. 2001; Vigness-Raposa et al. 2010). Whales from this stock feed during spring, summer, and fall in areas ranging from Cape Cod to Newfoundland. In the spring, greatest concentrations of humpback whales occur in the western and southern edges of the Gulf of Maine. During summer, the greatest concentrations are found throughout the Gulf of Maine, east of Cape Cod, and near the coast from Long Island to northern Virginia. Similar distribution patterns are seen in the fall, although sightings south of Cape Cod Bay are less frequent than those near the Gulf of Maine. From December to March, there are few occurrences of humpback whales over the continental shelf of the Gulf of Maine, and in Cape Cod and Massachusetts Bay (Clapham et al. 1993; Fig. B-5a *in* DoN 2005).

GMI (2010) reported 17 sightings of humpback whales during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009, with sightings during every season (including 1 in spring and 4 in summer[3]). There are >40 OBIS sighting records of humpback whales for the continental shelf off New Jersey, including sightings near the proposed survey area (IOC 2013). There was one sighting of a humpback whale during the 13-day cruise in 2014.

Common Minke Whale (*Balaenoptera acutorostrata*)

Four populations of the minke whale are recognized in the North Atlantic, including the Canadian East Coast stock that ranges from the eastern U.S. coast to Davis Strait (Waring et al. 2013). Minke whales are common off the U.S. east coast over continental shelf waters, especially off New England during spring and summer (CETAP 1982). Seasonal movements in the Northwest Atlantic are apparent, with animals moving south and offshore from New England waters during the winter (Fig. B-11a *in* DoN 2005; Waring et al. 2013). There are approximately 30 OBIS sightings of minke whales off New Jersey (IOC 2013), most of which were observed in the spring and summer during CETAP surveys (CETAP 1982).

GMI (2010) reported four sightings of minke whales during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009: two during winter and two during spring. Two sightings were also reported during summer NEFSC and SEFSC surveys between 1998 and 2011 on the shelf break off New Jersey (Waring et al. 2013). Minke whales likely would not be encountered during the proposed survey.

Sei Whale (*Balaenoptera borealis*)

Two stocks of the sei whale are recognized in the North Atlantic: the Labrador Sea Stock and the Nova Scotia Stock; the latter has a distribution that includes continental shelf waters from the northeastern U.S. to areas south of Newfoundland (Waring et al. 2013). The southern portion of the Nova Scotia stock's range includes the Gulf of Maine and Georges Bank during spring and summer (Waring et

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[3] GMI defined spring as 11 April–21 June and summer as 22 June–27 September.

al. 2013). Peak sightings occur in spring and are concentrated along the eastern edge of Georges Bank into the Northeast Channel and the southwestern edge of Georges Bank (Fig. B-6a *in* DoN 2005; Waring et al. 2013). Mitchell and Chapman (1977) suggested that this stock moves from spring feeding grounds on or near Georges Bank to the Scotian Shelf in June and July, eastward to Newfoundland and the Grand Banks in late summer, back to the Scotian Shelf in fall, and offshore and south in winter. During summer and fall, most sei whale sightings occur in feeding grounds in the Bay of Fundy and on the Scotian Shelf; sightings south of Cape Cod are rare (Fig. B-6a *in* DoN 2005).

There are at least three OBIS sightings of sei whales off New Jersey, and several more sightings to the south of the proposed survey area (IOC 2013). Palka (2012) reported one sighting on the shelf break off New Jersey in water depths ranging from 100–2000 m during June–August 2011 surveys. There were no sightings of sei whales during the CETAP surveys (CETAP 1982).

Fin Whale (*Balaenoptera physalus*)

Fin whales are present in U.S. shelf waters during winter, and are sighted more frequently than any other large whale at this time (DoN 2005). They occur year-round in shelf waters of New England and New Jersey (CETAP 1982; Fig. B-8a *in* DoN 2005). Winter sightings are most concentrated around Georges Bank and in Cape Cod Bay. During spring and summer, most fin whale sightings are north of 40ºN, with smaller numbers on the shelf south of there, including off New Jersey (Fig. B-8a *in* DoN 2005). During fall, almost all fin whales move out of U.S. waters to feeding grounds in the Bay of Fundy and on the Scotian Shelf, remain at Stellwagen Bank and Murray Basin (Fig. B-8a *in* DoN 2005), or begin a southward migration (Clark 1995).

GMI (2010) reported 37 sightings of fin whales during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009, with sightings during every season (including 11 in spring and 4 in summer). Acoustic detections were also made during all seasons (GMI 2010). Numerous sightings were also made off New Jersey during NEFSC and SEFSC summer surveys between 1995 and 2011, with two sightings on the shelf and other sightings on the shelf break and beyond (Waring et al. 2013). There are 170 OBIS sightings of fin whales off New Jersey (IOC 2013), most of which were made during the CETAP surveys (CETAP 1982).

Blue Whale (*Balaenoptera musculus*)

In the western North Atlantic, the distribution of the blue whale extends as far north as Davis Strait and Baffin Bay (Sears and Perrin 2009). Little is known about the movements and wintering grounds of the stocks (Mizroch et al. 1984). Acoustic detection of blue whales using the U.S. Navy's Sound Surveillance System (SOSUS) program has tracked blue whales throughout most of the North Atlantic, including deep waters east of the U.S. Atlantic EEZ and subtropical waters north of the West Indies (Clark 1995).

Wenzel et al. (1988) reported the occurrence of three blue whales in the Gulf of Maine in 1986 and 1987, which were the only reports of blue whales in shelf waters from Cape Hatteras to Nova Scotia. Several other sightings for the waters off the east coast of the U.S. were reported by DoN (2005). Wenzel et al. (1988) suggested that it is unlikely that blue whales occur regularly in the shelf waters off the U.S. east coast. Similarly, Waring et al. (2010) suggested that the blue whale is, at best, an occasional visitor in the U.S. Atlantic EEZ.

During CETAP surveys, the only two sightings of blue whales were made south of Nova Scotia (CETAP 1982). There are two offshore sightings of blue whales in the OBIS database to the southeast of New Jersey and several sightings to the north off New England and in the Gulf of Maine (IOC 2013). Blue whales likely would not be encountered during the proposed survey.

(2) Odontocetes

Sperm Whale (*Physeter macrocephalus*)

In the northwest Atlantic, the sperm whale generally occurs in deep water along the continental shelf break from Virginia to Georges Bank, and along the northern edge of the Gulf Stream (Waring et al. 2001). Shelf edge, oceanic waters, seamounts, and canyon shelf edges are also predicted habitats of sperm whales in the Northwest Atlantic (Waring et al. 2001). Off the eastern U.S. coast, they are also known to concentrate in regions with well-developed temperature gradients, such as along the edges of the Gulf Stream and warm core rings, which may aggregate their primary prey, squid (Jaquet 1996).

Sperm whales appear to have a well-defined seasonal cycle in the Northwest Atlantic. In winter, most historical records are in waters east and northeast of Cape Hatteras, with few animals north of 40ºN; in spring, they shift the center of their distribution northward to areas east of Delaware and Virginia, but they are widespread throughout the central area of the Mid-Atlantic Bight and southern tip of Georges Bank (Fig. B-10a in DoN 2005; Waring et al. 2013). During summer, they expand their spring distribution to include areas east and north of Georges Bank, the Northeast Channel, and the continental shelf south of New England (inshore of 100 m deep). By fall, sperm whales are most common south of New England on the continental shelf but also along the shelf edge in the Mid-Atlantic Bight (Fig. B-10a in DoN 2005; Waring et al. 2013).

There are several hundred OBIS records of sperm whales in deep waters off New Jersey and New England (IOC 2013), and numerous sightings were reported on and seaward of the shelf break during CETAP surveys (CETAP 1982) and during summer NEFSC and SEFSC surveys between 1998 and 2011 (Waring et al. 2013).

Pygmy and Dwarf Sperm Whales (*Kogia breviceps* and *K. sima*)

In the northwest Atlantic, both pygmy and dwarf sperm whales are thought to occur as far north as the Canadian east coast, with the pygmy sperm whale ranging as far as southern Labrador; both species prefer deep, offshore waters (Jefferson et al. 2008). Between 2006 and 2010, 127 pygmy and 32 dwarf sperm whale strandings were recorded from Maine to Puerto Rico, mostly off the southeastern U.S. coast; five strandings of pygmy sperm whales were reported for New Jersey (Waring et al. 2013).

There are 14 OBIS sightings of pygmy or dwarf sperm whales in offshore waters off New Jersey (IOC 2013). Several sightings of *Kogia* sp. (pygmy or dwarf sperm whales) for shelf-break waters off New Jersey were also reported during summer NEFSC and SEFSC surveys between 1995 and 2011 (Waring et al. 2013).

Cuvier's Beaked Whale (*Ziphius cavirostris*)

In the northwest Atlantic, Cuvier's beaked whale has stranded and been sighted as far north as the Nova Scotian shelf, and occurs most commonly from Massachusetts to Florida (MacLeod et al. 2006). Most sightings in the northwest Atlantic occur in late spring or summer, particularly along the continental shelf edge in the mid-Atlantic region (CETAP 1982; Waring et al. 2001, 2013). Mapping of combined beaked whale sightings in the northwest Atlantic suggests that beaked whales are rare in winter and fall, uncommon in spring, and abundant in summer in waters north of Virginia, off the shelf break and over the continental slope and areas of high relief, including the waters off New Jersey (Fig. B-13a *in* DoN 2005).

DoN mapped several sightings of Cuvier's beaked whales during the summer along the shelf break off New Jersey (Fig. B-13a *in* DoN 2005). One sighting was made off New Jersey during the CETAP surveys (CETAP 1982). Palka (2012) reported one sighting on the shelf break off New Jersey in water depths 100–2000 m during June–August 2011 surveys. There are eight OBIS sighting records of Cuvier's beaked whale in offshore waters off New Jersey (IOC 2013).

Northern Bottlenose Whale (*Hyperoodon ampullatus*)

Northern bottlenose whales are considered extremely uncommon or rare within waters of the U.S. Atlantic EEZ (Reeves et al. 1993; Waring et al. 2010), but there are known sightings off New England and New Jersey (CETAP 1982; McLeod et al. 2006; Waring et al. 2010). Two sightings of three individuals were made during the CETAP surveys; one sighting was made during May to the east of Cape Cod and the second sighting was made on 12 June along the shelf edge east of Cape May, New Jersey (CETAP 1982). Three sightings were made during summer surveys along the southern edge of Georges Bank in 1993 and 1996, and another three sightings were made in water depths 1000–4000 m at ~38–40ºN during NEFSC and SEFSC surveys between 1998 and 2006 (Waring et al. 2010). In addition, there is one OBIS sighting off New England in 2005 made by the Canadian Department of Fisheries and Oceans (IOC 2013). DoN (2005) also reported northern bottlenose whale sightings beyond the shelf break off New Jersey during spring and summer. Northern bottlenose whales likely would not be encountered during the proposed survey.

True's Beaked Whale (*Mesoplodon mirus*)

In the Northwest Atlantic, True's beaked whale occurs from Nova Scotia to Florida and the Bahamas (Rice 1998). Carwardine (1995) suggested that this species could be associated with the Gulf Stream. DoN did not report any sightings of True's beaked whale off New Jersey (Fig. B-13a *in* DoN 2005); however, several sightings of undifferentiated beaked whales were reported for shelf break waters off New Jersey during summer NEFSC and SEFSC surveys between 1995 and 2011 (Waring et al. 2013). There are no OBIS sightings of True's beaked whale off New Jersey, but there is one stranding record off North Carolina and one record off New England (IOC 2013). There are numerous other stranding records for the east coast of the U.S. (Macleod et al. 2006). True's beaked whales likely would not be encountered during the proposed survey.

Gervais' Beaked Whale (*Mesoplodon europaeus*)

Based on stranding records, Gervais' beaked whale appears to be more common in the western Atlantic than in the eastern Atlantic (Macleod et al. 2006; Jefferson et al. 2008). Off the U.S. east coast, it occurs from Cape Cod Bay, Massachusetts (Moore et al. 2004) to Florida, with a few records in the Gulf of Mexico (Mead 1989). DoN mapped two sightings of Gervais' beaked whale during summer to the south of the proposed survey area and numerous other sightings along the shelf break off the northeast coast of the U.S. (Fig. B-13a *in* DoN 2005). Palka (2012) reported three sightings in deep offshore waters during June–August 2011 surveys off the northeastern coast of the U.S. There are four OBIS stranding records of Gervais' beaked whale for Virginia, but no records for New Jersey (IOC 2013). Gervais' beaked whales likely would not be encountered during the proposed survey.

Sowerby's Beaked Whale (*Mesoplodon bidens*)

Sowerby's beaked whale occurs in cold temperate waters of the North Atlantic (Mead 1989). In the western North Atlantic, it is found from at least Massachusetts to the Labrador Sea (Mead et al. 2006; Jefferson et al. 2008). Palka (2012) reported one sighting on the shelf break off New Jersey during June–August 2011 surveys. There are also at least five OBIS sighting records in deep waters off New Jersey (IOC 2013). DoN mapped one stranding in New Jersey in fall and one in Delaware in spring, but no sightings off New Jersey (Fig. B-13a *in* DoN 2005). Sowerby's beaked whales likely would not be encountered during the proposed survey.

Blainville's Beaked Whale (*Mesoplodon densirostris*)

In the western North Atlantic, Blainville's beaked whale is found from Nova Scotia to Florida, the Bahamas, and the Gulf of Mexico (Würsig et al. 2000). There are numerous strandings records along the east coast of the U.S. (Macleod et al. 2006). DoN mapped several sightings of Blainville's beaked whale during summer along the shelf break off the northeastern coast of the U.S. (Fig. B-13a *in* DoN 2005). There is one OBIS sighting record in offshore waters to the southeast of New Jersey and one in offshore waters off New England (IOC 2013). Blainville's beaked whales likely would not be encountered during the proposed survey.

Rough-toothed Dolphin (*Steno bredanensis*)

The rough-toothed dolphin is distributed worldwide in tropical, subtropical, and warm temperate waters (Miyazaki and Perrin 1994). They are generally seen in deep, oceanic water, although they can occur in shallow coastal waters in some locations (Jefferson et al. 2008). The rough-toothed dolphin rarely ranges north of 40°N (Jefferson et al. 2008).

One sighting of 45 individuals was made south of Georges Bank seaward of the shelf edge during the CETAP surveys (CETAP 1982), and another sighting was made in the same areas during 1986 (Waring et al. 2010). In addition, two sightings were made off New Jersey to the southeast of the proposed survey area during 1979 and 1998 (Waring et al. 2010; IOC 2013). Palka (2012) reported a sighting in deep offshore waters off New Jersey during June–August 2011 surveys. Rough-toothed dolphins likely would not be encountered during the proposed survey.

Common Bottlenose Dolphin (*Tursiops truncatus*)

In the northwest Atlantic, the common bottlenose dolphin occurs from Nova Scotia to Florida, the Gulf of Mexico and the Caribbean, and south to Brazil (Würsig et al. 2000). There are regional and seasonal differences in the distribution of the offshore and coastal forms of bottlenose dolphins off the U.S. east coast. Although strandings of bottlenose dolphins are a regular occurrence along the U.S. east coast, since July 2013, an unusually high number of dead or dying bottlenose dolphins (971 as of 8 December 2013; 1175 as of 16 March 2014; 1283 as of 18 May 2014; and 1546 as of 19 October 2014) have washed up on the mid-Atlantic coast from New York to Florida (NOAA 2014b). NOAA declared an unusual mortality event (UME), the tentative cause of which is thought to be cetacean morbillivirus. As of 20 October 2014, 266 of 280 dolphins tested were confirmed positive or suspect positive for morbillivirus. NOAA personnel observed that the affected dolphins occur in nearshore waters, whereas dolphins in offshore waters >50 m deep did not appear to be affected (Environment News Service 2013), but have stated that it is uncertain exactly what populations have been affected (NOAA 2014b). In addition to morbillivirus, the bacteria *Brucella* was confirmed in 30 of 95 dolphins tested as of 20 October 2014 (NOAA 2014b). The NOAA web site is updated frequently, and it is apparent that the strandings initially had been moving south; in the 4 November update, dolphins had been reported washing up only as far south as South Carolina, and in the 8 December update, strandings were also reported in Georgia and Florida. Recently, the numbers of strandings appear to be decreasing, especially in the northern states; between 17 August and 19 October, there were 2, 3, 4, and 0 strandings in NY, NJ, DE, and MD, respectively.

Evidence of year-round or seasonal residents and migratory groups exist for the coastal form of bottlenose dolphins, with the so-called "northern migratory management unit" occurring north of Cape Hatteras to New Jersey, but only during summer and in waters <25 m deep (Waring et al. 2010). The offshore form appears to be most abundant along the shelf break and is differentiated from the coastal form by occurring in waters typically >40 m deep (Waring et al. 2010). Bottlenose dolphin records in the Northwest Atlantic suggest that they generally can occur year-round from the continental shelf to deeper waters over the abyssal plain, from the Scotian Shelf to North Carolina (Fig. B-14a *in* DoN 2005).

GMI (2010) reported 319 sightings of bottlenose dolphins during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009, with most sightings made during spring and summer. Palka (2012) also reported numerous sightings on the shelf break off New Jersey in water depths ranging from 100–2000 m during June–August 2011 surveys. There are also several hundred OBIS records off New Jersey, including sightings near the proposed survey area on the shelf and along the shelf edge (IOC 2013). There was one sighting of 10 bottlenose dolphins during the 13-day cruise in 2014.

Pantropical Spotted Dolphin (*Stenella attenuata*)

Pantropical spotted dolphins generally occur in deep offshore waters between 40°N and 40°S (Jefferson et al. 2008). There have been a few sightings at the southern edge of Georges Bank (Waring et al. 2010). In addition, there are at least 10 OBIS sighting records for waters off New Jersey that were made during surveys by the Canadian Wildlife Service between 1965 and 1992 (IOC 2013). Pantropical spotted dolphins likely would not be encountered during the proposed survey.

Atlantic Spotted Dolphin (*Stenella frontalis*)

In the western Atlantic, the distribution of the Atlantic spotted dolphin extends from southern New England, south to the Gulf of Mexico, the Caribbean Sea, Venezuela, and Brazil (Leatherwood et al. 1976; Perrin et al. 1994; Rice 1998). During summer, Atlantic spotted dolphins are sighted in shelf waters south of Chesapeake Bay, and near the continental shelf edge, on the slope, and offshore north of there, including the waters of New Jersey (Fig. B-15a *in* DoN 2005; Waring et al. 2014). Several sightings were also reported during summer NEFSC and SEFSC surveys between 1998 and 2011 on the shelf break off New Jersey (Waring et al. 2014). There are two OBIS sighting records northeast of the survey area and at least eight records to the southeast of the survey area (IOC 2013). There was one sighting of 12 Atlantic spotted dolphins during the 13-day cruise in 2014.

Spinner dolphin (*Stenella longirostris*)

The spinner dolphin is pantropical in distribution, with a range nearly identical to that of the pantropical spotted dolphin, including oceanic tropical and sub-tropical waters between 40ºN and 40ºS (Jefferson et al. 2008). The distribution of spinner dolphins in the Atlantic is poorly known, but they are thought to occur in deep waters along most of the U.S. coast; sightings off the northeast U.S. coast have occurred exclusively in offshore waters >2000 m (Waring et al. 2010). Several sightings were mapped by DoN (Fig. B-16 *in* DoN 2005) for offshore waters to the far east of New Jersey. There are also seven OBIS sighting records off the eastern U.S. but no records near the proposed survey area or in shallow water (IOC 2013). Spinner dolphins likely would not be encountered during the proposed survey.

Striped Dolphin (*Stenella coeruleoalba*)

In the western North Atlantic, the striped dolphin occurs from Nova Scotia to the Gulf of Mexico and south to Brazil (Würsig et al. 2000). Off the northeastern U.S. coast, striped dolphins occur along the continental shelf edge and over the continental slope from Cape Hatteras to the southern edge of Georges Bank (Waring et al. 2014). In all seasons, striped dolphin sightings have been centered along the 1000-m depth contour, and sightings have been associated with the north edge of the Gulf Stream and warm core rings (Waring et al. 2014). Their occurrence off the northeastern U.S. coast seems to be highest in the summer and lowest during the fall (Fig. B-17a *in* DoN 2005).

There are approximately 100 OBIS sighting records of striped dolphins for the waters off New Jersey to the east of the proposed survey area, mainly along the shelf break (IOC 2013). Numerous

sightings were also reported during summer NEFSC and SEFSC surveys between 1998 and 2011 off the shelf break (Waring et al. 2014).

Short-beaked Common Dolphin (*Delphinus delphis*)

The short-beaked common dolphin occurs from Cape Hatteras to Georges Bank during mid January–May, moves onto Georges Bank and the Scotian Shelf during mid summer and fall, and has been observed in large aggregations on Georges Bank in fall (Selzer and Payne 1988; Waring et al. 2014). Sightings off New Jersey have been made during all seasons (Fig. B-19a *in* DoN 2055). GMI (2010) reported 32 sightings of short-beaked common dolphins during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009, with sightings during fall and winter. There are over 100 OBIS sighting records near the proposed survey area off New Jersey, with most sightings near the shelf edge, but there are also several sightings in shelf waters (IOC 2013). There were 4 sightings of a total of 45 short-beaked common dolphins during the 13-day cruise in 2014.

White-beaked Dolphin (*Lagenorhynchus albirostris*)

The white-beaked dolphin is widely distributed in cold temperature and subarctic North Atlantic waters (Reeves et al. 1999a), and mainly occurs over the continental shelf, especially along the shelf edge (Carwardine 1995). It occurs in immediate offshore waters of the east coast of the North America, from Labrador to Massachusetts (Rice 1998). Off the northeastern U.S. coast, white-beaked dolphins are mainly found in the western Gulf of Maine and around Cape Cod (CETAP 1982; Fig. B-20a *in* DoN 2005; Waring et al. 2010). There are two OBIS sighting records to the east of the proposed survey area off New Jersey, and one to the south off North Carolina (IOC 2013). White-beaked dolphins likely would not be encountered during the proposed survey.

Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)

The Atlantic white-sided dolphin occurs in cold temperate to subpolar waters of the North Atlantic in deep continental shelf and slope waters (Jefferson et al. 2008). In the western North Atlantic, it ranges from Labrador and southern Greenland to ~38ºN (Jefferson et al. 2008). There are seasonal shifts in Atlantic white-sided dolphin distribution off the northeastern U.S. coast, with low numbers in winter from Georges Basin to Jeffrey's Ledge and very high numbers in spring in the Gulf of Maine. In summer, Atlantic white-sided dolphins are mainly distributed northward from south of Cape Cod with the highest numbers from Cape Cod north to the lower Bay of Fundy; sightings off New Jersey appear to be sparse (Fig. B-21a *in* DoN 2005). There are over 20 OBIS sighting records in the shelf waters off New Jersey, including near the proposed survey area (IOC 2013).

Risso's Dolphin (*Grampus griseus*)

The highest densities of Risso's dolphin occur in mid latitudes ranging from 30° to 45°, and primarily in outer continental shelf and slope waters (Jefferson et al. 2013). Off the northeast U.S. coast during spring, summer, and autumn, Risso's dolphins are distributed along the continental shelf edge from Cape Hatteras to Georges Bank, but they range into oceanic waters during the winter (Waring et al. 2014). Mapping of Risso's dolphin sightings off the U.S. east coast suggests that they could occur year-round from the Scotian Shelf to the coast of the southeastern U.S. in waters extending from the continental shelf to the continental rise (DoN 2005). Off New Jersey, the greatest number of sightings occurs near the continental slope during summer (Fig. B-22a *in* DoN 2005).

There are at least 170 OBIS records near the proposed survey area off New Jersey, including shelf waters and at the shelf edge (IOC 2013). Numerous sightings were also reported during summer NEFSC

and SEFSC surveys between 1998 and 2011 for the shelf break off New Jersey (Waring et al. 2014). There was one sighting of a Risso's dolphin during the 13-day cruise in 2014.

Pygmy Killer Whale (*Feresa attenuata*)

The pygmy killer whale is pantropical/subtropical, generally occurring between 40ºN and 35ºS (Jefferson et al. 2008). There is no abundance estimate for the pygmy killer whale off the U.S. east coast because it is rarely sighted during surveys (Waring et al. 2010). One group of six pygmy killer whales was sighted off Cape Hatteras in waters >1500 m deep during a NMFS vessel survey in 1992 (Hansen et al. 1994 *in* Waring et al. 2010). There are an additional three OBIS sighting records to the southeast of the proposed survey area (Palka et al. 1991 *in* IOC 2013). Pygmy killer whales likely would not be encountered during the proposed survey.

False Killer Whale (*Pseudorca crassidens*)

The false killer whale is found worldwide in tropical and temperate waters generally between 50ºN and 50ºS (Odell and McClune 1999). It is widely distributed, but not abundant anywhere (Carwardine 1995). In the western Atlantic, it occurs from Maryland to Argentina (Rice 1998). Very few false killer whales were sighted off the U.S. northeast coast in the numerous surveys mapped by DoN (2005). There are 13 OBIS sighting records for the waters off the eastern U.S., but none are near the proposed survey area (IOC 2013). False killer whales likely would not be encountered during the proposed survey.

Killer Whale (*Orcinus orca*)

In the western North Atlantic, killer whales occur from the polar ice pack to Florida and the Gulf of Mexico (Würsig et al. 2000). Based on historical sightings and whaling records, killer whales apparently were most often found along the shelf break and offshore in the northwest Atlantic (Katona et al. 1988). They are considered uncommon or rare in waters of the U.S. Atlantic EEZ (Katona et al. 1988). Killer whales represented <0.1 % of all cetacean sightings (12 of 11,156 sightings) in CETAP surveys during 1978–1981 (CETAP 1982). Four of the 12 sightings made during the CETAP surveys were made offshore from New Jersey. Off New England, killer whales are more common in summer than in any other season, occurring nearshore and off the shelf break (Fig. B-24 *in* DoN 2005). There are 39 OBIS sighting records for the waters off the eastern U.S., but none off New Jersey (IOC 2013). Killer whales likely would not be encountered during the proposed survey.

Long- and Short-finned Pilot Whales (*Globicephala melas* and *G. macrorhynchus*)

There are two species of pilot whale, both of which could occur in the survey area. The long-finned pilot whale (*G. melas*) is distributed antitropically, whereas the short-finned pilot whale (*G. macrorhynchus*) is found in tropical, subtropical, and warm temperate waters (Olson 2009). In the northwest Atlantic, pilot whales often occupy areas of high relief or submerged banks and associated with the Gulf Stream edge or thermal fronts along the continental shelf edge (Waring et al. 1992). The ranges of the two species overlap in the shelf/shelf-edge and slope waters of the northeastern U.S. between New Jersey and Cape Hatteras, with long-finned pilot whales occurring to the north (Bernard and Reilly 1999). During winter and early spring, long-finned pilot whales are distributed along the continental shelf edge off the northeast U.S. coast and in Cape Cod Bay, and in summer and fall they also occur on Georges Bank, in the Gulf of Maine, and north into Canadian waters (Fig. B-25a *in* DoN 2005).

There are at least 200 OBIS sighting records for pilot whales for the waters off New Jersey, including sightings over the shelf; these sightings include *Globicephala* sp. and *G. melas* (IOC 2013). Numerous sightings were also reported during summer NEFSC and SEFSC surveys between 1998 and 2007 for the shelf break off New Jersey (Waring et al. 2014).

Harbor Porpoise (*Phocoena phocoena*)

The harbor porpoise inhabits cool temperate to subarctic waters of the Northern Hemisphere (Jefferson et al. 2008). There are likely four populations in the western North Atlantic: Gulf of Maine/Bay of Fundy, Gulf of St. Lawrence, Newfoundland, and Greenland (Gaskin 1984, 1992). Individuals found off the eastern U.S. coast likely would be almost exclusively from the Gulf of Maine/Bay of Fundy stock.

Harbor porpoises concentrate in the northern Gulf of Maine and southern Bay of Fundy during July–September, with a few sightings ranging as far south as Georges Bank and one off Virginia (Waring et al. 2014). In summer, sightings mapped from numerous sources extended only as far south as off northern Long Island, New York (Fig. B-26a *in* DoN 2005). During October–December and April–June, harbor porpoises are dispersed and range from New Jersey to Maine, although there are lower densities at the northern and southern extremes (DoN 2005; Waring et al. 2014). Most would be found over the continental shelf, but some are also encountered over deep waters (Westgate et al. 1998). During January–March, harbor porpoises concentrate farther south, from New Jersey to North Carolina, with lower densities occurring from New York to New Brunswick (DoN 2005; Waring et al. 2014).

GMI (2010) reported 51 sightings of harbor porpoise during surveys conducted in shallow water (<30 m) on the continental shelf off New Jersey in January 2008–December 2009, with sightings during fall and winter. There are 10 OBIS sighting records for the waters off New Jersey during March–June, most of which are from the CETAP surveys (CETAP 1982; IOC 2013). Harbor porpoises likely would not be encountered during the proposed survey.

Sea Turtles

Two species of sea turtle, the leatherback and loggerhead turtles, are common off the U.S. east coast. Kemp's ridley and green turtles also occur in this area at much lower densities. A fifth species, the hawksbill turtle, is considered very rare in the northwest Atlantic Ocean. In fact, only one species was observed and identified during the 13-day cruise in 2014, the loggerhead turtle. Thirteen additional shelled sea turtles were also sighted, but were not identified. General information on the taxonomy, ecology, distribution and movements, and acoustic capabilities of sea turtles are given in § 3.4.1 of the PEIS. The general distribution of sea turtles in the northwest Atlantic is also discussed in § 3.4.2.1 of the PEIS and § 4.2.3.1 of the BOEM Final PEIS (BOEM 2014). The rest of this section deals specifically with their distribution off the northeastern coast of the U.S., particularly off New Jersey.

(1) Leatherback Turtle (*Dermochelys coriacea*)

Leatherback turtles commonly occur along the eastern U.S. coast and as far north as New England (Eckert 1995a), although important nesting areas occur only as far north as Florida (NMFS and USFWS 2013a). Leatherback occurrence in New England waters has been documented for many years, with most historic records during March–August focused around the Gulf of Maine and Georges and Browns Banks; in fall, they were focused more southerly in New England bays and sounds (Lazell 1980). Leatherbacks tagged off Cape Breton and mainland Nova Scotia during summer remained off eastern Canada and the northeastern U.S. coast before most began migrating south in October (James et al. 2005); foraging adults off Nova Scotia mainly originate from Trinidad (NMFS and USFWS 2013a). Some of these tags remained attached long enough to observe northward migrations, with animals leaving nesting grounds during February–March and typically arriving north of 38ºN during June, usually in areas within several hundred km of where they were observed in the previous year. Virtually all of the leatherbacks in sighting records off the northeastern U.S. occurred in summer off southern New Jersey, the southeastern tip of Long Island, and southern Nova Scotia (Fig. C-2a *in* DoN 2005).

GMI (2010) reported 12 sightings of leatherback sea turtles on the continental shelf off New Jersey during surveys conducted in January 2008–December 2009, with all sightings occurring during summer. There are over 200 OBIS sighting records for the waters off New Jersey (IOC 2013). Palka (2012) also reported several sightings off northern New Jersey south of Long Island during June–August 2011 surveys.

(2) Green Turtle (*Chelonia mydas*)

Important feeding areas for green turtles in U.S. waters are primarily located in Florida and southern Texas, but Long Island Sound and inshore waters of North Carolina appear to be important to juveniles during summer months (NMFS and USFWS 2007). Small numbers of juvenile green turtles have occurred historically in Long Island and Nantucket Sounds in New England (Lazell 1980). There are few sighting records, but DoN (Fig. C-5 *in* DoN 2005) suggested that small numbers can be found from spring to fall as far north as Cape Cod Bay, including off New Jersey. There are seven OBIS sightings of green turtles off the coast of New Jersey (IOC 2013). Palka (2012) also reported several sightings off northern New Jersey south of Long Island during June–August 2011 surveys.

(3) Loggerhead Turtle (*Caretta caretta*)

Major nesting areas for loggerheads in the western North Atlantic are located in the southeastern U.S., principally southern Florida, but also as far north as the Carolinas and occasionally Virginia; the nesting season is from May to August (Spotila 2004). Most females tagged on North Carolina nesting beaches traveled north to forage at higher latitudes (primarily off New Jersey, Maryland, and Delaware) during summer, and south to wintering grounds off the southeastern U.S. in the fall (Hawkes et al. 2007).

Some juveniles make seasonal foraging migrations into temperate latitudes as far north as Long Island, New York (Shoop and Kenney 1992 *in* Musick and Limpus 1997). Lazell (1980) reported that loggerheads were historically common in New England waters and the Gulf of Maine. Sighting records of loggerheads off the northeastern U.S. were in all seasons in continental shelf and slope waters from Cape Cod to southern Florida, with greatest concentrations in mid-continental shelf waters off New Jersey during the summer (Fig. C-3a *in* DoN 2005). There are increased stranding records of loggerheads from Cape Cod Bay and Long Island Sound in the fall (DoN 2005); loggerheads may be unable to exit these inshore habitats, which can result in hypothermia as temperatures drop in late fall (Burke et al. 1991 *in* DoN 2005).

GMI (2010) reported 69 sightings of loggerhead turtles on the continental shelf off New Jersey during surveys conducted in January 2008–December 2009; sightings occurred from spring through fall, with most sightings during summer. There are over 1000 OBIS sighting records off the coast of New Jersey, including within the proposed project area (IOC 2013). Palka (2012) also reported several sightings off northern New Jersey south of Long Island during June–August 2011 surveys. There were 16 sightings of a single loggerhead turtle during the 13-day cruise in 2014.

(4) Hawksbill Turtle (*Eretmochelys imbricata*)

The hawksbill is the most tropical of all sea turtles, generally occurring between ~30ºN and ~30ºS (Eckert 1995b). In the Atlantic Ocean, most nesting beaches are in the Caribbean Sea as far north as Cuba and the Bahamas (NMFS and USFWS 2013b). It is considered very rare and possibly extralimital in the northwest Atlantic (Lazell 1980; Eckert 1995b). Nonetheless, DoN (Fig. C-6 *in* DoN 2005) mapped two hawksbill turtle sightings off New Jersey (one during spring and one during fall) and several south of New Jersey. In addition, there is one OBIS sighting record offshore New Jersey, east of the proposed survey area (SEFSC 1992 *in* IOC 2013).

(5) Kemp's Ridley Turtle (*Lepidochelys kempii*)

Kemp's ridley turtle has a more restricted distribution than other sea turtles, with adults primarily located in the Gulf of Mexico; some juveniles also feed along the U.S. east coast, including Chesapeake Bay, Delaware Bay, Long Island Sound, and waters off Cape Cod (Spotila 2004). Nesting occurs primarily along the central and southern Gulf of Mexico coast during May–late July (Morreale et al. 2007). There have also been some rare records of females nesting on Atlantic beaches of Florida, North Carolina, and South Carolina (Plotkin 2003). After nesting, female Kemp's ridley turtles travel to foraging areas along the coast of the Gulf of Mexico, typically in waters <50 m deep from Mexico's Yucatan Peninsula to southern Florida; males tend to stay near nesting beaches in the central Gulf of Mexico year-round (Morreale et al. 2007). Only juvenile and immature Kemp's ridley turtles appear to move beyond the Gulf of Mexico into more northerly waters along the U.S. east coast.

Hatchlings are carried by the prevalent currents off the nesting beaches and do not reappear in the neritic zone until they are about two years old (Musick and Limpus 1997). Those juvenile and immature Kemp's ridley turtles that migrate northward past Cape Hatteras probably do so in April and return southward in November (Musick et al. 1994). North of Cape Hatteras, juvenile and immature Kemp's ridleys prefer shallow-water areas, particularly along North Carolina and in Chesapeake Bay, Long Island Sound, and Cape Cod Bay (Musick et al. 1994; Morreale et al. 1989; Danton and Prescott 1988; Frazier et al. 2007). There are historical summer sightings and strandings of Kemp's ridley turtles from Massachusetts into the Gulf of Maine (Lazell 1980). Occasionally, individuals can be carried by the Gulf Stream as far as northern Europe, although those individuals are considered lost to the breeding population. Virtually all sighting records of Kemp's ridley turtles off the northeastern U.S. were in summer off the coast of New Jersey (Fig. C-4a *in* DoN 2005). There are 60 OBIS sighting records off the coast of New Jersey, some within the proposed survey area (SEFSC 1992 *in* IOC 2013).

Seabirds

Two ESA-listed seabird species could occur in or near the Project area: the ***Threatened*** piping plover and the ***Endangered*** roseate tern. Neither species was observed during the 13-day cruise in 2014. General information on the taxonomy, ecology, distribution and movements, and acoustic capabilities of seabird families are given in § 3.5.1 of the PEIS.

(1) Piping Plover (*Charadrius melodus*)

The Atlantic Coast Population of the piping plover is listed as ***Threatened*** under the U.S. ESA, and the species is listed as ***Near Threatened*** on the IUCN Red List of Threatened Species (IUCN 2013). It breeds on coastal beaches from Newfoundland to North Carolina during March–August and it winters along the Atlantic Coast from North Carolina south, along the Gulf Coast, and in the Caribbean (USFWS 1996). Its marine nesting habitat consists of sandy beaches, sandflats, and barrier islands (Birdlife International 2013). Feeding areas include intertidal portions of ocean beaches, mudflats, sandflats, and shorelines of coastal ponds, lagoons, or salt marshes (USFWS 1996). Wintering plovers are generally found on barrier islands, along sandy peninsulas, and near coastal inlets (USFWS 1996).

Because it is strictly coastal, the piping plover likely would not be encountered at the proposed survey site.

(2) Roseate Tern (*Sterna dougallii*)

The Northeast Population of the roseate tern is listed as ***Endangered*** under the U.S. ESA, and the species is listed as ***Near Threatened*** on the IUCN Red List of Threatened Species (IUCN 2013). It breeds on islands along the northeast coast of the U.S from New York to Maine and north into Canada,

and historically as far south as Virginia (USFWS 1998, 2010). It is thought to migrate beginning in mid September through the eastern Caribbean and along the north coast of South America, and to winter mainly on the east coast of Brazil (USFWS 2010). During the breeding season, roseate terns forage over shallow coastal waters, especially in water depths <5 m, sometimes near the colony and at other times at distances of over 30 km. They usually forage over shallow bays, tidal inlets and channels, tide rips, and sandbars (USFWS 2010).

Because of its distribution during the breeding season, the roseate tern likely would not be encountered at the proposed survey site.

Fish, Essential Fish Habitat, and Habitat Areas of Particular Concern

(1) ESA-Listed Fish and Invertebrate Species

There are two fish species listed under the ESA as ***Endangered*** that could occur in the study area: the New York Bight distinct population segment (DPS) of the Atlantic sturgeon, and the shortnose sturgeon. There are two species that are candidates for ESA listing: the cusk and the Northwest Atlantic and Gulf of Mexico DPS of the dusky shark. There are no listed or candidate invertebrate species.

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

Five DPSs of the Atlantic sturgeon are listed under the U.S. ESA, one as ***Threatened*** and four as ***Endangered***, including the New York Bight DPS, and the species is listed as ***Near Threatened*** on the IUCN Red List of Threatened Species (IUCN 2014). It is a long-lived, late maturing (11–21 years in the Hudson River), anadromous fish. Spawning adults migrate upriver in spring, beginning in April–May in the mid Atlantic. The New York Bight DPS primarily uses the Delaware and Hudson rivers for spawning. Following spawning, males can remain in the river or lower estuary until fall, and females usually exit the rivers within 4–6 weeks. Juveniles move downstream and inhabit brackish waters for a few months before moving into nearshore coastal waters (NOAA 2012b).

Shortnose Sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is listed as ***Endangered*** throughout its range under the U.S. ESA and ***Vulnerable*** on the IUCN Red List of Threatened Species (IUCN 2014). It is an anadromous species that spawns in coastal rivers along the east coast of North America from Canada to Florida. The shortnose sturgeon prefers the nearshore marine, estuarine, and riverine habitats of large river systems, and apparently does not make long-distance offshore migrations (NOAA 2013c).

Cusk (*Brosme brosme*)

The cusk is an ESA ***Candidate Species*** throughout its range, and has not been assessed for the IUCN Red List. In the Northwest Atlantic, it occurs from New Jersey north to the Strait of Belle Isle and the Grand Banks of Newfoundland and rarely to southern Greenland. It is a solitary, benthic species found in rocky, hard bottom areas to a depth of 100 m. In U.S waters, it occurs primarily in deep water of the central Gulf of Maine (NOAA 2013d).

Dusky Shark (*Carcharhinus obscurus*)

The Northwest Atlantic and Gulf of Mexico DPS of the dusky shark is an ESA ***Candidate Species***, and the species is listed as ***Vulnerable*** on the IUCN Red List of Threatened Species (IUCN 2014). It is a coastal-pelagic species that inhabits warm temperate and tropical waters throughout the world. In the Northwest Atlantic, it is found from southern Massachusetts and Georges Bank to Florida and the northern Gulf of Mexico. The dusky shark occurs in both inshore and offshore waters, although it avoids

areas of low salinity from the surface to depths of 575 m. Along U.S. coasts, it undertakes long temperature-related migrations, moving north in summer and south in fall (NMFS 2013b).

(2) Essential Fish Habitat (EFH)

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity". "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities (NMFS 2013c). The entire eastern seaboard from the coast to the limits of the EEZ is EFH for one or more species or life stage for which EFH has been designated.

Two fishery management councils, created by the 1976 Magnuson Fisheries Conservation and Management Act (renamed Magnuson Stevens Fisheries Conservation and Management Act in 1996) are responsible for the management of fishery resources, including designation of EFH, in federal waters of the survey area: the Mid-Atlantic Fishery Management Council (MAFMC) and the New England Fishery Management Council (NEFMC). The Highly Migratory Division of the National Marine Fisheries Service in Silver Spring, MD, manages highly migratory species (sharks, swordfish, billfish, and tunas).

The life stages and associated habitats for those species with EFH in the survey area are described in Table 4.

Two EFH areas located ~150 km northeast of the proposed survey area, the Lydonia and Oceanographer canyons, were previously protected from fishing. Bottom trawling was prohibited in these areas because of the presence of *Loligo* squid eggs, under the Fisheries Management Plan for Atlantic mackerel, butterfish, and *Illex* and *Loligo* squid. This protection was valid as of 31 July 2008 for up to three years, after which it was to be subject to review for the possibility of extension (NOAA 2008).

(3) Habitat Areas of Particular Concern

Habitat Areas of Particular Concern (HAPC) are subsets of EFH that provide important ecological functions and/or are especially vulnerable to degradation, and are designated by Fishery Management Councils. All four life stages of summer flounder have EFH within the proposed survey area, whereas HAPC have only been designated for the juvenile and adult EFH: demersal waters over the continental shelf, from the coast to the limits of the EEZ, from the Gulf of Maine to Cape Hatteras, North Carolina (NOAA 2012c). Specifically, the HAPC include "all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile EFH. If native species of submerged aquatic vegetation are eliminated then exotic species should be protected because of functional value, however, all efforts should be made to restore native species" (NOAA 2012c). No other HAPC have been designated for those species with EFH within the proposed survey area.

Fisheries

Commercial and recreational fisheries data are collected by NMFS, including species, gear type and landings mass and value, all of which are reported by state of landing (NOAA 2013e). Fisheries data from 2008 to 2013 were used in the analysis of New Jersey's commercial and recreational fisheries near the proposed study area.

(1) Commercial Fisheries

The average annual catch weights and values, fishing season, and gear types for major commercial species are summarized in Table 5. In the waters off New Jersey, commercial fishery catches are dominated by menhaden, various shellfish, and squid. Menhaden accounted for 33% of the catch weight, followed by

Table 4. Marine species with Essential Fish Habitat (EFH) overlapping the proposed survey area.

	Life stage[1] and habitat[2]				
Species	E	L/N	J	A	SA
Atlantic cod *Gadus morhua*				B	B
Atlantic haddock *Melanogrammus aeglefinus*		P	B		
Pollock *Pollachius virens*				B	
Black sea bass *Centropristis striata*	P	P	D	D	D
Bluefish *Pomatomus saltatrix*	P	P	P	P	P
Butterfish *Peprilus triacanthus*	P	P	P	P	P
Atlantic herring *Clupea harengus*			P	P	B
Atlantic mackerel *Scomber scombrus*	P	P	P	P	P
Red hake *Urophycis chuss*	P	P	B		
Silver hake *Merluccius bilinearis*	P	P	B		
Scup *Stenotomus chrysops*			D	D	
Monkfish *Lophius americanus*	P	P	B	B	B
Ocean pout *Macrozoarces americanus*	B	B	B	B	B
Summer flounder *Paralichthys dentatus*	P	P	B	B	B
Windowpane flounder *Scophthalmus acquosus*	P	P		B	B
Winter flounder *Pleuronectes americanus*	B	D/P	B	B	B
Witch flounder *Glyptocephalus cynoglossus*	P	P			B
Yellowtail flounder *Limanda ferruginea*	P				
Albacore tuna *Thunnus alalunga*			P		
Bigeye tuna *Thunnus obesus*				P	
Bluefin tuna *Thunnus thynnus*			P		
Skipjack tuna *Katsuwonus pelamis*				P	
Yellowfin tuna *Thunnus albacres*			P		
Swordfish *Xiphias gladius*			P		
Little skate *Leucoraja erinacea*			B	B	
Winter skate *Leucoraja ocellata*			B		
Basking shark *Cetorhinus maximus*			P	P	
Blue shark *Prionace glauca*		P	P	P	
Dusky shark *Carcharhinus obscurus*		P	P	P	
Common thresher shark *Alopias vulpinus*		P	P	P	
Porbeagle shark *Lamna nasus*				P	
Sandbar shark *Carcharhinus plumbeus*		B	B	B	
Scalloped hammerhead shark *Sphyrna lewini*			P	P	
Shortfin mako shark *Isurus oxyrinchus*		P	P	P	
Smooth (spiny) dogfish *Squalus acanthias*		P	P	P	
Sand tiger shark *Carcharias taurus*		P	P		
Tiger shark *Galeocerdo cuvier*			P	P	
White shark *Carcharodon carcharias*		P	P	P	
Atlantic sea scallop *Placopecten magellanicus*	B	P	B	B	B
Atlantic surfclam *Spisula solidissima*	P	P	B	B	B
Ocean quahog *Arctica islandica*	P	P	B	B	B
Northern shortfin squid *Illex illecebrosus*	P	P	D/P	D/P	D/P
Longfin inshore squid *Loligo pealeii*	B	P	D/P	D/P	D/P

Source: NOAA 2012c

[1] E = eggs; L/N = larvae for bony fish and invertebrates, neonate for sharks; J = juvenile; A = adult; SA = spawning adult

[2] P = pelagic; D = demersal; B = benthic

Table 5. Commercial fishery catches for major marine species for New Jersey waters by weight, value, season, and gear type, averaged from 2008 to 2013.

Species	Average annual landings (mt)	% total	Average annual landings (1000$)	% total	Fishing season (peak season)	Gear Type	
						Fixed	Mobile
Menhaden	24,056	34	5,328	3	Year-round (May–Oct)	Gill nets, pots, traps, pound nets	Dip nets, trawls, dredge, purse seines, tongs, grabs
Atlantic surf clam	12,324	18	16,745	10	Year-round	N/A	Dredge, tongs, grabs
Ocean quahog	6,697	10	9,245	6	Year-round (spring–fall)	N/A	Dredge
Sea scallop	5,524	8	101,497	63	Year-round (Mar–Oct)	Gill nets, long lines, pots, traps, pound nets	Dredge, trawls
Northern shortfin squid	4,593	7	3,424	2	Year-round (Jun–Oct)	N/A	Dredge, trawls
Shellfish	3,607	5	1,464	1	Year-round (May–Oct)	Gill nets, long lines, pots, traps, pound nets, weirs	Trawls, cast nets, dip nets, diving, dredge, fyke net, hand lines, Scottish seine
Blue crab	2,768	4	7,718	5	Year-round (May–Oct)	Lines trot with bait, pots, traps	Dredge, hand lines, trawls
Atlantic herring	2,284	3	574	<1	Year-round (Jan–Feb)	Gill nets, pound nets	Trawls, fyke net
Atlantic mackerel	2,007	3	769	<1	Fall–spring (Jan–Apr)	Gill nets, pound nets	Dredge, trawls
Longfin squid	1,533	2	3,278	2	Year-round (Jan–Mar; Jul–Nov)	Gill nets, pound nets	Dredge, trawls
Monkfish (Goosefish)	1,144	2	3,199	2	Year-round (Oct–Mar; May–Jun)	Gill nets, long lines, pots, traps, pound nets	Dredge, trawls
Skate	1,036	1	667	<1	Year-round (Nov–Jan; May–Jun)	Gill nets, pots, traps, pound nets	Dredge, trawls
Summer flounder	953	1	4,527	3	Year-round	Gill nets, pots, traps, pound nets	Dredge, hand lines, trawls, rod and reel
Scup	669	1	831	1	Year-round (Jan–Apr)	Gill nets, pots, traps, pound nets	Dredge, trawls, hand lines
Spiny dogfish shark	554	1	247	<1	Fall–spring (Nov–Jan; May)	Gill nets, long lines, pots, traps, pound nets	Dredge, trawls, hand lines
Bluefish	422	1	452	<1	Year-round (Apr–Nov)	Gill nets, pots, traps, pound nets	Dredge, hand lines, trawls
Total	70,172	100	159,964	100			

Source: NOAA 2013g

Atlantic surf clam (17%), ocean quahog (9%), sea scallop (7%), northern shortfin squid (6%), shellfish (5%), and blue crab (4%). Numerous other fish and invertebrate species accounted for the remaining proportion of catch weight. In 2010 (the only such dataset available in NOAA 2013g), most finfish by weight (68.8%) were caught within 5.6 km from shore; that catch was almost all (98.1%) accounted for by menhaden. Fish dominating the offshore (5.6–370 km from shore) finfish catch by weight were American mackerel (20.1% of total finfish weight), American herring (17.7%), skates (12.8%), and summer flounder (8.8%). Most finfish by value (73.3%) were caught between 5.6 and 370 km from shore; dominant fish by value were summer flounder (25.7% of total finfish value), goosefish/anglerfish (15.2%), yellowfin tuna (6.8%), and bigeye tuna (6.4%). Most shellfish and squid were captured between 5.6 and 370 km from shore, both by weight (73.6% of total shellfish and squid catch) and value (89.1%).

During 2002–2006 (the last year reported), commercial catch in the EEZ along the U.S east coast has only been landed by U.S. and Canadian vessels, with the vast majority of the catch (>99%) taken by U.S. vessels (Sea Around Us Project 2011). Typical commercial fishing vessels in the New Jersey area include trawlers, gill netters, lobster/crab boats, dredgers, longliners, and purse seiners.

(2) Recreational Fisheries

In 2013, marine recreational fishers caught over 5 million fish for harvest or bait, and >17.8 million fish in catch and release programs in New Jersey waters. These catches were taken by over 900,000 recreational fishers during more than 4 million trips. The majority of the trips (87%) occurred within 5.6 km from shore. The periods with the most boat-based trips (including charter, party, and private/rental boats) were July–August (1.03 million trips or 44% of total), followed by 1.03 million trips or 44%), and September–October (445,923 or 19%). Most shore-based trips (from beaches, marshes, docks, and/or piers; DoN 2005) occurred in July–August (600,400 or 32%), then September–October (442,464 or 23%), and May–June (370,832 or 20%).

In 2004, there were eight recreational fishing tournaments around New Jersey between May and November, all of which were within 150 km (~80 nm) from shore (DoN 2005). Of the 'hotspots' (popular fishing sites commonly visited by recreational anglers) mapped by DoN (2005), most are to the north or south of the proposed survey area; however, there are several hotspots located within or very near the northwestern corner of the survey area. As of April 2014, 11 tournaments were scheduled in 2014 for central New Jersey ports of call (Table 6). No detailed information about locations is given in the sources cited. As of 10 October 2014, lists of 2015 tournaments were not available (D. Kaldunski, AmericanFishingContests.com, pers. comm.). As of 13 November 2014, one tournament is scheduled for 15–21 August 2015 out of Cape May, New Jersey (InTheBite 2014).

In 2013, at least 75 species of fish were targeted by recreational fishers off New Jersey. Species with 2013 recreational catch numbers exceeding one million include summer flounder (33% of total catch), black sea bass (12%), Atlantic croaker (7%), bluefish (7%), striped searobin (7%), striped bass (6%), and spot (5%). Other notable species or species groups representing at least 1% each of the total catch included unidentified sea robin, tautog, smooth dogfish, Atlantic menhaden, little skate, spiny dogfish, clearnose skate, tilefish, scup, cunner, red hake, unidentified skate, northern searobin, and weakfish. Most of these species/species groups were predominantly caught within 5.6 km from shore (on average 90% of total catch); summer flounder, skates/rays, and cunner were caught roughly equally within and beyond 5.6 km from shore, and red hake were mainly taken beyond 5.6 km from shore (80%).

Recreational SCUBA Diving

Wreck diving is a popular form of recreation in the waters off New Jersey. A search for shipwrecks in New Jersey waters was made using NOAA's automated wreck and obstruction information system (NOAA 2014a). Results of the search are plotted in Figure 2 together with the survey lines. There are over 900 shipwrecks/obstructions in New Jersey waters, most (58%) of which are listed by NOAA (2014b) as unidentified. Only one shipwreck, a known dive site, is in or near the survey area (Fig. 2): the *Lillian* (Galiano 2009; Fisherman's Headquarters 2014; NOAA 2014a).

Table 6. Fishing tournaments off New Jersey, June–mid August 2014.

Dates	Tournament name	Port/ waters	Marine species/groups targeted	Source
1 Feb–14 Dec	Kayak Wars	Statewide/ all legal	Barred sand/calico/spotted bay/white sea bass; bonefish; bonito; cabezon; California barracuda; coho/king/pink salmon; corvina; dorado (mahi mahi); greenling; halibut; leopard/mako/ sevengill/thresher shark; lingcod; opaleye; rock sole; rockfish; saltwater perch; sanddab; sculpin; sheepshead; spiny dogfish; starry flounder; sturgeon; cutthroat trout; whitefish; yellowtail	1
1 Apr–30 Nov	Jersey Shore Beach N Boat Fishing Tournament	Beach Haven/out to 37 km	Black drum; bluefish; fluke; northern kingfish; sea/striped bass; tog; weakfish	1
1 May–30 Nov	Manasquan River MTC Monthly and Mako Tournament	Brielle/N/A	White/blue marlin; pelagic sharks; bigeye/albacore/yellowfin tuna	2
Spring–Fall	Annual Striper Derby – Spring Lake Live Liners Fishing Club	Spring Lake/ any NJ waters	Striped bass	1
6 Jun–27 Jul	Manasquan River Marlin & Tuna Club Bluefin Tournament	Manasquan/ Atlantic Ocean	Bluefin tuna	1
27 Jun–6 Jul	Manasquan River Marlin & Tuna Club Jack Meyer Trolling Tournament	Manasquan/ Atlantic Ocean	Unlisted	1
3–7 Jul	Manasquan River MTC Jack Meyer Memorial Tournament	Brielle/ N/A	White/blue marlin; bigeye/ albacore/yellowfin tuna	2
4 Jul	World Cup Blue Marlin Championship	Statewide/ offshore	Blue marlin	1
12–13 Jul	Manasquan River Marlin & Tuna Club Ladies & Juniors	Manasquan/ Atlantic Ocean	Mako shark	1
23–26 Jul	Beach Haven Marlin & Tuna Club White Marlin Invitational	Beach Haven/ offshore	White marlin	1, 3
31 Jul–3 Aug	Manasquan River Marlin & Tuna Club Fluke Tournament	Manasquan/ Atlantic Ocean	Mako shark	1

Sources: 1: American Fishing Contests (2014); 2: NOAA (2014c); 3: InTheBite (2014)

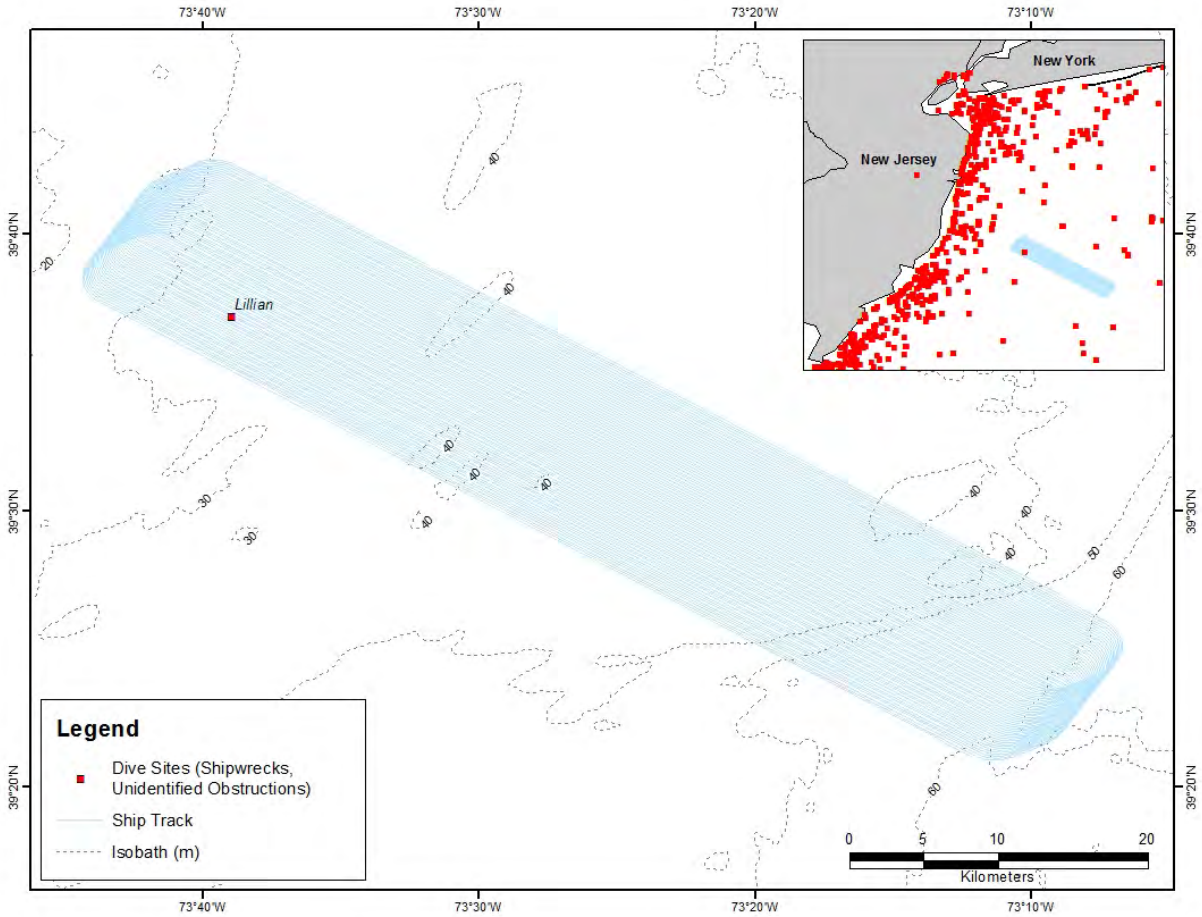

Figure 2. Potential dive sites (shipwrecks or unidentified obstructions) in New Jersey waters. Source: NOAA (2014b).

IV. Environmental Consequences

Proposed Action

The PEIS presented analyses of potential impacts from acoustic sources in general terms and for specific analysis areas. The proposed survey and effects analysis differ from those in the NW Atlantic DAA presented in the PEIS in that different sources were used, the survey areas covered a different range of depths, and different modeling methods were used. The following section includes site-specific details of the proposed survey, summary effects information from the PEIS, and updates to the effects information from recent literature. Analysis conducted for the proposed 2015 survey remains the same as described in the 2014 NSF Final EA for the 2014 survey, except for the smaller size of the airgun array. Seismic effects literature is updated in this Draft Amended EA, and additional effects literature given in the 2014 NMFS EA (Appendix E of the 1 July 2014 Final EA) is incorporated into this Draft Amended EA by reference as if fully set forth herein. In the conclusions of this section, we also refer to conclusions of the Final EA, FONSI, IHA, and Biological Opinion issued by NMFS for the New Jersey survey in 2014, and to observations made during the brief survey conducted in 2014. The effects are fully consistent with those set forth in the 2014 NSF Final EA and FONSI, and 2014 NMFS Final EA, FONSI,

IHA, and Biological Opinion, and EFH concurrence letter, and which are incorporated herein by reference.

(1) Direct Effects on Marine Mammals and Sea Turtles and Their Significance

The material in this section includes a brief summary of the anticipated potential effects (or lack thereof) of airgun sounds on marine mammals and sea turtles, and reference to recent literature that has become available since the PEIS was released in 2011. A more comprehensive review of the relevant background information, as well as information on the hearing abilities of marine mammals and sea turtles, appears in § 3.4.4.3, § 3.6.4.3, § 3.7.4.3, and Appendix E of the PEIS.

Estimates of the numbers of marine mammals that could be affected by the proposed seismic survey scheduled to occur during June–August 2015 are provided in (e) below, along with a description of the rationale for NSF's estimates of the numbers of individuals exposed to received sound levels ≥160 dB re 1 μPa_{rms}. Although the PEIS included modeling for the NW Atlantic DAA, it was done for a different energy source level and survey parameters (e.g., survey water depths and source tow depth), and modeling methods were different from those used by L-DEO (see PEIS, Appendix B, for further modeling details regarding the NW Atlantic DAA). Acoustic modeling for the proposed action was conducted by L-DEO, consistent with past EAs and determined to be acceptable by NMFS to use in the calculation of estimated takes under the MMPA (e.g., NMFS 2013d,e), including for the 2014 survey.

(a) Summary of Potential Effects of Airgun Sounds

As noted in the PEIS (§ 3.4.4.3, § 3.6.4.3, and § 3.7.4.3), the effects of sounds from airguns could include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and at least in theory, temporary or permanent hearing impairment, or non-auditory physical or physiological effects (Richardson et al. 1995; Gordon et al. 2004; Nowacek et al. 2007; Southall et al. 2007). Permanent hearing impairment (PTS), in the unlikely event that it occurred, would constitute injury, but temporary threshold shift (TTS) is not considered an injury (Southall et al. 2007; Le Prell 2012). Rather, the onset of TTS has been considered an indicator that, if the animal is exposed to higher levels of that sound, physical damage is ultimately a possibility. Recent research has shown that sound exposure can cause cochlear neural degeneration, even when threshold shifts and hair cell damage are reversible (Liberman 2013). These findings have raised some doubts as to whether TTS should continue to be considered a non-injurious effect. Although the possibility cannot be entirely excluded, it is unlikely that the project would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects. If marine mammals encounter the survey while it is underway, some behavioral disturbance could result, but this would be localized and short-term.

Tolerance.—Numerous studies have shown that pulsed sounds from airguns are often readily detectable in the water at distances of many kilometers (e.g., Nieukirk et al. 2012). Several studies have shown that marine mammals at distances more than a few kilometers from operating seismic vessels often show no apparent response. That is often true even in cases when the pulsed sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales and toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to airgun pulses under some conditions, at other times mammals of all three types have shown no overt reactions. The relative responsiveness of baleen and toothed whales are quite variable.

Masking.—Masking effects of pulsed sounds (even from large arrays of airguns) on marine mammal calls and other natural sounds are expected to be limited, although there are very few specific data on this. Because of the intermittent nature and low duty cycle of seismic pulses, animals can emit and receive

sounds in the relatively quiet intervals between pulses. However, in exceptional situations, reverberation occurs for much or all of the interval between pulses (e.g., Simard et al. 2005; Clark and Gagnon 2006), which could mask calls. Situations with prolonged strong reverberation are infrequent. However, it is common for reverberation to cause some lesser degree of elevation of the background level between airgun pulses (e.g., Gedamke 2011; Guerra et al. 2011, 2013), and this weaker reverberation presumably reduces the detection range of calls and other natural sounds to some degree. Guerra et al. (2013) reported that ambient noise levels between seismic pulses were elevated because of reverberation at ranges of 50 km from the seismic source. Based on measurements in deep water of the Southern Ocean, Gedamke (2011) estimated that the slight elevation of background levels during intervals between pulses reduced blue and fin whale communication space by as much as 36–51% when a seismic survey was operating 450–2800 km away. Based on preliminary modeling, Wittekind et al. (2013) reported that airgun sounds could reduce the communication range of blue and fin whales 2000 km from the seismic source. Klinck et al. (2012) also found reverberation effects between airgun pulses. Nieukirk et al. (2012) and Blackwell et al. (2013) noted the potential for masking effects from seismic surveys on large whales.

Some baleen and toothed whales are known to continue calling in the presence of seismic pulses, and their calls usually can be heard between the seismic pulses (e.g., Nieukirk et al. 2012). Cerchio et al. (2014) suggested that the breeding display of humpback whales off Angola could be disrupted by seismic sounds, as singing activity declined with increasing received levels. In addition, some cetaceans are known to change their calling rates, shift their peak frequencies, or otherwise modify their vocal behavior in response to airgun sounds (e.g., Di Iorio and Clark 2010; Castellote et al. 2012; Blackwell et al. 2013). The hearing systems of baleen whales are undoubtedly more sensitive to low-frequency sounds than are the ears of the small odontocetes that have been studied directly (e.g., MacGillivray et al. 2014). The sounds important to small odontocetes are predominantly at much higher frequencies than are the dominant components of airgun sounds, thus limiting the potential for masking. In general, masking effects of seismic pulses are expected to be minor, given the normally intermittent nature of seismic pulses. We are not aware of any information concerning masking of hearing in sea turtles.

Disturbance Reactions.—Disturbance includes a variety of effects, including subtle to conspicuous changes in behavior, movement, and displacement. Based on NMFS (2001, p. 9293), NRC (2005), and Southall et al. (2007), we believe that simple exposure to sound, or brief reactions that do not disrupt behavioral patterns in a potentially significant manner, do not constitute harassment or "taking". By potentially significant, we mean, 'in a manner that might have deleterious effects to the well-being of individual marine mammals or their populations'.

Reactions to sound, if any, depend on species, state of maturity, experience, current activity, reproductive state, time of day, and many other factors (Richardson et al. 1995; Wartzok et al. 2004; Southall et al. 2007; Weilgart 2007; Ellison et al. 2012). If a marine mammal does react briefly to an underwater sound by changing its behavior or moving a small distance, the impacts of the change are unlikely to be significant to the individual, let alone the stock or population (e.g., New et al. 2013). However, if a sound source displaces marine mammals from an important feeding or breeding area for a prolonged period, impacts on individuals and populations could be significant (e.g., Lusseau and Bejder 2007; Weilgart 2007). Given the many uncertainties in predicting the quantity and types of impacts of noise on marine mammals, it is common practice to estimate how many marine mammals would be present within a particular distance of industrial activities and/or exposed to a particular level of industrial sound. In most cases, this approach likely overestimates the numbers of marine mammals that would be affected in some biologically important manner.

The sound criteria used to estimate how many marine mammals could be disturbed to some biologically important degree by a seismic program are based primarily on behavioral observations of a few species. Detailed studies have been done on humpbacks, gray whales, bowheads, and sperm whales. Less detailed data are available for some other species of baleen whales and small toothed whales, but for many species, there are no data on responses to marine seismic surveys.

Baleen Whales

Baleen whales generally tend to avoid operating airguns, but avoidance radii are quite variable. Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kilometers, even though the airgun pulses remain well above ambient noise levels out to much longer distances. However, baleen whales exposed to strong noise pulses from airguns often react by deviating from their normal migration route and/or interrupting their feeding and moving away. In the cases of migrating gray and bowhead whales, the observed changes in behavior appeared to be of little or no biological consequence to the animals. They simply avoided the sound source by displacing their migration route to varying degrees, but within the natural boundaries of the migration corridors (Malme et al. 1984; Malme and Miles 1985; Richardson et al. 1995).

Responses of *humpback whales* to seismic surveys have been studied during migration, on summer feeding grounds, and on Angolan winter breeding grounds; there has also been discussion of effects on the Brazilian wintering grounds. Off Western Australia, avoidance reactions began at 5–8 km from the array, and those reactions kept most pods ~3–4 km from the operating seismic boat; there was localized displacement during migration of 4–5 km by traveling pods and 7–12 km by more sensitive resting pods of cow-calf pairs (McCauley et al. 1998, 2000). However, some individual humpback whales, especially males, approached within distances of 100–400 m. Studies examining the behavioral responses of humpback whales to airguns are currently underway off eastern Australia (Cato et al. 2011, 2012, 2013).

In the Northwest Atlantic, sighting rates were significantly greater during non-seismic periods compared with periods when a full array was operating, and humpback whales were more likely to swim away and less likely to swim towards a vessel during seismic vs. non-seismic periods (Moulton and Holst 2010). On their summer feeding grounds in southeast Alaska, there was no clear evidence of avoidance, despite the possibility of subtle effects, at received levels up to 172 re 1 μPa on an approximate rms basis (Malme et al. 1985). It has been suggested that South Atlantic humpback whales wintering off Brazil may be displaced or even strand upon exposure to seismic surveys (Engel et al. 2004), but data from subsequent years, indicated that there was no observable direct correlation between strandings and seismic surveys (IWC 2007).

There are no data on reactions of *right whales* to seismic surveys. However, Rolland et al. (2012) suggested that ship noise causes increased stress in right whales; they showed that baseline levels of stress-related fecal hormone metabolites decreased in North Atlantic right whales with a 6-dB decrease in underwater noise from vessels. Wright et al. (2011) also reported that sound could be a potential source of stress for marine mammals.

Results from *bowhead whales* show that their responsiveness can be quite variable depending on their activity (migrating vs. feeding). Bowhead whales migrating west across the Alaskan Beaufort Sea in autumn, in particular, are unusually responsive, with substantial avoidance occurring out to distances of 20–30 km from a medium-sized airgun source (Miller et al. 1999; Richardson et al. 1999). However, more recent research on bowhead whales corroborates earlier evidence that, during the summer feeding season, bowheads are not as sensitive to seismic sources (e.g., Miller et al. 2005). Nonetheless, Robertson et al. (2013) showed that bowheads on their summer feeding grounds showed subtle but statis-

tically significant changes in surfacing–respiration–dive cycles during exposure to seismic sounds, including shorter surfacing intervals, shorter dives, and decreased number of blows per surface interval.

Bowhead whale calls detected in the presence and absence of airgun sounds have been studied extensively in the Beaufort Sea. Bowheads continue to produce calls of the usual types when exposed to airgun sounds on their summering grounds, although numbers of calls detected are significantly lower in the presence than in the absence of airgun pulses; Blackwell et al. (2013) reported that calling rates in 2007 declined significantly where received SPLs from airgun sounds were 116–129 dB re 1 μPa. Thus, bowhead whales in the Beaufort Sea apparently decrease their calling rates in response to seismic operations, although movement out of the area could also contribute to the lower call detection rate (Blackwell et al. 2013).

A multivariate analysis of factors affecting the distribution of calling bowhead whales during their fall migration in 2009 noted that the southern edge of the distribution of calling whales was significantly closer to shore with increasing levels of airgun sound from a seismic survey a few hundred kilometers to the east of the study area (i.e., behind the westward-migrating whales; McDonald et al. 2010, 2011). It was not known whether this statistical effect represented a stronger tendency for quieting of the whales farther offshore in deeper water upon exposure to airgun sound, or an actual inshore displacement of whales.

Reactions of migrating and feeding (but not wintering) *gray whales* to seismic surveys have been studied. Off St. Lawrence Island in the northern Bering Sea, it was estimated, based on small sample sizes, that 50% of feeding gray whales stopped feeding at an average received pressure level of 173 dB re 1 μPa on an (approximate) rms basis, and that 10% of feeding whales interrupted feeding at received levels of 163 dB re 1 μPa_{rms} (Malme et al. 1986, 1988). Those findings were generally consistent with the results of experiments conducted on larger numbers of gray whales that were migrating along the California coast (Malme et al. 1984; Malme and Miles 1985), and western Pacific gray whales feeding off Sakhalin Island, Russia (e.g., Gailey et al. 2007; Johnson et al. 2007; Yazvenko et al. 2007a,b).

Various species of *Balaenoptera* (blue, sei, fin, and minke whales) have occasionally been seen in areas ensonified by airgun pulses; sightings by observers on seismic vessels off the U.K. from 1997 to 2000 suggest that, during times of good sightability, sighting rates for mysticetes (mainly fin and sei whales) were similar when large arrays of airguns were shooting vs. silent, although there was localized avoidance (Stone and Tasker 2006). Singing fin whales in the Mediterranean moved away from an operating airgun array, and their song notes had lower bandwidths during periods with versus without airgun sounds (Castellote et al. 2012).

During seismic surveys in the Northwest Atlantic, baleen whales as a group showed localized avoidance of the operating array (Moulton and Holst 2010). Sighting rates were significantly lower during seismic operations compared with non-seismic periods. Baleen whales were seen on average 200 m farther from the vessel during airgun activities vs. non-seismic periods, and these whales more often swam away from the vessel when seismic operations were underway compared with periods when no airguns were operating (Moulton and Holst 2010). Blue whales were seen significantly farther from the vessel during single airgun operations, ramp up, and all other airgun operations compared with non-seismic periods (Moulton and Holst 2010). Similarly, fin whales were seen at significantly farther distances during ramp up than during periods without airgun operations; there was also a trend for fin whales to be sighted farther from the vessel during other airgun operations, but the difference was not significant (Moulton and Holst 2010). Minke whales were seen significantly farther from the vessel during periods with than without seismic operations (Moulton and Holst 2010). Minke whales were also

more likely to swim away and less likely to approach during seismic operations compared to periods when airguns were not operating (Moulton and Holst 2010).

Data on short-term reactions by cetaceans to impulsive noises are not necessarily indicative of long-term or biologically significant effects. It is not known whether impulsive sounds affect reproductive rate or distribution and habitat use in subsequent days or years. However, gray whales have continued to migrate annually along the west coast of North America with substantial increases in the population over recent years, despite intermittent seismic exploration (and much ship traffic) in that area for decades. The western Pacific gray whale population did not seem affected by a seismic survey in its feeding ground during a previous year, and bowhead whales have continued to travel to the eastern Beaufort Sea each summer, and their numbers have increased notably, despite seismic exploration in their summer and autumn range for many years.

Toothed Whales

Little systematic information is available about reactions of toothed whales to sound pulses. However, there are recent systematic studies on sperm whales, and there is an increasing amount of information about responses of various odontocetes to seismic surveys based on monitoring studies. Seismic operators and marine mammal observers on seismic vessels regularly see dolphins and other small toothed whales near operating airgun arrays, but in general there is a tendency for most delphinids to show some avoidance of operating seismic vessels (e.g., Stone and Tasker 2006; Moulton and Holst 2010; Barry et al. 2012). In most cases, the avoidance radii for delphinids appear to be small, on the order of 1 km or less, and some individuals show no apparent avoidance.

During seismic surveys in the Northwest Atlantic, delphinids as a group showed some localized avoidance of the operating array (Moulton and Holst 2010). The mean initial detection distance was significantly farther (by ~200 m) during seismic operations compared with periods when the seismic source was not active; however, there was no significant difference between sighting rates (Moulton and Holst 2010). The same results were evident when only long-finned pilot whales were considered.

Preliminary findings of a monitoring study of *narwhals* (*Monodon monoceros*) in Melville Bay, Greenland (summer and fall 2012) showed no short-term effects of seismic survey activity on narwhal distribution, abundance, migration timing, and feeding habits (Heide-Jørgensen et al. 2013a). In addition, there were no reported effects on narwhal hunting. These findings do not seemingly support a suggestion by Heide-Jørgensen et al. (2013b) that seismic surveys in Baffin Bay may have delayed the migration timing of narwhals, thereby increasing the risk of narwhals to ice entrapment.

The *beluga*, however, is a species that (at least at times) shows long-distance (10s of km) avoidance of seismic vessels (e.g., Miller et al. 2005). Captive bottlenose dolphins and beluga whales exhibited changes in behavior when exposed to strong pulsed sounds similar in duration to those typically used in seismic surveys, but the animals tolerated high received levels of sound before exhibiting aversive behaviors (e.g., Finneran et al. 2000, 2002, 2005).

Most studies of *sperm whales* exposed to airgun sounds indicate that the sperm whale shows considerable tolerance of airgun pulses; in most cases the whales do not show strong avoidance (e.g., Stone and Tasker 2006; Moulton and Holst 2010), but foraging behavior can be altered upon exposure to airgun sound (e.g., Miller et al. 2009). There are almost no specific data on the behavioral reactions of *beaked whales* to seismic surveys. Most beaked whales tend to avoid approaching vessels of other types (e.g., Würsig et al. 1998) and/or change their behavior in response to sounds from vessels (e.g., Pirotta et al. 2012). However, some northern bottlenose whales remained in the general area and continued to produce high-frequency clicks when exposed to sound pulses from distant seismic surveys (e.g., Simard

et al. 2005). In any event, it is likely that most beaked whales would also show strong avoidance of an approaching seismic vessel, although this has not been documented explicitly.

The limited available data suggest that *harbor porpoises* show stronger avoidance of seismic operations than do Dall's porpoises. Thompson et al. (2013) reported decreased densities and reduced acoustic detections of harbor porpoise in response to a seismic survey in Moray Firth, Scotland, at ranges of 5–10 km (SPLs of 165–172 dB re 1 μPa, SELs of 145–151 dB $\mu Pa^2 \cdot s$); however, animals returned to the area within a few hours. The apparent tendency for greater responsiveness in the harbor porpoise is consistent with their relative responsiveness to boat traffic and some other acoustic sources (Richardson et al. 1995; Southall et al. 2007).

Odontocete reactions to large arrays of airguns are variable and, at least for delphinids, seem to be confined to a smaller radius than has been observed for the more responsive of the mysticetes and some other odontocetes. A ≥170 dB disturbance criterion (rather than ≥160 dB) is considered appropriate for delphinids, which tend to be less responsive than the more responsive cetaceans.

Sea Turtles

The limited available data indicate that sea turtles will hear airgun sounds and sometimes exhibit localized avoidance (see PEIS, § 3.4.4.3). Based on available data, it is likely that sea turtles will exhibit behavioral changes and/or avoidance within an area of unknown size near a seismic vessel. To the extent that there are any impacts on sea turtles, seismic operations in or near areas where turtles concentrate are likely to have the greatest impact. There are no specific data that demonstrate the consequences to sea turtles if seismic operations with large or small arrays of airguns occur in important areas at biologically important times of year.

Hearing Impairment and Other Physical Effects.—Temporary or permanent hearing impairment is a possibility when marine mammals are exposed to very strong sounds. TTS has been demonstrated and studied in certain captive odontocetes and pinnipeds exposed to strong sounds. However, there has been no specific documentation of TTS let alone permanent hearing damage, i.e., PTS, in free-ranging marine mammals exposed to sequences of airgun pulses during realistic field conditions.

Additional data are needed to determine the received sound levels at which small odontocetes would start to incur TTS upon exposure to repeated, low-frequency pulses of airgun sound with variable received levels. To determine how close an airgun array would need to approach in order to elicit TTS, one would (as a minimum) need to allow for the sequence of distances at which airgun pulses would occur, and for the dependence of received SEL on distance in the region of the seismic operation (e.g., Breitzke and Bohlen 2010; Laws 2012). At the present state of knowledge, it is also necessary to assume that the effect is directly related to total received energy, although there is recent evidence that auditory effects in a given animal are not a simple function of received acoustic energy. Frequency, duration of the exposure and occurrence of gaps within the exposure can also influence the auditory effect (Finneran and Schlundt 2010, 2011; Finneran et al. 2010a,b; Finneran 2012; Ketten 2012; Finneran and Schlundt 2011, 2013; Kastelein et al. 2013a).

The assumption that, in marine mammals, the occurrence and magnitude of TTS is a function of cumulative acoustic energy (SEL) is probably an oversimplification (Finneran 2012). Popov et al. (2011) examined the effects of fatiguing noise on the hearing threshold of Yangtze finless porpoises when exposed to frequencies of 32–128 kHz at 140–160 dB re 1 μPa for 1–30 min. They found that an exposure of higher level and shorter duration produced a higher TTS than an exposure of equal SEL but of lower level and longer duration. Kastelein et al. (2012a,b; 2013b) also reported that the equal-energy model is not valid for predicting TTS in harbor porpoises or harbor seals.

Recent data have shown that the SEL required for TTS onset to occur increases with intermittent exposures, with some auditory recovery during silent periods between signals (Finneran et al. 2010b; Finneran and Schlundt 2011). Schlundt et al. (2013) reported that the potential for seismic surveys using airguns to cause auditory effects on dolphins could be lower than previously thought. Based on behavioral tests, Finneran et al. (2011) and Schlundt et al. (2013) reported no measurable TTS in bottlenose dolphins after exposure to 10 impulses from a seismic airgun with a cumulative SEL of ~195 dB re 1 $\mu Pa^2 \cdot s$; results from auditory evoked potential measurements were more variable (Schlundt et al. 2013).

Recent studies have also shown that the SEL necessary to elicit TTS can depend substantially on frequency, with susceptibility to TTS increasing with increasing frequency above 3 kHz (Finneran and Schlundt 2010, 2011; Finneran 2012). When beluga whales were exposed to fatiguing noise with sound levels of 165 dB re 1 μPa for durations of 1–30 min at frequencies of 11.2–90 kHz, the highest TTS with the longest recovery time was produced by the lower frequencies (11.2 and 22.5 kHz); TTS effects also gradually increased with prolonged exposure time (Popov et al. 2013a). Popov et al. (2013b) also reported that TTS produced by exposure to a fatiguing noise was larger during the first session (or naïve subject state) with a beluga whale than TTS that resulted from the same sound in subsequent sessions (experienced subject state). Therefore, Supin et al. (2013) reported that SEL may not be a valid metric for examining fatiguing sounds on beluga whales. Similarly, Nachtigall and Supin (2013) reported that false killer whales are able to change their hearing sensation levels when exposed to loud sounds, such as warning signals or echolocation sounds.

It is inappropriate to assume that onset of TTS occurs at similar received levels in all cetaceans (*cf.* Southall et al. 2007). Some cetaceans could incur TTS at lower sound exposures than are necessary to elicit TTS in the beluga or bottlenose dolphin. Based on the best available information, Southall et al. (2007) recommended a TTS threshold for exposure to single or multiple pulses of 183 dB re 1 $\mu Pa^2 \cdot s$. Tougaard et al. (2013) proposed a TTS criterion of 165 dB re 1 $\mu Pa^2 \cdot s$ for porpoises based on data from two recent studies. Gedamke et al. (2011), based on preliminary simulation modeling that attempted to allow for various uncertainties in assumptions and variability around population means, suggested that some baleen whales whose closest point of approach to a seismic vessel is 1 km or more could experience TTS.

There is no specific evidence that exposure to pulses of airgun sound can cause PTS in any marine mammal, even with large arrays of airguns. However, given the likelihood that some mammals close to an airgun array might incur at least mild TTS, there has been further speculation about the possibility that some individuals occurring very close to airguns might incur PTS (e.g., Richardson et al. 1995, p. 372*ff*; Gedamke et al. 2011). In terrestrial animals, exposure to sounds sufficiently strong to elicit a large TTS induces physiological and structural changes in the inner ear, and at some high level of sound exposure, these phenomena become non-recoverable (Le Prell 2012). At this level of sound exposure, TTS grades into PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing TTS onset might elicit PTS (e.g., Kastak and Reichmuth 2007; Kastak et al. 2008).

Current NMFS policy regarding exposure of marine mammals to high-level sounds is that cetaceans and pinnipeds should not be exposed to impulsive sounds with received levels ≥180 dB and 190 dB re 1 μPa_{rms}, respectively (NMFS 2000). These criteria have been used in establishing the exclusion (shut-down) zones planned for the proposed seismic survey. However, those criteria were established before there was any information about minimum received levels of sounds necessary to cause auditory impairment in marine mammals.

Recommendations for science-based noise exposure criteria for marine mammals, frequency-weighting procedures, and related matters were published by Southall et al. (2007). Those recommendations were never formally adopted by NMFS for use in regulatory processes and during mitigation programs associated with seismic surveys, although some aspects of the recommendations have been taken into account in certain environmental impact statements and small-take authorizations. In December 2013, NOAA made available for public comment new draft guidance for assessing the effects of anthropogenic sound on marine mammals (NOAA 2013a), taking at least some of the Southall et al. recommendations into account. The new acoustic guidance and procedures could account for the now-available scientific data on marine mammal TTS, the expected offset between the TTS and PTS thresholds, differences in the acoustic frequencies to which different marine mammal groups are sensitive (e.g., M-weighting or generalized frequency weightings for various groups of marine mammals, allowing for their functional bandwidths), and other relevant factors. At the time of preparation of this Draft Amended EA, the date of release of the final guidelines and how they would be implemented are unknown.

Nowacek et al. (2013) concluded that current scientific data indicate that seismic airguns have a low probability of directly harming marine life, except at close range. Several aspects of the planned monitoring and mitigation measures for this project are designed to detect marine mammals occurring near the airgun array, and to avoid exposing them to sound pulses that might, at least in theory, cause hearing impairment (see § II and § IV[2], below). Also, many marine mammals and (to a limited degree) sea turtles show some avoidance of the area where received levels of airgun sound are high enough such that hearing impairment could potentially occur. In those cases, the avoidance responses of the animals themselves would reduce or (most likely) avoid any possibility of hearing impairment.

Non-auditory physical effects could also occur in marine mammals exposed to strong underwater pulsed sound. Possible types of non-auditory physiological effects or injuries that might (in theory) occur in mammals close to a strong sound source include stress, neurological effects, bubble formation, and other types of organ or tissue damage. It is possible that some marine mammal species (i.e., beaked whales) could be especially susceptible to injury and/or stranding when exposed to strong transient sounds.

There is no definitive evidence that any of these effects occur even for marine mammals in close proximity to large arrays of airguns. However, Gray and Van Waerebeek (2011) have suggested a cause-effect relationship between a seismic survey off Liberia in 2009 and the erratic movement, postural instability, and akinesia in a pantropical spotted dolphin based on spatially and temporally close association with the airgun array. Additionally, a few cases of strandings in the general area where a seismic survey was ongoing have led to speculation concerning a possible link between seismic surveys and strandings (e.g., Castellote and Llorens 2013).

Non-auditory effects, if they occur at all, would presumably be limited to short distances and to activities that extend over a prolonged period. Marine mammals that show behavioral avoidance of seismic vessels, including most baleen whales, some odontocetes, and some pinnipeds, are especially unlikely to incur non-auditory physical effects. The brief duration of exposure of any given mammal and the planned monitoring and mitigation measures would further reduce the probability of exposure of marine mammals to sounds strong enough to induce non-auditory physical effects.

Sea Turtles

There is substantial overlap in the frequencies that sea turtles detect vs. the frequencies in airgun pulses. We are not aware of measurements of the absolute hearing thresholds of any sea turtle to waterborne sounds similar to airgun pulses. In the absence of relevant absolute threshold data, we cannot estimate how far away an airgun array might be audible. Moein et al. (1994) and Lenhardt (2002) reported TTS for loggerhead turtles exposed to many airgun pulses (see PEIS). This suggests that sounds

from an airgun array might cause temporary hearing impairment in sea turtles if they do not avoid the (unknown) radius where TTS occurs. However, exposure duration during the proposed survey would be much less than during the aforementioned studies. Also, recent monitoring studies show that some sea turtles do show localized movement away from approaching airguns. At short distances from the source, received sound level diminishes rapidly with increasing distance. In that situation, even a small-scale avoidance response could result in a significant reduction in sound exposure.

The PSVOs stationed on the *Langseth* would also watch for sea turtles, and airgun operations would be shut down if a turtle enters the designated EZ.

(b) Possible Effects of Other Acoustic Sources

The Kongsberg EM 122 MBES, Knudsen Chirp 3260 SBP, and Teledyne OS75 75-kHz ADCP would be operated from the source vessel during the proposed survey, but not during transits. Information about this equipment was provided in § 2.2.3.1 of the PEIS (MBES, SBP) or § II of this Draft Amended EA (ADCP). A review of the anticipated potential effects (or lack thereof) of MBESs, SBPs, and pingers on marine mammals and sea turtles appears in § 3.4.4.3, § 3.6.4.3, § 3.7.4.3, and Appendix E of the PEIS.

There has been some recent attention given to the effects of MBES on marine mammals, as a result of a report issued in September 2013 by an IWC independent scientific review panel (ISRP) linking the operation of a MBES to a mass stranding of melon-headed whales (*Peponocephala electra*; Southall et al. 2013) off Madagascar. During May–June 2008, ~100 melon-headed whales entered and stranded in the Loza Lagoon system in northwest Madagascar at the same time that a 12-kHz MBES survey was being conducted ~65 km away off the coast. In conducting a retrospective review of available information on the event, an independent scientific review panel concluded that the Kongsberg EM 120 MBES was the most plausible behavioral trigger for the animals initially entering the lagoon system and eventually stranding. The independent scientific review panel, however, identified that an unequivocal conclusion on causality of the event was not possible because of the lack of information about the event and a number of potentially contributing factors. Additionally, the independent review panel report indicated that this incident was likely the result of a complicated confluence of environmental, social, and other factors that have a very low probability of occurring again in the future, but recommended that the potential be considered in environmental planning. The proposed survey design and environmental context of the proposed survey are quite different from the mass melon-headed whale stranding described by the ISRP. It should be noted that this event is the first known marine mammal mass stranding closely associated with the operation of a MBES. It is noted that leading scientific experts knowledgeable about MBES have expressed concerns about the independent scientific review panel analyses and findings (Bernstein 2013).

There is no available information on marine mammal behavioral response to MBES sounds (Southall et al. 2013) or sea turtle responses to MBES systems. Much of the literature on marine mammal response to sonars relates to the types of sonars used in naval operations, including Low-Frequency Active (LFA) sonars (e.g., Miller et al. 2012; Sivle et al. 2012) and Mid-Frequency Active (MFA) sonars (e.g., Tyack et al. 2011; Melcón et al. 2012; Miller et al. 2012; DeRuiter et al. 2013a,b; Goldbogen et al. 2013). However, the MBES sounds are quite different from naval sonars. Ping duration of the MBES is very short relative to naval sonars. Also, at any given location, an individual marine mammal would be in the beam of the MBES for much less time given the generally downward orientation of the beam and its narrow fore-aft beamwidth; naval sonars often use near-horizontally-directed sound. In addition, naval sonars have higher duty cycles. These factors would all reduce the sound energy received from the MBES relative to that from naval sonars.

Risch et al. (2012) found a reduction in humpback whale song in the Stellwagen Bank National Marine Sanctuary during Ocean Acoustic Waveguide Remote Sensing (OAWRS) activities that were carried out approximately 200 km away. The OAWRS used three frequency-modulated (FM) pulses centered at frequencies of 415, 734, and 949 Hz with received levels in the sanctuary 88–110 dB re 1 µPa. Deng et al (2014) measured the spectral properties of pulses transmitted by three 200-kHz echo sounders, and found that they generated weaker sounds at frequencies below the center frequency (90–130 kHz). These sounds are within the hearing range of some marine mammals, and the authors suggested that they could be strong enough to elicit behavioural responses within close proximity to the sources, although they would be well below potentially harmful levels.

Despite the aforementioned information that has recently become available, this Draft Amended EA is in agreement with the assessment presented in § 3.4.7, 3.6.7, and 3.7.7 of the PEIS that operation of MBESs, SBPs, and pingers is not likely to impact mysticetes or odontocetes, and is not expected to affect sea turtles, (1) given the lower acoustic exposures relative to airguns and (2) because the intermittent and/or narrow downward-directed nature of these sounds would result in no more than one or two brief ping exposures of any individual marine mammal or sea turtle given the movement and speed of the vessel. Also, for sea turtles, the associated frequency ranges are above their known hearing range.

(c) Other Possible Effects of Seismic Surveys

Other possible effects of seismic surveys on marine mammals and/or sea turtles include masking by vessel noise, disturbance by vessel presence or noise, and injury or mortality from collisions with vessels or entanglement in seismic gear.

Vessel noise from the *Langseth* could affect marine animals in the proposed survey area. Sounds produced by large vessels generally dominate ambient noise at frequencies from 20 to 300 Hz (Richardson et al. 1995). Ship noise, through masking, can reduce the effective communication distance of a marine mammal if the frequency of the sound source is close to that used by the animal, and if the sound is present for a significant fraction of time (e.g., Richardson et al. 1995; Clark et al. 2009; Jensen et al. 2009; Hatch et al. 2012). In order to compensate for increased ambient noise, some cetaceans are known to increase the source levels of their calls in the presence of elevated noise levels from shipping, shift their peak frequencies, or otherwise change their vocal behavior (e.g., Parks et al. 2011; 2012; Castellote et al. 2012; Melcón et al. 2012: Tyack and Janik 2013).

Baleen whales are thought to be more sensitive to sound at these low frequencies than are toothed whales (e.g., MacGillivray et al. 2014), possibly causing localized avoidance of the proposed survey area during seismic operations. Reactions of gray and humpback whales to vessels have been studied, and there is limited information available about the reactions of right whales and rorquals (fin, blue, and minke whales). Reactions of humpback whales to boats are variable, ranging from approach to avoidance (Payne 1978; Salden 1993). Baker et al. (1982, 1983) and Baker and Herman (1989) found humpbacks often move away when vessels are within several kilometers. Humpbacks seem less likely to react overtly when actively feeding than when resting or engaged in other activities (Krieger and Wing 1984, 1986).

Many odontocetes show considerable tolerance of vessel traffic, although they sometimes react at long distances if confined by ice or shallow water, if previously harassed by vessels, or have had little or no recent exposure to ships (Richardson et al. 1995). Dolphins of many species tolerate and sometimes approach vessels. Some dolphin species approach moving vessels to ride the bow or stern waves (Williams et al. 1992). There are few data on the behavioral reactions of beaked whales to vessel noise, though they seem to avoid approaching vessels (e.g., Würsig et al. 1998) or dive for an extended period when approached by a vessel (e.g., Kasuya 1986). Based on a single observation, Aguilar-Soto et al. (2006) suggest foraging efficiency of Cuvier's beaked whales may be reduced by close approach of vessels.

The PEIS concluded that project vessel sounds would not be at levels expected to cause anything more than possible localized and temporary behavioral changes in marine mammals or sea turtles, and would not be expected to result in significant negative effects on individuals or at the population level. In addition, in all oceans of the world, large vessel traffic is currently so prevalent that it is commonly considered a usual source of ambient sound.

Another concern with vessel traffic is the potential for striking marine mammals or sea turtles. Information on vessel strikes is reviewed in § 3.4.4.4 and § 3.6.4.4 of the PEIS. The PEIS concluded that the risk of collision of seismic vessels or towed/deployed equipment with marine mammals or sea turtles exists but is extremely unlikely, because of the relatively slow operating speed (typically 7–9 km/h) of the vessel during seismic operations, and the generally straight-line movement of the seismic vessel. There has been no history of marine mammal vessel strikes with the *Langseth*, or its predecessor, R/V *Maurice Ewing* over the last ~23 years, including those conducted off NJ.

Entanglement of sea turtles in seismic gear is also a concern. There have been reports of turtles being trapped and killed between the gaps in tail-buoys offshore from West Africa (Weir 2007); however, these tailbuoys are significantly different than those used on the *Langseth*. In April 2011, a dead olive ridley turtle was found in a deflector foil of the seismic gear on the *Langseth* during equipment recovery at the conclusion of a survey off Costa Rica, where sea turtles were numerous. Such incidents are possible, but this is the first case of sea turtle entanglement in seismic gear for the *Langseth*, which has been conducting seismic surveys since 2008, or for R/V *Maurice Ewing*, during 2003–2007. Towing the hydrophone streamer or other equipment during the proposed survey is not expected to significantly interfere with sea turtle movements, including migration. Although sea turtles were observed during the 2014 survey, no such effects were detected nor were strandings reported during survey activities.

(d) Mitigation Measures

Several mitigation measures are built into the proposed seismic survey as an integral part of the planned activities. These measures include the following: ramp ups; typically two, however a minimum of one dedicated observer maintaining a visual watch during all daytime airgun operations; two observers for 30 min before and during ramp ups; PAM during the day and night to complement visual monitoring (unless the system and back-up systems are damaged during operations); and power downs (or if necessary shut downs) when mammals or turtles are detected in or about to enter designated EZ. These mitigation measures are described in § 2.4.4.1 of the PEIS and summarized earlier in this document, in § II(3). The fact that the 4-airgun subarray, because of its design, would direct the majority of the energy downward, and less energy laterally, is also an inherent mitigation measure.

Previous and subsequent analysis of the potential impacts takes account of these planned mitigation measures. It would not be meaningful to analyze the effects of the planned activities without mitigation, as the mitigation (and associated monitoring) measures are a basic part of the activities, and would be implemented under the Proposed Action or Alternative Action. The same monitoring and mitigation measures proposed for the 2014 survey are proposed for the 2015 survey.

(e) Potential Numbers of Cetaceans Exposed to Received Sound Levels ≥160 dB

All anticipated takes would be "takes by harassment" as described in § I, involving temporary changes in behavior. The mitigation measures to be applied would minimize the possibility of injurious takes. (However, as noted earlier and in the PEIS, there is no specific information demonstrating that injurious "takes" would occur even in the absence of the planned mitigation measures.) In the sections below, we describe methods to estimate the number of potential exposures to sound levels >160 dB re 1 μPa_{rms}, and present estimates of the numbers of marine mammals that could be affected during the proposed seismic

program. The estimates are based on consideration of the number of marine mammals that could be disturbed appreciably by ~4900 km of seismic surveys off the coast of New Jersey. The main sources of distributional and numerical data used in deriving the estimates are described in the next subsection.

Basis for Estimating Exposure.—The estimates are based on a consideration of the number of marine mammals that could be within the area around the operating airgun array where the received levels (RLs) of sound >160 dB re 1 μPa_{rms} are predicted to occur (see Table 1). The estimated numbers are based on the densities (numbers per unit area) of marine mammals expected to occur in the area in the absence of a seismic survey. To the extent that marine mammals tend to move away from seismic sources before the sound level reaches the criterion level and tend not to approach an operating airgun array, these estimates are likely to overestimate the numbers actually exposed to the specified level of sounds. The overestimation is expected to be particularly large when dealing with the higher sound-level criteria, e.g., 180 dB re 1 μPa_{rms}, as animals are more likely to move away before RL reaches 180 dB than they are to move away before it reaches (for example) 160 dB re 1 μPa_{rms}. Likewise, they are less likely to approach within the ≥180 dB re 1 μPa_{rms} radius than they are to approach within the considerably larger ≥160 dB radius.

We used densities calculated from the U.S. Navy's "OPAREA Density Estimates" (NODE) database (DoN 2007). The cetacean density estimates are based on the NMFS-NEFSC aerial surveys conducted between 1998 and 2004; all surveys from New Jersey to Maine were conducted in summer (June–August). Density estimates were derived using density surface modeling of the existing line-transect data, which uses sea surface temperature, chlorophyll *a*, depth, longitude, and latitude to allow extrapolation to areas/seasons where survey data were not collected. For some species, there were not enough sightings to be able to produce a density surface, so densities were estimated using traditional line-transect analysis. The models and analyses have been incorporated into a web-based Geographic Information System (GIS) developed by Duke University's Department of Defense Strategic Environmental Research and Development Program (SERDP) team in close collaboration with the NMFS SERDP team (Read et al. 2009). We used the GIS to obtain densities in a polygon the size of the survey area for the 19 cetacean species in the model. The GIS provides minimum, mean, and maximum estimates for four seasons, and we have used the mean estimates for summer (June–August). Mean densities were used because the minimum and maximum estimates are for points within the polygon, whereas the mean estimate is for the entire polygon.

The estimated numbers of individuals potentially exposed presented below are based on the 160-dB re 1 μPa_{rms} criterion for all cetaceans. It is assumed that marine mammals exposed to airgun sounds that strong could change their behavior sufficiently to be considered "taken by harassment". Table 7 shows the density estimates calculated as described above and the estimates of the number of different individual marine mammals that potentially could be exposed to ≥160 dB re 1 μPa_{rms} during the seismic survey if no animals moved away from the survey vessel. The *Requested Take Authorization* is given in the far right column of Table 7. For species for which densities were not available but for which there were sighting records near the survey area, we have included a *Requested Take Authorization* for the mean group size for the species from Palka (2012).

It should be noted that the following estimates of exposures to various sound levels assume that the proposed survey would be completed; in fact, the ensonified areas calculated using the planned number of line-kilometers ***have been increased by 25%*** to accommodate lines that may need to be repeated, equipment testing, etc. As is typical during offshore ship surveys, inclement weather and equipment malfunctions are likely to cause delays and may limit the number of useful line-kilometers of seismic operations that can be undertaken. Also, any marine mammal sightings within or near the designated EZ would result in the shut down of seismic operations as a mitigation measure. Thus, the following estimates of the numbers of marine mammals potentially exposed to 160-dB re 1 μPa_{rms} sounds are precautionary and

TABLE 7. Densities and estimates of the possible numbers of individuals that could be exposed to ≥160 dB re 1 μPa_{rms} during the proposed seismic survey in the northwest Atlantic off New Jersey during June–August 2015. The proposed sound source consists of an 4-airgun subarray with a total discharge volume of ~700 in^3. Species in italics are listed under the ESA as endangered. The column of numbers in boldface shows the numbers of Level B "takes" for which authorization is requested.

Species	Reported Density (#/1000 km^2) Read et al. (2009)[1]	Correction Factor[2]	Estimated Density (#/1000 km^2)	Ensonified Area (km^2)	Calculated Take[3]	% of Regional Pop'n[4]	Requested Level B Take Authorization
Mysticetes							
North Atlantic right whale	*0*		*0*	*2037*	*0*	*0*	***0***
Humpback whale	*0*		*0*	*2037*	*0*	*0.01*	***1***[5]
Minke whale	0		0	2037	0	0	**0**
Sei whale	*0.161*		*0.161*	*2037*	*0*	*0.01*	***1***[5]
Fin whale	*0.002*		*0.002*	*2037*	*0*	*<0.01*	***1***[5]
Blue whale	*0*		*0*	*2037*	*0*	*0*	***0***
Odontocetes							
Sperm whale	*7.06*		*7.06*	*2037*	*14*	*0.11*	***14***
Pygmy/dwarf sperm whale	0.001		0.001	2037	0	0.05	**2**[5]
Beaked whales[6]	0.124		0.124	2037	0	0.02	**3**[5]
Rough-toothed dolphin	0		0	2037	0	0	**0**
Bottlenose dolphin	111.3		111.3	2037	227	0.26	**227**
Pantropical spotted dolphin	0		0	2037	0	0	**0**
Atlantic spotted dolphin	36.11		36.11	2037	74	0.16	**74**
Spinner dolphin[7]	0		0	2037	0	0	**0**
Striped dolphin	0		0	2037	0	0.08	**46**[5]
Short-beaked common dolphin	0		0	2037	0	0.01	**18**[5]
White-beaked dolphin[7]	0		0	2037	0	0	**0**
Atlantic white-sided dolphin	0		0	2037	0	0.03	**15**[5]
Risso's dolphin	13.60		13.60	2037	28	0.15	**28**
Pygmy killer whale[7]	0		0	2037	0	N/A	**0**
False killer whale[7]	0		0	2037	0	N/A	**0**
Killer whale [7]	0		0	2037	0	N/A	**0**
Pilot whale	0.184		0.184	2037	0	<0.01	**9**[5]
Harbor porpoise	0		0	2037	0	0	**0**

[1] Densities are the mean values for the survey area, calculated from the SERDP model of Read et al. (2009)
[2] No correction factors were applied for these calculations
[3] Calculated take is estimated density (reported density x correction factor) multiplied by the 160-dB ensonified area (including the 25% contingency)
[4] Requested takes expressed as percentages of the larger regional populations, where available, for species that are at least partly pelagic; where not available (most odontocetes–see Table 3), 2013 SAR population estimates were used; N/A means not available
[5] Requested take authorization was increased to group size from Palka (2012) for species for which densities were zero but that have been sighted near the proposed survey area
[6] May include Cuvier's, True's, Gervais', Sowerby's, or Blainville's beaked whales, or the northern bottlenose whale
[7] Atlantic waters not included in the SERDP model of Read et al. (2009)

probably overestimate the actual numbers of marine mammals that could be involved. These estimates assume that there would be no weather, equipment, or mitigation delays, which is highly unlikely. For the 2014 survey, NMFS added an additional 25% to the estimated take to account for the turnover of marine mammals in the survey area. NSF has traditionally not included this factor into take calculations and therefore has not included it here.

Consideration should be given to the hypothesis that delphinids are less responsive to airgun sounds than are mysticetes, as referenced in both the PEIS and "Summary of Potential Airgun Effects" of this document. The 160-dB (rms) criterion currently applied by NMFS, on which the following estimates are based, was developed based primarily on data from gray and bowhead whales. The estimates of "takes by harassment" of delphinids given below are thus considered precautionary. As noted previously, in December 2013, NOAA made available for public comment new draft guidance for assessing the effects of anthropogenic sound on marine mammals (NOAA 2013a), although at the time of preparation of this Draft Amended EA, the date of release of the final guidelines and how they would be implemented are unknown. Available data suggest that the current use of a 160-dB criterion may be improved upon, as behavioral response may not occur for some percentage of odontocetes and mysticetes exposed to received levels >160 dB, while other individuals or groups may respond in a manner considered as taken to sound levels <160 dB (NMFS 2013a). It has become evident that the context of an exposure of a marine mammal to sound can affect the animal's initial response to the sound (NMFS 2013a).

Potential Number of Marine Mammals Exposed.—The number of different individuals that could be exposed to airgun sounds with received levels ≥160 dB re 1 μPa_{rms} on one or more occasions can be estimated by considering the total marine area that would be within the 160-dB radius around the operating seismic source on at least one occasion, along with the expected density of animals in the area. The number of possible exposures (including repeated exposures of the same individuals) can be estimated by considering the total marine area that would be within the 160-dB radius around the operating airguns, including areas of overlap. During the proposed survey, the transect lines are closely spaced relative to the 160-dB distance. Thus, the area including overlap is 35.5 times the area excluding overlap, so a marine mammal that stayed in the survey area during the entire survey could be exposed ~36 times, on average. However, it is unlikely that a particular animal would stay in the area during the entire survey. The numbers of different individuals potentially exposed to ≥160 dB re 1 μPa_{rms} were calculated by multiplying the expected species density times the anticipated area to be ensonified to that level during airgun operations excluding overlap. The area expected to be ensonified was determined by entering the planned survey lines into a MapInfo GIS, using the GIS to identify the relevant areas by "drawing" the applicable 160-dB buffer (see Table 1) around each seismic line, and then calculating the total area within the buffers.

Applying the approach described above, ~1630 km^2 (~2037 km^2 including the 25% contingency) would be within the 160-dB isopleth on one or more occasions during the proposed survey. Because this approach does not allow for turnover in the mammal populations in the area during the course of the survey, the actual number of individuals exposed may be underestimated, although the conservative (i.e., probably overestimated) line-kilometer distances used to calculate the area may offset this. Also, the approach assumes that no cetaceans would move away or toward the trackline as the *Langseth* approaches in response to increasing sound levels before the levels reach 160 dB. Another way of interpreting the estimates that follow is that they represent the number of individuals that are expected (in the absence of a seismic program) to occur in the waters that would be exposed to ≥160 dB re 1 μPa_{rms}.

The estimate of the number of individual cetaceans that could be exposed to seismic sounds with received levels ≥160 dB re 1 μPa_{rms} during the proposed survey is 343 (Table 7). That total includes 14 cetaceans listed as ***Endangered*** under the ESA, all sperm whales (0.11% of the regional population). Most (96%) of the cetaceans potentially exposed are delphinids; the bottlenose dolphin, Atlantic spotted dolphin, and Risso's dolphin are estimated to be the most common delphinid species in the area, with estimates of 227 (0.26% of the regional population), 74 (0.16%), and 28 (0.15%) exposed to ≥160 dB re 1 μPa_{rms}, respectively.

As part of the IHA process in 2014, NMFS reviewed the take estimates presented in Table 7 of the July 2014 Final EA (Table 6 in the Draft EA), which were based on an 8-airgun subarray with a volume of ~1400 in^3. As part of NMFS's analyses process, however, they revised the take calculations for most species based upon the best available density information from SERDP SDSS and other sources and most recent population estimates from the 2013 SAR. These included some additional takes for blue, fin, humpback, minke, sei, and north Atlantic right whales; beaked whales; harbor porpoise; and gray, harbor, and harp seals, and other species. The IHA issued by NOAA on 1 July 2014 therefore included slightly different estimates of the possible numbers of marine mammals exposed to sound levels ≥160 dB re 1 mPa during the proposed seismic survey than those presented in Table 7. For all but two of the species for which take has been issued, the takes remain less than 1% of the species' regional population or stock. Additionally, in the 2014 Biological Opinion, a different methodology to analyze for multiple exposures of endangered species was presented. NMFS does not provide specific guidance or requirements for IHA Applicants or for Section 7 ESA consultation for the development of take estimates and multiple exposure analysis, therefore variation in methodologies and calculations are likely to occur. The analysis presented in this NSF Draft Amended EA and the Final EA dated 1 July 2014, however, is a methodology that has been used successfully for past NSF seismic surveys to generate take estimates and multiple exposures for the MMPA and ESA processes. Although NSF did not, and has not historically, estimated take for sea turtles, the Biological Opinion and ITS included analysis and take estimates for sea turtles (Appendix C of the 1 July 2014 Final EA). NSF and LDEO would adhere to the requirements of the Incidental Take Statement (ITS) and the IHA and associated take levels issued.

(f) Conclusions for Marine Mammals and Sea Turtles

The proposed seismic project would involve towing a 4-airgun subarray, with a total discharge volume of 700 in^3, that introduces pulsed sounds into the ocean. Routine vessel operations, other than the proposed seismic operations, are conventionally assumed not to affect marine mammals sufficiently to constitute "taking".

***Cetaceans.*—**In § 3.6.7 and 3.7.7, the PEIS concluded that airgun operations with implementation of the proposed monitoring and mitigation measures could result in a small number of Level B behavioral effects in some mysticete and odontocete species in the NW Atlantic DAA; that Level A effects were highly unlikely; and that operations were unlikely to adversely affect ESA-listed species. The information from recent literature summarized in sections (a) to (c) above complements, and does not affect the outcome of the effects assessment as presented in the PEIS.

In this analysis, estimates of the numbers of marine mammals that could be exposed to airgun sounds during the proposed program have been presented, together with the requested "take authorization". The estimated numbers of animals potentially exposed to sound levels sufficient to cause appreciable disturbance are very low percentages of the regional population sizes (Table 7). The estimates are likely overestimates of the actual number of animals that would be exposed to and would react to the seismic sounds. The reasons for that conclusion are outlined above. The relatively short-term exposures are unlikely to result in any long-term negative consequences for the individuals or their populations. Therefore, no significant impacts on cetaceans would be anticipated from the proposed activities. In decades of seismic surveys carried out by the *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related marine mammal injuries or mortality, including during 2014 survey activities. For the 2014 survey, NMFS issued a Final EA and a FONSI. NMFS also issued an IHA on 1 July 2014, therefore, the proposed activity meets the criteria that the proposed activities, "must not cause serious physical injury or death of marine mammals, must have negligible impacts on the species and stocks, must "take" no more than

small numbers of those species or stocks, and must not have an unmitigable adverse impact on the availability of the species or stocks for legitimate subsistence uses." In the Biological Opinion dated 1 July 2014, NMFS determined that the level of incidental take was not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat**.** The issuance of the Final EA, FONSI, IHA, and Biological Opinion by NMFS in July 2014 further verifies that significant impacts would not be anticipated from the proposed activities, especially given that the activities would be using the smaller 700-in^3 source, rather than the larger size source also analyzed and authorized by NMFS in 2014. Observations from the brief 2014 survey support this conclusion (Ingram et al. 2014).

Sea Turtles.—In § 3.4.7, the PEIS concluded that with implementation of the proposed monitoring and mitigation measures, no significant impacts of airgun operations are likely to sea turtle populations in any of the analysis areas, and that any effects are likely to be limited to short-term behavioral disturbance and short-term localized avoidance of an area of unknown size near the active airguns. Five species of sea turtle—the leatherback, loggerhead, green, hawksbill, and Kemp's ridley—could be encountered in the proposed survey area. Only foraging or migrating individuals would occur. Given the proposed activities, no significant impacts on sea turtles would be anticipated. In decades of seismic surveys carried out by the *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related sea turtle injuries or mortality, including during 2014 survey activities. In their July 2014 Final EA, FONSI, and Biological Opinion, NMFS determined that the level of incidental take was not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat**.** The Biological Opinion further verifies that significant impacts would not be anticipated from the proposed activities. Observations from the brief 2014 survey support this conclusion (Ingram et al. 2014).

(2) Direct Effects on Invertebrates, Fish, Fisheries, and EFH and Their Significance

Effects of seismic sound on marine invertebrates (crustaceans and cephalopods), marine fish, and their fisheries are discussed in § 3.2.4 and § 3.3.4 and Appendix D of the PEIS. Relevant new studies on the effects of sound on marine invertebrates, fish, and fisheries that have been published since the release of the PEIS are summarized below.

(a) Effects of Sound on Fish and Invertebrates

Morley et al. (2013) considered invertebrates important when examining the impacts of anthropogenic noise. Although their review focused on terrestrial invertebrates, they noted that invertebrates, because of their short life cycle, can provide model systems for evaluating the effects of noise on individual fitness and physiology, thereby providing data that can be used to draw stronger, ecologically valid conclusions.

Solé et al. (2013) exposed four cephalopod species to low-frequency sound (50–400 Hz sweeps) with received levels of 157 ± 5 dB re 1 μPa, and peak levels up to 175 dB re 1 μPa. Besides exhibiting startle responses, all four species examined received damage to the statocyst, which is the organ responsible for equilibrium and movement. The animals showed stressed behavior, decreased activity, and loss of muscle tone. When the shore crab *Carcinus maenas* was initially exposed to ship-noise playbacks, it consumed more oxygen, indicating a higher metabolic rate and potentially more stress; however, there were no changes in physiological responses to repeated exposure (Wale et al. 2013). Heavier crabs were more responsive than lighter crab (Wale et al. 2013). Celi et al. (2013) exposed red swamp crayfish (*Procambarus clarkia*) to linear sweeps with a frequency range of 0.1 to 25 kHz and a

peak amplitude of 148 dB re 1 μPa rms at 12 kHz for 30 min. They found that the noise exposure caused changes in the haemato-immunological parameters (indicating stress) and reduced agonistic behaviors.

Fewtrell and McCauley (2012) exposed squid (*Sepioteuthis australis*), pink snapper (*Pagrus auratus*), and trevally (*Pseudocaranx dentex*) to pulses from a single airgun. The received sound levels ranged from 120 to 184 dB re 1 dB re 1 $\mu Pa^2 \cdot s$ SEL. Increases in alarm responses were seen in the squid and fish at SELs >147–151 dB re 1 $\mu Pa^2 \cdot s$; the fish swam faster and formed more cohesive groups in response to the airgun sounds, and squid were seen to discharge ink or change their swimming pattern or vertical position in the water column.

Significant developmental delays and body abnormalities in scallop larvae exposed to seismic pulses were reported by de Soto et al. (2013). Their experiment used larvae enclosed in 60-ml flasks suspended in a 2-m diameter by 1.3-m water depth tank and exposed to a playback of seismic sound at a distance of 5–10 cm. Other studies conducted in the field have shown no effects on Dungeness crab larvae or snow crab embryos (Pearson et al. 1994; DFOC 2004 *in* NSF PEIS). Moreover, a major annual scallop-spawning period occurs in the Mid-Atlantic Bight during late summer to fall (August–October), although MacDonald and Thompson (1988 in NMFS 2004) reported scallop spawning off New Jersey during September–November. The timing of the proposed survey would not coincide with the time when scallops are spawning.

Bui et al. (2013) examined the behavioral responses of Atlantic salmon (*Salmo salar L.*) to light, sound, and surface disturbance events. They reported that the fish showed short-term avoidance responses to the three stimuli. Salmon that were exposed to 12 Hz sounds and/or surface disturbances increased their swimming speeds.

Peña et al. (2013) used an omnidirectional fisheries sonar to determine the effects of a 3D seismic survey off Vesterålen, northern Norway, on feeding herring (*Clupea harengus*). They reported that herring schools did not react to the seismic survey; no significant changes were detected in swimming speed, swim direction, or school size when the drifting seismic vessel approached the fish from a distance of 27 km to 2 km over a 6 h period. Peña et al. (2013) attributed the lack of response to strong motivation for feeding, the slow approach of the seismic vessel, and an increased tolerance to airgun sounds.

Miller and Cripps (2013) used underwater visual census to examine the effect of a seismic survey on a shallow-water coral reef fish community in Australia. The census took place at six sites on the reef prior to and after the survey. When the census data collected during the seismic program were combined with historical data, the analyses showed that the seismic survey had no significant effect on the overall abundance or species richness of reef fish. This was in part attributed to the design of the seismic survey, which reduced the impacts of seismic sounds on the fish communities by exposing them to relatively low SELs (<187 dB re 1 $\mu Pa^2 \cdot s$).

Hastings and Miksis-Olds (2012) measured the hearing sensitivity of caged reef fish following exposure to a seismic survey in Australia. When the auditory evoked potentials (AEP) were examined for fish that had been in cages as close as 45 m from the pass of the seismic vessel and at water depth of 5 m, there was no evidence of temporary threshold shift (TTS) in any of the fish examined, even though the cumulative SELs had reached 190 dB re 1 $\mu Pa^2 \cdot s$.

Two spawning stocks that migrate inshore/offshore off New Jersey are the summer flounder and black sea bass. Summer flounder normally inhabit shallow coastal and estuarine waters in summer and move offshore in 60–150 m depth in fall and winter. They spawn in fall and winter (September–December) (MAFMC 1988), after the proposed seismic survey period. Black sea bass normally inhabit shallow waters in summer and move offshore and south in 75–165 m depth in fall and winter (MAFMC 1996). Spawning in the Middle Atlantic Bight population occurs primarily on the inner continental shelf

from May to July during inshore migrations (NMFS 1999), largely before the survey's proposed timing. Therefore, spawning of at least two important species would not be affected to any great degree.

(b) Effects of Sound on Fisheries

Handegard et al. (2013) examined different exposure metrics to explain the disturbance of seismic surveys on fish. They applied metrics to two experiments in Norwegian waters, during which fish distribution and fisheries were affected by airguns. Even though the disturbance for one experiment was greater, the other appeared to have the stronger SEL, based on a relatively complex propagation model. Handegard et al. (2013) recommended that simple sound propagation models should be avoided and that the use of sound energy metrics like SEL to interpret disturbance effects should be done with caution. In this case, the simplest model (exposures per area) best explained the disturbance effect.

Hovem et al. (2012) used a model to predict the effects of airgun sounds on fish populations. Modeled SELs were compared with empirical data and were then compared with startle response levels for cod. Their preliminary analyses indicated that seismic surveys should occur at a distance of 5–10 km from fishing areas, in order to minimize potential effects on fishing.

In their introduction, Løkkeborg et al. (2012) described three studies in the 1990s that showed effects on fisheries. Results of their study off Norway in 2009 indicated that fishes reacted to airgun sound based on observed changes in catch rates during seismic shooting; gillnet catches increased during the seismic shooting, likely a result of increased fish activity, whereas longline catches decreased overall (Løkkeborg et al. 2012).

(c) Conclusions for Invertebrates, Fish, and Fisheries

This newly available information does not affect the outcome of the effects assessment as presented in the PEIS. The PEIS concluded that there could be changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of a high-energy acoustic source, but that there would be no significant impacts of NSF-funded marine seismic research on populations and associated EFH. The PEIS also concluded that seismic surveys could cause temporary, localized reduced fish catch to some species, but that effects on commercial and recreation fisheries were not significant.

Most commercial fish catches by weight (almost all menhaden) and most recreational fishing trips off the coast of New Jersey (87% in 2013 occur in waters within 5.6 km from shore, although the highest-value fish (e.g., flounder and tuna) are caught farther offshore. The closest distance between the proposed survey and shore is >25 km, so interactions between the proposed survey and recreational and some commercial fisheries would be relatively limited. Also, most of the recreational fishery "hotspots" described in § III are to the north or south of the proposed survey area; however, there are several hotspots located within or very near the northwestern corner of the survey area. Two possible conflicts are the *Langseth*'s streamer entangling with fixed fishing gear and temporary displacement of fishers within the survey area, although the survey area is relatively small (12 x 50 km). Fishing activities could occur within the survey area; however, a safe distance would need to be kept from the *Langseth* and the towed seismic equipment. Conflicts would be avoided and, therefore, impacts would be negligible, through communication with the fishing community and publication of a Notice to Mariners about operations in the area. No fisheries activities except vessels in transit were observed in the survey area during the 13 days that the Langseth was there in July 2014.

Survey activities are proposed to take place ~25–85 km off the coast of New Jersey. The area of the proposed survey is relatively small, ~600 km^2. If we were to make a comparison of that survey area to blocks in New York City, it would essentially be equivalent to an area of 8 by 22 city blocks. The overall

area of NJ marine waters from shore to the EEZ encompasses ~210,768 km^2. Thus the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ (600 km^2/210,768 km^2). The survey area plus the largest mitigation zone (8.15 km) would represent less than one percent (0.88%) of the area of waters from the NJ shore to the EEZ (1159 km^2/210,768 km^2). The seismic survey is proposed to take place for ~30 days within the June to August timeframe in 2015, not over the entire time that would be allowable under the IHA. As noted previously, fishing activities would not be precluded from operating in the proposed survey area. Any impacts to fish species would occur very close to the survey vessel and would be temporary. No fish kills or injuries were observed during 2014 survey activities (Ingram et al. 2014).

Given the proposed activities, no significant impacts on marine invertebrates, marine fish, their EFH, and their fisheries would be anticipated. In decades of seismic surveys carried out by the *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related fish or invertebrate injuries or mortality. Furthermore, past seismic surveys in the proposed survey area (2002, 1998, 1995, 1990) did not result in noticeable effects on commercial or recreational fish catches, based on a review of multi-year NMFS fish catch data in the months when seismic surveys were undertaken. The issuance of the Final EA, FONSI, IHA, and Biological Opinion by NMFS in July 2014 further verifies that significant impacts would not be anticipated from the proposed activities. Observations from the brief 2014 survey support this conclusion (Ingram et al. 2014).

NSF consulted in 2014, and will do so again in 2015, with the NMFS Greater Atlantic Regional Fisheries Office under the Magnuson-Stevens Act for EFH (see below "Coordination with Other Agencies and Processes" for further details). The NMFS Greater Atlantic Regional Fisheries Office concluded that the proposed activities may at some level adversely affect EFH, however, no specific conservation measures were identified for the proposed activities.

(3) Direct Effects on Seabirds and Their Significance

Effects of seismic sound and other aspects of seismic operations (collisions, entanglement, and ingestion) on seabirds are discussed in § 3.5.4 of the PEIS. The PEIS concluded that there could be transitory disturbance, but that there would be no significant impacts of NSF-funded marine seismic research on seabirds or their populations. Given the proposed activities, no significant impacts on seabirds would be anticipated. In decades of seismic surveys carried out by the *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related seabird injuries or mortality. Furthermore, NSF received concurrence from USFWS in 2014 (Appendix F of the 1 July 2014 Final EA), and will seek concurrence again in 2015, that the proposed activities "may affect" but "are not likely to adversely affect" species under their jurisdiction (Appendix F of the 1 July 2014 Final EA). Observations from the July 2014 survey support this conclusion (Ingram et al. 2014).

(4) Indirect Effects on Marine Mammals, Sea Turtles, and Their Significance

The proposed seismic operations would not result in any permanent impact on habitats used by marine mammals or sea turtles, or to the food sources they use. The main impact issue associated with the proposed activities would be temporarily elevated noise levels and the associated direct effects on marine mammals and sea turtles, as discussed above.

During the proposed seismic survey, only a small fraction of the available habitat would be ensonified at any given time. Disturbance to fish species and invertebrates would be short-term, and fish would return to their pre-disturbance behavior once the seismic activity ceased. Thus, the proposed

survey would have little impact on the abilities of marine mammals or sea turtles to feed in the area where seismic work is planned. No other indirect effects on other species would be anticipated.

(5) Direct Effects on Recreational SCUBA Divers and Dive Sites and Their Significance

No significant impacts on dive sites, including shipwrecks, would be anticipated. Airgun sounds would have no effects on solid structures. The only potential effects could be temporary displacement of fish and invertebrates from the structures.

Significant impacts on, or conflicts with, divers or diving activities would be avoided through communication with the diving community before and during the survey and publication of a Notice to Mariners about operations in the area. In particular, dive operators with dives scheduled on the shipwreck *Lillian* during the survey would be contacted directly. That dive site represents only a very small percentage of the recreational dive sites in New Jersey waters. No dive vessels were observed in the survey area during the ~14 days that the Langseth was there in July 2014.

(6) Cumulative Effects

The results of the cumulative impacts analysis in the PEIS indicated that there would not be any significant cumulative effects to marine resources from the proposed NSF-funded marine seismic research. However, the PEIS also stated that, "A more detailed, cruise-specific cumulative effects analysis would be conducted at the time of the preparation of the cruise-specific EAs, allowing for the identification of other potential activities in the area of the proposed seismic survey that may result in cumulative impacts to environmental resources." Here we focus on activities that could impact animals specifically in the proposed survey area (research activities, vessel traffic, and commercial fisheries). Additionally, the 2014 NMFS EA Cumulative Effects Section on Climate Change is incorporated into this Draft Amended EA by reference as if fully set forth herein.

(a) Past and future research activities in the area

Most recently, as part of the Integrated Ocean Drilling Program (IODP), the liftboat *Kayd* conducted scientific research and drilling on Expedition 313, New Jersey Shallow Shelf, at several sites off New Jersey during 30 April–17 July 2008. In the more distant past, there have been other scientific drilling activities in the vicinity. There have also been numerous prior seismic surveys, all of which were 2-D, ranging from poor quality, low resolution data collected in 1978 to the most recent, excellent quality, high resolution but shallow penetration data from 2002. These include surveys with a 6-airgun, 1350-in^3 array in 1990; with a single, 45-in^3 GI Gun in 1995 and 1998; and with two 45-in^3 GI Guns in 2002. No seismic sound-related marine mammal, fish, or seabird injuries or mortality were observed by crew or scientists during these past seismic surveys in the proposed survey area. Other scientific research activities may be conducted in this region in the future; however, no other marine geophysical surveys are proposed at this specific site using the *Langseth* in the foreseeable future. At the present time, the proponents of the survey are not aware of other similar research activities planned to occur in the proposed survey area during the June–August 2015 timeframe, but research activities planned by other entities are possible, although unlikely.

In 2014, the *Langseth* also supported an NSF-proposed 2-D seismic survey off the coast of North Carolina to study the U.S. mid-Atlantic margin. That cruise lasted ~34 days and collected ~5000 km of track lines in September/October 2014. Additionally, the *Langseth* conducted a 2-D seismic survey (~2700 km) for ~3 weeks in August/September 2014, and may conduct a similar survey in 2015, for the USGS in support of the delineation of the U.S. Extended Continental Shelf (ECS) along the east coast. Separate EAs were prepared for those activities, and neither project would overlap with the proposed survey area.

(b) Vessel traffic

Based on data available through the Automated Mutual-Assistance Vessel Rescue (AMVER) system managed by the U.S. Coast Guard, 15–49 commercial vessels per month travelled through the proposed survey area during the months of June and July from 2008 to 2013, and for each month in 2012 and 2013 (2013 data are available for January–June, the most recent data available as of October 2014). Over 50 commercial vessels per month were recorded during this time closer to shore (particularly around New York City), to the immediate west and northwest of the proposed survey area (USCG 2013).

Live vessel traffic information is available from MarineTraffic (2014), including vessel names, types, flags, positions, and destinations. Various types of vessels were in the general vicinity of the proposed survey area when MarineTraffic (2014) was accessed on 10 and 15 October and 14 November 2014, including fishing vessels (22), pleasure craft (11), tug/towing vessels (9), cargo vessels (16), tankers (7), and research/survey, military, and dredger vessels (1 of each). There was also one unidentified ship type, with a U.S.A. flag. All but the majority of cargo vessels, the military vessel, the tankers, and two pleasure craft were U.S.A.-flagged. During the 13 days in July 2014 that the *Langseth* was in the survey area, there was limited merchant vessel activity; most merchant traffic was lining up for "safety fairway" to the west of the survey area.

The total transit distance (~5200 km) by L-DEO's vessel *Langseth* would be minimal relative to total transit length for vessels operating in the proposed survey area during June–August 2015. Thus, the projected increases in vessel traffic attributable to implementation of the proposed activities would constitute only a negligible portion of the total existing vessel traffic in the analysis area, and only a negligible increase in overall ship disturbance effects on marine mammals.

(c) Marine Mammal Disease

As discussed in § III, since July 2013, an unusually high number of dead or dying bottlenose dolphins have washed up on the mid-Atlantic coast from New York to Florida. NOAA noted that the triggers for disease outbreaks are unknown, but that contaminants and injuries may reduce the fitness of dolphin populations by stressing the immune system. Morbillivirus outbreaks can also be triggered by a drop in the immunity of bottlenose dolphin populations if they have not been exposed to the disease over time, and natural immunity wanes (NOAA 2013b). The last morbillivirus mortality event occurred in 1987–1988, when more than 740 bottlenose dolphins died along the mid-Atlantic coast from New Jersey to Florida (NOAA 2013b). During that mortality event, fungal, bacterial, and mixed bacterial and fungal pneumonias were common in the lungs of 79 dolphins that were examined, and the frequent occurrence of the fungal and bacterial infections in dolphins that also were infected by morbillivirus was consistent with morbillivirus-induced immunosuppression resulting in secondary infections (Lipscomb et al. 1994). Dr. Teri Knowles of NOAA noted that if the current outbreak evolves like the one in 1987–1988, "we're looking at mortality being higher and morbillivirus traveling southwards and continuing until May 2014." In fact, as of mid October 2014 it is still continuing, although recently, the number of strandings appear to be decreasing, especially in the northern states; between 17 August and 19 October, there were 2, 3, 4, and 0 strandings in NY, NJ, DE, and MD, respectively. Dr. Knowles also speculated that environmental factors, such as heavy metal pollution and sea surface temperature changes, could also play a role in the current outbreak (National Geographic Daily News 2013). It seems unlikely that the short-term behavioral disturbance that could be caused by the proposed seismic survey, especially for dolphins, would contribute to the development or continuation of a morbillivirus outbreak. Although NSF has contacted the NMFS Greater Atlantic Regional Fisheries Office Marine Mammal Response Coordinator, strandings from the proposed activities would not be anticipated. Therefore, the proposed activities would not be anticipated to increase the level of coordination necessary for stranding networks and

associated budgets or impact the NJ Animal Health Diagnostic Laboratory budget, which has been involved with funding efforts related to the recent bottlenose dolphin morbillivirus mortality event.

(d) Fisheries

The commercial and recreational fisheries in the general area of the proposed survey are described in § III. No fisheries activities except vessels in transit were observed in the survey area during the 13 days that the Langseth was there in July 2014. The primary contributions of fishing to potential cumulative impacts on marine mammals and sea turtles involve direct removal of prey items, noise, potential entanglement (Reeves et al. 2003), and the direct and indirect removal of prey items. In U.S. waters, numerous cetaceans (mostly delphinids) and pinnipeds suffer serious injury or mortality each year from fisheries; for example, for the species assessed by Waring et al. (2013), average annual fishery-related mortality during 2006–2010 in U.S. Atlantic waters included 164 common dolphins, 212 Atlantic white-sided dolphins, 791 harbor porpoises, and 1466 harbor, gray, and harp seals. There may be some localized avoidance by marine mammals of fishing vessels near the proposed seismic survey area. L-DEO's operations in the proposed survey area are also limited (duration of ~1 month), and the combination of L-DEO's operations with the existing commercial and recreational fishing operations in the region is expected to produce only a negligible increase in overall disturbance effects on marine mammals and sea turtles.

(e) Military Activity

The proposed survey is located within the U.S. Navy's Atlantic City Range Complex (ACRC). The Boston, Narragansett Bay, and Atlantic City range complexes are collectively referred to as the Northeast Range Complexes. The types of activities that could occur in the ACRC would include the use of active sonar, gunnery events with both inert and explosive rounds, bombing events with both inert and explosive bombs, and other similar events. The ACRC includes special use airspace, Warning Area W-107. The ACRC is an active area, but there is typically relatively limited activity that occurs there. There has only been limited activity in the past, and there were no conflicts during the 2014 survey. L-DEO and NSF are coordinating, and would continue to coordinate, with the U.S. Navy to ensure there would be no conflicts in 2015.

(f) Oil and Gas Activities

Oil and gas activities are managed by BOEM. If BOEM were interested in oil and gas development activities in the survey area, BOEM would need to prepare the appropriate analyses under NEPA, followed by other consultation processes under such federal statutes as the MMPA, ESA, EFH, and CZMA. The proposed survey site is outside of the BOEM Atlantic Outer Continental Shelf Proposed Geological and Geophysical (G&G) Activities in the Mid-Atlantic and South Atlantic Planning Areas (BOEM 2014). The current BOEM mid-Atlantic and South Atlantic activities would be the preliminary surveys that are necessary for BOEM and industry to determine resource potential, and to provide siting information for renewable energy and marine minerals activities; lease sales in those areas have not yet been considered. The final BOEM Record of Decision for the proposed action was issued in July 2014.

Whereas it is theoretically possible that the oil and gas industry may be interested in the architecture of the passive margin area in the survey region for application to other locations (see Appendix B, page C-15, of the 1 July 2014 Final EA), there are no known interests for G&G activities, including oil and gas exploration, in or around the proposed survey site. The proposed seismic survey is not related to nor would it lead to offshore drilling; the proposed activities would evaluate sea level change as described here and in the 2014 Final EA and there are no additional activities proposed beyond those by the PIs or NSF (i.e., there are no proposed oil and gas exploration activities associated with the proposed activities).

Seismic surveys in support of research activities have occurred in the survey area in the recent past (2002, 1998, 1995, 1990). Additionally, NJDEP conducted a seismic survey (boomer/sparker source) in 1985 off the coast of New Jersey (Waldner and Hall 1991). Oil and gas activities in the proposed survey area have not resulted from these similar research seismic surveys. Therefore, it would not be logical to assume that the proposed research seismic survey would result in oil and gas development.

Given the potential distance from any future BOEM G&G activities in the region and separation in time with the proposed activities, no cumulative effects would be anticipated.

(7) Unavoidable Impacts

Unavoidable impacts to the species of marine mammals, sea turtles, seabirds, fish, and invertebrates occurring in the proposed survey area would be limited to short-term, localized changes in behavior of individuals. For cetaceans, some of the changes in behavior may be sufficient to fall within the MMPA definition of "Level B Harassment" (behavioral disturbance; no serious injury or mortality). TTS, if it occurs, would be limited to a few individuals, would be a temporary phenomenon that does not involve injury, and would be unlikely to have long-term consequences for the few individuals involved. No long-term or significant impacts would be expected on any of these individual marine mammals, sea turtles, seabirds, fish, and invertebrates or on the populations to which they belong. Effects on recruitment or survival would be expected to be (at most) negligible.

(8) Public Involvement and Coordination with Other Agencies and Processes

For the 2014 survey, NSF posted the Draft Environmental Assessment (Draft EA) on the NSF website for a 30 day public comment period from 3 February to 3 March 3, 2014, but received no comments during the open comment period. As noted below, public comments were received during the NMFS IHA process in June 2014, and although not received as part of the NSF NEPA process, NSF considered the responses with respect to the information included in the Draft EA and refinements were made and additional information included in the Final EA. The new information included in the 2014 Final EA and in this NSF Draft Amended EA remain consistent with the conclusions in the PEIS. This Draft Amended EA will also be posted on the NSF website for a 30 day public comment period.

This Draft Amended EA was prepared by LGL on behalf of L-DEO and NSF pursuant to NEPA. Potential impacts to endangered species and critical habitat were also assessed in the document; therefore, it will be used to coordinate and support other consultations with federal agencies as required and noted below.

Endangered Species Act (ESA)

For 2014 survey activities, NSF engaged in formal consultation with NMFS and informal consultation with USFWS pursuant to Section 7 of the ESA. NSF received concurrence from USFWS that the proposed activities "may affect" but "are not likely to adversely affect" species under their jurisdiction (Appendix F of the 1 July 2014 Final EA). Mitigation measures would include power-downs/shut-downs for foraging endangered or threatened seabirds. NMFS issued a Biological Opinion and an Incidental Take Statement (Appendix C of the 1 July 2014 Final EA) on 1 July 2014 for the proposed activities and consultation was concluded. For operational purposes and coordination with monitoring and mitigation measures required under the IHA, the Exclusion Zone for sea turtles and foraging seabirds was expanded to the 177db isopleth.

NSF will consult under ESA Section 7 again with NMFS and USFWS for proposed 2015 activities.

Marine Mammal Protection Act (MMPA)

For 2014 survey activities, L-DEO submitted to NMFS an IHA pursuant to the MMPA. On 17 March 2014, NMFS issued in the Federal Register a Notice of Intent to issue an IHA for the survey and 30-day public comment period. In response to public comment request, NMFS extended the public comment period an additional 30 days, for a total of 60 days. As noted above, public comments were received as part of the IHA process (Appendix G of the 1 July 2014 Final EA) and, although not received as part of the NSF NEPA process, NSF considered the responses with respect to the information included in the Draft EA. NMFS prepared a separate EA for its federal action of issuing an IHA; NMFS's EA (Appendix E of the 1 July 2014 Final EA) is hereby incorporated by reference in this NSF Draft Amended EA as appropriate and where indicated. NMFS issued an IHA on 1 July 2014 (Appendix D of the 1 July 2014 Final EA). The IHA stipulated monitoring and mitigation measures, including additional mitigation measures beyond those proposed in the NSF Draft EA and IHA Application, such as an expanded Exclusion Zone (177-dB isopleth) and a one minute shot interval for the 40-in^3 mitigation airgun.

As required by NMFS, L-DEO will submit a new IHA application to NMFS for the proposed 2015 activities. NSF and LDEO would adhere to the IHA requirements for the proposed action.

NMFS Marine Mammal Stranding Program

Although marine mammal strandings were not anticipated as a result of the 2014 survey activities, during ESA Section 7 and MMPA consultation with NMFS it was recommended that the NMFS Greater Atlantic Regional Fisheries Office Marine Mammal Response Coordinator be contacted regarding the proposed activity. Both NMFS and NSF made contact with that coordinator. NSF and NMFS will contact the NMFS Greater Atlantic Regional Fisheries Office Marine Mammal Response Coordinator again regarding proposed 2015 activities. Should any marine mammal strandings occur during the survey, NMFS and the NMFS Greater Atlantic Regional Fisheries Office Marine Mammal Response Coordinator would be contacted. No strandings associated with seismic activities were reported during 2014 survey operations.

Magnuson Stevens Act - Essential Fish Habitat (EFH)

The Magnuson Stevens Act requires that a federal action agency consult with NMFS for actions that "may adversely affect" EFH. Although adverse effects on EFH, including a reduction in quantity or quality of EFH, were not anticipated by the 2014 survey activities, NSF contacted the EFH Regional Coordinator of the NOAA Greater Atlantic Regional Fisheries Office regarding the proposed activities. The EFH Regional Coordinator concluded in a letter dated 18 June 2014, however, that some level of adverse effects to EFH may occur as a result of the proposed activities (Appendix H of the 1 July 2014 Final EA). Additional research and monitoring to gain a better understanding of the potential effects that seismic surveys may have on EFH, federal managed species, their prey, and other NOAA trust resources was recommended for future NSF activities. No project-specific EFH conservation recommendations were provided, however, and consultation was concluded.

NSF will consult again with the Regional Coordinator of the NOAA Greater Atlantic Regional Fisheries Office regarding the proposed 2015 survey activities.

Coastal Zone Management Act (CZMA)

For the 2014 survey, per the requirements of the CZMA, NSF reviewed the New Jersey Coastal Management Program (CMP) Federal Consistency Listings and determined that the proposed activity was unlisted. NSF contacted NOAA's Office of Ocean and Coastal Resource Management (OCRM) to

discuss CZMA implications regarding the proposed project. NSF, OCRM, and the New Jersey Department of Environmental Protection (NJDEP) engaged in several conversations regarding the proposed activity. On 20 May, OCRM received by email NJDEP's request for approval to review the NSF assistance to Rutgers as an unlisted activity under Subpart F and for OCRM to concur that the operation of the vessel was subject to Subpart C (Appendix I of the 1 July 2014 Final EA). OCRM submitted a letter to NSF requesting information about the proposed project (Appendix J of the 1 July 2014 Final EA). NSF provided a response to OCRM per request, also noting NSF's position that the proposed activities were applicable to Subpart F and that the NJDEP request to review was untimely (Appendix K of the 1 July 2014 Final EA). NSF further set forth its position that the operation of the vessel was pursuant to a cooperative agreement that had been approved years ago, and, thus, the time for consistency review had passed. In response to the NJDEP request, OCRM concluded in its letter dated 18 June 2014 that the proposed project falls under Subpart F, not Subpart C, of the regulations implementing CZMA and determined that the NJDEP request to review the project under Subpart F was untimely (Appendix L of the 1 July 2014 Final EA). No further action was required by NSF or the PIs under CZMA for 2014 activities.

NSF has contacted the NJDEP and OCRM regarding CZMA obligations for proposed 2015 survey activities and will comply as appropriate.

Alternative Action: Another Time

An alternative to issuing the IHA for the period requested, and to conducting the Project then, is to issue the IHA for another time, and to conduct the project at that alternative time. The proposed dates for the cruise (~34 days in June–August) are the dates when the personnel and equipment essential to meet the overall project objectives are available; if the date of the cruise were changed, for example to late spring or early fall, it is likely that the *Langseth* would not be available and, thus, the purpose and need of the proposed activities could not be met. If the IHA is issued for another period, it could result in significant delay and disruption not only of this cruise, but also of additional studies that are planned on the *Langseth* for 2015 and beyond.

The weather in the mid-Atlantic Ocean was taken into consideration when planning the proposed activities. The mid-Atlantic Ocean off New Jersey can be challenging to operate during certain times of year, precluding the ability to safely tow seismic gear. Whereas conducting the survey at an alternative time is a viable alternative if the *Langseth*, personnel, and essential equipment are available, because of the weather conditions, it would not be viable to conduct a seismic survey in winter months off the coast of New Jersey.

Marine mammals and sea turtles are expected to be found throughout the proposed survey area and throughout the time during which the project would occur. Some marine mammal species are expected to occur in the area year-round, so altering the timing of the proposed project likely would result in no net benefits for those species. Some migratory species are expected to be farther north at the time of the survey, so the survey timing is beneficial for those species (see § III, above). In particular, migration of the North Atlantic right whale occurs mostly between November and April, and the survey is timed to avoid those months. Accordingly, the alternative action would likely result in either a failure to meet the purpose and need of the proposed activities or it would raise the risk of causing impacts to species such as the North Atlantic right whale.

No Action Alternative

An alternative to conducting the proposed activities is the "No Action" alternative, i.e. do not issue an IHA and do not conduct the operations. If the research were not conducted, the "No Action" alternative would result in no disturbance to marine mammals or sea turtles attributable to the proposed activities, however valuable data about the marine environment would be lost. Research that would contribute to the understanding of the response of nearshore environments to changes in elevation of global sea level would be lost and greater understanding of Earth processes would not be gained. The "No Action" alternative could also, in some circumstances, result in significant delay of other studies that would be planned on the *Langseth* for 2015 and beyond, depending on the timing of the decision. Not conducting this cruise (no action) would result in less data and support for the academic institutions involved. Data collection would be an essential first step for a much greater effort to analyze and report information for the significant topics indicated. The field effort would provide material for years of analyses involving multiple professors, students, and technicians. The lost opportunity to collect valuable scientific information would be compounded by lost opportunities for support of research infrastructure, training, and professional career growth. The research goals and objectives cannot be achieved using existing scientific data. Existing seismic profiles occur at intervals too coarse to achieve the proposed scientific goals of this project. Both the larger spacing and the limitations inherent in processing 2-D seismic data preclude identification of key features of the past margin such as river or delta channels and shoreline adjustments. Only dense and 3-D seismic acquisition and processing can provide continuity of imaging to enable confident identification of these features, whose distributions are expected to evolve throughout the time period recorded in the sediments targeted. The no Action Alternative would not meet the purpose and need for the proposed activities.

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APPENDIX A:

ACOUSTIC MODELING OF SEISMIC ACOUSTIC SOURCES AND SCALING FACTORS FOR SHALLOW WATER[4]

For the proposed survey off New Jersey, a smaller energy source than the full airgun array available on the R/V *Langseth* would be sufficient to collect the desired geophysical data. Previously conducted calibration studies of the *Langseth*'s airgun arrays, however, can still inform the modeling process used to develop mitigation radii for the currently proposed survey.

Acoustic Source Description

This 3-D seismic data acquisition project would use two airgun subarrays that would be fired alternately as the ship progresses along track (one subarray would be towed on the port side and the other on the starboard side). Each airgun subarray would consist of four airguns (total volume 700 in^3). The subarrays would use subsets of the linear arrays or "strings" composed of Bolt 1500LL and Bolt 1900LLX airguns that are carried by the R/V *Langseth* (Figure A1): four airguns in one string would be fired simultaneously, and the other six airguns on the string would be inactive. The subarray tow depth would be either 4.5 m (desired tow depth) or 6 m (in case of weather degradation). The subarray would be fired roughly every 5.4 s. At each shot, a brief (~0.1 s) pulse of sound would be emitted, with silence in the intervening periods. This signal attenuates as it moves away from the source, decreasing in amplitude and increasing in signal duration.

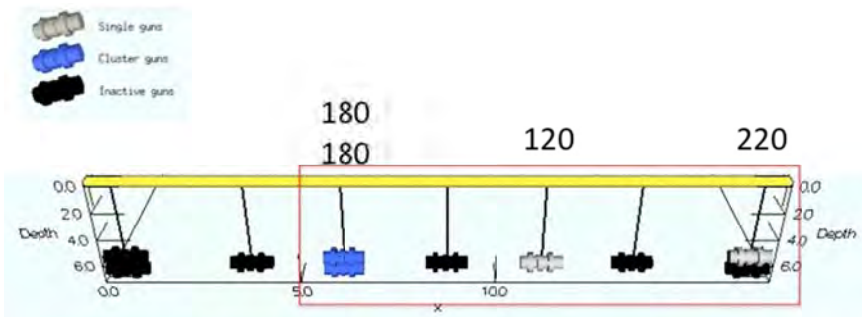

FIGURE A1. Four-airgun subset of one string that would be used as a 700-in^3 subarray for the proposed survey (individual volumes are indicated).

Four-Airgun Subarray Specifications

Energy Source	1950-psi Bolt airguns with volumes 120–220 in^3, arranged in one string of four operating airguns
Towing depth of energy source	4.5 m or 6 m
Source output (downward), 4.5 m	0-pk is 240.4 dB re 1 μPa · m; pk-pk is 246.3 dB re 1 μPa · m
Source output (downward), 6 m	0-pk is 240.4 dB re 1 μPa · m; pk-pk is 246.7 dB re 1 μPa · m
Air discharge volume	~700 in^3
Dominant frequency components	0–188 Hz

Because the actual source originates from 4 airguns rather than a single point source, the highest sound levels measurable at any location in the water is less than the nominal source level. In addition, the

[4] Helene Carton, Ph.D., L-DEO.

effective source level for sound propagating in near-horizontal directions would be substantially lower than the nominal source level applicable to downward propagation because of the directional nature of the sound from the airgun array.

Modeling and Scaling Factors

Propagation measurements were obtained in shallow water for the *Langseth*'s 18-gun, 3300-in^3 (2-string) array towed at 6 m depth, in both crossline (athwartship) and inline (fore and aft) directions. Results were presented in Diebold et al. (2010), and part of their Figures 5 and 8 are reproduced here (Figure A2). The crossline measurements, which were obtained at ranges ~2 km to ~14.5 km, are shown along with the 95th percentile fit (Figure A1, top panel). This allows extrapolation for ranges <2 km and >14.5 km, providing 150 dB SEL, 170 dB SEL and 180 dB SEL distances of 15.28 km, 1097 m, and 294 m, respectively. Note that the short ranges were better sampled in inline direction including by the 6-km long MCS streamer (Figure A2, bottom panel). The measured 170-dB SEL level is at 370-m distance in inline direction, well under the extrapolated value of 1097 m in crossline direction, and the measured 180-dB SEL level is at 140-m distance in inline direction, also less than the extrapolated value of 294 m in crossline direction. Overall, received levels are ~5 dB lower inline than they are crossline, which results from the directivity of the array (the 2-string array being spatially more extended in fore and aft than athwartship directions). Mitigation radii based on the crossline measurements are thus the more conservative ones and are therefore proposed to be used as the basis for the mitigation zone for the proposed activity.

The empirically derived crossline measurements obtained for the 18-gun, 3300-in^3 array in shallow water in the Gulf of Mexico, described above, are used to derive the mitigation radii for the proposed New Jersey margin 3-D survey that would take place in June–August 2015 (Figure A3). The entire survey area would be located in shallow water (<100 m). The source for this survey would be a 4-gun, 700-in^3 subset of 1 string at 4.5- or 6-m tow depth. The differences in array volumes, airgun configuration and tow depth are accounted for by scaling factors calculated based on the deep-water L-DEO model results (shown in Figures A4 to A6).

The scaling procedure uses radii obtained from L-DEO models. Specifically, from L-DEO modeling, 150-, 170-, and 180-dB SEL isopleths for the 18-gun, 3300-in^3 array towed at 6-m depth have radii of 4500, 450, and 142 m, respectively, in deep water (Figure A3). Similarly, the 150-, 170-, and 180-dB SEL isopleths for the 4-gun, 700-in^3 subset of 2 strings array towed at 4.5 m depth have radii of 1544, 155, and 49 m, respectively, in deep water (Figure A4). Taking the ratios between both sets of deep-water radii yields scaling factors of 0.3431–0.3451. These scaling factors are then applied to the empirically derived shallow water radii for the 3300-in^3 array at 6-m tow depth, to derive radii for the suite of proposed airgun subsets. For example, when applying the scaling ratios for the 4-gun, 700-in^3 array at 4.5-m tow depth, the distances obtained are 5.24 km for 150 dB SEL (proxy for SPL 160 dB rms), 378 m for 170 dB SEL (SPL 180 dB rms), and 101 m for 180 dB SEL (SPL 190 dB rms).

The same procedure is applied for the suite of arrays:

(1) 4-gun 700 in^3 array, subset of 1 string at 4.5 m tow depth (Figure A4)

(2) 4-gun 700 in^3 array, subset of 1 string at 6 m tow depth (Figure A5)

(3) Single 40 in^3 mitigation gun at 6 m tow depth (Figure A6)

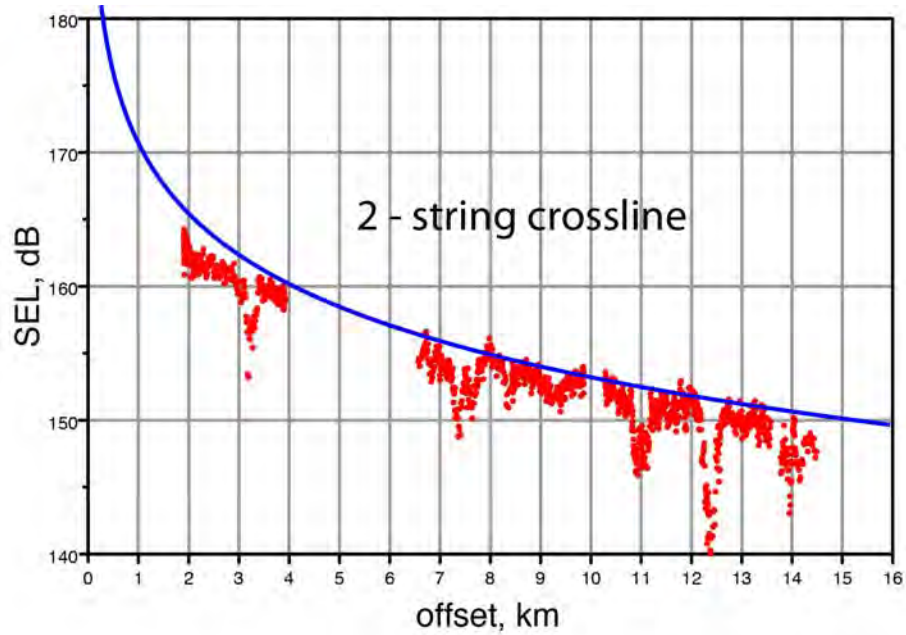

Figure 5a. Sound Exposure Levels for the crossline (side aspect) arrivals recorded along the spiral track at the shallow water calibration site, with a 95th percentile fit (using the methods described by Tolstoy et al., 2009).

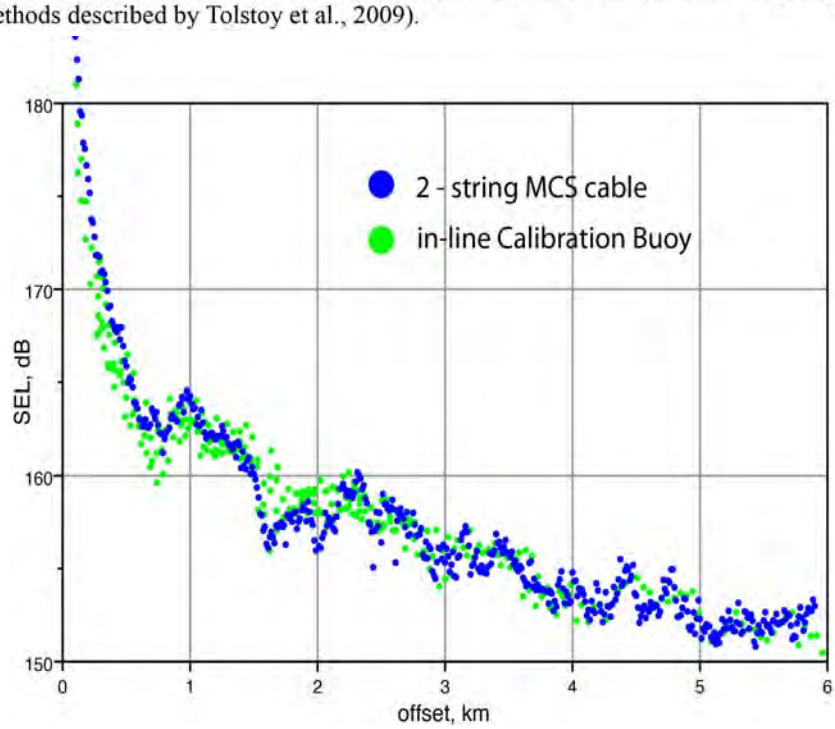

FIGURE A2. R/V *Langseth* Gulf of Mexico calibration results for the 18-gun, 3300-in^3, 2-string array at 6-m depth obtained at the shallow site (Diebold et al. 2010).

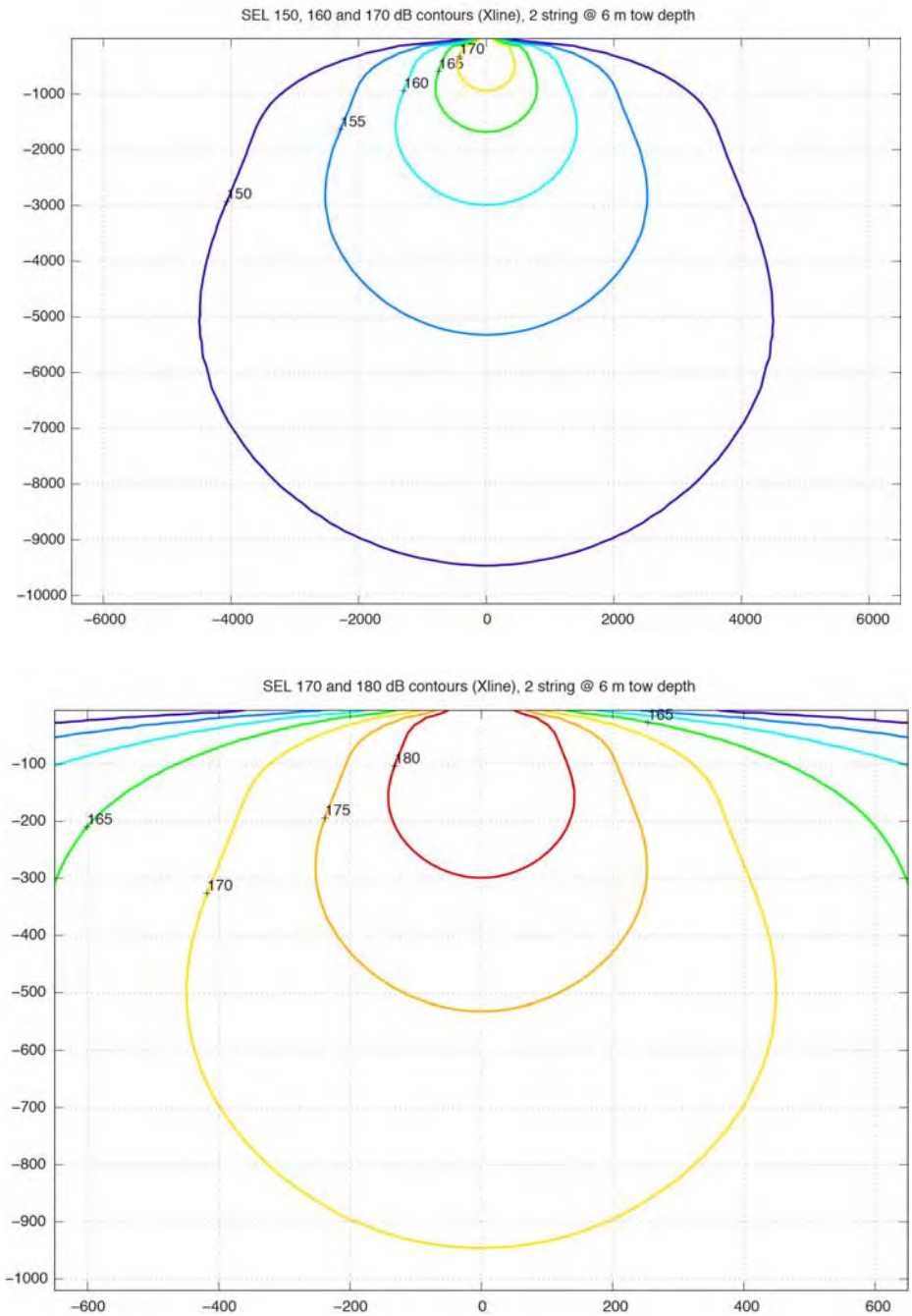

FIGURE A3. Deep-water model results for the 18-gun, 3300-in^3, 2-string array at 6-m tow depth, the configuration that was used to collect calibration measurements presented in Figure 2. The 150-dB SEL, 170-dB SEL, and 180-dB SEL (proxies for SPLs of 160, 180, and 190 dB rms[5]) distances can be read at 4500 m, 450 m, and 142 m.

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[5] Sound sources are primarily described in sound pressure level (SPL) units. SPL is often referred to as rms or "root mean square" pressure, averaged over the pulse duration. Sound exposure level (SEL) is a measure of the received energy in a pulse and represents the SPL that would be measured if the pulse energy were spread evenly across a 1-s period.

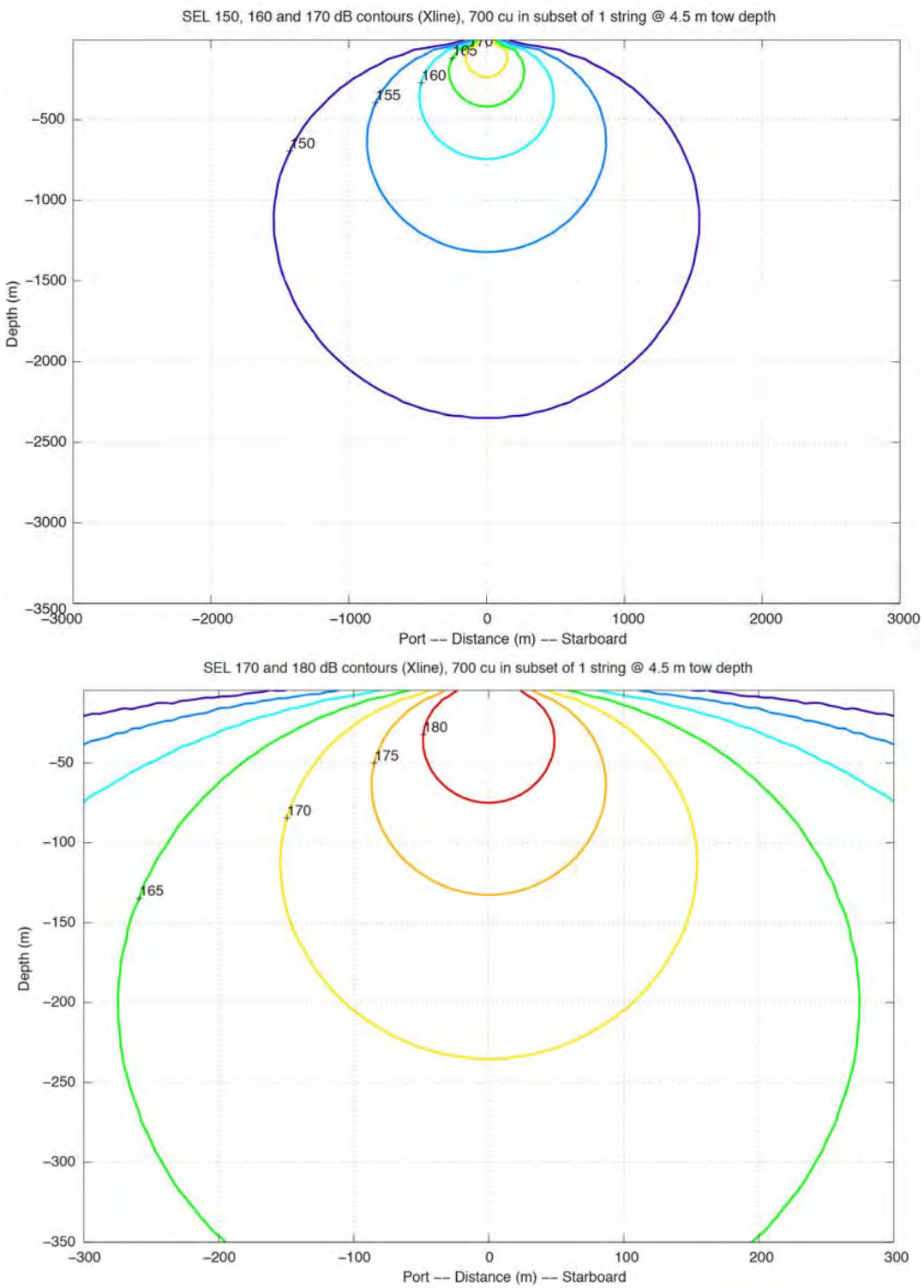


FIGURE A4. Deep-water model results for the 4-gun, 700-in^3 subset of 1-string array at 4.5-m tow depth that could be used for the NJ margin 3D survey. The 150-dB SEL, 170-dB SEL, and 180-dB SEL distances can be read at 1544 m, 155 m, and 49 m, respectively.

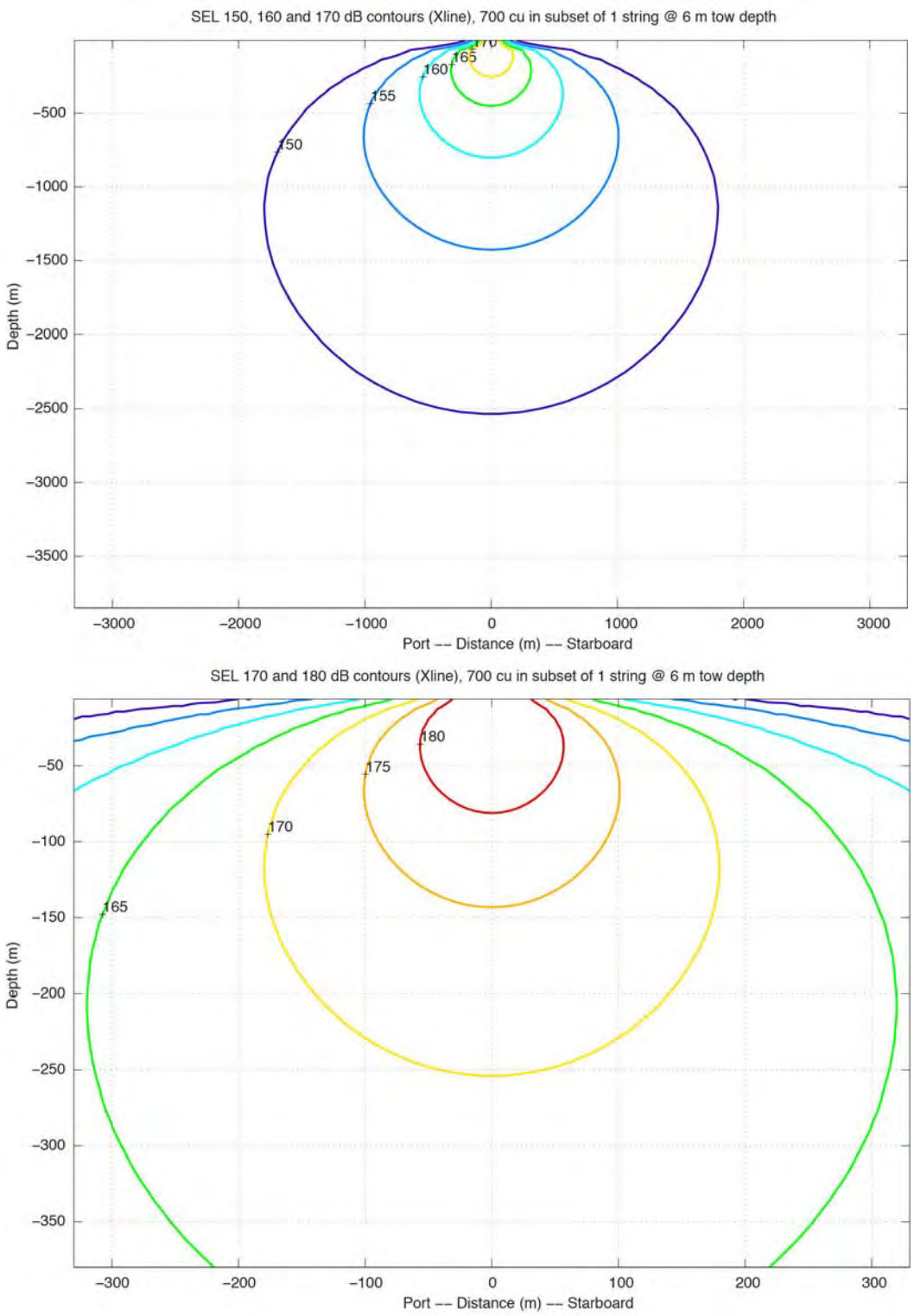
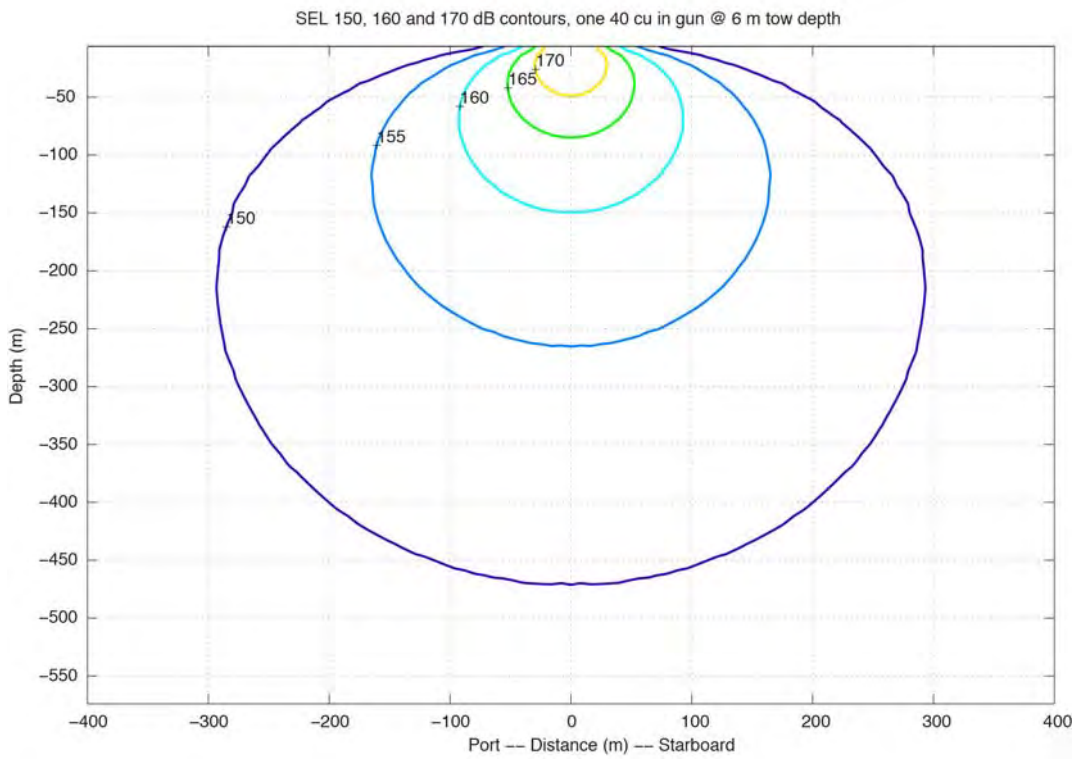


FIGURE A5. Deep-water model results for the 4-gun, 700-in^3 subset of 1-string array at 6m tow depth that could be used for the NJ margin 3-D survey. The 150-dB SEL, 170-dB SEL, and 180-dB SEL distances can be read at 1797 m, 180 m, and 57 m, respectively.



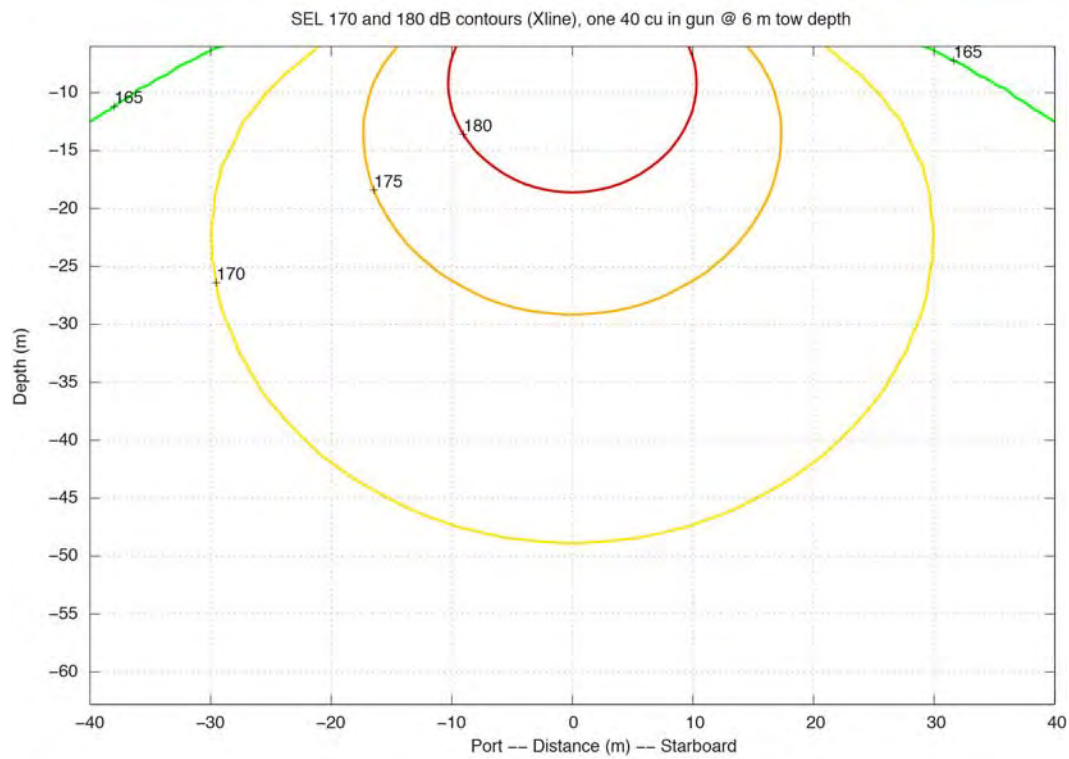


FIGURE A6. Deep-water model results for the single 40-in^3 Bolt airgun at 6-m tow depth. The 150-dB SEL, 170-dB SEL, and 180-dB SEL distances can be read at 293 m, 30 m, and 10 m, respectively.

The derived shallow water radii are presented in Table A1. The final values are reported in Table A2.

TABLE A1. Table summarizing scaling procedure applied to empirically derived shallow-water radii to derive shallow-water radii for various array subsets that could be used during the New Jersey margin 3D survey.

Calibration Study: 18-gun, 3300-in^3 @ 6-m depth	**Deep water radii (m)** (from L-DEO model results)		**Shallow Water Radii (m)** (Based on empirically-derived crossline Measurements)
	150 dB SEL: 4500		15280
	170 dB SEL: 450		1097
	180 dB SEL: 142		294
Proposed Airgun sources	**Deep water radii** (from L-DEO model results)	**Scaling factor** *[Deep-water radii for 18-gun 3300-in^3 array @ 6 m depth]*	**Shallow water radii (m)** *[Scaling factor **x** shallow water radii for 18-gun 3300 in^3 array @ 6 m depth]*
Source #1: 4-gun, 700-in^3 @ 4.5-m depth	150 dB SEL: 1544 m	0.3431	5240
	170 dB SEL: 155 m	0.3444	378
	180 dB SEL: 49 m	0.3451	101
Source #2: 4-gun, 700-in^3 @ 6-m depth	150 dB SEL: 1797 m	0.3993	6100
	170 dB SEL: 180 m	0.4000	439
	180 dB SEL: 57 m	0.4014	118
Source #3: Single 40-in^3 @ 6-m depth	150 dB SEL: 293 m	0.0651	995
	170 dB SEL: 30 m	0.0667	73
	180 dB SEL: 10 m	0.0704	21

TABLE A2. Predicted distances in meters to which sound levels ≥ 180 and 160 dB re 1 μPa$_{rms}$ would be received during the proposed 3-D survey off New Jersey, using a 4-gun, 700-in^3 subset of 1 string at 4.5- or 6-m tow depth and the 40-in^3 airgun during power-downs. Radii are based on Figures A2 to A6 and scaling described in the text and Table A1, assuming that received levels on an rms basis are, numerically, 10 dB higher than the SEL values.

		Predicted RMS Radii (m)	
Source and Volume	Water Depth	180 dB	160 dB
4-airgun subarray (700 in^3) @ 4.5 m	<100 m	378	5240
4-airgun subarray (700 in^3) @ 6 m	<100 m	439	6100
Single Bolt airgun (40 in^3) @ 6 m	<100 m	73	995

State of New Jersey

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Commissioner

February 11, 2015

Holly Smith
National Science Foundation
4201 Wilson Boulevard, Room 725
Arlington, VA 22230

RE: Federal Consistency Determination for Marine Geophysical Survey by the R/V *Marcus G. Langseth* in Atlantic Ocean off New Jersey, Summer 2015
DLUR File No. 0000-14-0030.1 CDT 150001

Dear Ms. Smith:

Pursuant to section 15 CFR 930.41 of the Federal Consistency Regulations, this office hereby requests that the review period to determine consistency with the New Jersey Coastal Management Program-Bay and Ocean Shore Segment for the above project, be extended 15 days, to March 6, 2015, in order for the Department to complete its review.

If you have any questions regarding the above please contact me in writing at the above address or by phone at (609) 633-2289.

Sincerely,

Jessica Cobb

Jessica Cobb, Environmental Specialist 3
Bureau of Coastal Regulation
Division of Land Use Regulation

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February 24, 2015

Jessica Cobb
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RE: Federal Consistency Determination for Marine Geophysical Survey by the R/V Marcus G. Langseth in Atlantic Ocean off New Jersey, Summer 2015
DLUR File No. 0000-14-0030.1 CDT 150001

Dear Ms. Cobb:

The National Science Foundation (NSF) is in receipt of a letter from the New Jersey Department of Environmental Protections (NJDEP) requesting a 15 day extension pursuant to 15 C.F.R. 930.41(b) of the Coastal Zone Management Act. The letter, which was dated February 11, 2015, was mailed via U.S postal service and postmarked February 12, 2015. Although the NJDEP identified in a previous letter submitted via email to NSF on February 9, 2015, that a final determination on NSF's Consistency Determination, or request to extend, would be provided to NSF by February 19, 2015, the letter requesting an extension was not received by NSF until February 20, 2015, and did not reach my office until February 23, 2015. To facilitate timely communication between our offices in the future, we would greatly appreciate receiving copies of all correspondence by email, regardless of whether a hard copy is also mailed via U.S. mail; NSF will, of course, extend the same courtesy to NJDEP.

NSF acknowledges that the state wishes the additional 15 days to complete its review of the proposed project that was originally scheduled to be completed during the summer of 2014. Based on your letter, we understand that your office intends to respond to NSF's Consistency Determination by March 6, 2015. NSF welcomes, however, earlier notification so that our offices can maximize the time available within the 90 day notice period to resolve any potential differences. Finally, as NSF has noted since October 2014, we are open to a dialogue about the proposed project with NJDEP and encourage your office to contact us if you have any questions regarding the Consistency Determination.

Thank you for your assistance on this matter and we look forward to receiving NJDEP's response.

Sincerely,

Holly Smith
Environmental Compliance Officer

cc:
Virginia KopKash, NJDEP
Elizabeth Semple, NJDEP
John Gray, NJDEP
Megan Brunatti, NJDEP
Kerry Kehoe, National Oceanic Atmospheric Administration Office of Ocean and Coastal Resource Management

State of New Jersey

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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Holly Smith
National Science Foundation
4201 Wilson Boulevard, Room 725
Arlington, VA 22230

RE: Federal Consistency Determination for Marine Geophysical Survey by the R/V *Marcus G. Langseth* in Atlantic Ocean off New Jersey, Summer 2015 - Inconsistent
DLUR File No. 0000-14-0030.1 CDT 150001

Dear Ms. Smith:

The New Jersey Department of Environmental Protection (Department) Division of Land Use Regulation (Division), acting pursuant to Section 307 of the Federal Coastal Zone Management Act (CZMA) of 1972 (P.L. 92-583) as amended, finds the above referenced request to be inconsistent with enforceable policies of the New Jersey Coastal Management Program (NJCMP).

Project Description

The National Science Foundation (NSF) is funding a research project proposed by lead Principle Investigator Dr. Gregory Mountain of Rutgers University and collaborators Drs. J. Austin, C. Fulthorpe, and M. Nedimovic of University of Texas Austin to study sea level rise in the Atlantic Ocean off of the coast of New Jersey, which includes a marine geophysical survey. The project includes the use of a 3-D seismic reflection survey to map sequences around existing drill sites and analyze their spatial/temporal evolution. Objectives include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea-level; and determining amplitudes and timing of global sea-level changes during the mid-Cenozoic era.

Administrative History

On March 17, 2014, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NFMS) published a Federal Register Notice (79 FR 14779, March 17, 2014) announcing the proposed issuance of an Incidental Harassment Authorization to the Lamont Doherty Earth Observatory in collaboration with NSF to take marine mammals by harassment incidental to conducting a marine geophysical (seismic) survey in the northwest Atlantic Ocean from May through August 2014.

On April 22, 2014, a conference call was held between NJCMP, NOAA's Office of Ocean and Coastal Resource Management (OCRM) and NSF staff to discuss the proposed activity. During that conference call, it was determined that Rutgers University will be the recipient of the NSF funding as the Principal Investigator for the scientific research related to the surveys that require the proposed incidental harassment authorization.

On May 7, 2014 another conference call was held between NJCMP, OCRM, and NSF to discuss alternate arrangements to assuage the NJCMP's concerns over potential impacts to New Jersey's resources. On this call, OCRM also provided NJCMP with the details necessary for the Department to appropriately request NSF submit a Consistency Determination request to the Department. While the conference call was beneficial to lay the foundation for an alternative resolution to this matter, the NJCMP made clear that the State of New Jersey would pursue this request since a final resolution was not agreed upon and the NJCMP is required to timely submit this request.

On May 16, 2014 the Department notified OCRM, NSF, and Rutgers University of the Department's intent to review the project for consistency with the enforceable policies of the NJCMP. The Department contended that the project would have both direct and indirect reasonably foreseeable effects on the uses and resources of New Jersey's coastal zone relating to commercial fishing, recreational fishing and boating; marine fish, sea turtles and marine mammals; shipwrecks and historical and archeological resources.

On June 18, 2014, the Department was advised of OCRM's concurrence that the project is considered federally funded assistance to a state entity and is therefore, subject to Subpart F requirements of the CZMA Federal Consistency regulations. However, OCRM ultimately denied the Department's review request due to untimeliness and OCRM did not address the Department's analysis of the project's reasonably foreseeable effects.

On June 25, 2014 the Department provided OCRM with information demonstrating that the request was timely and requested a reconsideration of the denial decision.

On July 1, 2014 the project commenced.

On July 3, 2014, the Department filed a complaint in federal District Court seeking injunctive and declaratory relief. On July 10, 2014 the District CourtCourt denied the Department's complaint, but issued a temporary injunction to afford the Department an opportunity to appeal.. The Department subsequently filed an appeal to U.S. Court of Appeals for the Third Circuit (Third Circuit). On July 14 2014, the Third Circuit denied the Department's appeal. On August 12,12, 2014 the matter was dismissed from District Court without prejudice.

In August 2014, the project was ultimately cancelled due to mechanical issues with the survey vessel, R/V *Marcus G. Langseth.*

On December 22, 2014, the Division received NSF's request for consistency concurrence for a similar project during the period of June to August 2015. The request included a report entitled,

"Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015" prepared for Lamont-Doherty Earth Observatory and the National Science Foundation's Division of Ocean Sciences, prepared by LGL Ltd., environmental research associates, and dated December 18, 2014 (Amended EA). Pursuant to 15 CFR Section 930.41, the Division has 60 days to provide a determination and may request an extension period of 15 days or less.

On February 11, 2015 the Department issued a 15 day extension request extending the Department's decision deadline to March 6, 2015.

Analysis

The following analysis is based on New Jersey's Rules on Coastal Zone Management, N.J.A.C. 7:7E-1.1 et seq., as amended July 15, 2013. The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), site-specific draft Environmental Assessment dated, December 2013 (EA), and the Amended EA. The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

For purposes of CZMA review, the Department must determine whether an activity will affect a coastal use or resource. This Department's analysis is embodied in Department published guidance.[1] Coastal effects are defined under National Oceanic and Atmospheric Administration (NOAA) regulations as any reasonably foreseeable effect on any coastal use or resource resulting from a Federal agency activity, Federal license, or permit activity. Effects are not just environmental effects, but also include effects on coastal uses. Effects include both direct effects, which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects that result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. The Department's foreseeability test applies to activities and uses or resources that occur outside a State's coastal zone, so long as the uses or resources impacted are uses or resources of a State's coastal zone.

The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), sitespecific draft Environmental Assessment dated, December 2013 (EA), and the draft Amended EA,dated December 2014(Amended EA). The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

In evaluating this project, the Department also looked to other sources to define "foreseeability." Black's Law Dictionary (5th Ed.) defines foreseeability as "the reasonable anticipation that harm or injury is a likely result of acts or omissions." Thus, the test is whether the impact is reasonably related to the activity, not whether an impact is more likely than not to occur.

[1] Federal Consistency in New Jersey, dated September 8, 2010. *Available at* http://www.state.nj.us/dep/cmp/fc_guidance.pdf

N.J.A.C. 7:7E-3.4 Prime Fishing AreasAreas

Both the project location and the timeframe will foreseeably adversely affect New Jersey's prime fishing areas. The project area will see high commercial and recreational activity off the coast of New Jersey during the study period.. The project's timeframe coincides with a period of high to peak population abundance of several commercially and recreationally important fish species at identified prime fishing areas.

Prime fishing areas include tidal water areas and water's edge areas, which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay," Figley and McCloy (1988), and those areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds."

The project is located off the coast of New Jersey, ingextending from Barnegat Ridge to the 35 fathom line, and runs in a northwest to southeast direction intersecting fathom curves at a general perpendicular nature along its extent. This location is offshore from some of New Jersey's most important fishing ports, including: Barnegat Light, Atlantic City, and Point Pleasant. Pursuant to the aforementioned "New Jersey's Specific Sport Ocean Fishing Grounds" map, a portion of the proposed survey area is a State-recognized productive and historical fishing area known as "The Fingers." Contrary to the portrayal in the Amended EA, areas beyond State waters areheavily utilized by New Jersey's commercial and recreational fishing industry. It should also be noted that according to National Marine Fisheries Service data, New Jersey's commercial and recreation fisheries are some of the most productive, highest grossing and employ more people than other states in the Mid-Atlantic and along the Atlantic Coast. Lastly, there is at least one known shipwreck, *Lillian,* within the project area that is popular with scuba diving and spearfishing enthusiasts.

Data analysis of commercial and recreational landings from 1996 to 2013 indicate that this entire area is not only used by multiple commercial fisheries including gillnetters, otter trawl vessels, scallop boats, and long liners, but is also heavily utilized by recreational fishermen. In combination, both commercial and recreational sectors pursue over 35 species of fish in this area including but not limited to: albacore, bluefish, big eye tuna, Bluefin tuna, bonita, black sea bass, butter fish, cobia, cod, smooth dogfish, spiny dogfish, summer flounder, Atlantic menhaden, monkfish, red hake, skate, tilefish, swordfish, yellow fin tuna, and skipjack tuna.

Offshore waters also serve as essential habitat for invertebrate species during various stages of their lifecycles. Studies have provided "evidence that noise exposure during larval development produces body malformations in marine invertebrates. Scallop larvae exposed to playbacks of seismic pulses showed significant developmental delays and 46% developed body abnormalities. Similar effects were observed in all independent samples exposed to noise while no

malformations were found in the control groups."[2] A reduction in harvestable stock would result in further impacts to New Jersey's commercial fisheries.

While seismic surveys are not expressly prohibited pursuant to the N.J.A.C. 7:7E-3.4(b)2, based on studies examining seismic survey impacts, it is reasonably foreseeable that the project would affect fishery distribution, movement, migration and spawning at identified prime fishing areas. This also foreseeably results in adverse impacts to the high productivity of New Jersey's commercial and recreational fishing industry. In conclusion, the project is found to be inconsistent with prime fishing areas rule, N.J.A.C. 7:7E-3.4, due to the foreseeable effect on utilization of prime fishing areas.

N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries

Both the project location and the timeframe will foreseeably affect New Jersey's fisheries. The project area and timeframe sees consistently high commercial and recreational activity based out of New Jersey. The Department finds the study inconsistent with the NJCMP for the following reasons: research indicates adverse impacts to fisheries are likely and New Jersey's rules discourage activities that adversely impact the natural functioning of marine fish; NSF's failure to minimize or mitigate for adverse impacts to a commercially important fishery, which is inconsistent with NSF's own guidance; National Marine Fisheries Service (NMFS) findings and guidance; and the significant concerns raised by the Department's stakeholders, including members of New Jersey's commercial and recreational fishing industry.

Numerous studies identify responses of fish to high energy sound. Studies have shown that noise produced from this activity can cause physical impacts such as short and long term damage to the ears of fish and in some cases, mortality. Research has also documented behavioral impacts that show a clear change in "normal" activity and an increase in "alarm" response behavior that results in changes to schooling behavior, swimming speeds, water column location and sound avoidance. Studies have also demonstrated declining catch rates for a number of commercial fisheries during seismic testing activities. For example, Arill Engas, et al., found that catch rates fell within the seismic shooting region and surrounding areas immediately after shooting started and continued after shooting ended.[3] More recently, Svein Løkkeborg, et al., highlighted that "reduced catches on fishing grounds exposed to seismic survey activities have been demonstrated."[4] The conclusions reached by the Løkkeborg study are further supported by other recent studies concluding that catch rates reduced in the presence of seismic studies.[5] Based on this information, it is reasonably foreseeable that the project will adversely impact New Jersey's marine fish and fisheries resources.

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[2] de Soto, N.; Delorme, N.; Atkins, J.; Howard, S.; Williams, J. & Johnson, M. 2013. Anthropogenic noise causes body malformations and delays development in marine larvae. Scientific Reports. 3. Article No. 2831.

[3] A. Engas, S. Lokkeborg, E. Ona and A.V. Soldad, 1996. Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddock (Melanogrammus aeglefinus). Can. J. Aquat. Sci. 53: 2238-2249.

[4] Løkkeborg, S.; Ona, E.; Vold, A.; & Salthaug, A., 2012. Effects of Sounds from Seismic Air Guns on Fish Behavior and Catch Rates. Advances in Experimental Medicine and Biology, 730, 415-419.

[5] Fewtrell, J.L. & McCauley R.D., 2012, Impact of Air Gun Noise on Behavior of Marine Fish and Squid. Marine Pollution Bulletin, 64, 984-993.

Department rules define marine fisheries as one or more stocks of marine fish that can be treated as a unit for the purposes of conservation and management, and which are identified on the basis of geographical, scientific, technical, recreational and economic characteristics. Any activity that would adversely impact the natural functioning of marine fish, including the reproductive, spawning and migratory patterns or species abundance or diversity of marine fish, is discouraged.[6] In addition, any activity that would adversely impact any New Jersey based marine fisheries or access thereto is discouraged. Based on the above cited research and lack of appropriate mitigation and threat reduction strategies, the Department concludes that any benefits for the study's research are outweighed by the risk posed to New Jersey's coastal resources.

The time of year and project duration (30 consecutive days) are considered significant negative factors that may adversely affect normal fisheries movement, migration and availability. The project's timeframe is a period of high to peak population abundance of several commercially and recreationally important fish species and commercial and recreational activity off the coast of New Jersey. These impacts could lead to direct and indirect consequences to New Jersey's important commercial and recreational fishing industries. The results of a harvest analysis from May through August 2013 showed that 20% of the commercial black sea bass harvest and 22% of the commercial summer flounder harvest occurred within an area that includes the study area. This represents $250,000 worth of black sea bass and $1,360,000 of potential loss of summer flounder. This period generates 21% of commercial harvest revenue for New Jersey fishermen and represents 60% to 100% of the entire recreational season for the species listed above. Generally during any given year from May through August, 67% of the annual black sea bass and 89% of summer flounder are recreationally harvested. Local businesses including restaurants, hotels, bait and tackle shops, and other coastal related trades are dependent on this time period for generating income.

The NSF established guidance for surveys occurring in areas with commercially important fisheries. The PEIS states that "pre-survey planning *would be conducted*...to minimize adverse impacts to the associated populations."[7] From March 2014 to March 2015, the Department and many other stakeholders, including members of the commercial and recreational fishing industries, made known that the study area and period coincide with commercially important fisheries. Yet, the Amended EA offers no plan, and simply reasserts that impacts are unlikely, or at most temporary. Under the terms of NSF's own guidance, the NSF is obligated to work with the Department and other stakeholders to minimize harms when commercially important fisheries are present. The Department has repeatedly raised concerns that NSF's tack of refuting the likelihood of harm is inconsistent with NSF's own guidance that instructs NSF to work collaboratively with stakeholders on the study's scope and mitigation strategies when commercially important fisheries are present. Since commercially important fisheries are present during the proposed study period and area, and the NSF has failed to provide any appropriate mitigation or risk reduction strategies in a pre-survey plan, the Department finds the study poses a foreseeable impact to New Jersey's coastal resources.

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[6] N.J.A.C. 7:7E-8.2(b)

[7] PEIS, 3-49 (June 2011) (emphasis added).

Even though studies identify impacts to fish from high energy sound, the Department recognizes the science is variable, with research documenting a variety of impacts. Both the Department and NSF have explored peer-reviewed literature regarding seismic activities' various impacts on fish. Quantifying impacts to New Jersey's marine fish and fisheries impacts is difficult because of the various findings and quality of research. However, the difficulty to quantify impacts is a poor excuse not to take necessary steps to more appropriately address the issue. The National Marine Fisheries Service concluded as such in a letter to NSF, dated June 18, 2014. The letter states that because of the lack of scientific consensus within current research, future seismic studies should include additional monitoring and planning to mitigate for potential impacts. The Department has steadfastly held that NSF is obligated to incorporate fisheries monitoring and mitigation as part of the study's current scope because of the lack of scientific consensus.

Various new studies concerning effects of sound on marine fish and fisheries are summarized in the Amended EA. According to the Amended EA, the information presented in the studies did not affect the conclusion that the project would not result in significant impacts on populations despite possible changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of high-energy acoustic source. In reviewing this information, the Department has determined there is insufficient evidence to support the conclusion that impacts on New Jersey's coastal fishery resources are insignificant and unlikely to occur.

Despite the Amended EA's consideration of impacts to New Jersey's marine fish and fisheries, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to New Jersey's marine fish and fisheries. Moreover, the NSF's own failure to provide appropriate mitigation violates NSF's own agency guidelines embodied in the PEIS. Therefore, the project is found to be inconsistent with the Marine fish and fisheries rule, N.J.A.C. 7:7E-8.2.

N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant SHSpecies Habitats

Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species.

Endangered or threatened wildlife or plant species habitats are terrestrial and aquatic, including marine, estuarine, or freshwater,, areas known to be inhabited on a seasonal or permanent basis by, or to be critical at any stage in the life cycle of, any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing. Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant

species habitat would not directly, or through secondary impacts on the relevant site or in the surrounding area, be adversely affected.

New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered sea turtle species which transit between habitats farther north and south. More specifically, the marine waters off New Jersey shore provide critical migration and feeding areas for sea turtle species such as Kemp's Ridley, Green, Atlantic Loggerhead and Leatherback turtles. Sea turtles likely use sound for navigation, predator avoiding, locating prey, and other activities (Piniak et al. 2012). Although information regarding the impacts of anthropogenic noise on sea turtles is conclusively lacking, there is evidence to suggest that observed effects due to airguns may include behavioral changes, as well as temporary or even permanent hearing loss (Moein et al. 1995).

Numerous sea turtle sightings have been reported from June through September in and around Barnegat Bay. It is believed that the sea turtles are utilizing the area as feeding grounds. It is believed that sea turtles are using the areas as feeding grounds. Therefore, sea turtles may be migrating through the project area during the critical June to July period, making them susceptible not only to impacts (e.g. behavior changes, hearing loss) from seismic activity, but to entanglement in the seismic array gear, and injury or mortality due to ship strikes. Although the Amended EA states that "recent monitoring studies show that some sea turtles do show localized movement away from approaching airguns," the extent to which sea turtles will exhibit avoidance behavior, along with the impacts to airgun exposure, remains unclear. Many of the sea turtles migrating near New Jersey during the project period are juveniles. Effects from air gun noise to smaller turtles will undoubtedly be greater than those observed in monitoring studies, while their ability to swim away or avoid the array due to their size will be reduced.

In addition to several turtle species, New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered marine mammals which transit between habitats farther north and south. Listed marine mammals found year round off of New Jersey include humpback and fin whales (GMI, Inc. 2010). Acoustic detections of whale calls by Geo-Marine, Inc. confirmed the presence of North Atlantic right whales within 37 km of the shoreline, approximately between Seaside Park and Stone Harbor, during all seasons, concluding that some individual North Atlantic right whales occur in the nearshore waters off New Jersey either transiently or regularly. Similarly, the Department's Endangered and Nongame Species Program has records of harbor porpoise occurring in the project vicinity and during the project period. Despite the time of year and 30 day duration, the project would still impact individual whales and other marine mammals remaining in the area.

Marine mammals, especially cetaceans, would be adversely affected by noise created during seismic testing activities. Cetaceans' primary means of communication, navigation, locating food and mates, and avoiding predators and other threats is through their sense of hearing. Cetaceans' sense of hearing is much more highly developed than that of humans and can detect sounds within a much wider range of frequency. Noise pollution, in the form of repeated or prolonged sounds would adversely impact marine mammals by disrupting otherwise normal behaviors associated with migration, feeding, alluding predators, resting, and breeding, etc. Any

alterations to these behaviors would jeopardize the survival of an individual simply by increasing efforts directed at avoidance of the noise and the perceived threat. In addition, animals distressed by noise generated from survey activities may become more susceptible to disease or predation by species which are not directly affected themselves. Furthermore, the project will add to an existing and increasing cacophony of anthropogenic noise pollution which may already be negatively impacting species.

The Endangered or threatened wildlife or vegetation species habitats rule, N.J.A.C. 7:7E-3.38, seeks to protect endangered and threatened species which are facing possible extinction in the State in the immediate future due to loss of suitable habitat, and past overexploitation through human activities or natural causes. Extinction represents a loss of biodiversity, which would adversely affect education, research and the interrelationship of all living creatures within the coastal ecosystem. Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species. Therefore, the project is found to be inconsistent with the Endangered or threatened wildlife or plant species habitats rule, N.J.A.C. 7:7E-3.38.

Considerations

The New Jersey Department of Environmental Protection opposes this study as currently proposed. We respectfully request that if NSF proceeds with the study, the NSF consider the following recommendations to be included in the study.

The Department proposes a September to October timeframe. This timeframe would most likely reduce adverse impacts to New Jersey's prime fishing areas, marine fish and fisheries, and endangered or threatened wildlife habitats. In addition, this timeframe would likely avoid hazardous weather conditions and take place outside of the migration of the North Atlantic right whale which occurs mostly between November and April. Some marine mammal species are expected to occur in the area year-round therefore, altering the project during September to October would likely result in no net difference for those species. Furthermore, the geologic formations which this project proposes to map are static and not likely to change if this project is rescheduled to September to October in a year in which the personnel and equipment essential to meet the overall project objectives are available.

If the project cannot be postponed to this year's September to October period, the Department recommends the study be rescheduled to September to October of another year. According to the Amended EA, alternative timeframes for the project were considered but deemed unworkable due to personnel and equipment needs, as well as weather conditions. The Amended EA proffers that the survey vessel is booked into the foreseeable future, however documentation demonstrating such was not provided. Following the cancelled 2014 survey, the Department finds it remarkable and expresses regret that the vessel is being rescheduled for the identical time period in 2015.

If the project is to take place during the proposed June to August timeframe, the Department recommends the inclusion of a field study focused on assessing the project's impacts on fisheries and marine mammals. More specifically, the Department recommends that the study include monitoring of fish behavior, abundance and catch rates. The monitoring should start a minimum of one month prior to project commencement, continue through the duration of the project, and last a minimum of one month after project cessation.

The Department also recommends that an aerial survey be performed over the project area just prior to the vessel leaving its home port to facilitate marine species protection. The flyover would determine if there is a feeding, static, or migrating population of sea turtles or marine mammals. This is especially important for North Atlantic right whales and harbor porpoise in the vicinity of the project area, which these species have a lower recommended PTS threshold level, according to new National Marine Fisheries Service guidelines, currently undergoing public comment. If marine mammals or sea turtles are not observed during the flyover, then the survey could be performed as scheduled. If marine mammals or sea turtles are found within or near the project area during the flyover, then delaying the survey for 3-4 days would be prudent.

In addition to the flyover, the Department recommends the incorporation of a QA/QC plan that would designate one independent person as responsible for ensuring the cessation of sound producing activities if sea turtles or marine mammals are observed during transect runs. The vessel should stop all noise for at least 30 minutes after the animal is no longer observable in the area. The designee would document any observations of sea turtles and send all relevant occurrence information to the Department's Endangered and Nongame Species Program for inclusion into the Biotics database.

The Department is disappointed this proposed seismic study takes a myopic view on research needs. While the study's focus is on climatology and geology, several important issues touch on other areas of research needs, including aquatic biology and fisheries management. The Department views this as contrary to NSF's mission to promote collaborative work on novel, complex issues. In addition, because of the significant concerns raised by multiple states and stakeholders throughout the United States, the Department sees this as an opportunity for NSF to develop scientifically valid consensus on seismic studies' impacts to marine life.

Conclusion

As discussed herein, the Department finds the project inconsistent with the N.J.A.C. 7:7E-3.4 Prime fishing areas, N.J.A.C. 7:7E-8.2 Marine fish and fisheries, and N.J.A.C. 7:7E-3.38 Endangered or threatened wildlife or plant species habitats, due to anticipated, foreseeable adverse impacts to New Jersey's coastal resources. In conclusion, the Department has determined that the project is inconsistent with the Rules on Coastal Zone Management.

The Department views this project as an opportunity to address issues surrounding the impacts of seismic activities on marine life. These issues are consistently raised by a number of stakeholders, including state agencies, members of the commercial and recreational fishing industry, as well as other environmental advocates across various seismic studies. On March 5,

2015, a group of 75 world leading ocean scientists urged President Obama to halt seismic studies for oil and gas exploration because of the "significant, long-lasting and widespread impacts on the reproduction and survival" of threatened whales and commercial fish populations. While this group of prominent scientists focused on seismic studies around oil and gas exploration, it is reflective of the need for further assessments for any study using high-energy sound. If the project proceeds, we urge the NSF to use this study as an opportunity to build scientific consensus on the impacts of high-energy sound on marine life.

Thank you for your attention to and your cooperation with New Jersey's Coastal Zone Management Program. If you have any questions with regard to this determination, please contact Jessica Cobb of my staff at Jessica.Cobb@dep.nj.gov, at the above address, or at (609) 633-2289. Be sure to indicate the Division's file number in all communication.

Sincerely,

David B. Fanz

David B. Fanz, Assistant Director
Division of Land Use Regulation

3/6/15
Date

cc: John Gray, Deputy Chief of Staff
Virginia Kopkash, Assistant Commissioner, Land Use Management
Elizabeth Semple, Division of Coastal and Land Use Planning
Brandon Muffley, Marine Fisheries Administration
Kelly Davis, Division of Fish & Wildlife
Megan Brunatti, Office of Permit Coordination and Environmental Review

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW
P.O. Box 420 Mail Code 401-07J Trenton, New Jersey 08625-0420
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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

April 21, 2015

Kerry Kehoe, Federal Consistency Specialist
Stewardship Division, OCRM/CSC
National Oceanic and Atmospheric Administration
1305 East-West Hwy., 10th Floor (N/ORM3)
Silver Spring, MD 20910

RE: Request for mediation assistance with National Science Foundation on the Inconsistent Federal Consistency Determination for Marine Geophysical Survey by the R/V *Marcus G. Langseth* in Atlantic Ocean off New Jersey, Summary 2015.

Dear Mr. Kehoe:

On March 6, 2015, the New Jersey Department of Environmental Protection (Department) Division of Land Use Regulation, acting pursuant to Section 307 of the Federal Coastal Zone Management Act (CZMA) of 1972 (P.L. 92-583) as amended, found the above referenced project to be inconsistent with the enforceable policy of the New Jersey Coastal Management Program (NJCMP). The Department is now seeking informal mediation assistance from OCRM, NOAA in seeking resolution to issues identified in our March 6, 2015 letter to Holly Smith, National Science Foundation (NSF).

The Department and NSF seek to work with OCRM through informal mediation to resolve issues identified in the attached findings related to the impacts of seismic activities on marine life. The Department will work with NSF and OCRM to identify a facilitator for the mediation; establish jointly agreed upon ground rules of the mediation; including process, desired outcome, and schedule.

Please contact Megan Brunatti, of the Office of Permit Coordination & Environmental Review, at (609)292-3600 or Megan.Brunatti@dep.nj.gov, to confirm OCRM's willingness to provide mediation services for the above referenced state agency determination.

Sincerely,

John Gray, Deputy Chief of Staff
New Jersey Department of Environmental Protection

w/Attachment

Cc: Holly Smith, National Science Foundation
Virginia Kopkash, Asst. Commissioner NJDEP

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Land Use Regulation
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MAR - 6 2015

Holly Smith
National Science Foundation
4201 Wilson Boulevard, Room 725
Arlington, VA 22230

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On March 17, 2014, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NFMS) published a Federal Register Notice (79 FR 14779, March 17, 2014) announcing the proposed issuance of an Incidental Harassment Authorization to the Lamont Doherty Earth Observatory in collaboration with NSF to take marine mammals by harassment incidental to conducting a marine geophysical (seismic) survey in the northwest Atlantic Ocean from May through August 2014.

On April 22, 2014, a conference call was held between NJCMP, NOAA's Office of Ocean and Coastal Resource Management (OCRM) and NSF staff to discuss the proposed activity. During that conference call, it was determined that Rutgers University will be the recipient of the NSF funding as the Principal Investigator for the scientific research related to the surveys that require the proposed incidental harassment authorization.

On May 7, 2014 another conference call was held between NJCMP, OCRM, and NSF to discuss alternate arrangements to assuage the NJCMP's concerns over potential impacts to New Jersey's resources. On this call, OCRM also provided NJCMP with the details necessary for the Department to appropriately request NSF submit a Consistency Determination request to the Department. While the conference call was beneficial to lay the foundation for an alternative resolution to this matter, the NJCMP made clear that the State of New Jersey would pursue this request since a final resolution was not agreed upon and the NJCMP is required to timely submit this request.

On May 16, 2014 the Department notified OCRM, NSF, and Rutgers University of the Department's intent to review the project for consistency with the enforceable policies of the NJCMP. The Department contended that the project would have both direct and indirect reasonably foreseeable effects on the uses and resources of New Jersey's coastal zone relating to commercial fishing, recreational fishing and boating; marine fish, sea turtles and marine mammals; shipwrecks and historical and archeological resources.

On June 18, 2014, the Department was advised of OCRM's concurrence that the project is considered federally funded assistance to a state entity and is therefore, subject to Subpart F requirements of the CZMA Federal Consistency regulations. However, OCRM ultimately denied the Department's review request due to untimeliness and OCRM did not address the Department's analysis of the project's reasonably foreseeable effects.

On June 25, 2014 the Department provided OCRM with information demonstrating that the request was timely and requested a reconsideration of the denial decision.

On July 1, 2014 the project commenced.

On July 3, 2014, the Department filed a complaint in federal District Court seeking injunctive and declaratory relief. On July 10, 2014 the District CourtCourt denied the Department's complaint, but issued a temporary injunction to afford the Department an opportunity to appeal.. The Department subsequently filed an appeal to U.S. Court of Appeals for the Third Circuit (Third Circuit). On July 14 2014, the Third Circuit denied the Department's appeal. On August 12,12, 2014 the matter was dismissed from District Court without prejudice.

In August 2014, the project was ultimately cancelled due to mechanical issues with the survey vessel, R/V *Marcus G. Langseth.*

On December 22, 2014, the Division received NSF's request for consistency concurrence for a similar project during the period of June to August 2015. The request included a report entitled,

"Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015" prepared for Lamont-Doherty Earth Observatory and the National Science Foundation's Division of Ocean Sciences, prepared by LGL Ltd., environmental research associates, and dated December 18, 2014 (Amended EA). Pursuant to 15 CFR Section 930.41, the Division has 60 days to provide a determination and may request an extension period of 15 days or less.

On February 11, 2015 the Department issued a 15 day extension request extending the Department's decision deadline to March 6, 2015.

Analysis

The following analysis is based on New Jersey's Rules on Coastal Zone Management, N.J.A.C. 7:7E-1.1 et seq., as amended July 15, 2013. The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), site-specific draft Environmental Assessment dated, December 2013 (EA), and the Amended EA. The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

For purposes of CZMA review, the Department must determine whether an activity will affect a coastal use or resource. This Department's analysis is embodied in Department published guidance.[1] Coastal effects are defined under National Oceanic and Atmospheric Administration (NOAA) regulations as any reasonably foreseeable effect on any coastal use or resource resulting from a Federal agency activity, Federal license, or permit activity. Effects are not just environmental effects, but also include effects on coastal uses. Effects include both direct effects, which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects that result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. The Department's foreseeability test applies to activities and uses or resources that occur outside a State's coastal zone, so long as the uses or resources impacted are uses or resources of a State's coastal zone.

The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), sitespecific draft Environmental Assessment dated, December 2013 (EA), and the draft Amended EA,dated December 2014(Amended EA). The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

In evaluating this project, the Department also looked to other sources to define "foreseeability." Black's Law Dictionary (5th Ed.) defines foreseeability as "the reasonable anticipation that harm or injury is a likely result of acts or omissions." Thus, the test is whether the impact is reasonably related to the activity, not whether an impact is more likely than not to occur.

[1] Federal Consistency in New Jersey, dated September 8, 2010. *Available at* http://www.state.nj.us/dep/cmp/fc_guidance.pdf

N.J.A.C. 7:7E-3.4 Prime Fishing AreasAreas

Both the project location and the timeframe will foreseeably adversely affect New Jersey's prime fishing areas. The project area will see high commercial and recreational activity off the coast of New Jersey during the study period.. The project's timeframe coincides with a period of high to peak population abundance of several commercially and recreationally important fish species at identified prime fishing areas.

Prime fishing areas include tidal water areas and water's edge areas, which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay," Figley and McCloy (1988), and those areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds."

The project is located off the coast of New Jersey, ingextending from Barnegat Ridge to the 35 fathom line, and runs in a northwest to southeast direction intersecting fathom curves at a general perpendicular nature along its extent. This location is offshore from some of New Jersey's most important fishing ports, including: Barnegat Light, Atlantic City, and Point Pleasant. Pursuant to the aforementioned "New Jersey's Specific Sport Ocean Fishing Grounds" map, a portion of the proposed survey area is a State-recognized productive and historical fishing area known as "The Fingers." Contrary to the portrayal in the Amended EA, areas beyond State waters areheavily utilized by New Jersey's commercial and recreational fishing industry. It should also be noted that according to National Marine Fisheries Service data, New Jersey's commercial and recreation fisheries are some of the most productive, highest grossing and employ more people than other states in the Mid-Atlantic and along the Atlantic Coast. Lastly, there is at least one known shipwreck, *Lillian,* within the project area that is popular with scuba diving and spearfishing enthusiasts.

Data analysis of commercial and recreational landings from 1996 to 2013 indicate that this entire area is not only used by multiple commercial fisheries including gillnetters, otter trawl vessels, scallop boats, and long liners, but is also heavily utilized by recreational fishermen. In combination, both commercial and recreational sectors pursue over 35 species of fish in this area including but not limited to: albacore, bluefish, big eye tuna, Bluefin tuna, bonita, black sea bass, butter fish, cobia, cod, smooth dogfish, spiny dogfish, summer flounder, Atlantic menhaden, monkfish, red hake, skate, tilefish, swordfish, yellow fin tuna, and skipjack tuna.

Offshore waters also serve as essential habitat for invertebrate species during various stages of their lifecycles. Studies have provided "evidence that noise exposure during larval development produces body malformations in marine invertebrates. Scallop larvae exposed to playbacks of seismic pulses showed significant developmental delays and 46% developed body abnormalities. Similar effects were observed in all independent samples exposed to noise while no

malformations were found in the control groups."[2] A reduction in harvestable stock would result in further impacts to New Jersey's commercial fisheries.

While seismic surveys are not expressly prohibited pursuant to the N.J.A.C. 7:7E-3.4(b)2, based on studies examining seismic survey impacts, it is reasonably foreseeable that the project would affect fishery distribution, movement, migration and spawning at identified prime fishing areas. This also foreseeably results in adverse impacts to the high productivity of New Jersey's commercial and recreational fishing industry. In conclusion, the project is found to be inconsistent with prime fishing areas rule, N.J.A.C. 7:7E-3.4, due to the foreseeable effect on utilization of prime fishing areas.

N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries

Both the project location and the timeframe will foreseeably affect New Jersey's fisheries. The project area and timeframe sees consistently high commercial and recreational activity based out of New Jersey. The Department finds the study inconsistent with the NJCMP for the following reasons: research indicates adverse impacts to fisheries are likely and New Jersey's rules discourage activities that adversely impact the natural functioning of marine fish; NSF's failure to minimize or mitigate for adverse impacts to a commercially important fishery, which is inconsistent with NSF's own guidance; National Marine Fisheries Service (NMFS) findings and guidance; and the significant concerns raised by the Department's stakeholders, including members of New Jersey's commercial and recreational fishing industry.

Numerous studies identify responses of fish to high energy sound. Studies have shown that noise produced from this activity can cause physical impacts such as short and long term damage to the ears of fish and in some cases, mortality. Research has also documented behavioral impacts that show a clear change in "normal" activity and an increase in "alarm" response behavior that results in changes to schooling behavior, swimming speeds, water column location and sound avoidance. Studies have also demonstrated declining catch rates for a number of commercial fisheries during seismic testing activities. For example, Arill Engas, et al., found that catch rates fell within the seismic shooting region and surrounding areas immediately after shooting started and continued after shooting ended.[3] More recently, Svein Løkkeborg, et al., highlighted that "reduced catches on fishing grounds exposed to seismic survey activities have been demonstrated."[4] The conclusions reached by the Løkkeborg study are further supported by other recent studies concluding that catch rates reduced in the presence of seismic studies.[5] Based on this information, it is reasonably foreseeable that the project will adversely impact New Jersey's marine fish and fisheries resources.

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[2] de Soto, N.; Delorme, N.; Atkins, J.; Howard, S.; Williams, J. & Johnson, M. 2013. Anthropogenic noise causes body malformations and delays development in marine larvae. Scientific Reports. 3. Article No. 2831.

[3] A. Engas, S. Lokkeborg, E. Ona and A.V. Soldad, 1996. Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddock (Melanogrammus aeglefinus). Can. J. Aquat. Sci. 53: 2238-2249.

[4] Løkkeborg, S.; Ona, E.; Vold, A.; & Salthaug, A., 2012. Effects of Sounds from Seismic Air Guns on Fish Behavior and Catch Rates. Advances in Experimental Medicine and Biology, 730, 415-419.

[5] Fewtrell, J.L. & McCauley R.D., 2012, Impact of Air Gun Noise on Behavior of Marine Fish and Squid. Marine Pollution Bulletin, 64, 984-993.

Department rules define marine fisheries as one or more stocks of marine fish that can be treated as a unit for the purposes of conservation and management, and which are identified on the basis of geographical, scientific, technical, recreational and economic characteristics. Any activity that would adversely impact the natural functioning of marine fish, including the reproductive, spawning and migratory patterns or species abundance or diversity of marine fish, is discouraged.[6] In addition, any activity that would adversely impact any New Jersey based marine fisheries or access thereto is discouraged. Based on the above cited research and lack of appropriate mitigation and threat reduction strategies, the Department concludes that any benefits for the study's research are outweighed by the risk posed to New Jersey's coastal resources.

The time of year and project duration (30 consecutive days) are considered significant negative factors that may adversely affect normal fisheries movement, migration and availability. The project's timeframe is a period of high to peak population abundance of several commercially and recreationally important fish species and commercial and recreational activity off the coast of New Jersey. These impacts could lead to direct and indirect consequences to New Jersey's important commercial and recreational fishing industries. The results of a harvest analysis from May through August 2013 showed that 20% of the commercial black sea bass harvest and 22% of the commercial summer flounder harvest occurred within an area that includes the study area. This represents $250,000 worth of black sea bass and $1,360,000 of potential loss of summer flounder. This period generates 21% of commercial harvest revenue for New Jersey fishermen and represents 60% to 100% of the entire recreational season for the species listed above. Generally during any given year from May through August, 67% of the annual black sea bass and 89% of summer flounder are recreationally harvested. Local businesses including restaurants, hotels, bait and tackle shops, and other coastal related trades are dependent on this time period for generating income.

The NSF established guidance for surveys occurring in areas with commercially important fisheries. The PEIS states that "pre-survey planning *would be conducted*...to minimize adverse impacts to the associated populations."[7] From March 2014 to March 2015, the Department and many other stakeholders, including members of the commercial and recreational fishing industries, made known that the study area and period coincide with commercially important fisheries. Yet, the Amended EA offers no plan, and simply reasserts that impacts are unlikely, or at most temporary. Under the terms of NSF's own guidance, the NSF is obligated to work with the Department and other stakeholders to minimize harms when commercially important fisheries are present. The Department has repeatedly raised concerns that NSF's tack of refuting the likelihood of harm is inconsistent with NSF's own guidance that instructs NSF to work collaboratively with stakeholders on the study's scope and mitigation strategies when commercially important fisheries are present. Since commercially important fisheries are present during the proposed study period and area, and the NSF has failed to provide any appropriate mitigation or risk reduction strategies in a pre-survey plan, the Department finds the study poses a foreseeable impact to New Jersey's coastal resources.

[6] N.J.A.C. 7:7E-8.2(b)
[7] PEIS, 3-49 (June 2011) (emphasis added).

Even though studies identify impacts to fish from high energy sound, the Department recognizes the science is variable, with research documenting a variety of impacts. Both the Department and NSF have explored peer-reviewed literature regarding seismic activities' various impacts on fish. Quantifying impacts to New Jersey's marine fish and fisheries impacts is difficult because of the various findings and quality of research. However, the difficulty to quantify impacts is a poor excuse not to take necessary steps to more appropriately address the issue. The National Marine Fisheries Service concluded as such in a letter to NSF, dated June 18, 2014. The letter states that because of the lack of scientific consensus within current research, future seismic studies should include additional monitoring and planning to mitigate for potential impacts. The Department has steadfastly held that NSF is obligated to incorporate fisheries monitoring and mitigation as part of the study's current scope because of the lack of scientific consensus.

Various new studies concerning effects of sound on marine fish and fisheries are summarized in the Amended EA. According to the Amended EA, the information presented in the studies did not affect the conclusion that the project would not result in significant impacts on populations despite possible changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of high-energy acoustic source. In reviewing this information, the Department has determined there is insufficient evidence to support the conclusion that impacts on New Jersey's coastal fishery resources are insignificant and unlikely to occur.

Despite the Amended EA's consideration of impacts to New Jersey's marine fish and fisheries, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to New Jersey's marine fish and fisheries. Moreover, the NSF's own failure to provide appropriate mitigation violates NSF's own agency guidelines embodied in the PEIS. Therefore, the project is found to be inconsistent with the Marine fish and fisheries rule, N.J.A.C. 7:7E-8.2.

N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant SHSpecies Habitats

Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species.

Endangered or threatened wildlife or plant species habitats are terrestrial and aquatic, including marine, estuarine, or freshwater,, areas known to be inhabited on a seasonal or permanent basis by, or to be critical at any stage in the life cycle of, any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing. Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant

species habitat would not directly, or through secondary impacts on the relevant site or in the surrounding area, be adversely affected.

New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered sea turtle species which transit between habitats farther north and south. More specifically, the marine waters off New Jersey shore provide critical migration and feeding areas for sea turtle species such as Kemp's Ridley, Green, Atlantic Loggerhead and Leatherback turtles. Sea turtles likely use sound for navigation, predator avoiding, locating prey, and other activities (Piniak et al. 2012). Although information regarding the impacts of anthropogenic noise on sea turtles is conclusively lacking, there is evidence to suggest that observed effects due to airguns may include behavioral changes, as well as temporary or even permanent hearing loss (Moein et al. 1995).

Numerous sea turtle sightings have been reported from June through September in and around Barnegat Bay. It is believed that the sea turtles are utilizing the area as feeding grounds. It is believed that sea turtles are using the areas as feeding grounds. Therefore, sea turtles may be migrating through the project area during the critical June to July period, making them susceptible not only to impacts (e.g. behavior changes, hearing loss) from seismic activity, but to entanglement in the seismic array gear, and injury or mortality due to ship strikes. Although the Amended EA states that "recent monitoring studies show that some sea turtles do show localized movement away from approaching airguns," the extent to which sea turtles will exhibit avoidance behavior, along with the impacts to airgun exposure, remains unclear. Many of the sea turtles migrating near New Jersey during the project period are juveniles. Effects from air gun noise to smaller turtles will undoubtedly be greater than those observed in monitoring studies, while their ability to swim away or avoid the array due to their size will be reduced.

In addition to several turtle species, New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered marine mammals which transit between habitats farther north and south. Listed marine mammals found year round off of New Jersey include humpback and fin whales (GMI, Inc. 2010). Acoustic detections of whale calls by Geo-Marine, Inc. confirmed the presence of North Atlantic right whales within 37 km of the shoreline, approximately between Seaside Park and Stone Harbor, during all seasons, concluding that some individual North Atlantic right whales occur in the nearshore waters off New Jersey either transiently or regularly. Similarly, the Department's Endangered and Nongame Species Program has records of harbor porpoise occurring in the project vicinity and during the project period. Despite the time of year and 30 day duration, the project would still impact individual whales and other marine mammals remaining in the area.

Marine mammals, especially cetaceans, would be adversely affected by noise created during seismic testing activities. Cetaceans' primary means of communication, navigation, locating food and mates, and avoiding predators and other threats is through their sense of hearing. Cetaceans' sense of hearing is much more highly developed than that of humans and can detect sounds within a much wider range of frequency. Noise pollution, in the form of repeated or prolonged sounds would adversely impact marine mammals by disrupting otherwise normal behaviors associated with migration, feeding, alluding predators, resting, and breeding, etc. Any

alterations to these behaviors would jeopardize the survival of an individual simply by increasing efforts directed at avoidance of the noise and the perceived threat. In addition, animals distressed by noise generated from survey activities may become more susceptible to disease or predation by species which are not directly affected themselves. Furthermore, the project will add to an existing and increasing cacophony of anthropogenic noise pollution which may already be negatively impacting species.

The Endangered or threatened wildlife or vegetation species habitats rule, N.J.A.C. 7:7E-3.38, seeks to protect endangered and threatened species which are facing possible extinction in the State in the immediate future due to loss of suitable habitat, and past overexploitation through human activities or natural causes. Extinction represents a loss of biodiversity, which would adversely affect education, research and the interrelationship of all living creatures within the coastal ecosystem. Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species. Therefore, the project is found to be inconsistent with the Endangered or threatened wildlife or plant species habitats rule, N.J.A.C. 7:7E-3.38.

Considerations

The Department recognizes that NSF can ultimately find this Federal Consistency determination as non-binding and advisory, or disagree with the Department's findings. In such cases, the Department submits the following considerations, if NSF proceeds with the proposed study.

The Department proposes a September to October timeframe. This timeframe would most likely reduce adverse impacts to New Jersey's prime fishing areas, marine fish and fisheries, and endangered or threatened wildlife habitats. In addition, this timeframe would likely avoid hazardous weather conditions and take place outside of the migration of the North Atlantic right whale which occurs mostly between November and April. Some marine mammal species are expected to occur in the area year-round therefore, altering the project during September to October would likely result in no net difference for those species. Furthermore, the geologic formations which this project proposes to map are static and not likely to change if this project is rescheduled to September to October in a year in which the personnel and equipment essential to meet the overall project objectives are available.

If the project cannot be postponed to this year's September to October period, the Department recommends the study be rescheduled to September to October of another year. According to the Amended EA, alternative timeframes for the project were considered but deemed unworkable due to personnel and equipment needs, as well as weather conditions. The Amended EA proffers that the survey vessel is booked into the foreseeable future, however documentation demonstrating such was not provided. Following the cancelled 2014 survey, the Department finds it remarkable and expresses regret that the vessel is being rescheduled for the identical time period in 2015.

If the project is to take place during the proposed June to August timeframe, the Department recommends the inclusion of a field study focused on assessing the project's impacts on fisheries and marine mammals. More specifically, the Department recommends that the study include monitoring of fish behavior, abundance and catch rates. The monitoring should start a minimum of one month prior to project commencement, continue through the duration of the project, and last a minimum of one month after project cessation.

The Department also recommends that an aerial survey be performed over the project area just prior to the vessel leaving its home port to facilitate marine species protection. The flyover would determine if there is a feeding, static, or migrating population of sea turtles or marine mammals. This is especially important for North Atlantic right whales and harbor porpoise in the vicinity of the project area, which these species have a lower recommended PTS threshold level, according to new National Marine Fisheries Service guidelines, currently undergoing public comment. If marine mammals or sea turtles are not observed during the flyover, then the survey could be performed as scheduled. If marine mammals or sea turtles are found within or near the project area during the flyover, then delaying the survey for 3-4 days would be prudent.

In addition to the flyover, the Department recommends the incorporation of a QA/QC plan that would designate one independent person as responsible for ensuring the cessation of sound producing activities if sea turtles or marine mammals are observed during transect runs. The vessel should stop all noise for at least 30 minutes after the animal is no longer observable in the area. The designee would document any observations of sea turtles and send all relevant occurrence information to the Department's Endangered and Nongame Species Program for inclusion into the Biotics database.

The Department is disappointed this proposed seismic study takes a myopic view on research needs. While the study's focus is on climatology and geology, several important issues touch on other areas of research needs, including aquatic biology and fisheries management. The Department views this as contrary to NSF's mission to promote collaborative work on novel, complex issues. In addition, because of the significant concerns raised by multiple states and stakeholders throughout the United States, the Department sees this as an opportunity for NSF to develop scientifically valid consensus on seismic studies' impacts to marine life.

Conclusion

As discussed herein, the Department finds the project inconsistent with the N.J.A.C. 7:7E-3.4 Prime fishing areas, N.J.A.C. 7:7E-8.2 Marine fish and fisheries, and N.J.A.C. 7:7E-3.38 Endangered or threatened wildlife or plant species habitats, due to anticipated, foreseeable adverse impacts to New Jersey's coastal resources. In conclusion, the Department has determined that the project is inconsistent with the Rules on Coastal Zone Management.

The Department views this project as an opportunity to address issues surrounding the impacts of seismic activities on marine life. These issues are consistently raised by a number of stakeholders, including state agencies, members of the commercial and recreational fishing industry, as well as other environmental advocates across various seismic studies. On March 5,

2015, a group of 75 world leading ocean scientists urged President Obama to halt seismic studies for oil and gas exploration because of the "significant, long-lasting and widespread impacts on the reproduction and survival" of threatened whales and commercial fish populations. While this group of prominent scientists focused on seismic studies around oil and gas exploration, it is reflective of the need for further assessments for any study using high-energy sound. If the project proceeds, we urge the NSF to use this study as an opportunity to build scientific consensus on the impacts of high-energy sound on marine life.

Thank you for your attention to and your cooperation with New Jersey's Coastal Zone Management Program. If you have any questions with regard to this determination, please contact Jessica Cobb of my staff at Jessica.Cobb@dep.nj.gov, at the above address, or at (609) 633-2289. Be sure to indicate the Division's file number in all communication.

Sincerely,

David B. Fanz, Assistant Director
Division of Land Use Regulation

3/6/15
Date

cc: John Gray, Deputy Chief of Staff
Virginia Kopkash, Assistant Commissioner, Land Use Management
Elizabeth Semple, Division of Coastal and Land Use Planning
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April 21, 2015

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RE: Notice of Stage Agency Review of the proposed Marine Geophysical Survey by the *R/V Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015

Dear Sirs:

I am writing concerning the proposed Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015 ("the Project"). The Coastal Zone Management Act and its implementing regulations grant States with an approved Coastal Management Program, including New Jersey, the right to review unlisted activities beyond the coastal zone that the State determines will have reasonably foreseeable coastal effects.

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Pursuant to these rights, this letter serves as notice that the proposed Project requires review by the New Jersey Department of Environmental Protection (the "Department") pursuant to 15 C.F.R. 930.54 within Subpart D (Unlisted federal license or permit activities) and 15 C.F.R. 930.98 within Subpart F (Federally assisted activities outside of the coastal zone) of the federal coastal management regulations.

I. Background and Discussion

On December 22, 2014, the National Science Foundation ("NSF") sent to the Department a Consistency Determination for the Project. The Consistency Determination directed the Department to concur or object to the Consistency Determination in accordance with Subpart C (Consistency for Federal Agency Activities) of the federal coastal management regulations.

Pursuant to the federal coastal management regulations, a federal agency is only required to prepare a Consistency Determination when it is engaging in a federal agency activity. See 15 C.F.R. 930.36. Moreover, the regulations make clear that an activity cannot be both a federal agency activity under Subpart C and an activity under Subpart D (Unlisted federal license or permit activities) or F (Federally assisted activities outside of the coastal zone).[1] Thus, by preparing a Consistency Determination, NSF apparently determined the Project is a federal agency activity under Subpart C and is not subject to Subparts D and F of the federal coastal management regulations.

At the behest of NSF, the Department proceeded to review the Project under the provisions of Subpart C, and did not review the project under Subparts D or F. Subpart C provided the Department with a 60-day review period with an optional extension. 15 C.F.R. 930.41. After obtaining an extension, on March 6, 2015, the Department submitted to NSF an Inconsistency Determination (attached) for the proposed Project.[2]

The Department's Inconsistency Determination is attached to this letter. In that determination, the Department found the Project to be inconsistent with New Jersey's coastal management program due to anticipated, foreseeable adverse impacts to fishing areas, fish and fisheries, and threatened or endangered species and their habitats.

The Department stands by its Inconsistency Determination and expects NSF to comply with its duties and obligations pursuant to 15 C.F.R. 930.43. However, it has recently come to the Department's attention that NSF may have erred in characterizing the Project as a federal agency activity subject to Subpart C.

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[1] The definition of "Federal agency activity" provides that "'Federal agency activity' does not include the issuance of a federal license or permit to and applicant [under Subpart D]. . . or the granting of federal assistance to an applicant agency [under Subpart F]."

[2] The Department also sent a copy of the Inconsistency Determination to the Director of the Office of Ocean and Coastal Resource Management on April 10, 2015.

Therefore, to preserve New Jersey's rights under the Coastal Zone Management Act and its implementing regulations in spite of NSF's possible mischaracterization of the Project, this letter serves to clarify the Department's position and to ensure all interested parties are on notice of the Department's determination that the proposed Project requires review pursuant to Subparts D and F of the coastal management regulations.

II. The Project requires review as an activity requiring a federal license or permit (Subpart D).

Subpart D of the federal coastal management regulations governs "Consistency for Activities Requiring a Federal License of Permit." A "federal license or permit" is defined, in pertinent part, as "any authorization that an applicant is required by law to obtain in order to conduct activities affecting any land or water use or natural resource of the coastal zone and that any Federal agency is empowered to issue to an applicant." 15 C.F.R. 930.51(a).

On March 17, 2015, the National Oceanic and Atmospheric Administration issued Notice of a proposed Incidental Harassment Authorization ("IHA Notice") for harassment incidental to the Project. Harassment of marine mammals is illegal under the Marine Mammal Protection Act without an Incidental Harassment Authorization. 16 U.S.C. 1371. According to the "IHA Notice," the Project is expected to result in the harassment of marine mammals. Thus, the Project constitutes an activity requiring a federal license or permit.

Pursuant to 15 C.F.R. 930.54(a), the Department hereby notifies the requisite parties that the Project requires State review as an unlisted activity affecting coastal uses and resources. The Department also hereby requests the approval of the Director of the Office of Ocean and Coastal Resource Management to review the unlisted activity. 15 C.F.R. 930.54(b). Please refer to the Department's attached Inconsistency Determination as the Department's analysis in support of its determination that coastal effects are reasonably foreseeable. 15 C.F.R. 930.54(b).

The Department anticipates any decision by the Director concerning the Department's review will be made in accordance with 15 C.F.R. 930.54(c). If the Director approves the Department's decision to review, the applicant must comply with the requirements contained in 15 C.F.R. 930.54(e).

III. The Department intends to review the Project due to the federal assistance being provided to a State entity (Subpart F).

Subpart F of the federal coastal management regulations governs "Consistency for Federal Assistance to State and Local Governments." "Federal assistance" is defined as "assistance provided under a federal program to an applicant agency through grant or contractual arrangements, loans, subsidies, guarantees, or other form of financial aid." 15 C.F.R. 930.91. "Applicant agency," in turn, "means any unit of State or local government, or any related public entity . . . submits an application for federal assistance." 15 C.F.R. 930.92 (emphasis added).

On approximately December 18, 2014, NSF issued a Draft Environmental Assessment ("Draft EA") of the Project. The Draft EA states that the State University of New Jersey at Rutgers ("Rutgers") is proposing to conduct the Project "with funding from the U.S. National Science Foundation[.]" Thus, the Project constitutes an activity subject to Subpart F because of the federal assistance NSF is providing to Rutgers.

Pursuant to 15 C.F.R. 930.98, the Department hereby notifies the requisite parties that the Project will have reasonably foreseeable coastal effects and the Department is reviewing for consistency with New Jersey's coastal management programs. Please refer to the Department's attached Inconsistency Determination for the Department's analysis in support of its determination that coastal effects are reasonably foreseeable.

The Department anticipates any decision by the Director concerning the Department's review will be made in accordance with 15 C.F.R. 930.98 and 930.54(c). If the Director decides not to review the Department's decision, or if the Director approves the Department's decision, the Department will inform the parties of any objections in accordance with 15 C.F.R. 930.98.

IV. Conclusion

This letter serves as notice that the Department is reviewing the Project for consistency with its approved coastal management program pursuant to Subparts D and F of the federal coastal management regulations. The Department also preserves its Inconsistency Determination submitted in response to NSF's Consistency Determination pursuant to Subpart C. Should you have any questions about this letter, please feel free to contact Megan Brunatti at (609)984-2462 or Megan.Brunatti@dep.nj.gov.

Sincerely yours,

By: _____
John Gray, Deputy Chief of Staff
New Jersey Department of Environmental Protection

W/attachment

c: Holly Smith, NSF
Gregory Mountain, Rutgers University
Ginger Kopkash, NJDEP LUM
David Apy, AAG
Lewin Weyl, DAG
John Doyle, DAG
Timothy Malone, DAG

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Land Use Regulation
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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

MAR - 6 2015

Holly Smith
National Science Foundation
4201 Wilson Boulevard, Room 725
Arlington, VA 22230

RE: Federal Consistency Determination for Marine Geophysical Survey by the R/V *Marcus G. Langseth* in Atlantic Ocean off New Jersey, Summer 2015 - Inconsistent
DLUR File No. 0000-14-0030.1 CDT 150001

Dear Ms. Smith:

The New Jersey Department of Environmental Protection (Department) Division of Land Use Regulation (Division), acting pursuant to Section 307 of the Federal Coastal Zone Management Act (CZMA) of 1972 (P.L. 92-583) as amended, finds the above referenced request to be inconsistent with enforceable policies of the New Jersey Coastal Management Program (NJCMP).

Project Description

The National Science Foundation (NSF) is funding a research project proposed by lead Principle Investigator Dr. Gregory Mountain of Rutgers University and collaborators Drs. J. Austin, C. Fulthorpe, and M. Nedimovic of University of Texas Austin to study sea level rise in the Atlantic Ocean off of the coast of New Jersey, which includes a marine geophysical survey. The project includes the use of a 3-D seismic reflection survey to map sequences around existing drill sites and analyze their spatial/temporal evolution. Objectives include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea-level; and determining amplitudes and timing of global sea-level changes during the mid-Cenozoic era.

Administrative History

On March 17, 2014, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NFMS) published a Federal Register Notice (79 FR 14779, March 17, 2014) announcing the proposed issuance of an Incidental Harassment Authorization to the Lamont Doherty Earth Observatory in collaboration with NSF to take marine mammals by harassment incidental to conducting a marine geophysical (seismic) survey in the northwest Atlantic Ocean from May through August 2014.

On April 22, 2014, a conference call was held between NJCMP, NOAA's Office of Ocean and Coastal Resource Management (OCRM) and NSF staff to discuss the proposed activity. During that conference call, it was determined that Rutgers University will be the recipient of the NSF funding as the Principal Investigator for the scientific research related to the surveys that require the proposed incidental harassment authorization.

On May 7, 2014 another conference call was held between NJCMP, OCRM, and NSF to discuss alternate arrangements to assuage the NJCMP's concerns over potential impacts to New Jersey's resources. On this call, OCRM also provided NJCMP with the details necessary for the Department to appropriately request NSF submit a Consistency Determination request to the Department. While the conference call was beneficial to lay the foundation for an alternative resolution to this matter, the NJCMP made clear that the State of New Jersey would pursue this request since a final resolution was not agreed upon and the NJCMP is required to timely submit this request.

On May 16, 2014 the Department notified OCRM, NSF, and Rutgers University of the Department's intent to review the project for consistency with the enforceable policies of the NJCMP. The Department contended that the project would have both direct and indirect reasonably foreseeable effects on the uses and resources of New Jersey's coastal zone relating to commercial fishing, recreational fishing and boating; marine fish, sea turtles and marine mammals; shipwrecks and historical and archeological resources.

On June 18, 2014, the Department was advised of OCRM's concurrence that the project is considered federally funded assistance to a state entity and is therefore, subject to Subpart F requirements of the CZMA Federal Consistency regulations. However, OCRM ultimately denied the Department's review request due to untimeliness and OCRM did not address the Department's analysis of the project's reasonably foreseeable effects.

On June 25, 2014 the Department provided OCRM with information demonstrating that the request was timely and requested a reconsideration of the denial decision.

On July 1, 2014 the projeet commenced.

On July 3, 2014, the Department filed a complaint in federal District Court seeking injunctive and declaratory relief. On July 10, 2014 the District CourtCourt denied the Department's complaint, but issued a temporary injunction to afford the Department an opportunity to appeal.. The Department subsequently filed an appeal to U.S. Court of Appeals for the Third Circuit (Third Circuit). On July 14 2014, the Third Circuit denied the Department's appeal. On August 12,12, 2014 the matter was dismissed from District Court without prejudice.

In August 2014, the project was ultimately cancelled due to mechanical issues with the survey vessel, R/V *Marcus G. Langseth.*

On December 22, 2014, the Division received NSF's request for consistency concurrence for a similar project during the period of June to August 2015. The request included a report entitled,

"Draft Amended Environmental Assessment of a Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015" prepared for Lamont-Doherty Earth Observatory and the National Science Foundation's Division of Ocean Sciences, prepared by LGL Ltd., environmental research associates, and dated December 18, 2014 (Amended EA). Pursuant to 15 CFR Section 930.41, the Division has 60 days to provide a determination and may request an extension period of 15 days or less.

On February 11, 2015 the Department issued a 15 day extension request extending the Department's decision deadline to March 6, 2015.

Analysis

The following analysis is based on New Jersey's Rules on Coastal Zone Management, N.J.A.C. 7:7E-1.1 et seq., as amended July 15, 2013. The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), site-specific draft Environmental Assessment dated, December 2013 (EA), and the Amended EA. The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

For purposes of CZMA review, the Department must determine whether an activity will affect a coastal use or resource. This Department's analysis is embodied in Department published guidance.[1] Coastal effects are defined under National Oceanic and Atmospheric Administration (NOAA) regulations as any reasonably foreseeable effect on any coastal use or resource resulting from a Federal agency activity, Federal license, or permit activity. Effects are not just environmental effects, but also include effects on coastal uses. Effects include both direct effects, which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects that result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. The Department's foreseeability test applies to activities and uses or resources that occur outside a State's coastal zone, so long as the uses or resources impacted are uses or resources of a State's coastal zone.

The Department relied on the study's Programmatic Environmental Impact Statement, dated June 2011 (PEIS), sitespecific draft Environmental Assessment dated, December 2013 (EA), and the draft Amended EA,dated December 2014(Amended EA). The Department also considered numerous and significant comments received as part of the Department's public comment period for this determination.

In evaluating this project, the Department also looked to other sources to define "foreseeability." Black's Law Dictionary (5th Ed.) defines foreseeability as "the reasonable anticipation that harm or injury is a likely result of acts or omissions." Thus, the test is whether the impact is reasonably related to the activity, not whether an impact is more likely than not to occur.

[1] Federal Consistency in New Jersey, dated September 8, 2010. *Available at* http://www.state.nj.us/dep/cmp/fc_guidance.pdf

N.J.A.C. 7:7E-3.4 Prime Fishing AreasAreas

Both the project location and the timeframe will foreseeably adversely affect New Jersey's prime fishing areas. The project area will see high commercial and recreational activity off the coast of New Jersey during the study period.. The project's timeframe coincides with a period of high to peak population abundance of several commercially and recreationally important fish species at identified prime fishing areas.

Prime fishing areas include tidal water areas and water's edge areas, which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay," Figley and McCloy (1988), and those areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds."

The project is located off the coast of New Jersey, ingextending from Barnegat Ridge to the 35 fathom line, and runs in a northwest to southeast direction intersecting fathom curves at a general perpendicular nature along its extent. This location is offshore from some of New Jersey's most important fishing ports, including: Barnegat Light, Atlantic City, and Point Pleasant. Pursuant to the aforementioned "New Jersey's Specific Sport Ocean Fishing Grounds" map, a portion of the proposed survey area is a State-recognized productive and historical fishing area known as "The Fingers." Contrary to the portrayal in the Amended EA, areas beyond State waters areheavily utilized by New Jersey's commercial and recreational fishing industry. It should also be noted that according to National Marine Fisheries Service data, New Jersey's commercial and recreation fisheries are some of the most productive, highest grossing and employ more people than other states in the Mid-Atlantic and along the Atlantic Coast. Lastly, there is at least one known shipwreck, *Lillian,* within the project area that is popular with scuba diving and spearfishing enthusiasts.

Data analysis of commercial and recreational landings from 1996 to 2013 indicate that this entire area is not only used by multiple commercial fisheries including gillnetters, otter trawl vessels, scallop boats, and long liners, but is also heavily utilized by recreational fishermen. In combination, both commercial and recreational sectors pursue over 35 species of fish in this area including but not limited to: albacore, bluefish, big eye tuna, Bluefin tuna, bonita, black sea bass, butter fish, cobia, cod, smooth dogfish, spiny dogfish, summer flounder, Atlantic menhaden, monkfish, red hake, skate, tilefish, swordfish, yellow fin tuna, and skipjack tuna.

Offshore waters also serve as essential habitat for invertebrate species during various stages of their lifecycles. Studies have provided "evidence that noise exposure during larval development produces body malformations in marine invertebrates. Scallop larvae exposed to playbacks of seismic pulses showed significant developmental delays and 46% developed body abnormalities. Similar effects were observed in all independent samples exposed to noise while no

malformations were found in the control groups."[2] A reduction in harvestable stock would result in further impacts to New Jersey's commercial fisheries.

While seismic surveys are not expressly prohibited pursuant to the N.J.A.C. 7:7E-3.4(b)2, based on studies examining seismic survey impacts, it is reasonably foreseeable that the project would affect fishery distribution, movement, migration and spawning at identified prime fishing areas. This also foreseeably results in adverse impacts to the high productivity of New Jersey's commercial and recreational fishing industry. In conclusion, the project is found to be inconsistent with prime fishing areas rule, N.J.A.C. 7:7E-3.4, due to the foreseeable effect on utilization of prime fishing areas.

N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries

Both the project location and the timeframe will foreseeably affect New Jersey's fisheries. The project area and timeframe sees consistently high commercial and recreational activity based out of New Jersey. The Department finds the study inconsistent with the NJCMP for the following reasons: research indicates adverse impacts to fisheries are likely and New Jersey's rules discourage activities that adversely impact the natural functioning of marine fish; NSF's failure to minimize or mitigate for adverse impacts to a commercially important fishery, which is inconsistent with NSF's own guidance; National Marine Fisheries Service (NMFS) findings and guidance; and the significant concerns raised by the Department's stakeholders, including members of New Jersey's commercial and recreational fishing industry.

Numerous studies identify responses of fish to high energy sound. Studies have shown that noise produced from this activity can cause physical impacts such as short and long term damage to the ears of fish and in some cases, mortality. Research has also documented behavioral impacts that show a clear change in "normal" activity and an increase in "alarm" response behavior that results in changes to schooling behavior, swimming speeds, water column location and sound avoidance. Studies have also demonstrated declining catch rates for a number of commercial fisheries during seismic testing activities. For example, Arill Engas, et al., found that catch rates fell within the seismic shooting region and surrounding areas immediately after shooting started and continued after shooting ended.[3] More recently, Svein Løkkeborg, et al., highlighted that "reduced catches on fishing grounds exposed to seismic survey activities have been demonstrated."[4] The conclusions reached by the Løkkeborg study are further supported by other recent studies concluding that catch rates reduced in the presence of seismic studies.[5] Based on this information, it is reasonably foreseeable that the project will adversely impact New Jersey's marine fish and fisheries resources.

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[2] de Soto, N.; Delorme, N.; Atkins, J.; Howard, S.; Williams, J. & Johnson, M. 2013. Anthropogenic noise causes body malformations and delays development in marine larvae. Scientific Reports. 3. Article No. 2831.

[3] A. Engas, S. Lokkeborg, E. Ona and A.V. Soldad, 1996. Effects of Seismic Shooting on Local Abundance and Catch Rates of Cod (Gadus morhua) and Haddock (Melanogrammus aeglefinus). Can. J. Aquat. Sci. 53: 2238-2249.

[4] Løkkeborg, S.; Ona, E.; Vold, A.; & Salthaug, A., 2012. Effects of Sounds from Seismic Air Guns on Fish Behavior and Catch Rates. Advances in Experimental Medicine and Biology, 730, 415-419.

[5] Fewtrell, J.L. & McCauley R.D., 2012, Impact of Air Gun Noise on Behavior of Marine Fish and Squid. Marine Pollution Bulletin, 64, 984-993.

Department rules define marine fisheries as one or more stocks of marine fish that can be treated as a unit for the purposes of conservation and management, and which are identified on the basis of geographical, scientific, technical, recreational and economic characteristics. Any activity that would adversely impact the natural functioning of marine fish, including the reproductive, spawning and migratory patterns or species abundance or diversity of marine fish, is discouraged.[6] In addition, any activity that would adversely impact any New Jersey based marine fisheries or access thereto is discouraged. Based on the above cited research and lack of appropriate mitigation and threat reduction strategies, the Department concludes that any benefits for the study's research are outweighed by the risk posed to New Jersey's coastal resources.

The time of year and project duration (30 consecutive days) are considered significant negative factors that may adversely affect normal fisheries movement, migration and availability. The project's timeframe is a period of high to peak population abundance of several commercially and recreationally important fish species and commercial and recreational activity off the coast of New Jersey. These impacts could lead to direct and indirect consequences to New Jersey's important commercial and recreational fishing industries. The results of a harvest analysis from May through August 2013 showed that 20% of the commercial black sea bass harvest and 22% of the commercial summer flounder harvest occurred within an area that includes the study area. This represents $250,000 worth of black sea bass and $1,360,000 of potential loss of summer flounder. This period generates 21% of commercial harvest revenue for New Jersey fishermen and represents 60% to 100% of the entire recreational season for the species listed above. Generally during any given year from May through August, 67% of the annual black sea bass and 89% of summer flounder are recreationally harvested. Local businesses including restaurants, hotels, bait and tackle shops, and other coastal related trades are dependent on this time period for generating income.

The NSF established guidance for surveys occurring in areas with commercially important fisheries. The PEIS states that "pre-survey planning *would be conducted*...to minimize adverse impacts to the associated populations."[7] From March 2014 to March 2015, the Department and many other stakeholders, including members of the commercial and recreational fishing industries, made known that the study area and period coincide with commercially important fisheries. Yet, the Amended EA offers no plan, and simply reasserts that impacts are unlikely, or at most temporary. Under the terms of NSF's own guidance, the NSF is obligated to work with the Department and other stakeholders to minimize harms when commercially important fisheries are present. The Department has repeatedly raised concerns that NSF's tack of refuting the likelihood of harm is inconsistent with NSF's own guidance that instructs NSF to work collaboratively with stakeholders on the study's scope and mitigation strategies when commercially important fisheries are present. Since commercially important fisheries are present during the proposed study period and area, and the NSF has failed to provide any appropriate mitigation or risk reduction strategies in a pre-survey plan, the Department finds the study poses a foreseeable impact to New Jersey's coastal resources.

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[6] N.J.A.C. 7:7E-8.2(b)
[7] PEIS, 3-49 (June 2011) (emphasis added).

Even though studies identify impacts to fish from high energy sound, the Department recognizes the science is variable, with research documenting a variety of impacts. Both the Department and NSF have explored peer-reviewed literature regarding seismic activities' various impacts on fish. Quantifying impacts to New Jersey's marine fish and fisheries impacts is difficult because of the various findings and quality of research. However, the difficulty to quantify impacts is a poor excuse not to take necessary steps to more appropriately address the issue. The National Marine Fisheries Service concluded as such in a letter to NSF, dated June 18, 2014. The letter states that because of the lack of scientific consensus within current research, future seismic studies should include additional monitoring and planning to mitigate for potential impacts. The Department has steadfastly held that NSF is obligated to incorporate fisheries monitoring and mitigation as part of the study's current scope because of the lack of scientific consensus.

Various new studies concerning effects of sound on marine fish and fisheries are summarized in the Amended EA. According to the Amended EA, the information presented in the studies did not affect the conclusion that the project would not result in significant impacts on populations despite possible changes in behavior and other non-lethal, short-term, temporary impacts, and injurious or mortal impacts on a small number of individuals within a few meters of high-energy acoustic source. In reviewing this information, the Department has determined there is insufficient evidence to support the conclusion that impacts on New Jersey's coastal fishery resources are insignificant and unlikely to occur.

Despite the Amended EA's consideration of impacts to New Jersey's marine fish and fisheries, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to New Jersey's marine fish and fisheries. Moreover, the NSF's own failure to provide appropriate mitigation violates NSF's own agency guidelines embodied in the PEIS. Therefore, the project is found to be inconsistent with the Marine fish and fisheries rule, N.J.A.C. 7:7E-8.2.

N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant SHSpecies Habitats

Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species.

Endangered or threatened wildlife or plant species habitats are terrestrial and aquatic, including marine, estuarine, or freshwater,, areas known to be inhabited on a seasonal or permanent basis by, or to be critical at any stage in the life cycle of, any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing. Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant

species habitat would not directly, or through secondary impacts on the relevant site or in the surrounding area, be adversely affected.

New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered sea turtle species which transit between habitats farther north and south. More specifically, the marine waters off New Jersey shore provide critical migration and feeding areas for sea turtle species such as Kemp's Ridley, Green, Atlantic Loggerhead and Leatherback turtles. Sea turtles likely use sound for navigation, predator avoiding, locating prey, and other activities (Piniak et al. 2012). Although information regarding the impacts of anthropogenic noise on sea turtles is conclusively lacking, there is evidence to suggest that observed effects due to airguns may include behavioral changes, as well as temporary or even permanent hearing loss (Moein et al. 1995).

Numerous sea turtle sightings have been reported from June through September in and around Barnegat Bay. It is believed that the sea turtles are utilizing the area as feeding grounds. It is believed that sea turtles are using the areas as feeding grounds. Therefore, sea turtles may be migrating through the project area during the critical June to July period, making them susceptible not only to impacts (e.g. behavior changes, hearing loss) from seismic activity, but to entanglement in the seismic array gear, and injury or mortality due to ship strikes. Although the Amended EA states that "recent monitoring studies show that some sea turtles do show localized movement away from approaching airguns," the extent to which sea turtles will exhibit avoidance behavior, along with the impacts to airgun exposure, remains unclear. Many of the sea turtles migrating near New Jersey during the project period are juveniles. Effects from air gun noise to smaller turtles will undoubtedly be greater than those observed in monitoring studies, while their ability to swim away or avoid the array due to their size will be reduced.

In addition to several turtle species, New Jersey's Atlantic Ocean waters act as a migration corridor for several endangered marine mammals which transit between habitats farther north and south. Listed marine mammals found year round off of New Jersey include humpback and fin whales (GMI, Inc. 2010). Acoustic detections of whale calls by Geo-Marine, Inc. confirmed the presence of North Atlantic right whales within 37 km of the shoreline, approximately between Seaside Park and Stone Harbor, during all seasons, concluding that some individual North Atlantic right whales occur in the nearshore waters off New Jersey either transiently or regularly. Similarly, the Department's Endangered and Nongame Species Program has records of harbor porpoise occurring in the project vicinity and during the project period. Despite the time of year and 30 day duration, the project would still impact individual whales and other marine mammals remaining in the area.

Marine mammals, especially cetaceans, would be adversely affected by noise created during seismic testing activities. Cetaceans' primary means of communication, navigation, locating food and mates, and avoiding predators and other threats is through their sense of hearing. Cetaceans' sense of hearing is much more highly developed than that of humans and can detect sounds within a much wider range of frequency. Noise pollution, in the form of repeated or prolonged sounds would adversely impact marine mammals by disrupting otherwise normal behaviors associated with migration, feeding, alluding predators, resting, and breeding, etc. Any

alterations to these behaviors would jeopardize the survival of an individual simply by increasing efforts directed at avoidance of the noise and the perceived threat. In addition, animals distressed by noise generated from survey activities may become more susceptible to disease or predation by species which are not directly affected themselves. Furthermore, the project will add to an existing and increasing cacophony of anthropogenic noise pollution which may already be negatively impacting species.

The Endangered or threatened wildlife or vegetation species habitats rule, N.J.A.C. 7:7E-3.38, seeks to protect endangered and threatened species which are facing possible extinction in the State in the immediate future due to loss of suitable habitat, and past overexploitation through human activities or natural causes. Extinction represents a loss of biodiversity, which would adversely affect education, research and the interrelationship of all living creatures within the coastal ecosystem. Despite the Amended EA's consideration of impacts to sea turtles and marine mammals and the proposed monitoring and mitigation measures, the Department contends that there is insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and threatened wildlife species. Therefore, the project is found to be inconsistent with the Endangered or threatened wildlife or plant species habitats rule, N.J.A.C. 7:7E-3.38.

Considerations

The Department recognizes that NSF can ultimately find this Federal Consistency determination as non-binding and advisory, or disagree with the Department's findings. In such cases, the Department submits the following considerations, if NSF proceeds with the proposed study.

The Department proposes a September to October timeframe. This timeframe would most likely reduce adverse impacts to New Jersey's prime fishing areas, marine fish and fisheries, and endangered or threatened wildlife habitats. In addition, this timeframe would likely avoid hazardous weather conditions and take place outside of the migration of the North Atlantic right whale which occurs mostly between November and April. Some marine mammal species are expected to occur in the area year-round therefore, altering the project during September to October would likely result in no net difference for those species. Furthermore, the geologic formations which this project proposes to map are static and not likely to change if this project is rescheduled to September to October in a year in which the personnel and equipment essential to meet the overall project objectives are available.

If the project cannot be postponed to this year's September to October period, the Department recommends the study be rescheduled to September to October of another year. According to the Amended EA, alternative timeframes for the project were considered but deemed unworkable due to personnel and equipment needs, as well as weather conditions. The Amended EA proffers that the survey vessel is booked into the foreseeable future, however documentation demonstrating such was not provided. Following the cancelled 2014 survey, the Department finds it remarkable and expresses regret that the vessel is being rescheduled for the identical time period in 2015.

If the project is to take place during the proposed June to August timeframe, the Department recommends the inclusion of a field study focused on assessing the project's impacts on fisheries and marine mammals. More specifically, the Department recommends that the study include monitoring of fish behavior, abundance and catch rates. The monitoring should start a minimum of one month prior to project commencement, continue through the duration of the project, and last a minimum of one month after project cessation.

The Department also recommends that an aerial survey be performed over the project area just prior to the vessel leaving its home port to facilitate marine species protection. The flyover would determine if there is a feeding, static, or migrating population of sea turtles or marine mammals. This is especially important for North Atlantic right whales and harbor porpoise in the vicinity of the project area, which these species have a lower recommended PTS threshold level, according to new National Marine Fisheries Service guidelines, currently undergoing public comment. If marine mammals or sea turtles are not observed during the flyover, then the survey could be performed as scheduled. If marine mammals or sea turtles are found within or near the project area during the flyover, then delaying the survey for 3-4 days would be prudent.

In addition to the flyover, the Department recommends the incorporation of a QA/QC plan that would designate one independent person as responsible for ensuring the cessation of sound producing activities if sea turtles or marine mammals are observed during transect runs. The vessel should stop all noise for at least 30 minutes after the animal is no longer observable in the area. The designee would document any observations of sea turtles and send all relevant occurrence information to the Department's Endangered and Nongame Species Program for inclusion into the Biotics database.

The Department is disappointed this proposed seismic study takes a myopic view on research needs. While the study's focus is on climatology and geology, several important issues touch on other areas of research needs, including aquatic biology and fisheries management. The Department views this as contrary to NSF's mission to promote collaborative work on novel, complex issues. In addition, because of the significant concerns raised by multiple states and stakeholders throughout the United States, the Department sees this as an opportunity for NSF to develop scientifically valid consensus on seismic studies' impacts to marine life.

Conclusion

As discussed herein, the Department finds the project inconsistent with the N.J.A.C. 7:7E-3.4 Prime fishing areas, N.J.A.C. 7:7E-8.2 Marine fish and fisheries, and N.J.A.C. 7:7E-3.38 Endangered or threatened wildlife or plant species habitats, due to anticipated, foreseeable adverse impacts to New Jersey's coastal resources. In conclusion, the Department has determined that the project is inconsistent with the Rules on Coastal Zone Management.

The Department views this project as an opportunity to address issues surrounding the impacts of seismic activities on marine life. These issues are consistently raised by a number of stakeholders, including state agencies, members of the commercial and recreational fishing industry, as well as other environmental advocates across various seismic studies. On March 5,

2015, a group of 75 world leading ocean scientists urged President Obama to halt seismic studies for oil and gas exploration because of the "significant, long-lasting and widespread impacts on the reproduction and survival" of threatened whales and commercial fish populations. While this group of prominent scientists focused on seismic studies around oil and gas exploration, it is reflective of the need for further assessments for any study using high-energy sound. If the project proceeds, we urge the NSF to use this study as an opportunity to build scientific consensus on the impacts of high-energy sound on marine life.

Thank you for your attention to and your cooperation with New Jersey's Coastal Zone Management Program. If you have any questions with regard to this determination, please contact Jessica Cobb of my staff at Jessica.Cobb@dep.nj.gov, at the above address, or at (609) 633-2289. Be sure to indicate the Division's file number in all communication.

Sincerely,

David B. Fanz, Assistant Director
Division of Land Use Regulation

3/6/15
Date

cc: John Gray, Deputy Chief of Staff
Virginia Kopkash, Assistant Commissioner, Land Use Management
Elizabeth Semple, Division of Coastal and Land Use Planning
Brandon Muffley, Marine Fisheries Administration
Kelly Davis, Division of Fish & Wildlife
Megan Brunatti, Office of Permit Coordination and Environmental Review

U.S. DEPARTMENT OF COMMERCE
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Mr. David B. Fanz, Assistant Director
Division of Land Use Regulation
Office of Permit Coordination and Environmental Review
Department of Environmental Protection
P.O. Box 420, Mail Code 401-07J
Trenton, New Jersey 08625-0420

APR 30 2015

Re: Request for Approval to Review the Proposed Marine Geophysical Survey by the *R/V Marcus G. Langseth* in the Federal Waters offshore of New Jersey in June-August 2015

Dear Mr. Fanz:

Thank you for your request to review the proposed marine geophysical survey by the *R/V Marcus G. Langseth* (Project) in the federal waters offshore of New Jersey under the federal consistency requirements of the Coastal Zone Management Act (CZMA). As the survey is beyond the New Jersey coastal zone and unlisted by the state for CZMA review, the New Jersey Department of Environmental Protection (Department) has requested the National Oceanic and Atmospheric Administration's (NOAA's) Office for Coastal Management approval to review the survey under the CZMA Federal Consistency regulations for unlisted federal licenses or permits (15 C.F.R. Part 930, Subpart D) and unlisted federal financial assistance to state and local governments (15 C.F.R. Part 930, Subpart F).

For the reasons below, the Department's request is denied.

DISCUSSION

As you described in your April 21, 2015, letter, the Department has already conducted and completed review of this Project under the CZMA regulations (15 C.F.R. Part 930, Subpart C), and reached a final determination. Nothing in the Department's letter provides a basis for additional review of the project at this time. Rather, the letter states that "it has recently come to the Department's attention that NSF may have erred in characterizing the project as a federal agency activity subject to Subpart C" and -- while the Department stands by its determination made at the conclusion of its review under Subpart C -- additional review is necessary to "preserve New Jersey's rights" due to the possible mischaracterization. Despite these assertions, the Department has provided no convincing explanation as to why it believes the project was not properly characterized as a federal agency activity under Subpart C, nor why additional reviews are necessary in light of the review the Department has already performed. Based on the information that the Department has provided on the Project in its filings, NOAA finds no reason to question the characterization of the project as a federal agency activity or the review that was performed under Subpart C.

As the Department acknowledged in its letter, the CZMA regulations make clear that a project cannot be treated as *both* a federal agency activity under Subpart C and also an activity under Subpart D or F. Here, the Department performed its review of the Project under Subpart C and, having completed that review, additional, parallel, or redundant reviews under other Subparts of the regulations are now precluded. The CZMA regulations do not provide for the "provisional" types of reviews the Department describes, and your current request cannot be approved.

While it is not the basis for our current decision, we also note that even if the reviews the Department is requesting were not otherwise precluded, it is not clear the request would meet the technical requirements set forth in the CZMA rules for reviews under Subpart D or F, including timeliness, proper notice, etc.

CONCLUSION

For the reasons described above, the Office for Coastal Management denies New Jersey's request to conduct additional CZMA reviews of the Project under both Subparts D and F.

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

Sincerely,

Dr. Jeffrey Payne
Acting Director
Office for Coastal Management

cc:

Richard W. Murray, Director
Division of Ocean Sciences
National Science Foundation
4201 Wilson Blvd., Suite 725
Arlington, VA 22230

Ms. Holly E. Smith
Environmental Compliance Officer
National Science Foundation
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Professor James Wright, Graduate Programs Director
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NATIONAL SCIENCE FOUNDATION
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ARLINGTON, VIRGINIA 22230

May 1, 2015

Jeffrey Payne, Acting Director
Office for Coastal Management
National Oceanic and Atmospheric Administration
1305 East West Highway
Silver Spring, Maryland 20910-9997

Re: Response by the National Science Foundation (NSF) to the April 21, 2015 Letter from the New Jersey Department of Environmental Protection (NJDEP) Requesting Federal Consistency Review of the Proposed Rescheduled Marine Seismic Research Survey in the Atlantic Ocean off New Jersey, Summer 2015

Dear Dr. Payne:

NSF is in receipt of NJDEP's letter dated April 21, 2015, in which NJDEP notifies the National Oceanic and Atmospheric Administration's Office of Coastal Management (OCM) of its position that the proposed rescheduled marine geophysical survey by Rutgers, the State University of New Jersey (Rutgers) offshore of New Jersey ("proposed Survey") requires review under Subparts D and F of the Coastal Zone Management Act (CZMA) Federal Consistency regulations. NSF is also in receipt of your letter responding to NJDEP dated April 30, 2015, and concurs with the findings therein. In addition to the conclusions reached in your April 30, 2015 letter, NSF provides the following comments in response to NJDEP's position for your consideration.

I. Background

As you may recall, following an extensive environmental review process, the proposed Survey was originally planned for and did commence on July 1, 2014.[1] Due to mechanical issues with the vessel (the R/V *Marcus G. Langseth* ("*Langseth*")), however, the research was

[1] Because OCM is familiar with the proposed Survey, NSF has omitted a detailed description of it here. A detailed description of the proposed Survey can be found in the *NSF Coastal Zone Management Act (CZMA) Consistency Determination*, dated December 22, 2014, and NSF's *Draft Amended Environmental Assessment for a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015*, dated December 18, 2014.

unable to be completed during the time periods authorized under the Incidental Harassment Authorization (IHA) and the Incidental Take Statement (ITS) issued for the 2014 survey. As a result, NSF informed the National Marine Fisheries Service (NMFS) of its interest in rescheduling the proposed Survey for a 30 day period during the June-August 2015 timeframe. In response, NMFS informed NSF that a new IHA would be required to reschedule the proposed Survey for 2015. NSF then initiated an environmental review process for the proposed Survey.

On October 8, 2014, NSF contacted NJDEP about NSF's interest in rescheduling the proposed Survey for the same time of year during 2015. On October 15, 2014, NSF and NJDEP held a teleconference in which the proposed Survey was discussed and NJDEP's interest in reviewing the proposed Survey under the CZMA was confirmed. Accordingly, on December 22, 2014, NSF submitted to NJDEP its *NSF Coastal Zone Management Act (CZMA) Consistency Determination* ("CD"), with its *Draft Amended Environmental Assessment for a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off New Jersey, Summer 2015* ("Draft Amended EA") appended as "Attachment 1." On March 6, after requesting a 15 day extension of time to respond, NJDEP provided its response to NSF's CD, which concluded that, contrary to NSF's determination, the proposed Survey is inconsistent with three enforceable policies of New Jersey's federally approved coastal management program.[2]

On March 17, 2015, NMFS published in the Federal Register a Notice of intent to issue an Incidental Harassment Authorization ("IHA Notice") for the proposed Survey in response to the IHA application submitted to NMFS on December 23, 2014, on behalf of NSF, Rutgers University ("Rutgers"), and the *Langseth* operator, Columbia University's Lamont-Doherty Earth Observatory (L-DEO). A 30 day public comment period began on the date of publication of the IHA Notice and closed on April 16, 2015. NJDEP submitted comments on the IHA Notice to NMFS during the public comment period.

On April 21, 2015, NJDEP submitted a letter to OCM, Rutgers, L-DEO, and NSF notifying the letter recipients of its position that the proposed Survey requires consistency review under 15 C.F.R. Part 930, Subparts D and F. At no time prior to April 21, 2015, however, did NJDEP notify Rutgers, L-DEO, or NSF of its position.

II. Response to NJDEP's Notice of Required Consistency Review under Subparts D and F

A. Subpart D

Subpart D of the Federal Consistency regulations provides, in pertinent part, as follows:

[2] NJDEP also submitted comments on NSF's Draft Amended EA during the 52 day public comment period (which had an original duration of 37 days, but was later extended by an additional 15 days).

> With the assistance of Federal agencies, State agencies should monitor unlisted federal license or permit activities (e.g., by . . . review of NEPA documents, Federal Register notices). State agencies shall notify Federal agencies, applicants, and the Director [of OCM] of unlisted activities affecting any coastal use or resource which require State agency review **within 30 days** from notice of the license or permit application . . ., otherwise the State agency **waives its right to review the unlisted activity**.

15 C.F.R. § 930.54(a)(1) (emphasis added). NJDEP had both actual and constructive notice that an application for an IHA related to the proposed Survey would be forthcoming.

NSF provided actual notice to NJDEP of the IHA application on December 22, 2014, when it submitted its CD and appended Draft Amended EA.[3] In the transmittal letter accompanying NSF's CD, NSF stated that NMFS was requiring a new IHA for the proposed Survey. In addition, in both the CD and the appended Draft Amended EA, NSF made it clear that an IHA application for the proposed Survey would be submitted to NMFS. Indeed, because the proposed Survey is identical[4] to the 2014 survey, NJDEP should have been well aware that there would be an application for an IHA for the proposed Survey. On March 17, 2015, NMFS published in the Federal Register its IHA Notice, providing constructive notice that an application for an IHA had been submitted to NMFS. Certainly, there can be no doubt that NJDEP was aware of the proposed Survey and the IHA application for many months prior to sending its April 21, 2015 letter; in fact, NJDEP submitted comments during the public comment periods on both the Draft Amended EA and the IHA Notice, and also provided a response to NSF's CD.

Despite the fact that NJDEP had both actual and constructive notice of the IHA application for the proposed Survey, it was not until many months later, April 21, 2015, that NJDEP first requested consistency review under Subpart D. Because that request came more than 30 days after NJDEP received notice of the application for an IHA, NJDEP has waived its right to review the unlisted activity under Subpart D.

B. Subpart F

Subpart F of the Federal Consistency regulations provides for consistency review when a "unit of State or local government . . . submits an application for federal assistance." 15 C.F.R. §

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[3] As stated earlier, NSF gave NJDEP actual notice of the proposed Survey as early as October 8, 2014, and, again, in numerous emails and telephone communications from October 2014 to the present. The requirement for an IHA for the proposed Survey was discussed during some of those telephone communications, and, in any event, NJDEP was well aware of the requirement for an IHA based on its involvement in the 2014 survey.

[4] The proposed Survey is identical to the 2014 survey except that the proposed Survey would carry out the research using a smaller array of airguns (4).

930.92. *See also* 15 C.F.R. § 930.98. While Rutgers, a unit of the State of New Jersey, did, indeed, submit an application for federal assistance for the 2014 survey, it did not submit such an application for the 2015 proposed Survey. This was because NSF issued its decision to award a grant of federal funds to Rutgers for the 2014 survey in 2014, and the funds under that award have already been issued. There is no pending application for federal assistance before NSF at this juncture. Therefore, Subpart F of the Federal Consistency regulations does not apply to the proposed Survey.

If, however, it could somehow be construed that the proposed Survey now involves an application for federal assistance (which NSF does not believe it does), NJDEP clearly did not act "immediately," as required under 15 C.F.R 930.98, when it requested consistency review in its April 21, 2015 letter. As explained above in the subsection concerning Subpart D, NJDEP has been well aware of the proposed Survey for many months, having actual notice of it as early as October 8, 2014, and then again on December 22, 2014, when it received NSF's CD with the Draft Amended EA appended to it. NJDEP also had constructive notice of the proposed Survey on December 19, 2014, when NSF posted its Draft Amended EA on its website, and, again, on March 17, 2015, when NMFS published its IHA Notice in the Federal Register. Accordingly, NJDEP does not meet the requirements for obtaining consistency review under Subpart F.[5]

III. NSF's Submission of its CD Under Subpart C

Although NJDEP concedes in its April 21, 2015 letter to OCM that NSF did provide a CD to NJDEP and that it "stands by its Inconsistency Determination," the letter goes on to state that, ". . . it has recently come to the Department's attention that NSF may have erred in characterizing the [proposed Survey] as a federal agency activity subject to Subpart C." (*See* NJDEP letter dated April 21, 2015 at page 2.) To clarify, NSF's CD was properly submitted under Subpart C.

NSF's "Federal agency activity" does come under Subpart C. While NSF does not assert that its "Federal agency activity" falls under 15 C.F.R. § 930.31(a) or (b) (as it is neither a function performed by or on behalf of NSF, nor a federal development project), it does fall within the definition of Subpart C's "residual category of Federal actions that are not covered under subparts D, E, or F of this part." 15 C.F.R. § 930.31(c). For the proposed Survey, NSF, through its environmental reviews, is now in the process of determining whether there are environmental impacts associated with rescheduling the 2014 survey to the same timeframe in 2015; NSF's role, as stated above, is no longer to consider a federal assistance application from Rutgers for the survey. Therefore, NSF's "Federal agency activity" properly falls under 15 C.F.R. § 930.31(c).

[5] NJDEP also failed to meet the "immediately" requirement under Subpart F last year for the 2014 survey.

IV. Conclusion

NSF appreciates the opportunity to provide comments in response to NJDEP's April 21, 2015 letter. NSF hopes that the information set forth above will provide clarity regarding NJDEP's actual and constructive notice of the proposed Survey, and NSF's current role in reviewing whether there are environmental impacts, if any, associated with the rescheduling of the proposed Survey during the June-August 2015 timeframe.

NSF has made significant efforts, especially after the 2014 survey was postponed, to reach out to NJDEP to ensure that NJDEP was: 1) notified of the proposed Survey; 2) given an opportunity for Consistency Review; and 3) provided numerous opportunities to work with NSF to resolve any potential differences. NSF remains committed to working with NJDEP in a positive manner regarding the proposed Survey. If you need any additional information, or would like to discuss the information already provided, please do not hesitate to contact me either by email or by phone at 703-292-7713.

Sincerely,

Holly E. Smith
Environmental Compliance Officer

Cc: Professor James Wright, Graduate Programs Director
The State University of New Jersey at Rutgers

Dr. Gregory S. Mountain
Department of Earth and Planetary Sciences
The State University of New Jersey at Rutgers

Sean C. Soloman, Director
Lamont-Doherty Earth observatory
The Earth Institute, Columbia University

David B. Fanz, Assistant Director
Division of Land Use Regulation
New Jersey Department of Environmental Protection

RUTGERS
Office of the Senior Vice President
and General Counsel

May 5, 2015

Jeffrey Payne, Acting Director
Office for Coastal Management
National Oceanic and Atmospheric Administration
1305 East West Highway
Silver Spring, MD 20910-9997

Re: April 21, 2015 Letter from New Jersey Department of Environmental Protection ("DEP") requesting Coastal Zone Management Act ("CZMA") review of the proposed marine geophysical survey aboard the *R/V Marcus G. Langseth* off the New Jersey coastline in the summer of 2015 (the "Project")

Dear Mr. Payne:

Rutgers University received the above captioned letter from the DEP as well as your response dated April 30, 2015 and the response from the National Science Foundation ("NSF") dated May 1, 2015. I write to confirm Rutgers University's agreement with the conclusions in your April 30, 2015 letter as well as in the NSF's letter dated May 1, 2015. For the reasons you and NSF have explained, Rutgers does not believe DEP has a right to require a review of the Project pursuant to Subpart D or F of the CZMA regulations.

Rutgers continues to stand behind the Project and believes the resulting data will help environmental agencies carry out their missions in the future.

Very truly yours,

Robert Roesener
Senior Associate General Counsel

cc (via email):
Richard W. Murrary, NSF
Holly E. Smith, NSF
Sean C. Solomon, Lamont-Doherty Earth Observatory
John Gray, NJDEP
Greg Mountain, Rutgers

Rutgers, The State University of New Jersey

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COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

LAMONT-DOHERTY EARTH OBSERVATORY
OFFICE OF THE DIRECTOR

11 May 2015

Dr. Jeffrey L. Payne, Acting Director
Office for Coastal Management
National Oceanic and Atmospheric Administration
1305 East-West Highway
Silver Spring, MD 20910-9997

Re: 21 April 2015 Letter from New Jersey Department of Environmental Protection ("NJDEP") Requesting Approval to Review the Proposed Marine Geophysical Survey by the *R/V Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015 (the "Project")

Dear Dr. Payne:

The Lamont-Doherty Earth Observatory of Columbia University ("LDEO") received the above-captioned letter from the NJDEP and has also received your response dated 30 April 2015 and the comments from the National Science Foundation ("NSF") dated 1 May 2015. LDEO concurs with the conclusions in your 30 April 2015 letter and with the comments provided by NSF in the 1 May 2015 letter. For the reasons set forth in those letters, LDEO does not believe that NJDEP has a right to require a review of the Project pursuant to Subpart D or F of the Coastal Zone Management Act federal consistency regulations.

Sincerely,

Sean C. Solomon
Director

cc (via email):
David B. Fanz, NJDEP
Richard W. Murray, NSF
Holly E. Smith, NSF
Gregory S. Mountain, Rutgers University
James D. Wright, Rutgers University

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National Science Foundation
Geosciences Directorate
Division of Ocean Sciences
Arlington, Virginia

FINAL FEDERAL CONSISTENCY DETERMINATION
for the Marine Geophysical Survey by the R/V *Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015

PROPOSAL:
OCE 1260237
Principal Investigator/Institution: Gregory Mountain, Rutgers University
Project Title: Collaborative Research: Community-Based 3D Imaging That Ties Clinoform Geometry to Facies Successions and Neogene Sea-Level Change

COLLABORATIVE PROPOSAL:
OCE 1259135
Principal Investigators/Institution: Craig Fulthorpe, James Austin, Mladen Nedimovic, University Texas at Austin

Following an extensive environmental review process, a proposed federally funded marine geophysical research survey, designed to take place approximately 18 – 50 nautical miles (nmi) (33–92 km) off the coast of New Jersey (NJ) and 15 – 47 nmi (27–87 km) from NJ state waters, was authorized by the National Science Foundation (NSF) to commence on July 1, 2014. Due to mechanical issues with the vessel (the R/V *Marcus G. Langseth* (*Langseth*)), however, the research was unable to be completed during the time periods authorized under the Incidental Harassment Authorization (IHA) and the Biological Opinion/Incidental Take Statement (BO/ITS) issued by the National Marine Fisheries Service (NMFS) for the 2014 survey. As a result, NSF informed NMFS of its interest in rescheduling the 2014 survey for a 30 day period during the same June-August timeframe in 2015 (Proposed Activity). In response, NMFS informed NSF that a new IHA would be required to reschedule the 2014 survey, and an environmental review process for the Proposed Activity was initiated by NSF.

NSF's environmental review process for the Proposed Activity included compliance with Subpart C of the Coastal Zone Management Act (CZMA). After learning that a new IHA would be necessary, NSF initiated a dialogue with the New Jersey Department of Environmental Protection (NJDEP) to determine if they were interested in conducting a consistency review of the Proposed Activity under the CZMA, and NJDEP indicated that it was interested in doing so. As described below, NSF prepared a Consistency Determination (CD) to which NJDEP responded (Consistency Review), finding the proposed Activity inconsistent with three enforceable policies of NJ's federally approved Coastal Management Plan (CMP). After receiving NJDEP's Consistency Review, NSF considered it within the context of the entire record for the 2014 survey; the Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey and accompanying Record of Decision (PEIS); the Draft Amended Environmental Assessment and associated public comments; the IHA, BO, and ITS issued in 2015 by NMFS; concurrence from USFWS; and the EFH response from NMFS. Based on all of these sources and the entire record for NSF's CZMA compliance, NSF concludes that the Proposed Activity is, contrary to NJDEP's finding, consistent to the maximum extent practicable with the CMP.

Proposed Activity

The proposal, "Collaborative Research: Community-Based 3D Imaging That Ties Clinoform Geometry to Facies Successions and Neogene Sea-Level Change," was submitted to NSF by lead Principal Investigator (PI) Dr. G. Mountain, of Rutgers University, and collaborating PIs Drs. C. Fulthorpe, M. Nedimovic, and J. Austin, of University of Texas at Austin . Following NSF's merit review process, the proposal was recommended for award in late 2013. A two-year continuing grant, contingent upon obtaining appropriate authorizations and completion of the NSF environmental review process, was awarded on January 15, 2014.[1]

The proposed collaborative research objectives and efforts associated with the Proposed Activity remain unchanged from those planned in 2014. Specifically, the research[2] efforts would include the collection and analysis of data on the arrangement of sediments deposited during times of changing global sea level from roughly 60 million years ago to the present. Despite their existence being clearly indicated in sediment cores recovered during International Ocean Discovery Program (IODP) Expedition 313, features such as river valleys cut into coastal plain sediments, now buried under a kilometer (km) of younger sediment and flooded by today's ocean, cannot be resolved in existing 2-Dimensional (D) seismic data to the degree required to map shifting shallow-water depositional settings in the vicinity of clinoform rollovers. To achieve the research goals, the PIs propose to use a 3-D seismic reflection survey to map sequences around existing IODP Expedition 313 drill sites and analyze their spatial/temporal evolution. Objectives that would then be met include establishing the impact of known Ice House base-level changes on the stratigraphic record; providing greater understanding of the response of nearshore environments to changes in elevation of global sea level; and determining the amplitudes and timing of global sea-level changes during the mid-Cenozoic era.

As was the case with the 2014 survey, the research for the Proposed Activity would be conducted on the NSF-owned research vessel (R/V) *Marcus G. Langseth (Langseth*), which is operated on NSF's behalf by

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[1] The award expires on December 31, 2015. All funding for this two-year grant has been released

[2] In its Consistency Review, NJDEP commented that the focus of the study was on, "climatology and geology, and did not include other areas of research needs, including aquatic biology and fisheries management" which NJDEP found, "contrary to NSF's mission to promote collaborative work on novel, complex issues." While NSF does promote collaborative work on novel complex issues, NSF's mission, as stated in the preamble to the National Science Foundation Act of 1950 (Public Law 810507, as amended) is, "To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." Both the PEIS (Section 1.2) and Draft Amended EA (Chapter I) cite to the mission of NSF. Furthermore, the research proposal for the Proposed Activity was submitted to the NSF Marine Geology and Geophysics program (MG&G) which supports a broad range of research on all aspects of geology and geophysics of the ocean basins and margins, as well as the Great Lakes. Proposals submitted to this program must relate to established program priorities (for more detail see: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=11726). While collaborative interdisciplinary research efforts are encouraged and funded by NSF, they are not a pre-requisite for all funding opportunities, including the NSF MG&G program. The information collected during the survey would support research on various geologic processes and produce a data set for a larger user community of scientists, educators and students. While the research proposal may not have included topics outside of the geosciences, such as aquatic biology as suggested by NJDEP, it is a prime example of community driven scientific collaboration, which in this instance, was determined by a panel of experts to be highly meritorious, met all NSF program requirements, and was determined by NSF Program Officers as worthy of funding. Moreover, it is not appropriate for NJDEP to use the consistency review process to alter the research proposal or the Proposed Activity (National Oceanic and Atmospheric Administration (NOAA) 2009. CZMA Federal Consistency Overview. Section 307 of the Coastal Zone Management Act of 1972. Accessed on May 16, 2015, at http://coast.noaa.gov/czm/consistency/media/FC_overview_022009.pdf. p. 7).

Columbia University's Lamont-Doherty Earth Observatory (L-DEO) pursuant to a cooperative agreement. The research is not related to energy resources or facilities, including oil and gas exploration, development, production, or lease sales, and, therefore, is not subject to Bureau of Ocean Energy Management regulatory jurisdiction pursuant to the Outer Continental Shelf Lands Act. The research is also not related to ocean mining.

Procedural History

2014 Survey

On February 3, 2014, NSF posted a Draft Environmental Assessment (EA) on the NSF website, requesting public review and comment on the 2014 survey during a 30 day public comment period, ending on March 3, 2014. NJDEP did not comment during this public comment period on NSF's Draft EA, which was prepared pursuant to the National Environmental Policy Act (NEPA).

On March 17, 2014, NMFS announced in the Federal Register their intent to issue an Incidental Harassment Authorization (IHA) pursuant to the Marine Mammal Protection Act (MMPA) for the 2014 survey.

On April 9, 2014, in response to a request to extend the public comment period on the IHA, NMFS issued a second notice in the Federal Register extending the comment period by 30 days.

In addition to the formal public notices of the 2014 survey published on the NSF website and in the Federal Register, NSF, NOAA's Office for Coastal Management (OCM) and NJDEP engaged in informal conversations regarding the 2014 survey. These informal conversations began when NSF contacted OCM in late March to discuss CZMA implications regarding the 2014 survey.

On April 14, 2014, OCM left a voicemail message for NSF staff notifying them that the NJDEP informally contacted OCM on April 11, 2014, expressing an interest in the 2014 survey. After receiving the news from OCM, NSF immediately contacted OCM and suggested holding a joint teleconference with NJDEP and OCM to discuss NJDEP's interest in the 2014 survey.

On April 22, 2014, OCM arranged a teleconference with NJDEP and NSF to discuss applicability of the CZMA. The majority of the discussion was devoted to identifying which CZMA Subpart applied to the 2014 survey. Despite repeated requests for NJDEP to identify which enforceable policies it believed were implicated, no response was given to NSF.

Following the April 22, 2014, teleconference with NJDEP, NSF staff held numerous discussions separately with OCM and NJDEP staff to try to identify NJDEP's concerns with the 2014 survey and learn of any relevant enforceable policies NJDEP believed applied.

On May 7, 2014, another teleconference was held with OCM, NJDEP, and NSF staff to again discuss NJDEP's concerns, however, NJDEP again failed to identify any enforceable policies it believed were implicated; only vague requests for delaying the 2014 survey and employing non-specific mitigation measures were made. When NSF asked NJDEP staff to provide specifics regarding these requests, however, none were provided.

On May 15, 2014, NJDEP submitted comments to NMFS pursuant to the MMPA IHA public comment period.

On May 20, 2014, despite NSF's repeated and good-faith efforts to respond to NJDEP's concerns, NJDEP sent an email to NSF staff with an attachment of a letter sent by NJDEP, via regular U.S. mail, from Virginia KopKash, Assistant Commissioner NJDEP to Margaret Davidson, Acting Director OCM requesting review of the 2014 survey under Subparts C and F of the regulations implementing the CZMA, with a carbon copy to NSF. The letter, however, failed to formally identify the relevant enforceable policies of concern to NJDEP. In sum, NJDEP waited three and one-half months to bring their request to OCM to review the 2014 survey under Subpart F of the CZMA's implementing regulations. Further, despite being given many opportunities to engage in a dialogue about their concerns, NJDEP waited until the very end of the lengthy environmental compliance process to make their formal request to review the 2014 survey; the originally proposed 2014 survey sail date of June 3, 2014, was clearly published in the NSF Draft EA, which was made available on the NSF website on February 3, 2014; the originally proposed June 3, 2014 sail date was also published in the NMFS IHA Federal Register notice on March 17, 2014.

On May 29, 2014, NSF responded to NJDEP's consistency review request for the 2014 survey, an unlisted activity, asserting that the state's request was untimely under the CZMA regulations.

On June 18, 2014, OCM, formally responded to, and denied, NJDEP's request to review the 2014 unlisted activity, finding the request untimely.

On July 1, 2014, having received all necessary regulatory authorizations and approvals, and after completing the NSF environmental compliance process, the 2014 survey was authorized to commence. As noted in the Draft Amended EA, during the 2014 survey activity, which took place within the same timeframe in 2014 as is proposed for 2015, no active commercial or recreational fishing vessels were observed during the approximate 13 days the vessel was in or near the survey area. Also during the days at sea in 2014, no fish kills or injuries to fish, marine mammals, seabirds, or sea turtles (or their habitats) were observed by the independently contracted Protected Species Observers (PSOs) aboard the *Langseth*. No reports of marine mammal strandings were reported to NSF as attributable to the 2014 survey.

On July 3, 2014, NJDEP filed a complaint in federal District Court seeing injunctive and declaratory relief. On July 10, 2014, the District Court denied NJDEP's request for emergency injunctive relief, and NJDEP filed an appeal to U.S. Court of Appeals for the Third Circuit. On July 14, 2014, NJDEP's request for emergency injunctive relief was denied by the Third Circuit, and on August 12, 2014, the matter was dismissed from District Court without prejudice.

In August 2014, the 2014 survey was postponed due to mechanical issues with the *Langseth*, with the intent to reschedule in 2015.

<u>2015 Proposed Survey</u>

On October 8, 2014, NSF contacted NJDEP about NSF's interest in rescheduling the 2014 survey for a 30-day period within the same timeframe (June/July/August) in 2015, and a teleconference to discuss details further was arranged for October 15, 2014.

On October 15, 2014, NSF and NJDEP held a teleconference about the Proposed Activity. NSF reviewed NJ's Coastal Management Program Federal Consistency Listings (http://www.state.nj.us/dep/cmp/2008_fc_listing.pdf) and determined the activity to be unlisted. NSF then asked NJDEP if they had interest in reviewing the Proposed Activity under the CZMA, and NJDEP confirmed their interest in conducting a consistency review. By providing early notice about the Proposed Activity, NSF intended to allow for the maximum time available to discuss it with NJDEP and resolve any potential differences

prior to submitting a CD and/or during the 90 day consultation period following submission of a CD. At that time, per 15 C.F.R. Part 930.34(d), NSF also requested that NJDEP provide a list of relevant enforceable policies for the Proposed Activity. Despite repeated requests, NJDEP did not provide a list of relevant enforceable policies to NSF.

On November 17, 2014, NSF again contacted NJDEP regarding the Proposed Activity. NSF was informed that a particular NJDEP staff member had been assigned to review the Proposed Activity and manage the collaboration.

On November 20, 2014, NSF spoke briefly about the Proposed Activity with the assigned NJDEP staff member. As a follow-up to this conversation, on November 21, 2014, NSF offered to discuss the Proposed Activity further with NJDEP, either remotely or in person. NJDEP, however, did not respond to NSF's offer.

On December 19, 2014, NSF posted a Draft Amended EA prepared pursuant to NEPA on the NSF website for a 37 day public comment period. NSF later extended the public comment period an additional 15 days, closing February 9, 2015.

On December 22, 2014, despite not receiving a list of relevant enforceable policies from NJDEP, NSF submitted a CD to NJDEP under Subpart C of the federal consistency regulations[3]. Although NSF did not anticipate effects on NJ's coastal uses or resources as a consequence of the Proposed Activity, due to the circumstances surrounding the 2014 survey and NJDEP's expressed interest in reviewing the Proposed Activity for federal consistency, NSF chose to submit a CD to ensure that NJDEP would have the opportunity to have a consistency review[4]. NJDEP's 60 day consistency review period under CZMA Subpart C commenced on December 22, 2014.

In January 2015, NSF contacted NJDEP several times regarding the CD, however, the assigned NJDEP staff member did not contact or engage NSF further on the matter.

On February 9, 2015, NJDEP submitted comments to NSF on the Draft Amended EA for the Proposed Activity.

NSF received a letter from NJDEP requesting a 15 day extension pursuant to 15 CFR 930.41(b) of the CZMA. The letter, which was dated February 11, 2015, was sent via regular U.S mail and postmarked February 12, 2015. NJDEP identified in a previous letter submitted via email to NSF on February 9, 2015, that a final determination on NSF's CD, or request to extend, would be provided to NSF by February 19, 2015. The letter requesting an extension, however, was not received by NSF until February 20, 2015, and did not reach NSF staff until February 23, 2015.[5]

On February 24, 2015, NSF responded to NJDEP's extension request acknowledging that the state wished an additional 15 days (until March 6, 2015) to complete their review of the Proposed Activity. NSF encouraged NJDEP, however, to provide earlier notification so that NSF and NJDEP could maximize the time available within the 90 day notice period to resolve any potential differences.

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[3] Appended to the CD was NSF's Draft Amended EA, which had been posted on NSF's website on December 19, 2014.

[4] As an unlisted activity, per the CZMA, NJDEP would be required to (1) request review of the project and receive approval from NOAA OCM, and (2) prove the proposed activity would have effects on coastal uses and resources.

[5] The request for an extension was not made by e-mail, which NSF had previously requested.

On March 6, 2015, NJDEP provided their Consistency Review to NSF, finding the proposed activity to be "inconsistent" with three enforceable policies of the CMP. Pursuant to 15 CFR Part 930.41 (a), "A state agency shall inform the federal agency of its concurrence with or objection to the Federal agency's consistency determination at the earliest practical time...".[6] Although NJDEP's Consistency Review was slightly ambiguous, NSF has treated it as an objection.

On March 6, 2015, NSF contacted NJDEP to discuss their Consistency Review and to engage in a dialogue regarding NJDEP's concerns. Subsequent teleconferences were held, and NSF stressed interest in trying to resolve differences within the 90 day consultation period (which ended on March 22, 2015). NSF also requested clarifying information on some points noted in NJDEP's Consistency Review.

On March 16, 2015, per NSF's request, NJDEP provided some information regarding commercial and recreational fisheries noted in NJDEP's Consistency Review.

On March 17, 2015, NMFS issued in the Federal Register a notice of intent to issue an IHA and solicitation for comments during a 30-day open public comment period closing April 16, 2015.

On March 25, 2015, NJDEP expressed interest in arranging a meeting to further discuss NJDEP's field study recommendation, provided a scientific publication on the study of the effect of seismics on fish abundance and catch rates, and provided revisions to some of the commercial fisheries information provided to NSF on March 16, 2015.

On April 6, 2015, NSF received a request from NJDEP for informal mediation facilitated by OCM pursuant to 15 CFR Part 930.111. This request was made following NSF's multiple attempts since October 8, 2014, to discuss and resolve potential issues with NJDEP both prior to submission of the CD (as encouraged by CFR 930.36(a)) and during the 90 day consultation period.

On April 9, 2015, NSF agreed to informal mediation within the context of the CZMA and the enforceable policies of the CMP.

On April 16, 2015, the NMFS public comment period on the IHA closed.

On April 20, 2015, NJDEP responded to NSF that they would initiate a request for mediation assistance with OCM. Although unclear to NSF why NJDEP waited 11 days to respond to NSF regarding the informal mediation, NSF provided an immediate response back to NJDEP and OCM on April 21, 2014, to begin informal mediation efforts, and arranged a telecon for that afternoon.

On April 21, 2015, NSF, NJDEP, and NOAA OCM held a telecon to begin a discussion on informal mediation efforts. On that call, NJDEP agreed to contact OCM and NSF on April 23, 2015 about arrangements for a next meeting and additional details regarding recommendations included in their Consistency Review; NJDEP, however, did not follow up with those details.

On April 27, 2015, NSF staff received a letter from NJDEP dated April 21, 2015[7] (mailed via U.S. mail and post marked April 22, 2015) regarding, "Notice of Stage [*sic*] Agency Review of the proposed

[6] 15 C.F.R. 930.41(a).

[7] On February 24, 2015, NSF requested that NJDEP, in order to facilitate timely communication between our offices, all correspondence be provided by email, regardless of whether a hard copy is also mailed via U.S. mail; NSF extended the same courtesy to NJDEP. Despite acknowledging the need to be sensitive to the timeline, NJDEP ignored NSF's request and sent their letter via regular U.S. mail.

Marine Geophysical Survey by the *R/V Marcus G. Langseth* in the Atlantic Ocean off New Jersey, Summer 2015." NJDEP stated that the letter, "serves as notice that the proposed Project requires review by the New Jersey Department of Environmental Protection (the "Department") pursuant to 15 C.F.R. 930.54 within Subpart D (Unlisted federal license or permit activities) and 15 C.F.R. 930.98 within Subpart F (Federally assisted activities outside of the coastal zone) of the federal coastal management regulations." Regardless that Subpart C was the appropriate Subpart under which NSF should have and did submit a CD for review, NJDEP, through its April 21, 2015, letter announced that it wanted additional consistency review for the same Proposed Activity, albeit under different subparts. The Proposed Activity would, however, remain the same whether reviewed by NJDEP under Subpart C, D, or F. In addition, NJDEP had ample opportunity to review the project, both in the spring of 2014 when NJDEP waited months to seek review of the 2014 survey – an unlisted activity – and again for the Proposed Activity, which NJDEP knew about since October 8, 2014.

On April 30, 2015, OCM sent a letter to NJDEP denying the request to review the Proposed Activity under Subparts D and F. OCM noted that, as NJDEP had acknowledged in their letter, "...the CZMA regulations make clear that a project cannot be treated as *both* a federal agency activity under Subpart C and also an activity under Subpart D or F. Here, the Department [NJDEP] performed its review of the Project under Subpart C and having completed that review, additional, parallel, or redundant reviews under other Subparts of the regulations are now precluded." In its letter, OCM also indicated, "...that even if the reviews the Department is requesting were not otherwise precluded, it is not clear the request would meet the technical requirements set forth in the CZMA rules for reviews under Subpart D or F, including timeliness, proper notice, etc."

On May 1, 2015, NSF submitted comments to OCM regarding NJDEP's April 21, 2015, request to seek additional consistency review. In its comments, NSF explained why NJDEP should not be given yet another bite at the consistency review apple. Specifically, NSF explained that, because the Proposed Activity did not involve a pending application for federal financial assistance and the agency activity at issue for NSF now is to determine whether rescheduling the 2014 survey to the same timeframe in 2015 would result in any environmental impacts not previously considered, consistency review was appropriate under Subpart C, not F. Moreover, even if Subpart F could be deemed appropriate, NJDEP did not "immediately" seek review as required by the regulations. Finally, NSF explained that, even if NJDEP had a right to review under Subpart D, NJDEP waived their right to seek review because they waited more than 30 days before seeking review.

On May 5 and 11, 2015, Rutgers University and L-DEO, respectively, sent letters to OCM concurring with OCM's findings and the additional comments provided in NSF's letter to OCM dated May 1, 2015.

Mediation efforts by NSF and NJDEP are ongoing, and NSF remains hopeful that an agreement will ultimately be reached.

Enforceable Policies

In their Consistency Review, NJDEP reported their findings that the Proposed Activity was inconsistent with three enforceable policies of the CMP: N.J.A.C. 7:7E-3.4 Prime Fishing Areas; N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries; and N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant Species Habitats. NJDEP stated their determination relied on the NSF PEIS dated June 2011, the NSF Draft Environmental Assessment dated December 2013, the Draft Amended EA dated December 2014, and comments received as part of the public comment period held by NJDEP for their Consistency Review. On March 9, 2015, NSF requested copies of the public comments received by NJDEP; on March 16,

2015, NJDEP provided copies of the public comments which included comments from five entities[8]: Clean Ocean Action, Jersey Coast Anglers Association, New Jersey Outdoor Alliance, and two private citizens. As noted above, NSF reviewed and considered the analysis and information NJDEP presented in their Consistency Review which led them to conclude the Proposed Activity was inconsistent with three enforceable policies of the CMP. After review of the entire CZMA record, NSF concludes, however, that the Proposed Activity is indeed consistent to the maximum extent practical with the enforceable policies of the CMP for the specific reasons set forth below.

N.J.A.C. 7:7E-3.4 Prime Fishing Areas

In their consistency review, NJDEP found that, while seismic surveys were not expressly prohibited by N.J.A.C. 7:7E-3.4 Prime Fishing Areas, based on studies examining seismic survey impacts, it would be reasonably foreseeable that the Proposed Activity would affect fishery distribution, movement, migration, and spawning at identified prime fishing areas. NJDEP further stated that the Proposed Activity would foreseeably result in adverse impacts to the high productivity of New Jersey's commercial and recreational fishing industry. In conclusion, NJDEP found the Proposed Activity to be inconsistent with the prime fishing areas rule, N.J.A.C. 7:7E-3.4, because of the foreseeable effect on utilization of prime fishing areas.

The Prime Fishing Area enforceable policy described at N.J.A.C. 7:7E-3.4 states:

(a) Prime fishing areas include tidal water areas and water's edge areas which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay" Figley and McCloy (1988) and those

[8] NJDEP states on page 10 of their Consistency Review, that, "because of the significant concerns raised by multiple states and stakeholders throughout the United Sates, the Department sees this as an opportunity for NSF to develop scientifically valid consensus on seismic studies." NSF reviewed the public comments from the five entities received by NJDEP regarding NSF's CD and found no public comments received from other states. Although no specific reference or citation was provided, NJDEP refers at the conclusion of their letter, on page 11, to a group that has "urged the President" about concerns related to "oil and gas exploration," which is an activity unrelated to the Proposed Activity and is proposed and regulated by a different federal agency. NJDEP's Consistency Review should have focused on *NSF's* Proposed Activity, the enforceable policies of the CMP, and the public comments received as part of NJDEP's review process. Within the bounds of CZMA review, unless public comments relate to the effects of the proposed action on coastal uses and resources and the consistency of the proposed activity to relevant enforceable policies, they should have no bearing on the State's decision.

Furthermore, NSF participates on many interagency committees, in workshops, and on panels related to anthropogenic sound in the marine environment, including for seismic surveys. For example, for approximately the past year and a half NSF has participated on the Subcommittee on Ocean Science and Technology (SOST) Interagency Task Force on Ocean Noise and Marine Life. NSF has also funded numerous awards related to furthering the understanding of the impacts of sound on marine species and the environment. Most recently, in March 2015, NSF provided federal funding for the, "Fourth International Conference on Effects of Noise on Aquatic Life" (see page 14-15 for more details). For a wide variety of technical reasons, it would, however, be impossible for NSF to "develop scientifically valid consensus on seismic studies' impacts to marine life" anticipated from the Proposed Activity as suggested by NJDEP on page 10 of their Consistency Review, as the Proposed Activity is not representative of the myriad scenarios that seismic surveys are conducted or located (i.e., source level, water depth, presence of marine species, etc.). NJDEP's statement and recommendation were inappropriate for inclusion in their Consistency Review and outside of the scope of what should have been included in a State's CZMA review.

areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds." This map is available through the Coastal Management Program's website at www.state.nj.us/dep/cmp.

(b) Standards relevant to prime fishing areas are as follows:

1. Permissible uses of prime fishing areas include recreational and commercial finfishing and shellfishing, as presently regulated by the Department's Division of Fish and Wildlife, scuba diving and other water related recreational activities.

2. Prohibited uses include sand or gravel submarine mining which would alter existing bathymetry to a significant degree so as to reduce the high fishery productivity of these areas. Disposal of domestic or industrial wastes must meet applicable State and Federal effluent limitations and water quality standards.

It is clear that the enforceable policy described at N.J.A.C. 7:7E-3.4 does *not* prohibit marine geophysical surveys inside, or outside, NJ state waters, but, rather, specifically identifies the prohibition of sand and gravel submarine mining within the coastal zone and notes conditions for disposal of domestic and industrial waste. Furthermore, in the unlikely event the Proposed Activity did have an effect on prime fishing areas, the enforceable policy described at N.J.A.C. 7:7E-3.4 does not prohibit activities from having effects on prime fisheries areas, other than for sand and gravel submarine mining.

As support for their inconsistency finding, NJDEP also noted in their Consistency Review that the project location and timeframe for the Proposed Activity would foreseeably and adversely affect NJ's prime fishing areas. NJDEP stated that the proposed project area, off the coast of NJ and beyond state waters, would see high commercial and recreational activity during the study period. While NSF agrees with NJDEP that there are waters off NJ that include important fishing areas, NSF disagrees with NJDEP's portrayal that the proposed survey area would be one that would be heavily occupied by recreational and commercial fishermen during the proposed survey time period. As noted in the Draft Amended EA, during the 2014 survey activity, which took place within the same timeframe in 2014 as is proposed for 2015, no active commercial or recreational fishing vessels were observed during the approximate 13 days the vessel was in or near the survey area. To determine fishing vessel traffic during the proposed survey period off NJ, historical National Automated Identification System (NAIS)[9] data from the USCG Navigation Center for June and July 2013 and 2014 was evaluated. The number of fishing vessels equipped with AIS in the proposed survey area was 21–27 per month, with only 4–6 of those vessels spending more than a few hours. During 4 previous research seismic surveys in the survey area, space-use conflicts were not reported to NSF or the Principal Investigators (PIs), nor were there any noticeable effects on commercial or recreational fish catch rates (Draft Amended EA, page 53). The Proposed Activity would occur approximately 18 – 50 nautical miles (nmi) (33–92 km) off the coast of NJ and 15 – 47 nmi (27–87 km) from NJ state waters. Potential impacts to fisheries would be temporary and localized within or near the proposed survey area, and likely would have no effect on prime fishing areas within NJ's state waters (which extend three nautical miles from the NJ shore) or on other related coastal uses or resources. Indeed, NJDEP did not assert in its Consistency Review that any coastal uses or resources within NJ's coastal zone would be impacted by the Proposed Activity. In the unlikely event the Proposed Activity would have an effect on prime fishing areas, the enforceable policy described at N.J.A.C. 7:7E-3.4 would not be implicated because it does not prohibit activities from having effects on prime fishing areas, except for sand and gravel submarine mining. In addition, unlike some other enforceable policies of the CMP, N.J.A.C. 7:7E-3.4 does not provide timeframe restrictions for activities that may have effects on prime fishing areas.

[9] Using the National Automated Identification System (NAIS), detailed information on marine vessel traffic is collected, consolidated, and disseminated to the Coast Guard and other government agencies; the information includes vessel type, name, and other information that allows the data to be sorted by activities, e.g., fishing, diving, sailing, recreational, and cargo. Because AIS-equipped vessels transmit at regular intervals, it is possible to discriminate between vessels that are in the area for a period of time and those that are passing through.

NJDEP also stated in their Consistency Review that the timing of the proposed survey would coincide with a period of high to peak population abundance of several commercially and recreationally important fish species at identified prime fishing areas. Also, in the recommendations included in their Consistency Review, NJDEP stated that they recommended that the Proposed Activity be moved to the September/October 2015 timeframe. Upon request by NSF, on March 16, 2015, NJDEP provided information that they relied upon in making this statement. The information was based on statistical data collected by NOAA for two large areas off the coast of NJ, specifically Statistical Areas 615 and 614. The survey area, however, would occur only within a small portion of NMFS Statistical Area 615. The information provided by NJDEP included commercial and recreational landing data for the combined NMFS Statistical Areas 614 and 615. The information portrayed peak landings in Statistical Areas 614 and 615 during 2011 occurring in the summer months. On March 25, 2015, in response to NSF's request, NJDEP provided data for the NMFS Statistical Areas 614 and 615, uncombined; NJDEP, however, also noted that the information provided on March 16, 2015, was miscalculated and, therefore, corrections had been made to the data. The revised information contradicted the earlier information provided to NSF. Rather than demonstrating peak landings for Statistical Areas 614 and 615 during 2011 in the summer months, the revised information showed the summer as having significantly lower landings than in spring, fall, or winter. Information provided by NJDEP demonstrated that for recreational landings from 2011 to 2014, the highest landings for two out of the four years occurred in September/October. The recreational landings information provided were for all waters off NJ, not just for the survey area or Statistical Area 615. Irrespective, it is essential to distinguish that landing data does not necessarily indicate fish abundance, as landings are affected by both abundance and fishing effort. Furthermore, and more importantly, the enforceable policy described at N.J.A.C. 7:7E-3.4 does not address or include activity restrictions for time periods of population abundance of commercial and recreational fish species at prime fishing areas. As noted previously, time restrictions are, however, included in other enforceable policies of the CMP for certain activities. For example, under N.J.A.C. 7:7E-3A.2 Standards applicable to routine beach maintenance (a) 4, there is a specific time period (March 15 and August 31) during which certain beach maintenance activities, such as beach raking, are prohibited because NJDEP has identified the presence of habitat for threatened and endangered beach nesting shorebirds. Therefore, NJDEP's request that the Proposed Activity be moved to the September/October time-frame is not grounded in any enforceable policy of the CMP.

In NJDEP's Consistency Review, references to studies on potential impacts from airguns on scallop lifecycle stages and concern about reductions in harvestable stock were noted. As stated on page 51 of the Draft Amended EA, "Significant developmental delays and body abnormalities in scallop larvae exposed to seismic pulses were reported by de Soto et al. (2013)[10]. Their experiment used larvae enclosed in 60-ml flasks suspended in a 2-m diameter by 1.3-m water depth tank and ***exposed to a playback of seismic sound at a distance of 5–10 cm***. [Emphasis added] This laboratory experiment would not, however, be representative of the Proposed Activity. Other studies conducted in the field have shown no effects on Dungeness crab larvae or snow crab embryos (Pearson et al., 1994; DFOC 2004 *in* PEIS[11]). Moreover, a major annual scallop-spawning period occurs in the Mid-Atlantic Bight during late summer to fall (August–October), although MacDonald and Thompson (1988 *in* NMFS 2004[12]) reported scallop

[10] de Soto, N.A, Delorme, N., Atkins, J., Howard, S., William, J., and M. Johnson. Anthropogenic noise causes body malformations and delays development in marine larvae. Sci. Rep. 3:2831. doi: 10.1038/srep02831.

[11] NSF and USGS (National Science Foundation and U.S. Geological Survey). 2011. Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey (PEIS). Accessed on 28 April 2015 at http://www.nsf.gov/geo/oce/envcomp/usgs-nsf-marine-seismic-research/nsf-usgs-final-eis-oeis-with-appendices.pdf.

[12] NMFS (National Marine Fisheries Service). 2004. Essential Fish Habitat source document: sea scallop, *Placopecten magellanicus*, life history and habitat characteristics. 2nd edit. NOAA Tech. Memo. NMFS-NE-189. 21 p. Accessed at http://www.nefsc.noaa.gov/publications/tm/tm189/tm189.pdf in June 2014.

spawning off New Jersey during September–November." Therefore, the timing of the Proposed Activity (June/July/August) would mainly avoid the scallop-spawning period. Moving the timing of the Proposed Activity to September/October, as recommended by NJDEP would increase the chances of the Proposed Activity overlapping with the scallop-spawning period.

Based on this information, NSF concludes that there is no support for NJDEP's assertion that the Proposed Activity would take place in a highly utilized commercial and recreational fishing area during a time in which there would be a high to peak population abundance of several important fish species. This conclusion is in further support of NSF's conclusions noted in its PEIS, the 2014 Final EA, the 2015 Draft Amended EA, and CD that the Proposed Activity would not have a significant impact on fisheries in or near the survey area, let alone affect distant prime fishing areas or other coastal uses or resources within the NJ coastal zone. Furthermore, and as noted above, even if there were effects, affecting prime fishing areas is not prohibited by the enforceable policy described at N.J.A.C. 7:7E-3.4 Prime Fishing Areas.

In summary, NJDEP contends that the Proposed Activity could have reasonably foreseeable effects on prime fishing areas, however, they fail to identify how the Proposed Activity, even if there would be effects on prime fishing areas, would be inconsistent with the enforceable policy set forth at N.J.A.C. 7:7E-3.4 Prime Fishing Area. The enforceable policy, N.J.A.C. 7:7E-3.4 Prime Fishing Areas, specifically defines prime fishing areas and identifies prohibited activities in those areas over which the state has jurisdiction. While NJDEP suggests in their Consistency Review that the Proposed Activity would have foreseeable effects on utilization of prime fishing areas, the enforceable policy is not related to and does not address activities that might impact utilization rates of prime fishing areas. Academic seismic research surveys are not identified as activities that are not allowable in prime fishing areas within, or outside of, the NJ coastal zone. As noted in NSF's CD, the Proposed Activity does not involve those activities listed in 7:7E-3.4 Prime Fishing Areas as prohibited (sand or gravel submarine mining, or disposal of domestic or industrial wastes that do not meet applicable State and Federal effluent limitations and water quality standards). More importantly, the enforceable policy does not prohibit activities from having an effect on prime fishing areas, but, rather, prohibits particular activities not proposed by NSF, specifically, sand and gravel submarine mining. For these reasons, NSF concludes that the Proposed Activity is consistent to the maximum extent practicable with NJ's enforceable policy N.J.A.C. 7:7E-3.4 Prime Fishing Areas.

N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries

In their Consistency Review, NJDEP found the Proposed Activity inconsistent with the enforceable policy at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries. The enforceable policy, N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries, specifically states:

> (b) Any activity that would adversely impact on the natural functioning of marine fish, including the reproductive spawning and migratory patterns or species abundance or diversity of marine fish, is discouraged. In addition, any activity that would adversely impact any New Jersey based marine fisheries or access thereto is discouraged, unless it complies with (c) below.
> (c) The following coastal activities are conditionally acceptable provided that the activity complies with the appropriate general water area rule(s) at N.J.A.C 7:7E-4;
> 1. Construction of submerged cables and pipelines;
> 2. Sand and gravel mining to obtain material for beach nourishment, provided:
> i. The beach nourishment project is in the public interest;
> ii. There are no alternative borrow sites that would result in less impact to marine fish and fisheries;
> iii. Any alteration of existing bathymetry within Prime Fishing areas, as defined at N.J.A.C. 7:7E-3.4, does not reduce the high fishery productivity of these areas; and
> iv. Measures are implemented to minimize and compensate for impacts to marine fish and fisheries

NJDEP provided several reasons why the Proposed Activity was inconsistent with the enforceable policy described under N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries, all of which are addressed below.

New Jersey's rules discourage activities that adversely impact the natural functioning of marine fish: The enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries "discourages" but does not *prohibit* activities that adversely impact the natural functioning of marine fish. While the Proposed Activity may have a temporary impact on fish close to the vessel, as supported by the PEIS, 2014 Final EA, and Draft Amended EA, no significant impacts on fish populations and associated Essential Fish Habitat (EFH) would be anticipated. This conclusion is further supported by the EFH consultation conducted for the activity in 2014 and the proposed 2015 activity. The Proposed Activity would occur outside of NJ state waters, and any effects, would likely not affect fish and fisheries within the 3-nmi state waters. It is also important to note that studies evaluating impacts of sound on fish and fisheries vary (e.g., use of a larger source size) and do not necessarily emulate the Proposed Activity or potential impacts. Regardless, as the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries discourages, but does not prohibit activities that may impact marine fish, the Proposed Activity is consistent to the maximum extent practical with the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries.

NJDEP's Consistency Review referenced a study that demonstrated declining catch rates for a number of commercial fisheries during seismic testing activities (Engås, et al., 1996[13]). A substantial difference between the study by Engås et al. (1996) and the proposed activity is that they used a 5000-in^3 airgun array, whereas the proposed 2015 survey would use a 700-in^3 array. A shortcoming of the study by Engås et al. (1996) is that it lasted only 5 days after seismic activities ceased; during that time, trawl catches of cod and haddock and longline catches of haddock showed no increase, whereas longline catches of cod approached the preshooting level.

In NJDEP's letter, they also reported, "More recently, Svein Lokkeborg, et al., highlighted that "reduced catches on fishing grounds exposed to seismic survey activities have been demonstrated."" [Løkkeborg et al., 2012a[14]] The reference in NJDEP's letter is, however, a review in a book, "The effects of noise on aquatic life," whereas the reference provided in the Draft Amended EA is a paper in a journal that presents the results of a field experiment off Norway in 2009. As stated on page 52 of the Draft Amended EA, Løkkeborg et al. (2012b)[15] described in their introduction three studies in the 1990s that showed effects on fisheries. "In contradiction to these findings and fishermen's concerns" (Løkkeborg et al., 2012b), their study off Norway in 2009 showed that gillnet catches during seismic shooting were doubled for redfish (86% increase) and Greenland halibut (132%), whereas longline catches decreased (16% for Greenland halibut, 25% for haddock). These results were explained by greater swimming activity and lowered food search behavior in fish exposed to airgun sound. Also, for all but one fish species (pollock), acoustic mapping did not suggest displacement from fishing grounds (Løkkeborg et al., 2012b). NJDEP stated that, "The conclusions reached by the Løkkeborg study are further supported by other recent studies concluding that catch rates reduced in the presence of seismic studies," referring to Fewtrell and

[13] Engås, A., S. Lokkeborg, E. Ona, and A.V. Soldad. 1996. Effects of seismic shooting on local abundance and catch rates of cod (*Gadus morhua*) and haddock (*Melanogrammus aeglefinus*). **Can. J. Fish. Aquat. Sci.** 53:2238-2249.

[14] Løkkeborg, S., E. Ona, A. Vold, and A. Salthaug. 2012a. Effects of sounds from seismic air guns on fish behavior and catch rates. Advances in Experimental Medicine and Biology 730:415-419.

[15] Løkkeborg, S., E. Ona, A. Vold, and A. Salthaug. 2012b. Sounds from seismic air guns: Gear- and species-specific effects on catch rates and fish distribution. **Can. J. Fish. Aquat. Sci.** 69:1278-1291.

McCauley (2012)[16]. Fewtrell and McCauley (2012), however, did not study catch rates, nor did they make any suggestions that their results were applicable to catch rates. Rather, as stated in the Draft Amended EA, they exposed squid, pink snapper, and trevally to pulses from a single airgun. The received sound levels ranged from 120 to 184 dB re 1 dB re 1 $\mu Pa^2 \cdot s$ SEL. Increases in alarm responses were seen in the squid and fish at SELs >147–151 dB re 1 $\mu Pa^2 \cdot s$; the fish swam faster and formed more cohesive groups in response to the airgun sounds, and squid were seen to discharge ink or change their swimming pattern or vertical position in the water column.

In their Consistency Review, NJDEP noted that, due to the time of year and project duration, the potential impacts could significantly affect harvest rates. The survey, however, would only take place for approximately 30 days, not the entire summer season, and only a small portion of the entire survey area would be affected at any one time during seismic operations. As stated in the Draft Amended EA (page 53), "the proposed survey area represents less than one half percent (0.28%) of the area of waters from the NJ shore to the EEZ..." The information presented by NJDEP in their letter, however, presumes loss of an entire harvest season for particular species over the entire NJ coastal region. In the unlikely event the survey were to have an impact on harvest rates, it would impact a much smaller percentage of harvest than what was presented by NJDEP. Furthermore, as noted previously and in the CD and Draft Amended EA, during 4 previous research seismic surveys in the proposed survey area, there were no noticeable effects on commercial or recreational fish catch rates in the months when the activities were undertaken (Draft Amended EA, page 53).

Minimize or mitigate for adverse impacts: The second reason NJDEP provided for finding the proposed activity inconsistent was, "NSF's failure to minimize or mitigate for adverse impacts to a commercially important fishery, which is inconsistent with NSF's own guidance..." This allegation – even if true – is not, however, related to the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries; there is no requirement for monitoring and mitigation for activities that may adversely impact marine fish except for those activities specifically defined in N.J.A.C. 7:7E-8.2 (c) 2 related to sand and gravel mining, and the Proposed Activity does not involve sand and gravel mining. Furthermore, although NSF disagrees with NJDEP's conclusion that pre-survey planning was not conducted, the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries does not require pre-survey planning or an agency to be consistent with their own policies. As the Proposed Activity does not involve sand or gravel mining, and the enforceable policy does not require monitoring and mitigation or agency consistency with their own policies, NSF concludes that the Proposed Activity is consistent with the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries.

Even if relevant to the Consistency Review, which NSF asserts it is not, NJDEP's conclusion that pre-survey mitigation planning was not conducted lacks merit. Pre-survey mitigation planning is described in the PEIS Section 2.4.1.1 Mitigation Measures (Mitigation during Planning Phases) (page 2-64); PEIS Section 3.3.7 Summary of Environmental Consequences – Fish (page 3-49); and, in the Draft Amended EA, Chapter II, Proposed Action (3)(a) Planning Phase (pages 6-7). During the planning stage for the Proposed Activity, survey timing and seasonal presence of marine species were taken into consideration. Most importantly, it was determined that for the 2015 proposed survey, a relatively small seismic source, 700 in^3, would be sufficient to meet the scientific needs. Based on preliminary information about the survey site provided by the PI, past experience by ship personnel familiar with the survey site, information presented in the 2014 Final EA, federal consultations conducted in 2014, impacts related to fish and space-use conflicts with fishermen, if any, were not expected to be significant. Therefore, during the survey planning stage, given the Proposed Activity, the standard operational monitoring and mitigation measures identified in the PEIS and the 2014 Final EA were viewed as appropriate to observe

[16] Fewtrell, J.L. and R.D. McCauley. 2012. Impact of airgun noise on the behaviour of marine fish and squid. **Mar. Poll. Bull.** 64(5):984-993.

and protect for potential impacts to marine species, including fish, and address potential space-use conflicts. Plans for monitoring and mitigation during operations were identified in the Draft Amended EA, Chapter II, Proposed Action (3)(b) Operational Phase (pages 7-8) and were consistent with the PEIS. As articulated in the Draft Amended EA, during survey operations, fishing activities could occur within the survey area; however, a safe distance would need to be kept from the *Langseth* and the towed seismic equipment. As identified during pre-survey planning efforts and specified in the Draft Amended EA, during operations, LDEO would coordinate with the U.S. Coast Guard to issue Notice to Mariners to avoid space-use conflicts with any fishermen in the area. Conflicts would be avoided and, therefore, impacts would be negligible. Greater clarification of PSO roles for monitoring for impacts to fish will be included in the Final Amended EA for the Proposed Activity based on NJDEP comments submitted to NSF during the public comment period on the Draft Amended EA. In addition to pre-survey planning, the Draft Amended EA provided detailed information in Chapter III, Fish, Essential Fish Habitat, and Habitat Areas of Particular Concern Section, on the two fish species listed under the ESA as Endangered that could occur within the study area: the New York Bight distinct population segment (DPS) of the Atlantic sturgeon, and the shortnose sturgeon, and the two candidate species for listing: the cusk and the Northwest Atlantic and Gulf of Mexico DPS of the dusky shark. Of the four potential species identified, two of them, the Atlantic and shortnose sturgeons, would be less likely to be found within the survey area because of their estuarine and nearshore coastal distribution. The Draft Amended EA, Chapter III, Fisheries Section also included analysis of the types of fish and commercial and recreational fisheries that could occur within and near the proposed survey site.

LDEO also has significant experience working in and around fisheries vessels while towing seismic equipment. A recent example includes the *Langseth* successfully coordinating with and working in and around fisheries vessels during a seismic survey conducted off the coast of North Carolina in 2014. In addition, during a survey in the Gulf of Mexico in 2007/2008, numerous vessels, including small fishing and shrimp boats, operated near the *Langseth*, approaching within 200 m of the vessel (Holst and Beland 2008)[17].

National Marine Fisheries Service (NMFS) findings and guidance: The third reason NJDEP found the Proposed Activity to be inconsistent with the enforceable policy was they felt NSF had not addressed a recommendation made by NMFS in a letter to NSF dated June 18, 2014, that delineated the conclusions of the EFH consultation for the 2014 survey. Contrary to NJDEP's interpretation, however, as stated in the letter, NMFS required no specific EFH conservation recommendations pursuant to Section 305(b)(2) of the Magnuson-Stevens Act for the Proposed Activity. Whereas NMFS suggested that additional research and monitoring were needed "to gain a better understanding of the potential effects seismic survey activities may have on EFH, federally managed species, their prey and other NOAA trust resources, and should be a component of future NSF funded seismic survey activities," it was not a requirement of the EFH consultation. Even though this was not a requirement for the survey to proceed, NSF has engaged in activities to gain a better understanding of the potential effects seismic survey activities may have on the marine environment, including on fish and EFH. For example, NSF provided federal funding for the, "Fourth International Conference on Effects of Noise on Aquatic Life" (AN2016), which is a follow-on from international meetings held in Nyborg, Denmark (2007), Cork, Ireland (2010), and Budapest, Hungary (2013; www.an2013.org), all of which NSF also provided funding. The major goal of AN2016 will be to define the current state of knowledge on the impact of underwater noise and, in particular, explore the progress made in this field in the three years since the previous conference. The meeting will bring together researchers, regulators/policy makers, and industry with an interest in

[17] Holst, M. and J. Beland. 2008. Marine mammal and sea turtle monitoring during Lamont-Doherty Earth Observatory's seismic testing and calibration study in the northern Gulf of Mexico, November 2007–February 2008. LGL Rep. TA4295-2. Rep. from LGL Ltd., King City, Ont., for Lamont-Doherty Earth Observatory of Columbia Univ., Palisades, NY, and Nat. Mar. Fish. Serv., Silver Spring, MD. 76 p.

different animal groups, including marine mammals, turtles, fish and invertebrates. Regardless of NJDEP's misinterpretation that additional research and monitoring were a requirement of the 2014 EFH consultation and that NSF has not made any efforts on this front, NJDEP did not identify how this issue relates to the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries. The enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries includes no reference or provision for fisheries monitoring and mitigation except for those activities specifically defined in N.J.A.C. 7:7E-8.2 (c) 2. related to sand and gravel mining. As the Proposed Activity does not involve sand or gravel mining, and monitoring and mitigation are not requirements of the enforceable policy, NSF concludes that the Proposed Activity is consistent with the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries. Although not relevant for the consistency review, for clarity, NSF has in fact consulted on EFH with NMFS, the federal agency with jurisdiction over EFH for the Proposed Activity, and NMFS has drawn the same conclusion as in 2014 and provided no conservation recommendations.

Concerns raised by the Department's stakeholders: NJDEP also cited concerns raised by the Departments stakeholders, including members of New Jersey's commercial and recreational fishing industry as a reason for finding the Proposed Activity inconsistent with the enforceable policy. On January 21, 2015, NJDEP announced in the DEP Bulletin a 15-day public comment period for the CD review. After receiving NJDEP's Consistency Review on March 6, 2015, NSF requested on March 9, 2015, copies of the public comments received by NJDEP. NJDEP provided those comments to NSF on March 16, 2015. After NSF's review of the five comments received from NJDEP, NSF concluded that the comments focused on potential effects of the Proposed Activity, but did not define or describe how the Proposed Activity was consistent or not with the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries.

For the reasons noted above, NSF disagrees with NJDEP's inconsistent finding, and concludes that the Proposed Activity is consistent to the maximum extent practicable with the enforceable policy described at N.J.A.C. 7:7E-8.2 Marine Fish and Fisheries. Although NJDEP has suggested several recommendations for NSF to consider implementing should the Proposed Activity move forward, NJDEP did not specifically clarify how implementation of those recommendations would make the Proposed Activity consistent with this particular enforceable policy.

N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant Species Habitats

In their Consistency Review, NJDEP, contends that there was "insufficient information to conclude that there will be insignificant impacts to the habitat of New Jersey's endangered and wildlife species" and, therefore, found the Proposed Activity inconsistent with the enforceable policy set forth at N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant Species Habitats. That enforceable policy states, in pertinent part, as follows:

7:7E-3.38 Endangered or threatened wildlife or plant species habitats

(a) Endangered or threatened wildlife or plant species habitats are terrestrial and aquatic (marine, estuarine or freshwater) areas known to be inhabited on a seasonal or permanent basis by or to be critical at any stage in the life cycle of any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing. The definition of endangered or threatened wildlife or plant species habitats includes a sufficient buffer area to ensure continued survival of the population of the species as well as areas that serve an essential role as corridors for movement of endangered or threatened wildlife. Absence of such a buffer area does not preclude an area from being endangered or threatened wildlife or plant species habitat.

1. Areas mapped as endangered or threatened wildlife species habitat on the Department's Landscape Maps of Habitat for Endangered, Threatened and Other Priority Wildlife (known hereafter as Landscape Maps) are subject to the requirements of this section unless excluded in accordance with (c)2 below. Buffer areas, which are part of the endangered or threatened wildlife species habitat, may extend beyond the mapped areas. The Department's Landscape Maps, with a listing of the endangered and threatened species within a specific area, are available from the Department's Division of Fish and Wildlife, Endangered and Nongame Species Program at the Division's web address, www.state.nj/us/dep/fgw/ensphome.

* * *

(b) Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant species habitat would not directly or through secondary impacts on the relevant site or in the surrounding area be adversely affected.

At the outset, the Proposed Activity involves a rescheduled marine seismic research survey and does not appear to constitute a "development activity" as contemplated by NJ in its CMP. Examples of development activities provided in NJ's CMP include such things as waterfront development facilities; construction, relocation, or enlargement of any building or structure; site preparation (grading, filling, excavation) on beaches and dunes; and residential, commercial, industrial, and public development. N.J.A.C. 7:7E-1.8 Definitions. Therefore, N.J.A.C. 7:7E-3.38 does not apply to the Proposed Activity.

Further, even if the Proposed Activity could somehow be deemed to be a "development activity," it would occur substantially outside of NJ state waters and would be highly unlikely to impact species habitat areas depicted in NJDEP's Landscape Map referred to in 7.7E-3.38(a)(1). Indeed, NJDEP does not indicate in its Consistency Review how the Proposed Activity, which would conduct research located, at the closest point, approximately 15 nmi from the NJ coastal zone, would impact species habitat located on the Landscape Map. Accordingly, the Proposed Activity does not implicate N.J.A.C. 7:7E-3.38.

Aside from the points made above, NSF did prepare an assessment of the potential impacts of the Proposed Activity on marine species and habitat within and near the survey area, and concluded that endangered or threatened wildlife or plant species habitat would not directly or through secondary impacts on the relevant site or in the surrounding area be adversely affected. Specifically, NSF prepared a Draft Amended EA (which tiered from the PEIS and the 2014 Final EA), a CD, an application for an Incidental Harassment Authorization, and submitted consultation and concurrence requests under Section 7 of the Endangered Species Act. The conclusion of no significant impacts was validated by the National Marine Fisheries Service (NMFS), the federal agency charged with regulating activities having the potential to impact marine mammals and threatened and endangered species, when it issued an Incidental Harassment Authorization (IHA) and Biological Opinion (BO)/Incidental Take Statement (ITS) on May 7, 2015. In addition, U.S. Fish and Wildlife Service concurred that the proposed activity may affect but would not adversely affect endangered and threatened species under their jurisdiction.

The information NJDEP provided in its Consistency Review did not support their finding that there would be impacts to endangered and threatened species habitat, but, rather, focused on potential impacts to marine species that might occur if they were close to the seismic sources during operations (i.e., outside of NJ state waters), which is not applicable to N.J.A.C. 7:7E-3.38. Moreover, as noted in the Draft

Amended EA (page vi), impacts from the Proposed Activity would primarily be anticipated from use of the airguns and impacts (if any) from the proposed airgun source would mainly be to marine species themselves, and not to their habitat. In addition, impacts to marine species would be temporary in nature and would occur relatively close to the vessel. In sum, the analysis NJDEP included in their Consistency Review did not demonstrate how airguns would have impacts on habitat, including habitat in NJ state waters, as a result of the Proposed Activity.

NJDEP also included information about sea turtles in their Consistency Review, including the statement, "Sea turtles likely use sound for navigation, predator avoiding, locating prey, and other activities," with a reference to "Piniak et al. 2012"; the full reference for that citation, however, was not provided to NSF. Similarly, a reference to "Moein et al. 1995" was provided regarding the impacts of anthropogenic noise on sea turtles, however a full reference for that citation was not provided. Moein et al. (1994)[18], however, investigated the avoidance behavior and physiological responses of loggerhead turtles exposed to an operating airgun, as well as the effects on their hearing. The turtles were held in a netted enclosure ~18 m by 61 m by 3.6 m deep, with an airgun of unspecified size at each end. The turtles exhibited avoidance during the first presentation of airgun sounds at a mean range of 24 m, but the avoidance response waned quickly. Based on physiological measurements, there was some evidence of increased stress in the sea turtles, but this stress could also have resulted from the handling of the turtles. Five confined turtles exposed to a few hundred pulses from a single airgun exhibited some change in their hearing when tested within 24 h after exposure relative to pre-exposure hearing, and hearing had reverted to normal when tested two weeks after exposure. The results are consistent with the occurrence of temporary threshold shift (TTS) upon exposure of the turtles to airgun pulses. There was no indication of permanent hearing loss.

NJDEP also stated in their Consistency Review, "Therefore, sea turtles may be migrating through the project area during the critical June to July period, making them susceptible not only to impacts (e.g., behavior changes, hearing loss) from seismic activity, but to entanglement in the seismic array gear, and injury or mortality due to ship strikes." NSF assumes that, in that statement, "critical June to July period" means "relevant June to July period", as that period is not critical for sea turtles. Entrapment of sea turtles in the *Langseth* gear is highly unlikely because of the equipment design, and ship strikes are unlikely because of the slow vessel speed associated with survey operations. As stated on page 50 of the Draft Amended EA, "In decades of seismic surveys carried out by the R/V *Langseth* and its predecessor, the R/V *Ewing*, Protected Species Observers (PSOs) and other crew members have seen no seismic sound-related sea turtle injuries or mortality, including during 2014 survey activities [off New Jersey]." Although NJDEP suggests, "Effects from air gun noise to smaller turtles would undoubtedly be greater than those observed in monitoring studies, while their ability to swim away or avoid the array due to their size will be reduced..." no scientific references were provided to support this conclusion, nor were specific references provided to identify to which "monitoring studies" NJDEP was referring. Whereas smaller sea turtles might be slightly more disadvantaged at swimming away from the source, because of the vessel operating speed, the ship would pass by any sea turtle relatively quickly regardless of its size. PSOs would also monitor and mitigate for sea turtles around the vessel.

NJDEP also reported in their Consistency Review, "Acoustic detections of whale calls by Geo-Marine, Inc. confirmed the presence of right whales within 37 km of the shoreline, approximately between Seaside Park and Stone Harbor, during all seasons, concluding that some individual right whales occur in the nearshore waters off New Jersey either transiently or regularly." While it is possible, it is not likely that a small number of North Atlantic right whales (NARWs) could be off New Jersey in June. Geo-

[18] Moein, S.E., J.A. Musick, J.A. Keinath, D.E. Barnard, M. Lenhardt, and R. George. 1994. Evaluation of seismic sources for repelling sea turtles from hopper dredges. Rep. from Virginia Inst. Mar. Sci., Gloucester Point, VA, for U.S. Army Corps of Engineers. 33 p.

Marine, Inc.'s (GMI's) acoustic recording effort was in March, June, September, and December 2008, and March and August 2009. The majority of acoustic detections of NARWs were in March 2008 (78 or 60%), whereas there were only 7 detections in March 2009, indicating annual differences or, more likely, methodological limitations. There were 12 acoustic detections in June 2008. NARW sightings were few: during the study period (aerial and vessel surveys once or twice monthly between February 2008 and June 2009), there were a total of 4 sightings during November, December, and January. As stated on page 8 of the Draft Amended EA, "Special mitigation measures were considered for this cruise. Although it is very unlikely that a NARW would be encountered, the airgun array would be shut down if one is sighted at any distance from the vessel because of the species' rarity and conservation status."

NJDEP's Consistency Review also notes concerns about sound effects (page 8-9): "Noise pollution, in the form of repeated or prolonged sounds would adversely impact marine mammals by disrupting otherwise normal behaviors associated with migration, feeding, alluding predators, resting, and breeding, etc. Any alterations to these behaviors would jeopardize the survival of an individual simply by increasing efforts directed at avoidance of the noise and the perceived threat." In both sentences, "would" should be replaced by "could". The proposed rescheduled survey is expected to result in only minor behavioral disturbances that would be expected to have only negligible impacts both on individual marine mammals and on the associated species and stocks. The type of effects described by NJDEP would only occur if marine mammals were excluded from critical areas for migration, feeding, or breeding at critical times, and that would not be the case off New Jersey in summer. A recent special issue of the journal *Aquatic Mammals* (February 2015) was devoted to the identification and description by NOAA of "important biological areas" (IBAs) in U.S. waters; for an area to be biologically important for cetacean species, stocks, or populations, it needs to meet at least one of the following four criteria: areas and times within which (1) a particular species selectively mates, gives birth, or is found with neonates or calves (*Reproductive Areas*); (2) aggregations of a particular species preferentially feed, (3) a substantial portion of a species is known to migrate (*Migratory Corridors*); and (4) small and resident populations occupy a limited geographic extent (*Small and Resident Population*). The only IBA off New Jersey is the NARW migratory corridor during March–April and November–December, which the timing of the proposed 2015 survey in June/July/August would avoid.[19]

NJDEP further noted in their Consistency Review (page 10): "This is especially important for North Atlantic right whales and harbor porpoise[20] in the vicinity of the project area, which these species [sic] have a lower recommended PTS threshold level, according to new National Marine Fisheries Service guidelines, currently undergoing public comment."[21] NMFS did recommend lower TTS and PTS thresholds for harbor porpoises (and other high-frequency cetaceans), but not for North Atlantic right whales, which are low-frequency cetaceans. As stated on page 40 of the Draft Amended EA, "The limited available data suggest that *harbor porpoises* show stronger avoidance of seismic operations …" which would reduce their susceptibility to incurring TTS.

The survey would occur at its closest point approximately 15 nmi outside the NJ coastal zone. Analysis of effects on habitat in the PEIS, the 2014 Final EA, and the Draft Amended EA, all concluded that

[19] LaBrecque, E., C. Curtice, J. Harrison, S.M. Van Parijs, and P.N. Halpin. 2015. Biologically important areas for cetaceans within U.S. waters—east coast region. p. 17-29 *In*: S.M. Van Parijs, C. Curtice, and M.C. Ferguson (eds.), Biologically important areas for cetaceans within U.S. waters. **Aquat. Mamm.** (Special Issue) 41(1). 128 p.

[20] NSF would be interested in receiving the Department's Endangered and Nongame Species Program's records of harbor porpoise occurring in the project vicinity and during the project period for future consideration. As stated on page 25 of the Draft Amended EA, "In summer, sightings mapped from numerous sources extended only as far south as off northern Long Island, New York".

[21] NMFS has not issued new acoustic guidance. In 2013, NMFS issued draft acoustic guidance for public review and comment. The public comment period has closed and NMFS is currently revising the guidance based on public comment, however, it remains unclear when, or if, new guidance will be issued.

impacts from survey activity would not be significant in or near the survey area; therefore, farther away from the survey area, including within NJ state waters, effects would either be reduced or not expected. Federal regulatory agencies with jurisdiction over the survey area concurred that impact on species and habitat for both the 2014 survey and the proposed 2015 survey would not be significant and all necessary authorizations were issued. No impacts on habitats were observed or reported during the portion of the 2014 survey that was conducted (Ingram et al., 2014)[22]. NJDEP contended in their Consistency Review that there was insufficient information to conclude impacts on endangered or threatened wildlife habitats within the NJ coastal zone would be insignificant; however, uncertainty, even by NJDEP's definition, does not make the Proposed Activity inconsistent with the enforceable policy – especially if the Proposed Activity is not a development activity. For the above noted reasons, NSF concludes that the Proposed Activity is consistent to the maximum extent practicable with the enforceable policy described at N.J.A.C. 7:7E-3.38 Endangered or Threatened Wildlife or Plant Species Habitats.

NJDEP Recommendations

As noted above, NJDEP included several recommendations in their Consistency Review and requested NSF consider and include them in the Proposed Activity should NSF decide to move forward over NJDEP's stated opposition. NSF considered these recommendations in the context of the enforceable policies of the CMP, per the CZMA, and responds to each recommendation below.

1. Shift the survey to a September/October timeframe

NJDEP suggested shifting the survey to a September/October timeframe for 2015, or to a September/October timeframe of a future year. Whereas NSF has taken into consideration alternative times to conduct the survey, NJDEP has disregarded reasons provided in the Draft Amended EA for survey scheduling limitations, including presence of marine species, weather, and personnel and equipment availability.

There is no indication in seasonal marine mammal density data that September/October would be preferable to June through August. NJDEP has failed to identify how the September/October timeframe is more optimal and less impactful than the June/July/August timeframe proposed by NSF -- a timeframe that federal agencies with jurisdiction over endangered and threatened species in the area have also found to be of an optimal period to operate with respect to marine mammals. These agencies also found in 2014 that the 2014 survey, also authorized to occur during the June/July/August timeframe, would not result in significant impacts to marine species, including endangered or threatened species, and their habitats, and met the criteria for obtaining an IHA. At most, with implementation of monitoring and mitigation measures, the Proposed Activity, like the 2014 survey, could result in Level B harassment (behavior modification) to marine mammals. Given that the federal agencies charged with protecting marine mammals and endangered and threatened species authorized the same activity during the June/July/August timeframe in 2014, it is logical that NSF has proposed that the project occur within the same time period in 2015.

NJDEP also suggested that September/October would likely avoid hazardous weather conditions. This time period, however, is actually peak season for hurricanes[23]; some of NJ's deadliest recorded storms have occurred during September/October. The most recent deadliest hurricane that hit the NJ shoreline was Hurricane Sandy which impacted the state from October 26, 2012 to November 8, 2012. The

[22] Ingram, H., L. Marcella, L. Curran, C. Frey, and L. Dugan. 2014. Draft protected species mitigation and monitoring report: 3-D seismic survey in the northwest Atlantic Ocean off New Jersey, 1 July 2014–23 July 2014, R/V *Marcus G. Langseth*. Rep. from RPS, Houston, TX, for Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY.

[23] http://climate.rutgers.edu/stateclim/?section=menu&%20target=nj_hurricane_history

hurricane was declared a major disaster on October 30, 2012.[24] Hurricane Sandy was responsible for 73 deaths in the United States and cost billions of dollars in assistance.[25] The rough weather encountered by the *Langseth* during the 2014 survey demonstrates the challenges of conducting oceanographic research even during optimal weather periods, and similarly, highlights the potential safety hazards of operating during suboptimal weather periods.

NJDEP assumed the PI and science team were available at any time to conduct the survey. The science team consists of upwards of 35 people, including senior scientists and students. During the September/October timeframe, the lead PI and a collaborating PI have teaching obligations, and, two collaborating PIs are scheduled to conduct field work at sea on other research cruises. It is also not reasonable to anticipate that the *Langseth* would be available in the North Atlantic Ocean in the near term future. Although the *Langseth* has been in the North Atlantic for the last year and a half in support of academic research activities, this is the first time it has operated along the U.S. East Coast since it began science operations for NSF in 2008. At present, the *Langseth* is scheduled to support other research activities in 2015, including a research activity in the Mediterranean Sea; the *Langseth* is scheduled to depart in support of that activity in September. After that survey, the vessel is scheduled to transit to the east coast of South America, the west coast of South America, then on to the southwest Pacific Ocean. Therefore, it is not a reasonable assumption that the *Langseth* would be available to work along the U.S. East Coast in the foreseeable future. In addition, as a U.S. government-owned national asset, it is NSF's responsibility to operate the vessel in the most efficient way possible; thus, when scheduling the vessel in support of research activities, factors such as minimizing transits are considered.

In addition, NJDEP has suggested that the geologic formations at the target depths of interest are static and not likely to change if the Proposed Activity were rescheduled to September to October in a future year in which the personnel and equipment essential to meet the overall project objectives are available. This suggestion, however, does not take into account that the research was proposed by researchers and students with professional and academic careers that depend upon the collection of these data and successful completion of the survey. In other words, there is a timeliness factor involved with the Proposed Activity, as well as a desire to have the scientific results incorporated into the broader scientific community in the near term.

NJDEP also suggested that this recommendation would reduce impacts to prime fishing areas, marine fish and fisheries, and endangered or threatened wildlife habitats**.** NJDEP has failed, however, to demonstrate how implementation of this recommendation would make the activity consistent with enforceable policies of the CMP. In particular, as noted above, data provided to NSF by NJDEP on March 25, 2015, for the NMFS Statistical Areas 614 and 615 showed that commercial landings in 2011 were much lower in summer than in spring, fall, or winter. For recreational landings for all waters off NJ from 2011 to 2014, the highest landings for two out of the four years occurred in September/October. Other points identified by NJDEP do not support that moving the survey to September/October would reduce potential environmental impacts as purported by NJDEP, or how they relate to the enforceable policies.

2. Field Study

NJDEP also recommended that, if the Proposed Activity were to take place during the June to August timeframe, that a field study focused on assessing the Proposed Activity's impacts on fisheries and marine mammals be included. NJDEP indicated the study should include monitoring of fish behavior, abundance and catch rates; monitoring should start a minimum of one month prior to project commencement, continue through the duration of the project, and last a minimum of one month after project cessation. NJDEP did not, however, provide a description of how the study should be conducted

[24] http://www.fema.gov/disaster/4086
[25] http://www.fema.gov/sandy-recovery-office

in its Consistency Review, nor did they explain how implementation of such a study would make the Proposed Activity consistent with the enforceable policies of the CMP.

The Proposed Activity does, though, include a monitoring plan focused on assessing the project's impacts on marine species, including marine mammals, sea turtles, sea birds, and fish. As described earlier, and in the Draft Amended EA (pages 5-8 and 45), the associated IHA application (on which NJDEP commented on April 16, 2015), and the IHA and BO/ITS issued on May 7, 2015, 5 NMFS approved PSOs would be independently contracted to be present during the survey to conduct monitoring activities and implement mitigation measures. Rotating shifts of PSOs would allow two observers to monitor for marine species during daylight hours, and 1 observer to monitor the Passive Acoustic Monitoring system during day and night-time seismic operations. Although inclusion of PSOs during a seismic survey is a standard measure required by the PEIS, it is also a requirement of the IHA and BO/ITS issued by NMFS, and was identified and required in the IHA issued for the survey in 2014. PSOs would monitor and report on the presence and behavior of marine species, and implement any of the mitigation measures for the research activity as described in the NSF Draft Amended EA, LOC issued by USFWS, and the IHA and BO/ITS, including the cessation of seismic sources. PSOs would document any observations, including species behavior and abundance, during the survey as described by the Draft Amended EA and as required by the IHA and BO/ITS. Although the survey would only occur within a small area within statistical area 615, fish catch rates for both statistical areas 614 and 615 could be obtained from the NOAA database (http://www.st.nmfs.noaa.gov/st1/commercial/index.html) and assessed for comparative analysis when that information becomes available. Within 90 days of the conclusion of the survey, an observation report would be provided to NMFS, it could also, following NMFS' approval, be provided to NJDEP's Endangered and Nongame Species Program for inclusion into the Biotics database. Pre-survey monitoring would commence upon departure from port and during initial gear deployment; monitoring would continue throughout the duration of the survey. Post-survey monitoring would occur upon conclusion of the seismic operations, during gear retrieval, transit through survey area, and transit to port. Should a support vessel be used during the survey, the vessel could serve as an additional platform for marine species observations, with an enhanced focus on fish monitoring. Although not originally proposed, to address concerns about space-use conflicts, throughout the duration of the survey, the R/V *Langseth* and any support vessel could keep a log of all vessels observed within the survey area; the complete log could be included in the formal report of PSO observations submitted to NJDEP's Endangered and Nongame Species Program. In addition, NAIS data could be evaluated and reported to NJDEP to confirm vessel activity in the survey area.

NJDEP, as stated above, has failed to demonstrate how their recommendation relates to the enforceable policies of the CMP and how implementation of this recommendation would make the activity consistent with the enforceable policies of the CMP. Regardless, the Proposed Activity, which would include the above-mentioned monitoring plan, already satisfies the majority of the goals of the field study recommended by NJDEP.

3. Aerial survey

NJDEP suggested that an aerial survey be performed over the survey area just prior to the vessel leaving its home port to facilitate marine species protection. NJDEP suggested the flyover would determine if there were feeding, static, or migrating populations of sea turtles or marine mammals; if animals were not observed during the flyover, then the survey could be performed as scheduled. If marine mammals or sea turtles were found within or near the project area during the flyover, then NJDEP suggested a 3-4 day delay of the survey would be prudent. NJDEP noted that a flyover would be important for North Atlantic right whales and harbor porpoises in the vicinity because they have lower recommended Permanent Threshold Shift levels according to NMFS draft acoustic guidance currently undergoing public

comment.[26] NSF comments on Temporary Threshold Shift TTS and PTS levels on the two species are given on p. 18 of this letter.

The flyover request by NJDEP is not, however, a scientifically rigorous or effective mitigation measure. Regardless, NSF did bring this recommendation to the attention of NMFS during the IHA consultation process. NMFS, the federal agency with jurisdiction to regulate activities having the potential to affect marine mammals in the proposed survey area, however, did not recommend conducting aerial surveys as a mitigation measure that would further protect marine mammals in the IHA or BO/ITS issued for the proposed survey. If this measure were to be included in the study, it would unnecessarily add noise to the survey area and would require assessment under NEPA, ESA and MMPA.

Importantly, because of the high risk nature of marine mammal aerial surveys, especially those that occur farther offshore, NSF would only consider conducting one if it were recommended or required, and scientifically justified, by NMFS. On May 17, 2008, a Cessna 337A, N5382S, crashed while attempting to divert to Eagles Nest Airport (31E), West Creek, New Jersey for an emergency landing and the certified commercial pilot and one passenger were fatally injured, and the other two passengers were seriously injured.[27] The plane was conducting a marine mammal survey flight for a study funded by NJDEP. Here, the Proposed Activity would take place substantially beyond the nearshore area that NJDEP had contracted for the fatal aerial survey, further increasing risk in the event of an in-flight emergency.

Aside from the high risk associated with this recommendation, NJDEP has not demonstrated that this measure has biologically relevant scientific merit and would improve marine species protection. In contrast, the monitoring plan proposed by NSF includes standard and systematic monitoring and mitigation measures for seismic surveys. The *Langseth* would carry five PSOs on board to observe for marine species around the vessel and survey area. Observations would begin during daylight hours immediately upon leaving port. During deployment of seismic gear, PSOs would have the opportunity to monitor around the vessel and observe for feeding, static, or migrating populations of sea turtles or marine mammals. Seismic operations would not begin if marine mammals, sea turtles, or sea birds were observed within a designated zone around the seismic source. The standard monitoring and mitigation measures described in the PEIS and Draft Amended EA would be followed along with the additional measures set forth in the associated IHA and BO/ITS.

In sum, NJDEP has failed to demonstrate how their recommendation for an aerial survey is tied to the enforceable policies of the CMP and how this measure would make the Proposed Activity more consistent with the enforceable policies of the CMP. Therefore, NSF concludes that the Proposed Activity is consistent to the maximum extent practical with the CMP, regardless of whether this recommendation is implemented.

4. QA/QC Plan

NJDEP also suggested a, "QA/QC[28] plan that would designate one independent person as responsible for ensuring the cessation of sound producing activities if sea turtles or marine mammals are observed during transect runs." NJDEP suggests the vessel should stop all noise for at least 30 minutes after the animal is no longer observable in the area. The designee would document any observations of sea turtles and send

[26] As explained earlier, the NMFS draft acoustic guidance is no longer undergoing public comment. NMFS is currently revising the guidance based on public comment, however, it remains unclear when, or if, new guidance will be issued.

[27] NJDEP EBS Final Report: Volume III, July 2010; http://www.kathrynsreport.com/2013/01/trenton-new-jersey-woman-injured-in.html)

[28] QA/QC was not defined by NJDEP, however, NSF has assumed it to mean "Quality Assurance/Quality Control."

the information to NJDEP's Endangered and Nongame Species Program for inclusion in the Biotics database.

As described in the Draft Amended EA (pages 5- 8) and associated IHA application (pages 34-40), five NMFS approved PSOs would be independently contracted to participate on the survey. Although inclusion of PSOs during a seismic survey is a standard measure required by the PEIS and has been the case for previous surveys, it is also a requirement of the IHA and BO/ITS recently issued by NMFS. PSOs would monitor and report on the presence and behavior of marine species, and direct the implementation of the mitigation measures for the research activity as described in the NSF Draft Amended EA, LOC issued by USFWS, and IHA and BO/ITS, including the cessation of seismic sources due to presence of marine species within a designated area around the vessel. PSOs would document any observations during the survey as described by the Draft Amended EA, IHA, and BO/ITS. As the survey would be conducted in federal waters outside of NJ state waters and NMFS has federal jurisdiction over the protection of marine mammals, NSF and LDEO would be legally required to follow the monitoring and mitigation requirements dictated in the IHA and BO/ITS issued by NMFS; this includes adhering to designated cessation periods of the seismic source due to presence of marine mammals.

In addition to the five independently contracted PSOs, NSF offered NJDEP the opportunity to identify a staff member to participate as an observer during the survey, should it go forward. Whereas ultimate authority to enforce the requirements of the IHA, including cessation of seismic activity, would remain with the PSOs, the NJDEP observer would have the opportunity to monitor, make recommendations, record and document observations, and provide observations to NJDEP's Endangered and Nongame Species Program for inclusion in the Biotics database. After NMFS approval, the formal report of PSO observations could be provided to NJDEP's Endangered and Nongame Species Program for inclusion in the Biotics database. To address concerns about space-use conflicts, throughout the duration of the survey, the R/V *Langseth* and any support vessel could keep a log of all vessels observed within the survey area; the complete log could be included in the formal report of PSO observations submitted to NJDEP's Endangered and Nongame Species Program. NAIS data could also be evaluated and reported to NJDEP to confirm vessel activity in the survey area. These offers and suggestions were repeatedly made to New Jersey over the past several months; unfortunately, however, NJDEP has not responded to any of these offers and suggestions.

NJDEP's proposed recommendation for a QA/QC plan is not related to the enforceable policies of the CMP. Regardless, the NSF Proposed Activity already meets this recommendation. NSF concludes, therefore, that the Proposed Activity is consistent to the maximum extent practicable with the enforceable policies of the CMP.

Conclusion

For the reasons stated herein, and in the entire CZMA record, NSF concludes that the Proposed Activity is consistent to the maximum extent practicable with the enforceable policies of the CMP. With regard to the recommendations advanced by NJDEP in their consistency review, NSF has considered them and concludes that the Proposed Activity already meets two of the three recommendations (field study [in part] and QA/QC plan) suggested if the proposed survey were to take place in the June/July/August timeframe; the remaining recommendation (aerial survey) raises safety concerns and fails to meet the proposed mitigative intent of furthering protection of marine mammals and sea turtles; therefore, NSF finds no justification for its implementation. Given that the NSF Proposed Activity includes a systematic and robust monitoring and mitigation plan that was approved both last year and this year by the federal agency with the authority to regulate activities to protect marine mammals and sea turtles, the concerns raised by NJDEP for marine species protection have been addressed. For these additional reasons, NSF's conclusion that the Proposed Activity is consistent to the maximum extent practicable with the enforceable policies of the CMP is reaffirmed.