Proposed Action	Issuing an Incidental Take Permit (File No. **27490**) to the University of Massachusetts Dartmouth School for Marine Science and Technology for the incidental take of ESA-listed sea turtles and sturgeon associated with the otherwise lawful fisheries survey activities within and adjacent to the Massachusetts/Rhode Island Wind Energy Area.
Type of Statement	Draft Environmental Assessment
Date	December 23, 2024
Lead Agency:	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service Office of Protected Resources
Responsible Official:	Kimberly Damon-Randall Director, Office of Protected Resources
For Further Information	Office of Protected Resources National Marine Fisheries Service 1315 East West Highway Silver Spring, MD 20910 (301) 427-8402
Location:	Offshore coastal waters of Southern New England

Abstract: The National Marine Fisheries Service proposes to issue an incidental take permit (ITP) to the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST), under section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1531 et seq.), and the regulations governing the incidental taking of endangered and threatened species (50 CFR 222.307). If issued, the ITP would authorize the incidental take of endangered and threatened sea turtles and sturgeon, including the North Atlantic Distinct Population Segment (DPS) of green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and Northwest Atlantic Ocean DPS of loggerhead (*Caretta caretta*) sea turtles, and the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), associated with the otherwise lawful fisheries survey activities within and adjacent to the Massachusetts/Rhode Island Wind Energy Area in southern New England offshore waters. The ITP would be valid for 10 years. On December 3, 2024, SMAST

submitted a revised complete application for an ESA section 10(a)(1)(B) ITP, including a conservation plan to monitor, minimize, and mitigate the impacts of incidental take of sea turtles and sturgeon in the fisheries surveys to the maximum extent practicable. This followed their initial draft application submitted on September 29, 2022, a complete application submitted on June 13, 2023, and a revised application submitted on November 30, 2023.

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CHAPTER 1 INTRODUCTION AND PURPOSE AND NEED

The National Marine Fisheries Service (NMFS) received an application from the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) requesting an Incidental Take Permit (ITP) for take of species of sea turtle and sturgeon listed under the federal Endangered Species Act (ESA), associated with the otherwise lawful operation of fisheries survey activity within and adjacent to the Massachusetts/Rhode Island Wind Energy Area (MA/RI WEA). NMFS has a statutory responsibility to authorize take of threatened and endangered species pursuant to the ESA, section 10(a)(1)(B) after receipt and review of an application and if certain findings and determinations are made. In addition, the National Environmental Policy Act (NEPA), Title 40 Code of Federal Regulations (CFR) Parts 1500 - 1508[1], and the National Oceanic and Atmospheric Administration (NOAA) policy and procedures[2] require all proposals for major federal actions be reviewed with respect to environmental consequences on the human environment. Therefore, NMFS conducted an environmental review of the requested ITP and determined an Environmental Assessment (EA) is appropriate for NMFS consideration of whether to issue an ITP to SMAST.

This chapter presents a summary of NMFS' authority pursuant to the ESA to authorize take of threatened and endangered species associated with an applicant's specified activities (Section 1.1), a summary of the applicant's request (Section 1.2), and identifies NMFS' proposed action and purpose and need (Section 1.3). This chapter also explains the environmental review process (1.4) and provides other information relevant to the analysis in this EA, such as the scope of the analysis (Section 1.5). The remainder of this EA is organized as follows:

- Chapter 2 describes the applicant's activities, and the alternatives carried forward for analysis;
- Chapter 3 describes the baseline conditions of the affected environment;
- Chapter 4 describes the direct, indirect, and cumulative impacts on the affected environment, specifically impacts to ESA listed sea turtles and sturgeon associated with NMFS' proposed action and alternatives;
- Chapter 5 lists the preparers of the EA; and
- Chapter 6 lists references cited.

1.1 Overview of the Endangered Species Act and Relevant Authorities

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[1] This EA applies CEQ's 2020 CEQ NEPA Regulations as modified by the Phase I 2022 revisions NEPA regulations because review of this proposed action began on November 30, 2023, which preceded the effective date of CEQ's Phase 2 NEPA regulations (July 1, 2024).

[2] National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6A "Compliance with the National Environmental Policy Act and Executive Order 12114 Environmental Effects Abroad of Major Federal Actions 11988 and 13690 Floodplain Management; and 11990 Protection of Wetlands" and the Companion Manual for NAO 216-6A.

The ESA establishes a national policy for conserving threatened and endangered species of fish, wildlife, plants and the habitat they depend on. An endangered species is a species in danger of extinction throughout all or a significant portion of its range, and a threatened species is one that is likely to become endangered within the foreseeable future throughout all or in a significant portion of its range (ESA, section 3). The U.S. Fish and Wildlife Service (USFWS) and NMFS jointly administer the ESA and are responsible for listing a species as either threatened or endangered, as well as designating critical habitat where applicable, developing recovery plans for these species, and undertaking other conservation actions pursuant to the ESA. Section 9 of the ESA prohibits the "take"[3], including incidental take of endangered sea turtles and sturgeon. Pursuant to section 4(d) of the ESA, NMFS has issued regulations extending the prohibition of take, with exceptions, to threatened sea turtles (50 CFR 223.205 and 223.206) and to threatened sturgeon (50 CFR 223.211). NMFS may grant exceptions to the take prohibitions with an incidental take statement or an ITP issued pursuant to ESA section 7 or 10, respectively.

Section 7(a)(2) of the ESA requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of threatened and endangered species or adversely modify or destroy their designated critical habitat. Federal agencies must do so in consultation with NMFS (or the USFWS) for actions that may affect species listed per section 4 of the ESA as threatened or endangered or critical habitat designated for such species. Section 7(b)(3) of the ESA requires that at the conclusion of formal consultation, the consulting agency provides an opinion stating whether the federal action agency's action is likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat.

Section 10(a) of the ESA includes allowable circumstances for permitting, which includes any act otherwise prohibited by section 9 for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations (section 10(a)(1)(A)) or any taking otherwise prohibited by section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (section 10(a)(1)(B)).

As provided in 50 CFR 222.307, NMFS may issue section 10(a)(1)(B) ITPs to non-Federal entities to take threatened and endangered species when such taking is incidental to an otherwise lawful activity, and when specific issuance criteria have been met.

Issuance criteria

(1) In determining whether to issue a permit, the Assistant Administrator will consider the following:

[3] Take, as defined in Section 3 of the ESA, means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

(i) The status of the affected species or stocks;
(ii) The potential severity of direct, indirect, and cumulative impacts on the species or stocks and habitat as a result of the proposed activity;
(iii) The availability of effective monitoring techniques;
(iv) The use of the best available technology for minimizing or mitigating impacts; and
(v) The views of the public, scientists, and other interested parties knowledgeable of the species or stocks or other matters related to the application.

(2) To issue the permit, the Assistant Administrator must find that—
(i) The taking will be incidental;
(ii) The applicant will, to the maximum extent practicable, monitor, minimize, and mitigate the impacts of such taking;
(iii) The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild;
(iv) The applicant has amended the conservation plan to include any measures (not originally proposed by the applicant) that the Assistant Administrator determines are necessary or appropriate; and
(v) There are adequate assurances that the conservation plan will be funded and implemented, including any measures required by the Assistant Administrator.

The applicant must submit a completed application and conservation plan detailing the anticipated impact of the activity on listed species and/Distinct Population Segments (DPSs), the anticipated impacts to habitat, actions that will be taken to monitor, minimize, and mitigate such impacts, and the funding available to do so, as well as alternative actions that have been considered.

1.2 Incidental Take Permit Application Summary

SMAST intends to conduct fisheries survey activities within and adjacent to MA/RI WEA. The proposed fisheries surveys are intended to sample non-ESA listed wild fish populations to provide baseline fisheries data prior to the construction of an offshore wind farm within the WEA in order to better understand the effects on wild fish populations from offshore wind development.

SMAST has applied for an ITP that would authorize the take of green (North Atlantic DPS), Kemp’s ridley, leatherback, and loggerhead (Northwest Atlantic Ocean DPS) sea turtles, and Atlantic sturgeon (Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs) during the operation of the fishery survey activities. The ITP, if issued, would provide an exemption to the ESA take prohibitions for 10 years. Through their developed conservation plan, SMAST would monitor, minimize, and mitigate the impacts of the taking, to the maximum extent practicable, for the capture of ESA-listed sea turtles and sturgeon incidental to their fisheries survey activities and ensure that the conservation plan will be funded and implemented.

1.3 Proposed Action and Purpose and Need

NMFS proposes to issue an ITP to SMAST pursuant to section 10(a)(1)(B) of the ESA and the regulations governing the incidental taking of endangered and threatened species (50 CFR 222.307). The potential for take of ESA-listed sea turtles and sturgeon warrants a take authorization from NMFS in the form of an ITP. NMFS' proposed action is a direct outcome of SMAST's request for an ITP to take ESA-listed sea turtles and sturgeon. The ITP would be valid for 10 years from the date issued and would authorize the incidental nonlethal take of ESA-listed sea turtles and sturgeon in the SMAST fisheries survey activities. It would also require specific levels of observer monitoring, reporting protocols, and minimization and mitigation measures.

SMAST submitted a complete ITP application on June 13, 2023, a revised complete application on November 30, 2023 that incorporated changes in response to public comments and removed one project, and an updated application that removed two projects that received ESA-listed species coverage through other federal actions on December 3, 2024. The purpose of NMFS' action is to evaluate SMAST's complete, updated application pursuant to section 10(a)(1)(B) of the ESA, to consider the impacts of the proposed survey activities on NMFS' ESA-listed species and designated critical habitat, and, if appropriate, to issue the ITP. The need for NMFS' action is to meet its obligation to grant or deny the ITP request under the ESA. NMFS has a responsibility to implement the ESA and to protect, conserve, and recover threatened and endangered species under its jurisdiction. Applying for an ITP necessitates the applicant's development of a conservation plan. ITPs and associated conservation plans are in place to ensure the conservation and management of endangered and threatened species and minimize the impact of otherwise lawful activities, such as conducting fisheries survey activities. Working with institutions to develop conservation plans for scientific research activities, such as fisheries surveys, is a critical effort to reduce impacts from research activities and promote the conservation and recovery of species.

1.4 Environmental Review Process

Under NEPA, federal agencies are required to examine the environmental impacts of their proposed actions within the United States (U.S.) and its territories. An EA is a concise public document that provides an assessment of the potential effects a major federal action may have on the human environment. Major federal actions include activities that federal agencies fully or partially fund, regulate, conduct, or approve. Because the issuance of an ITP would allow for the taking of ESA-listed species, consistent with provisions under section 10(a)(1)(B) of the ESA, and incidental to the applicant's lawful activities, NMFS considers this to be a major federal action subject to NEPA; therefore, NMFS analyzes the environmental effects associated with authorizing takes of ESA-listed species and prepares the appropriate NEPA documentation. In addition, NMFS, to the fullest extent possible, integrates the requirements of NEPA with other regulatory processes required by law or by agency practice so that all procedures run concurrently, rather than consecutively. This includes coordination within NOAA (*e.g.*, the Greater Atlantic Regional Fisheries Office (GARFO)) and with other regulatory agencies (*e.g.*, the USFWS), as appropriate, during NEPA reviews prior to implementation of a proposed action to ensure that all applicable requirements are met.

1.4.1 Compliance with Other Laws

NMFS must comply with all applicable federal environmental laws and regulations or Executive Orders (as applicable) necessary to implement a proposed action. NMFS' evaluation of and compliance with environmental laws and regulations is based on the nature and location of the applicant's proposed activities and NMFS' proposed action. Therefore, this section only summarizes environmental laws and consultations applicable to NMFS' consideration of whether to issue the ITP to SMAST.

ESA: NMFS's issuance of an ITP is a federal action that is subject to consultation requirements under Section 7 of the ESA, and NMFS is required to ensure the issuance of this ITP to SMAST is not likely to jeopardize the continued existence of any threatened and endangered species, or result in the destruction or adverse modification of designated critical habitat for these species.

The green (North Atlantic DPS), Kemp's ridley, leatherback, and loggerhead (Northwest Atlantic Ocean DPS) sea turtles, and Atlantic sturgeon (Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs) are ESA-listed species with confirmed occurrence in southern New England offshore waters. The Endangered Species Conservation Division requested formal ESA section 7 consultation with NMFS GARFO, Division of Protected Resources on the proposed issuance of ITP, pursuant to section 7 of the ESA on December 23, 2024. The consultation is in-progress and a biological opinion will be issued by GARFO at the conclusion of the consultation process. As appropriate, the final EA will be informed by the analysis in the final biological opinion.

Magnuson-Stevens Fishery Conservation and Management Act (MSA): Under Section 305(b)(2), federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, undertaken, or proposed to be authorized, funded or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSA. OPR determined no adverse effects to EFH would occur as a result of the preferred alternative under consideration and therefore, no EFH consultation is necessary.

1.4.2 Public Involvement

Per section 10(a)(2)(B) of the ESA, once NMFS receives a completed application with adequate information included, NMFS is required to publish a Notice of Receipt (NOR) in the *Federal Register*. In the NOR, NMFS presents information relevant to the environmental impacts associated with the agency's consideration of whether to issue the ITP for the activities and species described in the application.

NMFS received a draft ITP application from SMAST on September 29, 2022. The application included a conservation plan and analytical methods for estimating potential takes. NMFS reviewed the draft application and requested additional information and clarification. After several draft submissions and reviews, on June 13, 2023, SMAST submitted a revised and complete application for the take of ESA-listed sturgeon and sea turtles during the operation of fisheries survey operations in and around the MA/RI WEA. In response to public comments, the application was further revised and resubmitted on November 30, 2023 and again on December 3, 2024 to remove additional projects.

A *Federal Register* notice was published to inform the public of receipt of the application and allow for comments to be submitted on the ITP application and conservation plan (ITP No. 27490). On July 6, 2023 (88 FR 43082), NMFS published the NOR of the June 13, 2023, ITP application and conservation plan from SMAST. Two requests to extend the comment period were submitted on August 7, 2023, the last day of the comment period. In response to the extension requests, on August 16, 2023, NMFS published a notice in the *Federal Register* (88 FR 55668) reopening the comment period for 15 days. The second public comment period ended on August 31, 2023, and 3 comments were received. The comments received and their accompanying responses are located in **Appendix A** of this document. After additional discussions between NMFS and the applicant, additional revisions were made to the application and conservation plan to address these comments, as appropriate and a revised application was submitted to NMFS for review on November 30, 2023, and further revised to remove additional projects on December 3, 2024. Revisions applicable to the SMAST's proposed action and conservation plan are included in this draft EA.

1.5 Scope of the Environmental Assessment

This draft EA was prepared in accordance with the Council on Environmental Quality (CEQ) 2022 Phase 1 NEPA (42 USC 4321, et seq.), 40 CFR 1500-1508 because review of this proposed action began on November 30, 2023 which preceded the effective date of CEQ's Phase 2 NEPA regulations (July 1, 2024), as well as in accordance with NOAA policy and procedures (NOAA Administrative Order [NAO] 216-6A and the Companion Manual for the NAO 216-6A). The analysis in this EA addresses potential direct, indirect, and cumulative impacts green (North Atlantic DPS), Kemp's ridley, leatherback, and loggerhead (Northwest

Atlantic Ocean DPS) sea turtles, and Atlantic sturgeon (Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs), and their ESA-designated critical habitat resulting from NMFS' proposed action to authorize incidental take associated with conducting fisheries survey activities in southern New England offshore waters. However, the scope of this analysis is limited to the decision for which NMFS is responsible (*i.e.*, whether to issue the ITP). This EA is intended to provide focused information on the primary issues and impacts of the proposed action directly related to the issuance of an ITP to SMAST, which would authorize the incidental take of green (North Atlantic DPS), Kemp's ridley, leatherback, and loggerhead (Northwest Atlantic Ocean DPS) sea turtles, and Atlantic sturgeon (Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs) and the monitoring efforts and the avoidance, minimization, and mitigation measures to reduce the effects of that take (*i.e.*, the proposed ITP would only authorize incidental take of ESA-listed sea turtles and sturgeon so NMFS anticipates effects will be limited to these species). In addition, the action area is limited to four delineated areas in the offshore waters of southern New England, within and adjacent to the MA/RI WEA which are presented in **Figure 1** and described in section **3.1 Physical Environment**. For these reasons, this EA does not provide a detailed evaluation of the effects to the elements of the human environment listed in **Table 1** below.

Table 1: Elements of the human environment not evaluated in this EA.

Biological	**Physical**	**Socioeconomic/Cultural**
● Benthic Communities ● Coral Reef Systems ● Fisheries Resources ● Humans ● Invertebrates ● Invasive Species	● Air Quality ● Farmland Geography ● Geology/Sediments ● Land Use ● Oceanography ● State Marine Protected Areas ● Federal Marine Protected Areas ● National Marine Sanctuaries ● National Wildlife Refuge ● Park Lands ● Water Quality ● Wetlands ● Wild and Scenic Rivers	● Indigenous Cultural Resources ● Low-Income Populations ● Military Activities ● Minority Populations ● Other Marine Uses: Military activities, shipping marine transport, and Boating ● Recreational Fishing ● Public Health and Safety

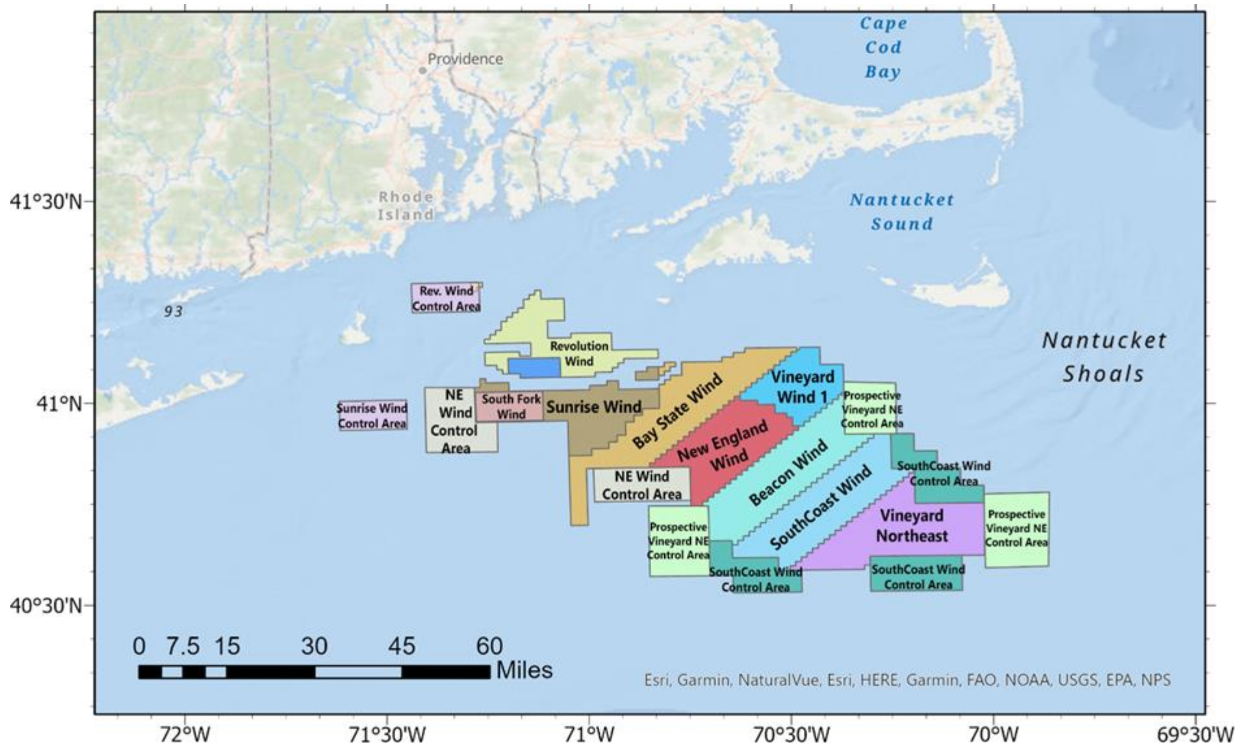

Figure 1: Trawl survey areas within and adjacent to the MA/RI WEA, including offshore wind development areas and prospective control areas.

CHAPTER 2 ALTERNATIVES

As described in Chapter 1, NMFS' proposed action is issuance of an ITP to SMAST, which would authorize take of threatened and endangered sea turtle and sturgeon species associated with the otherwise lawful operation of SMAST fisheries survey activities and require implementation of a conservation plan, in accordance with the requirements of the ESA. NMFS' proposed action is triggered by SMAST's request for an ITP under section 10(a)(1)(B) of the ESA. In accordance with NEPA, NMFS is required to consider a reasonable range of alternatives to a proposed action as well as the no action alternative. The evaluation of alternatives under NEPA assists NMFS with assessing alternate ways to achieve the purpose and need for their proposed action that may result in less environmental harm. For the purposes of this EA, an alternative will only meet the purpose and need if it satisfies the requirements under section 10(a)(1)(B) of the ESA. Therefore, NMFS applied the screening criteria and considerations outlined below to identify which alternatives to carry forward for analysis.

Considerations for Selecting Alternatives

Section 10(a)(2)(B) of the ESA specifies that an ITP may be issued if the issuance criteria are met (**Section 1.1**). Under Section 10 of the ESA, NMFS' primary responsibility in evaluating an ITP application is to determine if the contents of the application and conservation plan meet the issuance criteria. Per NMFS regulation found at 50 CFR 222.307, NMFS will evaluate the sufficiency of the application and conservation plan. To issue an ITP, NMFS must determine that the issuance criteria are met. NMFS has worked with SMAST since the first draft application was received to ensure these criteria have been addressed.

2.1 Description of Activities

There are numerous methods available to collect fisheries data, including trawl surveys, eDNA, baited underwater video, ropeless traps, etc. SMAST has proposed to use demersal bottom-trawls for their surveys to collect baseline fisheries resource data prior to the construction of offshore wind developments. As described below, the proposed use of demersal bottom-trawl gear and the survey methodologies are consistent with other regional fisheries resource surveys (i.e. NEFSC and Northeast Area Monitoring and Assessment Program (NEAMAP) bottom-trawl surveys) used to inform fisheries management decisions.

Demersal Otter Trawl Fisheries Survey:
SMAST would use a demersal otter trawl to collect fisheries data related to seasonal fish abundance, distribution, population structure and community composition in and around one proposed wind development project (i.e., Vineyard Northeast) in and adjacent to the MA/RI WEA. The survey would collect fisheries data to assess the potential environmental impacts of proposed wind energy development projects on marine fish and invertebrate communities. The survey would use a demersal trawl of similar configuration and with similar operating protocols and performance criteria as the NEAMAP survey protocols. The survey would use NEAMAP protocols to help ensure compatibility with other regional surveys, including the NEFSC annual spring and fall trawl surveys, the annual NEAMAP spring and fall trawl surveys, and state trawl surveys including the Massachusetts Division of Marine Fisheries trawl survey. Exceptions to the NEAMAP protocols include survey area, survey timing, survey vessel, and specific biological sampling. The existing NEAMAP surveys occur within areas closer to shore than the proposed trawl survey. The NEAMAP survey has been peer reviewed and is designed to be consistent with the NEFSC survey that occurs within the proposed survey area within and adjacent to the MA/RI WEA (Bonzek et al., 2008).

2.1.1 General Survey Design

The general survey methodology is designed to provide a consistent framework between projects and ensure consistency of the data collected with regional scientific fisheries surveys (i.e. NEAMAP and NEFSC trawl surveys). The trawl surveys proposed in the ITP application are designed to provide baseline data (i.e., 1 - 5 years) on species abundance, population structure, and community composition for a future EA using the Before-After-Control-Impact

(BACI) framework as recommended by BOEM (BOEM, 2019). Each survey would sample a development area as well as associated control reference areas. The reference areas were selected to have similar depth and habitat characteristics as the project areas. Seasonal sampling with multiple reference areas is recommended under the "beyond-BACI" methodology to account for temporal and spatial variability (Underwood, 1994). The timing and sampling rate differ from NEAMAP and NEFSC surveys. The NEAMAP survey protocol provides data at a rate of one tow, approximately every 100 km^2 (30 nm^2). The proposed fishery survey would increase the NEAMAP sampling rate to allow for an evaluation of wind farm development impacts to fisheries resources at a smaller scale. In addition to a higher sampling rate, the proposed fisheries survey would sample seasonally, rather than biannually, to adequately capture the seasonal variation within the region, as recommended by BOEM (2019). Specifically, the survey would occur four times a year within the following time frames: Spring (April - June), Summer (July - September), Fall (October - December) and Winter (January - March).

Trawl tow locations within the wind development project area and selected reference areas would be selected using a spatially balanced sampling design. Project and reference areas would be divided into grid cells, and one randomly chosen location would be sampled within each grid cell during each seasonal trawl survey. Seasonal sampling would occur in discrete events as quickly and continuously as weather allows, as opposed to spread out over the season. Sampling intensity may vary between surveys based on area. A detailed description of the survey and survey effort is described in Section 3.7 of the project's ITP application.

Surveys would be conducted on a commercial trawl vessel currently operating in the region. Consistent with NEAMAP surveys, all tows would be completed during daylight hours, and the target tow duration would be 20 minutes. Tow time starts when all the trawl wire has been set out and ends at the beginning of haulback (i.e., the initiation of retrieving the gear). A target tow speed range of 2.8 to 3.2 knots would be used. The amount of wire set with each trawl to achieve the target net geometry would be left to the professional judgment of the captain, dependent upon the depth and the *in-situ* conditions. The following data would be collected during each sampling effort:

- Station number
- Latitude and longitude at the start and end of the tow
- Time at the start and end of the tow
- Vessel speed and heading
- Water depth at the start and end of the tow
- Wind speed
- Wave height
- Weather conditions (e.g., cloud cover, precipitation)
- Tow speed
- Gear condition/performance code at the end of the tow

A Conductivity Temperature Depth (CTD) sensor (or similar) would be used to sample a vertical profile of the water column at each trawl station. The CTD profile may be obtained at the start or end of the tow, at the discretion of the chief scientist.

While depth is an important factor in fish distribution and incorporated into the NEAMAP protocols, the proposed surveys are constrained to a narrow depth range (30 – 60 meters). There is not sufficient data or evidence to guide a stratified experimental design based on depth, however post-stratification of the data would be feasible with the current sampling design if it is proven to be beneficial.

2.1.2 Trawl Design

2.1.3 Trawl monitoring

A Simrad PX trawl monitoring system would be used to measure and monitor trawl geometry in real time. Door spread (i.e. the distance between trawl doors), wing spread (i.e. distance between wingends), headline height (i.e. distance of headrope to seafloor), and bottom contact (i.e. distance of sweep to seafloor) would be measured for every tow (Figure 2). These data would be used to validate trawl tows against established permissible deviations from targeted geometry. Tows with geometry outside of allowed deviations may be considered invalid, with the collected data omitted from subsequent analysis. Acceptable trawl parameters are adopted from the NEAMAP protocol. These values are within a margin of error of 5% of the optimal trawl parameters for wingspread and headline height (as defined by the Trawl Survey Advisory Panel). Additionally, the trawl monitoring system would also log depth and bottom water temperature.

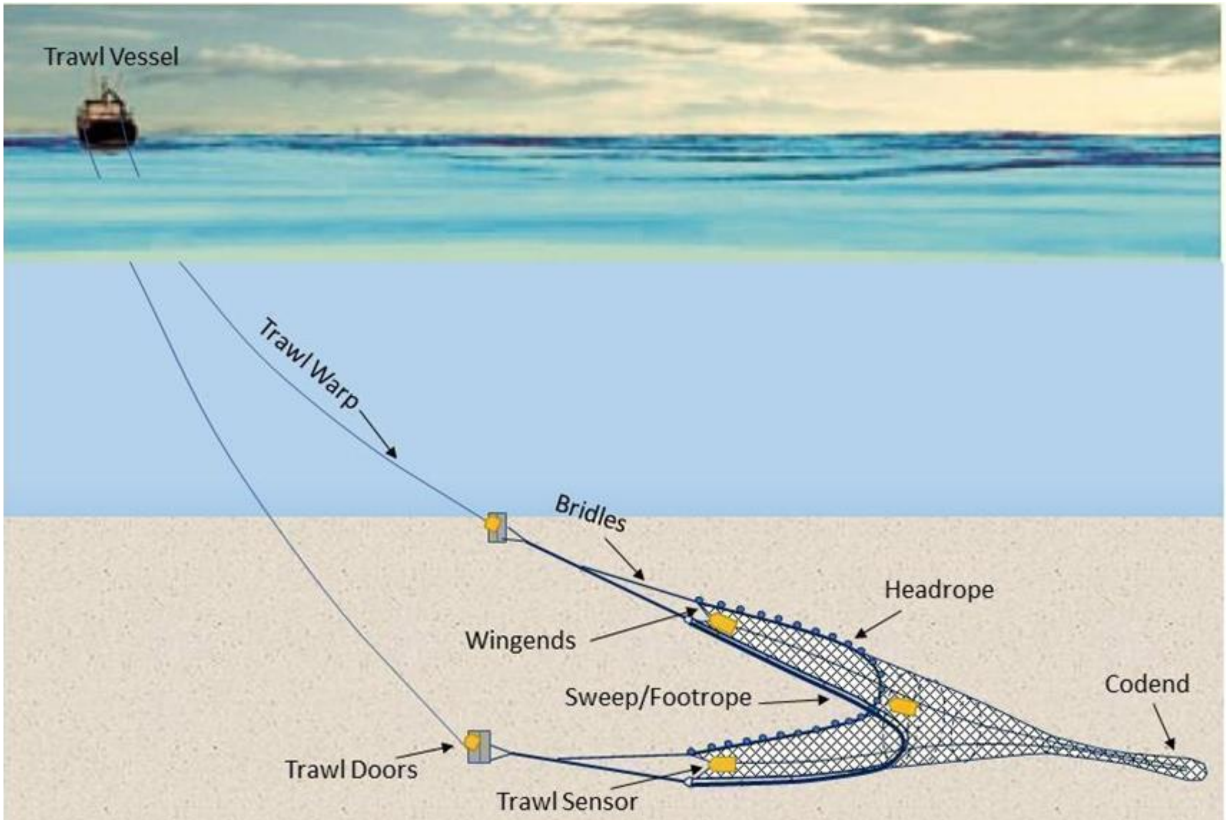

Figure 2: General schematic (not to scale) of a demersal otter trawl illustrating location of trawl doors, wingends, headrope, and sweep. Yellow rectangles indicate geometry sensors.

2.1.4 Catch sampling

At the conclusion of each tow, the catch would be released from the tail end of the net onto the deck. Animals collected in each trawl sample would be sorted, identified to the species level, weighed, and enumerated consistent with the sampling approach of NEAMAP. Species would be identified consistently with the Integrated Taxonomy Information System (ITIS). The following information would be collected for each trawl that is sampled; catch per unit effort (CPUE), species diversity, and size structure of the catch. All species captured would be documented for each valid trawl sample. When large catches occur, sub-sampling may be used to process the catch, at the discretion of the lead scientist. The three sub-sampling strategies adopted are identical to the NEAMAP survey protocols and include straight subsampling by weight, mixed subsampling by weight, and discard by count sampling (Bonzek et al. 2008). The type of sub-sampling strategy that is employed would depend on the volume and species diversity of the catch. If any protected species are captured during trawling, SMAST would prioritize the sampling and release of those animals over sampling the rest of the catch. A detailed description of the handling and care of protected species can be found in Section 3.6 of the ITP application. Deviations from the current NEAMAP data collection protocol would be the omission of the collection of stomach contents, sex and maturity data and otolith samples.

The biomass (weight, kg) of each species would be recorded on a motion-compensated marine scale that has been calibrated according to the manufacturer's specifications and used to calculate CPUE. Length would be recorded for the dominant species (i.e., most commonly encountered species), and priority species, in the catch. To assess the condition of individual organisms, up to 100 individuals of each species (and size class) would be measured (to the nearest cm) and weighed on a motion-compensated balance. Length (e.g., total length, fork length) would be recorded for each species consistent with the measurement type specified in the Northeast Observer Program Biological Sampling Guide. After sampling, all catch would be returned to the water as quickly as possible to minimize incidental mortality.

2.2 Alternatives

The alternatives NMFS is considering in this EA are the no action alternative (*i.e.*, not issuing the ITP) and issuing the ITP as requested in the revised application and conservation plan. In accordance with Section 10(a)(2) of the ESA, SMAST described several alternatives for its operation to minimize incidental take (see application Section 4.2.3 Assessment of alternatives to the proposed action), all of which were deemed infeasible as they would either result in: 1) a reduction of the survey's ability to detect changes; 2) a significant delay to the initiation of the surveys which would jeopardize the ability to collect pre-construction baseline data that is necessary to understand the response of wild fish populations to offshore wind development; or 3) reliance upon unproven methods. NMFS considered each of the applicant's proposed alternatives and the reasons why they are not being utilized and concurs that they will not fulfill the purpose and need.

2.2.1 Alternative 1 - No Action

Under the No Action Alternative, no ITP would be issued for the take of sturgeon and sea turtles incidental to the otherwise lawful fisheries survey activities. While NMFS cannot know for certain what measures SMAST would implement absent the ITP, for purposes of analysis in the EA it is assumed that SMAST would either not undertake the fisheries resource surveys using bottom-trawl gear or SMAST would use alternative methods (e.g., eDNA, baited underwater video, ropeless traps). In either case, there would not be a need for an ITP because take of listed species would not be expected.

2.2.2 Alternative 2 - Issue Incidental Take Permit as Requested in Application (Preferred Alternative)

Under Alternative 2, an ITP would be issued to exempt SMAST from the ESA prohibition on taking sturgeon and sea turtles during operation of the otherwise lawful fisheries survey activities within and adjacent to the MA/RI WEA. The ITP would be valid for 10 years and would require SMAST to operate the fishery surveys as described in the ITP application, conservation plan, and any other requirements specified in the ITP which are incorporated here by reference. This alternative would include authorizing the take levels proposed in the December 3, 2024 ITP application and conservation plan.

Summary of Conservation Plan

The conservation plan prepared by SMAST describes measures designed to avoid, minimize, and mitigate, to the maximum extent practicable, the incidental take of ESA-listed sea turtles and sturgeon associated with the otherwise lawful fisheries survey activities within southern New England waters.

2.2.2.1 Monitoring, Minimization, and Mitigation of potential interactions and impacts of interactions

Observers

To avoid and minimize potential interactions with ESA-listed sea-turtles, between June 1 and November 30, SMAST would have a trained lookout posted on all vessel transits during all phases of the project to observe for protected species and communicate with the captain to take avoidance measures as soon as possible if one is sighted as detailed below. The designated survey staff or vessel crew member onboard the SMAST trawl survey would have completed Northeast Fisheries Observer Program (NEFOP-observer) training within the last 5 years, or other equivalent training in protected species identification and safe handling (inclusive of taking genetic samples from Atlantic sturgeon). Reference materials for identification, disentanglement, safe handling, and genetic sampling procedures would be available on board each survey vessel. All training would be documented to ensure compliance and provided to federal agencies upon request.

The trained lookout would maintain a vigilant watch and monitor a Vessel Strike Avoidance Zone (500 m) at all times to maintain minimum separation distances from ESA-listed species. If the trained lookout is a vessel crew member, this would be their designated role and primary responsibility while the vessel is transiting. Designated crew lookouts would receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. The following avoidance measures would be implemented between June 1 and November 30:

1) The trained lookout would monitor seaturtlesightings.org prior to each trip and report any observations of sea turtles in the vicinity of the planned transit to all vessel operators/captains and lookouts on duty that day.

2) If a sea turtle is sighted within 100 m of the operating vessel's forward path, the vessel operator must slow down to 4 knots (unless unsafe to do so) and may resume normal vessel operations once the vessel has passed the sea turtle. If a sea turtle is sighted within 50 m of the forward path of the operating vessel, the vessel operator must shift to neutral when safe to do so and then proceed away from the turtle at a speed of 4 knots or less until there is a separation distance of at least 100 m at which time normal vessel operations may be resumed.
3) The vessel would spend 15 minutes prior to each tow at the sampling station looking out for sea turtles. If a sea turtle is sighted during transit to a sampling station, during scouting, or while the gear is being prepared and deployed, the vessel would immediately proceed to an alternative tow station away from where the animal was observed.
4) Between June 1 and November 30, vessels would avoid transiting through areas of visible jellyfish aggregations or floating sargassum lines or mats. In the event that operational safety prevents avoidance of such areas, vessels would slow to 4 knots while transiting through such areas.
5) All vessel crew members would be briefed in the identification of sea turtles and in regulations and best practices for avoiding vessel collisions. Reference materials would be available aboard all project vessels for identification of sea turtles. The expectation and process for reporting of sea turtles (including live, entangled, and dead individuals) would be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so.

Gear Recovery

For any survey gear lost, all reasonable efforts would be undertaken to recover the gear, provided such efforts do not compromise human safety. All lost gear would be reported to NMFS (nmfs.gar.incidental-take@noaa.gov) within 24 hours of the documented time of missing or lost gear. This report would include information on any markings on the gear and any efforts undertaken or planned to recover the gear.

Survey Tow Time

Tow time for the survey would be limited to 20 minutes. The brief tow duration has been documented to reduce potential mortality in both Atlantic sturgeon and sea turtles (Sasso and Epperly, 2006; PSIT 2024). Tow speeds of 2.8 – 3.2 knots further reduces the potential for vessel strikes.

Data Collection

Any sea turtles or Atlantic sturgeon caught and/or retrieved in any fisheries survey gear would first be identified to species or species group. Each ESA-listed species caught and/or retrieved would then be properly documented using appropriate equipment and data collection forms. Biological data, samples, and tagging would occur as outlined below. Live, uninjured animals would be returned to the water as quickly as possible after completing the required handling and documentation.

Handling Protocols

Any sea turtles or Atlantic sturgeon caught and retrieved in gear used in fisheries surveys would be handled and resuscitated (if unresponsive) by the trained observers according to established protocols (https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/commercial-fishing-reporting-protected-species-bycatch#:~:text=If%20you%20accidentally%20catch%20a,the%20time%20of%20the%20incident) and whenever at-sea conditions are safe for those handling and resuscitating the animal(s) to do so. Specifically:

1) Priority would be given to the handling and resuscitation of any sea turtles or sturgeon that are captured in the gear being used, if conditions at sea are safe to do so. Handling times for these species would be minimized to limit the amount of stress placed on the animals.
2) All survey vessels must have copies of the sea turtle handling and resuscitation requirements (https://www.fisheries.noaa.gov/s3/2021-10/Sea-turtle-HR-October-25-2021-2-.pdf) pursuant to 50 CFR 223.206(d)(1) prior to the commencement of any on-water activity. These handling and resuscitation procedures must be carried out any time a sea turtle is incidentally captured and brought onboard the vessel during the proposed actions.
3) If any sea turtles that appear injured, sick, or distressed are caught and retrieved in fisheries survey gear, survey staff would immediately contact the Greater Atlantic Region Marine Animal Hotline at 866-755-6622 for further instructions and guidance on handling the animal, and potential coordination of transfer to a rehabilitation facility. If unable to contact the hotline (e.g., due to distance from shore or lack of ability to communicate via phone), the U.S. Coast Guard (USCG) must be contacted via VHF marine radio on Channel 16. If requested, hard-shelled sea turtles (i.e., non-leatherbacks) may be held on board for up to 24 hours following handling instructions provided by the Hotline, prior to possible transfer to a rehabilitation facility.
4) Any live uninjured sea turtles or Atlantic sturgeon caught and retrieved in gear used in any fisheries survey would be immediately released according to established protocols for sea turtles (https://www.fisheries.noaa.gov/s3/2021-10/Sea-turtle-HR-October-25-2021-2-.pdf) and Atlantic sturgeon (https://www.fisheries.noaa.gov/s3//dam-migration/atlantic-sturgeon-safe-handling.pdf).

5) Attempts would be made to resuscitate any Atlantic sturgeon that are unresponsive or comatose by providing a running source of water over the gills as described in the Sturgeon Resuscitation Guidelines (https://media.fisheries.noaa.gov/dam-migration/sturgeon_resuscitation_card_06122020_508.pdf).
6) Provided that appropriate cold storage facilities are available on the survey vessel, following the report of a dead sea turtle or sturgeon to NMFS, and if NMFS requests, any dead sea turtle or Atlantic sturgeon would be retained on board the survey vessel for transfer to an appropriately permitted partner or facility on shore as safe to do so.

Reporting Protocols

NMFS Office of Protected Resources (OPR) would be notified by SMAST as soon as possible of all observed takes of sea turtles and Atlantic sturgeon occurring as a result of any fisheries survey. Specifically:

1) SMAST would notify NMFS OPR within 24 hours of any interaction with a sea turtle or sturgeon (*pr.esa.incidentaltakepermit@noaa.gov*). The report must include at a minimum: (1) survey name and applicable information (e.g., vessel name, station number); (2) GPS coordinates describing the location of the interaction (in decimal degrees); (3) gear type involved (e.g., bottom trawl, trap); (4) soak time, gear configuration and any other pertinent gear information; (5) time and date of the interaction; and (6) identification of the animal to the species level. Additionally, the e-mail must transmit a copy of the NMFS Take Report Form (download at: https://media.fisheries.noaa.gov/2021-07/Take%20Report%20Form%2007162021.pdf) and a link to or acknowledgement that a clear photograph or video of the animal was taken (multiple photographs are suggested, including at least one photograph of the head scutes). If reporting within 24 hours is not possible due to distance from shore or lack of ability to communicate via phone, fax, or email, reports must be submitted as soon as possible; late reports must be submitted with an explanation for the delay.
2) At the end of each survey season, SMAST would send a report to NMFS OPR that compiles all information on any observations and interactions with ESA-listed species. This report would also contain information on all survey activities that took place during the season including location of gear set, duration of soak/trawl, total effort and minimization/mitigation measures employed. The report on survey activities would be comprehensive of all activities, regardless of whether ESA-listed species were observed.

2.2.2.2 Requested number of incidental takes

SMAST estimated the interaction rate for their surveys with Atlantic sturgeon and sea turtles from the observed interaction rates in the NMFS Northeast Fisheries Science Center (NEFSC) trawl surveys. Similar to the NEAMAP survey, the NEFSC trawl survey is twice a year (spring and fall) covering from Cape Hatteras, North Carolina to the Canadian Border. The NEFSC trawl survey uses a similar protocol and net design to NEAMAP and the proposed fisheries survey. While the NEAMAP survey extent is near shore, the NEFSC ranges from coastal waters to the continental shelf break and operates in the proposed action area. Where data allows, estimated take is based on observed data from NEFSC trawl surveys. Estimated take is predicted where existing data indicate a species interaction if feasible but observational data is not available either due to temporal or methodological discrepancies between the data available and the proposed survey methodology. To help account for the inter-annual variability in estimated takes due to annual variability in sturgeon and sea turtle abundance and distribution in the survey area, SMAST requested take for two-year rolling intervals (e.g., any two consecutive years).

Table 2: Requested incidental takes by species in rolling 2-year (Incidental Take Permit (ITP) year) intervals were based on observed interactions with NEFSC trawl surveys and the potential of interaction based on commercial fisheries data. The requested incidental takes are not expected to result in serious injury or mortality.

Species	**Requested 2-year rolling take**	**Maximum Requested Take for 10-year ITP duration**
Atlantic Sturgeon	10	50
Green (North Atlantic DPS)	2	10
Kemp's Ridley	2	10
Leatherback	2	10
Loggerhead (Northwest Atlantic Ocean DPS)	2	10

Atlantic sturgeon

SMAST estimated the interaction rate for their surveys with Atlantic sturgeon from the observed interaction rates in the NMFS Northeast Fisheries Science Center (NEFSC) trawl surveys. To estimate incidental take of Atlantic sturgeon, NMFS provided SMAST an interaction rate of 0.00167 for the NEFSC spring trawl surveys from 2012-2022 for trawls above 39^0N (excluding the Gulf of Maine) to be used to calculate estimated take. A total of 3 sturgeon interactions were documented over 1,796 tows giving an interaction rate of 0.00167 sturgeon per tow. The spring interaction rate (0.00167) is higher than the fall interaction rate (0.00058), which may be because fall NEFSC surveys do not overlap temporally with sturgeon presence in the survey area. Therefore, the spring interaction rate was used to estimate take and may be considered conservative for the proposed action.

Incidental take of Atlantic sturgeon is allocated based on their respective DPS. Kazyak et al. (2021) compared the capture location of Atlantic sturgeon to their DPS using genetic analysis. This study found significant movement of sturgeon between regions irrespective of their natal grounds. As a result, all five DPSs could be present in the action area. The MA/RI WEA is defined as "MID Offshore" within the genetic mixed stock analysis presented by Kazyak et al. (2021). While this analysis presented the genetic composition of the sturgeon in the Mid-Atlantic, the majority of the data used in the analysis was collected near the Chesapeake Bay, Delaware Bay and Hudson River. Limited observations were collected from Southern New England. Of the five sturgeon collected from the region, two belonged to the South Atlantic DPS, two belonged to the Gulf of Maine DPS and one individual belonged to the Canadian DPS. To account for the disparity between the regional and local observations, the relative expected proportions were combined (i.e., regional plus local) then normalized to 100% (Table 3).

Table 3: Expected DPS of observed Atlantic sturgeon based on local and regional data presented by Kazyak et al. (2021).

Distinct Population Segment (DPS)	Regional Observations (%)	Local Observations (%)	Combined (%)	Normalized Allocations (%)
New York Bight	55.3	0	55.3	27.7
Chesapeake Bay	22.9	0	22.9	11.5
South Atlantic	13.6	40	53.6	26.8
Carolina	5.8	0	5.8	2.9
Gulf of Maine	2.4	60	62.4	31.2
Total	100.0	100.0	200.0	100.0

Based on the presented analysis, the estimated annual incidental take of Atlantic sturgeon is derived from the number of tows in the action area and the interaction rate. The take is then allocated to each DPS based on Table 3 and the annual estimated take per DPS is presented in

Table 4. Each calculated anticipated take amount is round up to the nearest whole number. To help account for the inter-annual variability in estimated takes due to annual variability in sturgeon abundance and distribution in the survey area, SMAST requested a total two-year rolling interval take request for 10 Atlantic sturgeon, based on 5 estimated takes (1 per DPS) per year (Table 5).

Table 4: Estimated annual incidental take of Atlantic sturgeon with respect to DPS within each project area. Whole numbers in parentheses represent the estimated take after rounding up to the nearest whole animal.

Project	Tows per Year	Interaction Rate (#/Tow)	Est. Annual Take	Estimated Incidental Take by DPS				
				New York Bight	Chesapeake	South Atlantic	Carolina	Gulf of Maine
Vineyard Northeast	240	0.00167	0.40	0.11 (1)	0.05 (1)	0.11 (1)	0.01 (1)	0.06 (1)

Table 5: Anticipated assignment of DPS from the observed number of Atlantic sturgeon takes for each two-year rolling interval requested ITP.

Atlantic Sturgeon Disp.	Takes 2-year interval	New York Bight DPS	Chesapeake DPS	South Atlantic DPS	Carolina DPS	Gulf of Maine DPS
Live	1.6	0.22(1)	0.10(1)	0.22(1)	0.02(1)	0.12(1)

Sea turtles:
Estimates of interaction rate for sea turtles were based on data from NEFSC surveys (Northwest Atlantic Ocean DPS of loggerhead sea turtles) and the Murray (2020) analysis on interaction rates in the U.S. commercial bottom trawl fisheries along the Atlantic (Kemp's ridley, leatherback, and the North Atlantic DPS of green sea turtles). The NEFSC surveys overlap spatially and temporally (in spring and fall) with the survey area and use the same survey methodology and gear. NMFS provided SMAST an interaction rate of 0.00175 per tow

for the NEFSC fall trawl surveys from 2012-2022 for trawls above 39° F (excluding the Gulf of Maine) to be used to calculate estimated take of loggerhead sea turtles (see Section 4.1.2, Sea Turtles, Anticipated Interactions). Each incidental take estimate is rounded up to the nearest whole number. Estimated incidental take for loggerhead sea turtles by project is presented in Table 6. Total estimated annual incidental take is rounded up to the nearest whole number, displayed in parenthesis. SMAST requested a total two-year rolling interval take request for 2 loggerhead sea turtles, based on 1 estimated take per year.

Table 6: Estimated annual incidental take for each project for loggerhead sea turtles.

Project	Number of tows (Spring, Summer, Fall only)	Interaction Rate	Estimated incidental take per year
			Loggerhead sea turtle
Vineyard Northeast	180	0.00175	0.32
Total			0.32 (1)

Murray (2020) estimated the interaction rates of sea turtles in the U.S. commercial bottom trawl fisheries along the Atlantic coast between 2014-2018 using fisheries observer data (Figure 3). Data from the Northeast Fisheries Observer Program and at-sea monitors documented the capture of loggerhead, Kemp's ridley, leatherback and green turtles aboard commercial fishing vessels over 5,227 days fished. The analysis examined the interaction rate with respect to region, season, and depth. Interaction rates from this analysis were used due to similar fishing gear characteristics. These data overlap temporally and spatially with the survey area, however, as trawl gear used in these fisheries varies, they may differ from those used in the proposed survey. This dataset includes trawl activities during the summer months, when Kemp's ridley, green, and leatherback sea turtles are most likely to be present in the action area. While these fisheries may use a variety of trawl types, the Murray (2020) analysis shows that, even with low interaction rates, there is potential for trawls operating in the survey area to interact with Kemp's ridley, green, and leatherback sea turtles. Due to this potential for interaction, SMAST requested a take of 1 Kemp's ridley, 1 green, and 1 leatherback sea turtle annually, for a total of 2 of each species in any two-year rolling interval.

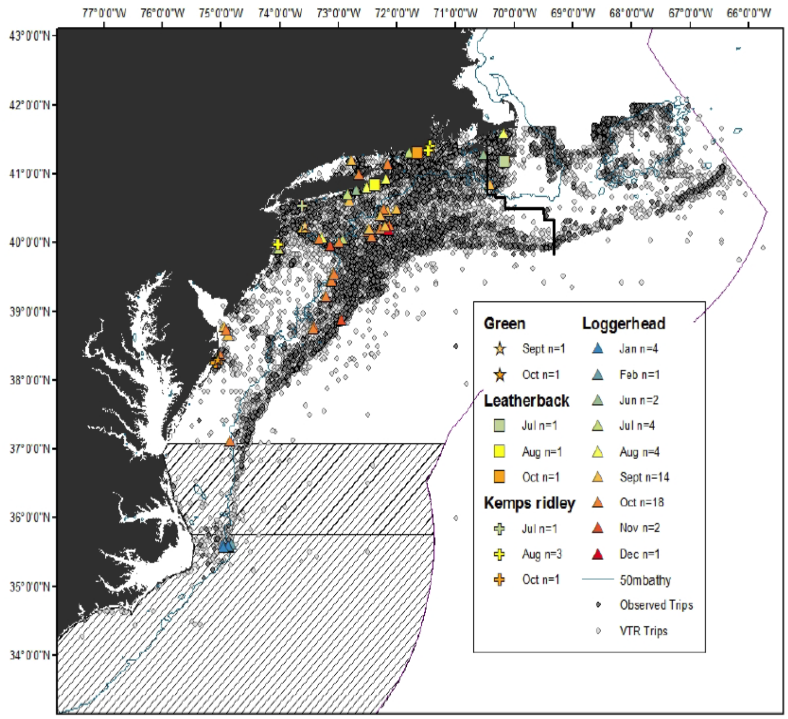

Figure 3: Observed loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) turtle interactions, observed trips and commercial trips in US bottom trawl gear from 2014 to 2018 throughout Georges Bank and the Mid-Atlantic. From Murray (2020).

CHAPTER 3 AFFECTED ENVIRONMENT

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

3.1 Physical Environment

3.1.1 Southern New England (SNE) Region

The SNE region extends from the Great South Channel in the east to the Mid-Atlantic Bight in the west. The southwestern flow of cold shelf water feeding out of the Gulf of Maine and off Georges Bank dominates the circulatory patterns in this area. The SNE continental shelf is a gently sloping region with relatively smooth topography. The shelf is approximately 100 km wide and the shelf break occurs at a depth of approximately 120 m (Theroux and Wigley

1998).

Seafloor habitats in SNE are dominated by fine unconsolidated substrates (i.e., sand and mud sediments). Rock and coarse unconsolidated substrates (i.e. bedrock, megaclast, and gravel sediments) occur in patchy distributions throughout SNE but are prevalent throughout Cox Ledge and surrounding areas. Water temperatures vary seasonally with minimum and maximum bottom temperatures ranging between approximately 4° C to 16° C, respectively (Theroux and Wigley 1998).

The action area includes the offshore waters and habitats of SNE within and adjacent to the MA/RI WEA. Four discrete areas within and adjacent to the MA/RI WEA have been identified for the collection of baseline fisheries by SMAST to allow for an evaluation of wind energy development impacts to fisheries resources (Figure 4). The proposed survey areas within the MA/RI WEA are dominated by soft-bottom sediments (e.g. mud and sand) and sites with similar bottom sediment types and depths would be selected within the identified prospective control areas outside of the boundaries of the MA/RI WEA.

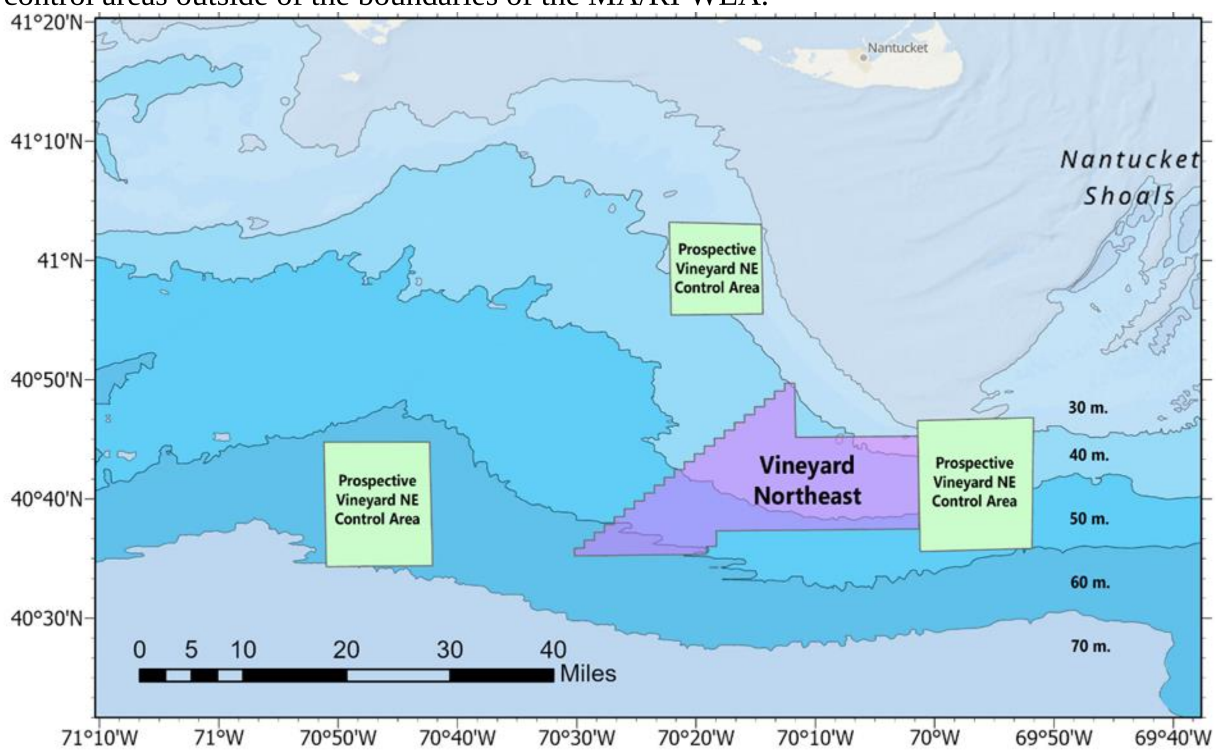

Figure 4: Proposed trawl survey areas including the development and reference areas.

3.1.2 Essential Fish Habitat (EFH)

Essential fish habitat (EFH) is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802 et seq.). EFH is designated for all federally managed species and includes both state and federal jurisdictional waters throughout the range of the species. Regional fisheries management councils identify and describe EFH for managed species through Fishery Management Plans (FMPs). The designation of EFH does not inherently confer any protection of specific habitats from non-fishing or fishing activities. However, any proposed federal action that may result in an adverse effect to designated EFH requires consultation with NMFS under the MSA. The consultation allows for the conservation and protection of habitats important to federally managed species through the issuance of conservation recommendations by NMFS to the federal action agency that avoid, minimize, and mitigate adverse impacts to EFH that may result from the proposed federal action.

Designated EFH for managed species is typically defined for each life-history stage, including: eggs, larvae, juveniles, and adults. The SMAST fisheries resource surveys overlap with designated EFH for multiple federally-managed species; the most-up-to-date EFH designations can be accessed using the EFH Mapper (https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper) and/or downloaded at: https://www.habitat.noaa.gov/application/efhinventory/index.html. . These species are managed by the New England Fishery Management Council (NEFMC), the Mid-Atlantic Fishery Management Council (MAFMC), and as highly migratory species (HMS) that are managed by the NMFS headquarters Office of Sustainable Fisheries HMS Division.

In general, the designated EFH for federally managed species that occur within the action area includes both nearshore estuarine and offshore marine waters and habitats, as well as mud, sand, gravel, and shell substrates over the continental shelf, including structure forming benthic fauna such as sponges and other emergent species.

3.1.3 Habitat Areas of Particular Concern (HAPC)

Habitat Areas of Particular Concern (HAPC) are discrete subsets of EFH. Fishery management councils may designate a specific habitat area as a HAPC based on one or more of the following reasons: the importance of the ecological function provided by the habitat; the extent to which the habitat is sensitive to human-induced environmental degradation; whether, and to what extent, development activities are, or would be, stressing the habitat type; and the rarity of habitat type. As with EFH, HAPC designation does not confer additional protection or restrictions upon an area but is used by managers to prioritize the conservation and protection of important habitats for managed fish species. The following two HAPCs overlap with the SMAST survey activities:

- Summer flounder HAPC - all portions of adult and juvenile summer flounder EFH where species of macroalgae, seagrasses, and freshwater and tidal macrophytes exist as either native or exotic species;

- Southern New England HAPC – complex habitats and Atlantic cod spawning areas in the MA/RI WEA and within an approximately 10 km buffer zone surrounding the MA/RI WEA.

3.2 Biological Environment - Status of Affected Species

Common Name	Scientific Name	DPS	Status
Atlantic Sturgeon	*Acipenser oxyrinchus oxyrinchus*	Carolina DPS	Endangered
		Chesapeake Bay DPS	Endangered
		New York Bight DPS	Endangered
		South Atlantic DPS	Endangered
		Gulf of Maine DPS	Threatened
Kemp's ridley sea turtle	*Lepidochelys kempii*	N/A	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	N/A	Endangered
Green sea turtle	*Chelonia mydas*	North Atlantic DPS	Threatened
Loggerhead sea turtle	*Caretta caretta*	Northwest Atlantic Ocean DPS	Threatened

The following subsections are synopses of the best available information on the status of the species that are likely to be affected by one or more components of the action. The biology and ecology of these species as well as their status and trends inform the impact analyses for this document.

3.2.1 Atlantic Sturgeon

Species Description and Distribution
Five separate DPSs of Atlantic sturgeon were listed under the ESA by NMFS effective April 6, 2012 (77 FR 5880 and 5914, February 6, 2012). The New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs were listed as endangered and the Gulf of Maine DPS was listed as threatened. Atlantic sturgeon are long-lived, late-maturing, estuarine-dependent, anadromous fish distributed along the eastern coast of North America (Waldman and Wirgin 1998). Historically, sightings have been reported from Hamilton Inlet, Labrador, Canada, south to the St. Johns River, Florida (Murawski and Pacheco 1977; Smith and Clugston 1997). While

adult Atlantic sturgeon from all DPSs mix extensively in marine waters, the majority of Atlantic sturgeon return to their natal rivers to spawn. Genetic studies show that fewer than two adults per generation spawn in rivers other than their natal river (Wirgin et al. 2000; King et al. 2001; Waldman et al. 2002; Grunwald et al. 2008). Young sturgeon spend the first few years of life in their natal river estuary before moving out to sea (Wirgin et al. 2002). The Atlantic sturgeon were once present in 38 river systems and, of these, spawned in 35 of them. Individuals are currently present in 36 rivers, and spawning occurs in at least 20 of these (ASSRT 2007).

Detailed information on the status of Atlantic sturgeon, including information on population structuring, taxonomy and life history, distribution and abundance, and threats throughout their range, can be found in the most recent five-year reviews for the New York Bight, Chesapeake Bay, and Gulf of Maine DPSs of Atlantic Sturgeon (https://www.fisheries.noaa.gov/action/5-year-review-new-york-bight-chesapeake-bay-and-gulf-maine-distinct-population-segments, NMFS 2022b, 2022c, 2022d), the Final Rules for the Carolina and South Atlantic DPSs (77 FR 5913), Gulf of Maine, New York Bight, Chesapeake Bay DPSs (77 FR 5879) and the Final Rule for designation of Critical Habitat (82 FR 39160).

Genetic Diversity
The marine range of the U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. As Atlantic sturgeon travel long distances in these waters, all five DPSs of Atlantic sturgeon have the potential to be anywhere in this marine range. Based on a recent genetic mixed stock analysis (Kazyak et al. 2021), we expect Atlantic sturgeon in the portions of the action area north of Cape Hatteras to originate from the five DPSs at the following frequencies: New York Bight (55.3%), Chesapeake (22.9%), South Atlantic (13.6%), Carolina (5.8%), and Gulf of Maine (2.4%) DPSs.

Status within the Action Area
Based on fishery-independent, fishery dependent, tracking, and tagging data, Atlantic sturgeon appear to primarily occur inshore of the 164 ft. (50 m) depth contour (Dunton et al. 2012, Dunton et al. 2010, Erickson et al. 2011, Laney et al. 2007, O'Leary et al. 2014, Stein et al. 2004a, b, Waldman et al. 2013, Wirgin et al. 2015a, Wirgin et al. 2015b). However, they are not restricted to these depths and excursions into deeper (e.g., 250 ft. (75 m)) continental shelf waters have been documented (Colette and Klein-MacPhee 2002, Collins and Smith 1997, Erickson et al. 2011, Stein et al. 2004b, Timoshkin 1968). Data from fishery-independent surveys and tagging and tracking studies also indicate that some Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010, Erickson et al. 2011, Hilton et al. 2016, Oliver et al. 2013, Post et al. 2014, Wippelhauser 2012). For instance, studies found that satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight, at depths greater than 66 ft. (20 m), during winter and spring; while, in the summer and fall, Atlantic sturgeon concentrations shifted to the northern portion of the Mid-Atlantic Bight at depths less than 66 ft. (20 m) (Erickson et al. 2011). There

is potential for Atlantic sturgeon to be present within the action area at any time of the year, but with a higher likelihood of occurrence during warmer periods of the year during seasonal movement patterns.

Critical Habitat
NMFS designated critical habitat for each ESA-listed DPS of Atlantic sturgeon in September of 2017 (82 FR 39160). Based on the best scientific information available for the life history needs of the Gulf of Maine, New York Bight, and Chesapeake Bay DPSs, the physical features essential to the conservation of the species and that may require special management considerations or protection are: (1) Hard bottom substrate (*e.g.*, rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.*, 0.0-0.5 parts per thousand (ppt) range) for settlement of fertilized eggs, refuge, growth, and development of early life stages; (2) Aquatic habitat with a gradual downstream salinity gradient of 0.5 up to as high as 30 ppt and soft substrate (*e.g.*, sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development; (3) Water of appropriate depth and absent physical barriers to passage (*e.g.*, locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (i) Unimpeded movement of adults to and from spawning sites; (ii) Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (iii) Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (*e.g.*, at least 1.2 meters (m)) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river; (4) Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (i) Spawning; (ii) Annual and interannual adult, subadult, larval, and juvenile survival; and (iii) Larval, juvenile, and subadult growth, development, and recruitment (*e.g.*, 13° C to 26° C for spawning habitat and no more than 30° C for juvenile rearing habitat, and 6 milligrams per liter (mg/L) dissolved oxygen (DO) or greater for juvenile rearing habitat).

NMFS determined, based on the best scientific information available, the physical features essential to the conservation of the Carolina and South Atlantic DPSs of Atlantic sturgeon that may require special management considerations or protection, that support the identified conservation objectives, are: 1) hard bottom substrate (*e.g.*, rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (*i.e.*, 0.0-0.5 ppt range) for settlement of fertilized eggs and refuge, growth, and development of early life stages; 2) transitional salinity zones inclusive of waters with a gradual downstream gradient of 0.5- up to 30 ppt and soft substrate (*e.g.*, sand, mud) between the river mouths and spawning sites for juvenile foraging and physiological development; 3) water of appropriate depth and absent physical barriers to passage (*e.g.*, locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouths and spawning sites necessary to support: (i) Unimpeded movement of adults to and from spawning sites; (ii) Seasonal and physiologically-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; and (iii) Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river; 4) water quality conditions, especially in the bottom meter of the water column, between the river mouths and spawning sites with temperature and oxygen values that support: (i) Spawning; (ii) Annual and inter-annual adult, subadult, larval, and juvenile survival; and (iii) Larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values may vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO <5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is >25° C. In temperatures >26° C, DO >4.3 mg/L is needed to protect survival and growth. Temperatures of 13° C to 26° C are likely to support spawning habitat.

Designated critical habitat for Atlantic sturgeon does not occur within the action area (see **Figure 5**).

Atlantic Sturgeon Critical Habitat

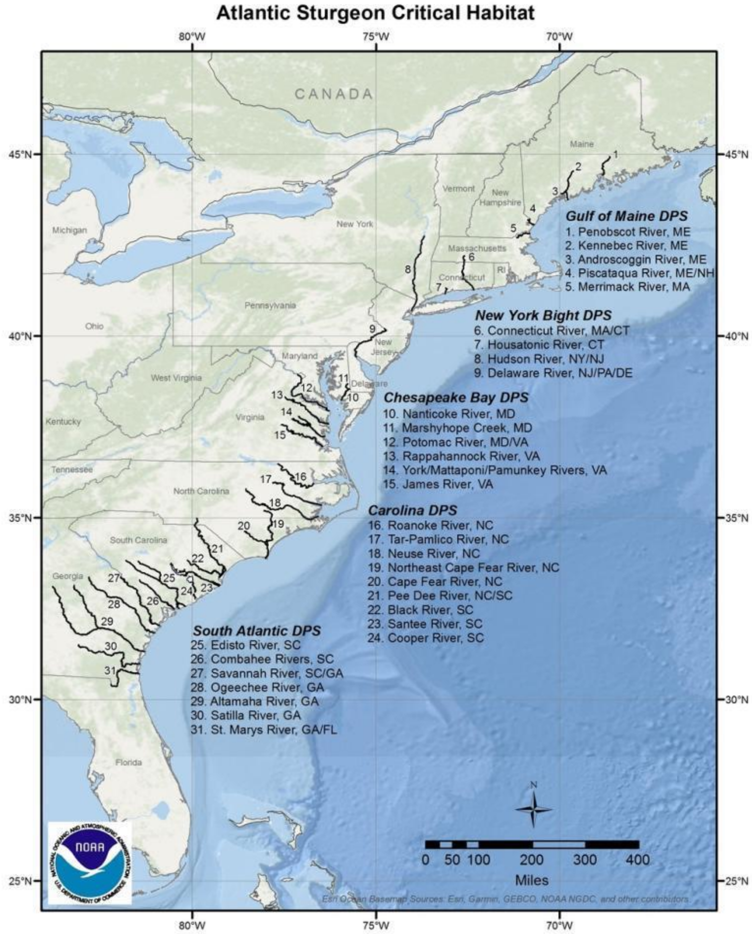

Figure 5: Map representing critical habitat for the conservation of endangered and threatened Atlantic sturgeon from Maine to Florida.

3.2.2 Sea turtles

All sea turtle species occurring in the Atlantic Ocean are listed as either endangered or threatened under the ESA. The alternatives discussed in this EA may affect four sea turtle species: leatherback and Kemp's ridley sea turtles, which are listed as endangered, and the North Atlantic DPS of green sea turtles and Northwest Atlantic Ocean DPS of loggerhead sea turtles, which are listed as threatened. The species summaries in this section will focus primarily on the Atlantic Ocean populations of these species, as these are the populations that may be affected by the proposed action. The following subsections are synopses of the best available information on the life history, distribution, population trends, current status, and threats of the four species of sea turtles that are likely to be affected by one or more components of the action. Thorough descriptions and assessments of the status of the species and DPSs of sea turtles found in U.S. Atlantic waters can be found in the most recent sea turtle recovery plans (NMFS and USFWS 1991, 1992, 1998a, 1998b, 2008; NMFS et al. 2011), 5-year reviews (NMFS and USFWS 2007a, 2007b, 2013, 2015, 2023), and the loggerhead (Conant et al. 2009), green (Seminoff et al. 2015), and leatherback (NMFS and USFWS 2020) status reviews, which are incorporated herein by reference. A brief summary of the status of the species within U.S. Atlantic waters and in the action area is given below.

General threats to sea turtles
Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are either the same or similar in nature for all listed sea turtle species including interactions with fisheries, construction and maintenance of navigation channels (dredging), coastal development, environmental contamination, climate change, and variety of other national and anthropogenic threats including predation, diseases, toxic blooms from algae and other microorganisms, and cold stunning. Additional detail about these threats is described in **Section 4.4 Cumulative Impacts** and information specific to a particular species or DPS is discussed in the corresponding status sections where appropriate.

3.2.2.1 Green sea turtle (North Atlantic DPS)

The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered (43 FR 32800). On September 2, 1998, critical habitat for green sea turtles was designated in coastal waters surrounding Culebra Island, Puerto Rico (63 FR 46693). On April 6, 2016, NMFS and USFWS issued a final rule to list 11 DPSs of the green sea turtle. Three DPSs were listed as endangered and eight DPSs were listed as threatened (81 FR 20057). This rule superseded the 1978 final listing rule for green sea turtles and applied the existing protective regulations to the DPSs. For the purposes of this analysis, only the North Atlantic DPS (NA

DPS) will be considered as it is the only DPS with individuals occurring in the southern New England waters of the U.S. (Figure 6).

Detailed information on the status of green sea turtles, including information on population structure, taxonomy and life history, distribution and abundance, and threats throughout their range, can be found in the Status Review (Seminoff et al. 2015) and the final rule listing DPSs (81 FR 20057).

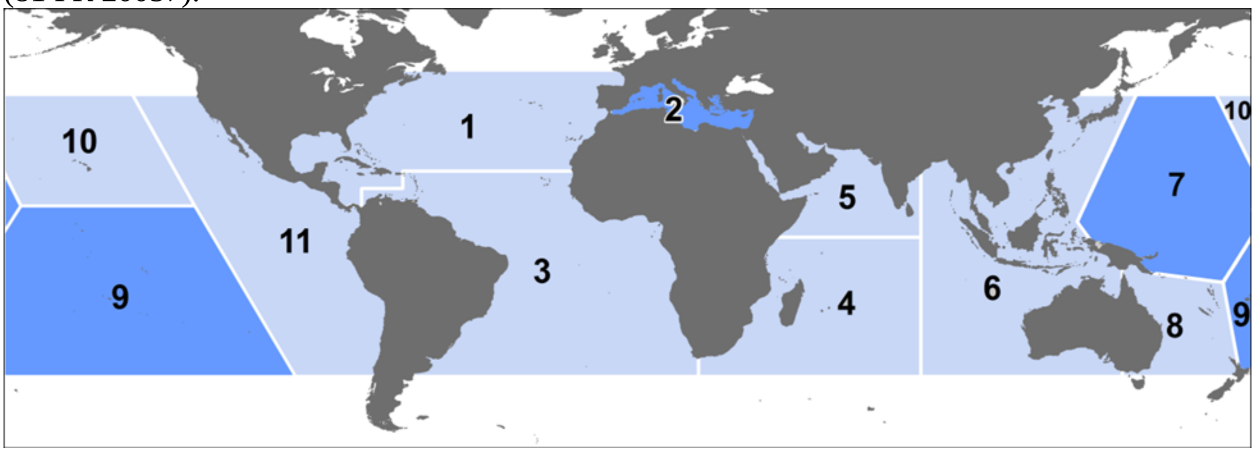

Figure 6: Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11. East Pacific.

Species Description and Distribution

The green sea turtle is the largest of the hardshell marine turtles growing up to 1 m in shell length. They have dark brown, gray, or olive colored shells (carapace) and a much lighter, yellow-to-white underside (plastron). The green sea turtle has a circumglobal distribution, occurring throughout nearshore tropical, subtropical and, to a lesser extent, temperate waters. Adult turtles exhibit site fidelity and migrate hundreds to thousands of kilometers from nesting beaches to foraging areas. With the exception of post-hatchlings, green turtles live in coastal foraging grounds including open coastline and protected bays and lagoons. Oceanic habitats are used by oceanic-stage juveniles (post-hatchlings), migrating adults, and in some cases foraging juveniles and adults. Post-hatchlings feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. Juvenile and adult green turtles feed primarily on seagrasses and algae, although they also consume jellyfish, sponges, and other invertebrate prey. Green sea turtles nest on sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands in more than 80 countries worldwide (Hirth 1997).

Green sea turtles from the NA DPS range from the boundary of South and Central America (7.5° N, 77° W) in the south, throughout the Caribbean, the Gulf of Mexico, and the U.S. Atlantic coast to New Brunswick, Canada (48° N, 77° W) in the north. The range of the DPS then extends due east along latitudes 48° N and 19° N to the western coasts of Europe and Africa (Figure 6). In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are distributed in inshore and nearshore waters from Texas to Massachusetts.

Genetic Diversity

The North Atlantic DPS has a globally unique haplotype[4], which was a factor in defining the discreteness of the population for the DPS. Evidence from mitochondrial DNA studies indicates that there are at least four independent nesting subpopulations in Florida, Cuba, Mexico, and Costa Rica (Seminoff et al. 2015). More recent genetic analysis indicates that designating a new western Gulf of Mexico management unit might be appropriate (Shamblin et al. 2015).

Life History Information

Estimates of age at first reproduction for female green sea turtles range widely depending on population from 15-50 years (Avens and Snover 2013, Seminoff et al. 2015). Females lay an average of three nests per season with an average of 100 eggs per nest and have a remigration interval of 2 to 5 years (Hirth 1997). Nesting occurs primarily on beaches with intact dune structure, native vegetation and appropriate incubation temperatures during summer months. After emerging from the nest, post-hatchlings begin an oceanic juvenile phase. Oceanic-stage juvenile green turtles originating from nesting beaches in the Northwest Atlantic appear to use oceanic developmental habitats and move with the predominant ocean gyres for several years before returning to their neritic foraging and nesting habitats (Musick and Limpus 1997, Bolten 2003). Most green turtles exhibit particularly slow growth rates, which has been described as a consequence of their largely herbivorous (*i.e.*, low net energy) diet (Bjorndal 1982). Growth rates of juveniles vary substantially among populations, ranging from less than 1 cm/year (Green 1993) to >5 cm/year (Eguchi et al. 2012).

Status and Population Dynamics

Compared to other DPSs, the North Atlantic DPS exhibits the highest nester abundance, with approximately 167,424 females at 73 nesting sites, and available data indicate an increasing trend in nesting (NMFS 2023, Seminoff et al. 2015). The largest nesting site in the NA DPS is in Tortuguero, Costa Rica, which hosts 79 percent of nesting females for the DPS (Seminoff et al. 2015). There are no reliable estimates of population growth rate for the DPS as a whole, but estimates have been developed at a localized level. In the continental U.S., green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida. Modeling by Chaloupka et al. (2008) using data sets of 25 years or more show the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9 percent, and the Tortuguero, Costa Rica, population growing at 4.9 percent. According to data collected from Florida's index nesting beach survey from 1989-2021, green sea turtle nest counts across Florida have increased dramatically, from a low of 267 in the early 1990s to a

[4] A set of closely linked genetic markers or DNA variations on a chromosome that tend to be inherited together.

high of 40,911 in 2019. Green sea turtle nesting is also documented annually on beaches of North Carolina, South Carolina, and Georgia, though nesting is found in low quantities (up to tens of nests) (nesting databases maintained on www.seaturtle.org).

Status within the Action Area

Green sea turtle density offshore of southern New England, including Massachusetts, Rhode Island, and Connecticut, is relatively low compared to other regions in the Northwest Atlantic. Sea turtle distribution in this region is strongly influenced by sea surface temperature (SST), with turtles typically appearing when water temperatures reach 11-14 C (Braun-McNeill et al. 2008). Based on recent density surveys, green sea turtles begin migrating north towards Massachusetts in March with sightings of individuals near and within the action area beginning in June and lasting through October (DiMatteo et al. 2023). In Massachusetts, cold stunned juvenile green sea turtles are found on the southern and eastern beaches of Cape Cod Bay in December and January as the water temperatures drop. These juveniles are usually about 30 to 40 cm long. In late fall and early winter, hundreds of cold-stunned sea turtles wash ashore along Cape Cod Bay beaches, with 303 turtles reported over the past ten years (STSSN 2024).

Threats

The principal cause of past declines and extirpations of green sea turtles has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern U.S., green sea turtles that nest and forage in the region may spend large portions of their life cycle outside the region and outside U.S. jurisdiction, where exploitation is still a threat in some areas. In addition to general threats to all sea turtles, green sea turtles are particularly susceptible to mortality from Fibropapillomatosis (FP) disease. FP results in the growth of tumors on soft external tissues (flippers, neck, tail, etc.), the carapace, the eyes, the mouth, and internal organs (gastrointestinal tract, heart, lungs, etc.) of turtles (Jacobson et al. 1989, Herbst 1994, Aguirre et al. 2002). Presently, FP is cosmopolitan, but has been found to affect large numbers of animals in specific areas, including Hawaii and Florida. Green sea turtles are also susceptible to cold-stunning. As temperatures fall below 8-10° C, turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters, or are unable to leave these waters prior to temperature decreases, are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989).

Critical Habitat

Critical habitat has not been designated for the North Atlantic DPS, however in the interim, the existing critical habitat designation (*i.e.*, waters surrounding Culebra Island, Puerto Rico) remains in effect for the North Atlantic DPS. The interim designated critical habitat for green sea turtles is outside the action area. Additionally, NMFS has proposed critical habitat for six

DPSs segments of green sea turtles (88 FR 46527; July 19, 2023). The proposed marine critical habitat includes nearshore waters (from the mean high water line to 20 m depth) off the coasts of Florida, North Carolina, Texas, Puerto Rico, U.S. Virgin Islands, California (which also includes nearshore areas from the mean high water line to 10 km offshore), Hawaiʻi, American Samoa, Guam, and the Commonwealth of Northern Mariana Islands. Proposed marine critical habitat also includes *Sargassum* habitat (from 10 m depth to the outer boundary of the U.S. Exclusive Economic Zone) in the Gulf of Mexico and Atlantic Ocean. The proposed critical habitat for green sea turtles does not occur within the action area.

3.2.2.2 Kemp's ridley sea turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970 (35 FR 8491), under the Endangered Species Conservation Act of 1969, a precursor to the ESA. When the ESA was signed into law in 1973, the Kemp's ridley remained listed as endangered. Additional detailed information on the status of Kemp's ridley turtles, including information on population structuring, taxonomy and life history, distribution and abundance, and threats throughout their range, can be found in the Kemp's ridley 5-year review (NMFS and USFWS 2015), the Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (NMFS et al. 2011).

Species Description and Distribution
The Kemp's ridley sea turtle is the smallest of all sea turtles with adults generally weighing <45 kilogram (kg). Kemp's ridleys have a nearly circular, gray-olive colored carapace and a pale yellowish plastron. Kemp's ridleys range from the Gulf of Mexico to the northwest Atlantic Ocean, as far north as the Grand Banks (Márquez 2001, Watson et al. 2004) and Nova Scotia (Bleakney 1955). Kemp's ridley habitat includes sandy and muddy areas in shallow, nearshore waters, although they can also be found in deeper offshore waters during early life stages and migration. These areas support their primary prey species, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks. Pelagic stage turtles rely on the array of prey items associated with floating *Sargassum* habitat. Kemp's ridleys use relatively shallow corridors to migrate between these foraging areas to nesting beaches. Most nesting occurs in Tamaulipas, Mexico, however in the United States, Kemp's ridleys are known to nest from Texas to North Carolina.

Life History
Estimates of age to sexual maturity for Kemp's ridley sea turtles ranges greatly from 5-18 years. NMFS et al. (2011) determined the best available point estimate of age to maturity for Kemp's ridley sea turtles was 12 years. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately 2 years. Nesting generally occurs from April to July. Females lay approximately 2.5 nests per season with each nest containing 95-112 eggs. After hatching, pelagic post-hatchling and juveniles spend approximately 2 years in the ocean prior to recruiting to nearshore waters.

Status and Population Dynamics

Of all the sea turtle species in the world, the Kemp's ridley has declined to the lowest population level. When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached 21,797 in 2012 (Gladys Porter Zoo 2013). From 2013 through 2014, there was a second significant decline in Mexico. More recent data in Mexico indicate similar fluctuations in the number of nests with periods of low and high nesting. Nesting in Texas has paralleled the trends observed in Mexico, however over the long term, nesting has increased in Texas from one reported nest in 1985 to over 200 in 2020. At this time, it is unclear whether the increases and decreases in nesting seen over the past decade represents a population oscillating around an equilibrium point or if nesting will increase or decrease in the future. Given these uncertainties, NMFS reported the population trend for Kemp's ridley sea turtle as unknown in the most recent report to Congress (NMFS 2023).

Status within the Action Area

Kemp's ridley sea turtles are present in the action area summer through winter. Similar to green sea turtles, some individuals may begin migrating north towards Massachusetts in early June and linger through the winter. While their density is low in this region they are most often seen when they wash ashore after being cold stunned in November and December. Of the cold-stuns reported in Massachusetts, the vast majority (85 – 90%) are juvenile Kemp's ridleys with subadult loggerheads and juvenile greens comprising the remainder. Over the past ten years, 6,502 Kemp's ridley sea turtles have stranded in Massachusetts as a result of cold stunning events (STSSN 2024).

Threats

The Kemp's ridley sea turtle was listed as endangered in response to a severe population decline, primarily the result of egg collection. Because the Kemp's ridley has one primary nesting beach, this species is particularly susceptible to habitat destruction by natural (e.g., hurricanes) and human caused events (NMFS and USFWS 2015). Human caused threats include the potential for oil spills, especially in the Gulf of Mexico since it is an area of high-density offshore oil exploration and extraction. Kemp's ridley populations were impacted by the Deepwater Horizon oil spill in which pelagic/oceanic juvenile Kemp's ridleys were the most common species encountered (Witherington et al. 2012). Bycatch in fisheries is a major threat to Kemp's ridleys. Kemp's ridleys are incidentally captured in fisheries using trawls, gill nets, and hook and line throughout the northwest Atlantic Ocean and Gulf of Mexico and were reported to have the highest interaction with fisheries operating in these areas of any species (Finkbeiner et al. 2011, Wallace et al. 2013).

Critical Habitat
No critical habitat has been designated for Kemp's ridley sea turtles.

3.2.2.3 Leatherback sea turtle

The leatherback sea turtle was listed as endangered throughout its entire range on June 2, 1970 (35 FR 8491) under the Endangered Species Conservation Act of 1969. When the ESA was signed into law in 1973, the leatherback remained listed as endangered. In 2020 NMFS and USFWS published a status review and identified seven discrete populations (separated from each other as a result of physical and behavioral factors). NMFS concluded that the 7 populations would meet the criteria for recognition as DPSs, however did not list them separately as DPSs as all would meet the definition of the endangered (85 FR 48332). For the purposes of this analysis, this document will primarily focus on the Northwest Atlantic Ocean population as only individuals from this population occur in the southern New England waters of the U.S.
Additional detailed information on the status of leatherback sea turtles, including information on population structuring, taxonomy and life history, distribution and abundance, and threats throughout their range, can be found in the status review (NMFS and USFWS 2020), 5-year review (NMFS and USFWS 2013b), and recovery plan (NMFS and USFWS 1998a).

Species Description and Distribution
The leatherback sea turtle is unique due to its large size and wide distribution (due to thermoregulatory adaptations and behavior), and lack of a hard, bony carapace. Leatherbacks are the largest living turtle, reaching lengths of six feet long (~1.83 m), and weighing up to one ton (0.91 metric tons). They have a black carapace with prominent dorsal ridges, long clawless flippers, and a pink spot on the top of their heads. Leatherbacks have pointed tooth-like cusps and sharp-edged jaws that are adapted for a diet of gelatinous prey such as jellyfish, tunicates, and ctenophores. Leatherback turtles spend the majority of their lives at sea, where they develop, forage, migrate, and mate. The leatherback turtle has the widest distribution of any reptile, with a global range extending from 71° N to 47° S and migrates between highly productive temperate foraging areas and tropical and subtropical sandy nesting beaches. The northwest Atlantic population includes leatherbacks originating from the northwest Atlantic Ocean, south of 71° N, east of the Americas, and west of Europe and northern Africa (the southern boundary is a diagonal line between 5.377° S, 35.321° W and 16.063° N, 16.51° W) (NMFS and USFWS 2020).

Life History Information
Based on mean estimates, leatherback turtles mature at approximately 20 years of age and approximately 130 cm CCL in size (Spotila et al. 1996, Avens et al. 2009, NMFS and USFWS 2020). Females lay an average of five to seven clutches per season, with an inter-nesting interval of 7 to 15 days (Eckert et al. 2012, Eckert et al. 2015). Females lay 20 to 100 eggs per nest (Eckert et al. 2012) and nesting occurs on average every 2 to 4 years (remigration interval,

Eckert et al. 2015). The number of leatherback turtle hatchlings that make it out of the nest on to the beach (*i.e.*, emergent success) is approximately 50 percent worldwide (Eckert et al. 2012) and approximately 30 percent of the eggs may be infertile. Nesting females exhibit low site-fidelity to their natal beaches, returning to the same region, but not necessarily the same beach, to nest (Dutton et al. 1999, Dutton et al. 2007). This natal homing results in reproductive isolation between distant nesting beaches, which are separated by physical features, such as land masses, oceanographic features, and currents. This separation is supported by data showing significant genetic discontinuity among the seven populations: northwest Atlantic, southwest Atlantic, southeast Atlantic, southwest Indian, northeast Indian, west Pacific, east Pacific (as summarized in NMFS and USFWS 2020).

Status and Population Dynamics
The northwest Atlantic population nesting female abundance at 55 sites is estimated to be 20,659, with the largest nesting site, Grand Riviere in Trinidad accounting for 29 percent of this abundance. NMFS and USFWS (2020) estimated the index of nesting female abundance for 24 nesting sites in 10 nations within the northwest Atlantic population. Nesting in the northwest Atlantic population is characterized by many small nesting beaches. Large nesting aggregations are rare; only about 10 leatherback nesting beaches in the wider Caribbean region (about 2 percent of the population’s total nesting sites) host more than 1,000 crawls annually (Piniak and Eckert 2011). At beaches with the greatest known nesting female abundance, the northwest Atlantic population is exhibiting a decreasing trend in nesting activity (NMFS and USFWS 2020). The Northwest Atlantic Leatherback Working Group completed a region-wide trend analysis that also showed an overall decline in the population, reporting a 9.32 percent decline in nesting annually from 2008-2017 (Northwest Atlantic Leatherback Working Group 2018). In-water abundance studies of leatherbacks are rare. However, the relative abundance of turtles at a foraging area off Nova Scotia, Canada, from 2002 to 2015 was recently assessed (Archibald and James 2016). This study evaluated opportunistic sightings per unit effort and found a mean density of 9.8 turtles per 100 km^2, representing the highest in-water density of leatherback turtles reported to date. Archibald and James (2016) concluded that the relative abundance of foraging leatherback turtles off Canada exhibited high inter-annual variability, but overall showed a stable trend from 2002 to 2015.

Status within the Action Area
Leatherback sea turtles are frequently observed in New England waters, particularly off of Massachusetts. They’re present in the action area from May through November, with peak sightings in August (Dodge et al. 2021; Kraus et al. 2016). While there is limited information on leatherback movement within the region, they’re known to migrate along the east coast of the United States, traversing the South and Mid-Atlantic Bight while traveling to and from known northern foraging areas off of Southern New England (Rider et al. 2024). These summer hotspots include areas just south of Nantucket (Kraus et al. 2016). Their presence in these waters puts them at risk of entanglement in fixed-gear fisheries, particularly in lobster, whelk, and fish traps (Dodge et al., 2021). Since 2014, 314 leatherback sea turtles have been

reported as stranded in Massachusetts, with 131 individuals being incidentally captured (10% lethal). The majority of these interactions occurred between June and October (STSSN 2024).

Threats
The primary threats to leatherback sea turtles include fisheries interactions (bycatch), harvest of nesting females, and egg harvesting. Because of these threats, once large rookeries are now functionally extinct, and there have been range-wide reductions in population abundance. Leatherbacks are also more susceptible to marine debris ingestion than other sea turtle species due to their predominantly pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding and migratory purposes (Shoop and Kenney 1992, Lutcavage et al. 1997). Ingestion of marine debris (plastic) is common in leatherback turtles and can block gastrointestinal tracts leading to death. Global climate change can be expected to have various impacts on all sea turtles, including leatherbacks. Climate change is likely to impact leatherbacks by altering nesting habitat, and changing the abundance and distribution of forage species, which will result in changes in leatherback foraging behavior and distribution and fitness and growth (NMFS and USFWS 2020).

Critical Habitat
On March 23, 1979, NMFS designated critical habitat for leatherback sea turtles in the waters adjacent to Sandy Point, St. Croix, U.S.V.I. from the 183 m isobath to mean high tide level between 17° 42’12” N and 65° 50’00” W (44 FR 17710). On January 26, 2012, NMFS revised the critical habitat designation for leatherback sea turtles to include coastal and open water areas along the U.S. west coast (77 FR 4170). Designated critical habitat for leatherback sea turtles is outside the action area.

3.2.2.4 Loggerhead sea turtle (Northwest Atlantic Ocean DPS)

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a Final Rule designating nine DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011; effective October 24, 2011): (1) Northwest Atlantic Ocean (NWA) (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The NWA DPS is the only DPS that occurs within the action area and, therefore, it is the only one considered in this document.

Additional detailed information on the status of loggerhead sea turtles, including information on population structuring, taxonomy and life history, distribution and abundance, and threats throughout their range, can be found in the 5-year review (NMFS and USFWS 2023), and recovery plan (NMFS and USFWS 2008).

Species Description and Distribution
Loggerheads sea turtles are large, and adults in the southeast U.S. average 92 cm in carapace length and weigh approximately 116 kg (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace and have large, strong jaws. Loggerhead turtles are circumglobal, and are found in continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic, Indian, and Pacific Oceans. NWA DPS of loggerheads are found along eastern North America, Central America, and northern South America (Dodd Jr. 1988). Habitat use within these areas vary by life stage. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd Jr. 1988). Subadult and adult loggerheads are primarily found in coastal waters and eat benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats. Nesting occurs on beaches within the southeast U.S. and the wider Caribbean region.

Within the NWA DPS, most loggerheads nest from North Carolina to Florida and along the Gulf of Mexico coast of Florida. The recovery plan identified five recovery units. The Northern Recovery Unit (NRU) includes nesting areas from the Florida/Georgia border north through southern Virginia. The recovery plan concluded that all recovery units are essential to the recovery of the species.

Life History Information
Estimates of mean age of sexual maturity for female loggerheads sea turtles is 36 to 38 years (mean age predictions for minimum age are 22.5 to 25 years; Avens et al. 2015) with a 95 percent predictive interval of 29 to 49 years (Chasco et al. 2020). Mean age at sexual maturity for males is 37 to 42 years (mean age predictions for minimum age are 26 to 28 years; Avens et al. 2015). Females nest one to seven times in a season, and clutch sizes range from 95 to 130 eggs. Females nest every 1 to 7 years and exhibit relatively strong nest-site fidelity (Shamblin et al. 2017), with a mean remigration interval of 2.7 years (Shamblin et al. 2021). Young juvenile loggerheads inhabit oceanic waters spanning the width of the north Atlantic Ocean and Mediterranean Sea after which juveniles typically return to the neritic waters of the northwest Atlantic Ocean. Older juveniles undergo an ontogenetic, oceanic-to-neritic habitat shift, however, this transition is not obligate, permanent (*i.e.*, some return to oceanic habitats; Mansfield and Putman 2013), nor fixed to a certain body size or age class (Winton et al. 2018).

Status and Population Dynamics
An overall estimate of nesting females for the NWA DPS is not available because of reproductive parameter uncertainty: remigration intervals and clutch frequencies vary spatially and temporally, and data are insufficient for some recovery units. Adequate data are available from the NRU (Florida/Georgia border north through southern Virginia), and the state of Florida, which represents 89 percent of nesting within the DPS (Ceriani and Meylan 2017). Ceriani et al. (2019) evaluated all known Florida nesting data from 1989 to 2018. Using the

average annual number of loggerhead nests between 2014 and 2018, Ceriani et al. (2019) estimated the total number of adult females nesting in Florida to be 51,319 (95 percent confidence interval of 16,639-99,739 individuals). To avoid pitfalls of estimating nesting females based on estimates of emigration interval and clutch frequency, Shamblin et al. (2021) used genetic analyses to estimate female abundance for the NRU, estimating 8,074 total nesting females from 2010 to 2015 (Shamblin et al. 2021). The overall nesting trend of NWA DPS appears to be stable, neither increasing nor decreasing, for over two decades (NMFS and USFWS 2023). The NRU has demonstrated a positive, statistically significant growth rate (1.3 percent; $p = 0.04$) over the previous 37 years (NMFS and USFWS 2023).

In-water estimates of abundance include juvenile and adult life stages of both sexes but are difficult to perform on a wide scale. In the summer of 2010, NMFS' Northeast and Southeast Fisheries Science Centers estimated the abundance of juvenile and adult loggerhead sea turtles along the continental shelf between Cape Canaveral, Florida and the mouth of the Gulf of St. Lawrence, Canada. They provided a preliminary regional abundance estimate of 588,000 individuals (approximate inter-quartile range of 382,000-817,000) based on positively identified loggerhead sightings (NMFS 2011). A separate, smaller aerial survey, conducted in the southern portion of the Mid-Atlantic Bight and Chesapeake Bay in 2011 and 2012, demonstrated uncorrected loggerhead sea turtle abundance ranging from a spring high of 27,508 to a fall low of 3,005 loggerheads (Barco et al. 2018).

Status within the Action Area

Loggerhead sea turtles are seasonally present in New England, including Massachusetts, with peak abundance during late summer months (August and September (Kraus et al. 2016). From June through November, individuals can be found further offshore towards the continental shelf migrating and feeding in nutrient rich waters (DiMatteo et al. 2023). Juvenile loggerheads are susceptible to cold stunning and are second to Kemp's ridleys in cold stun strandings in Massachusetts, reporting 506 strandings over the past ten years (STSSN 2024). Climate change is expected to increase loggerhead presence, both in abundance and seasonal duration, in the northern region of the northwest Atlantic shelf (Patel et al. 2021).

Threats

Destruction and modification of terrestrial and marine habitats threaten the NWA DPS of loggerhead turtles. On beaches, threats that interfere with successful nesting, egg incubation, hatchling emergence, and transit to the sea include erosion, erosion control, coastal development, artificial lighting, beach use, and beach debris (NMFS and USFWS 2023). In the marine environment, threats that interfere with foraging and movement include marine debris, oil spills and other pollutants, harmful algal blooms, and noise pollution (NMFS and USFWS 2023). Domestic and international fisheries bycatch impacts juvenile and adult loggerheads in pelagic and coastal waters throughout the range of the DPS (Bolten et al. 2011, Finkbeiner et al. 2011). Harmful algal blooms (HABs), also called "red tides," are a significant, nearly-annual threat to the DPS, especially to turtles inhabiting the waters off southwest Florida (Hart et al. 2018).

Critical Habitat
In 2014, NMFS and the USFWS designated critical habitat for the NWA DPS of loggerhead sea turtles along the U.S. Atlantic and Gulf of Mexico coasts, from North Carolina to Mississippi (79 FR 39856). The final rule designated five different units of critical habitat, each supporting an essential biological function of loggerhead turtles. These units include nearshore reproductive habitat, winter area, *Sargassum*, breeding areas, and migratory corridors. Designated critical habitat for loggerhead sea turtles is outside the proposed action area (Figure 7).

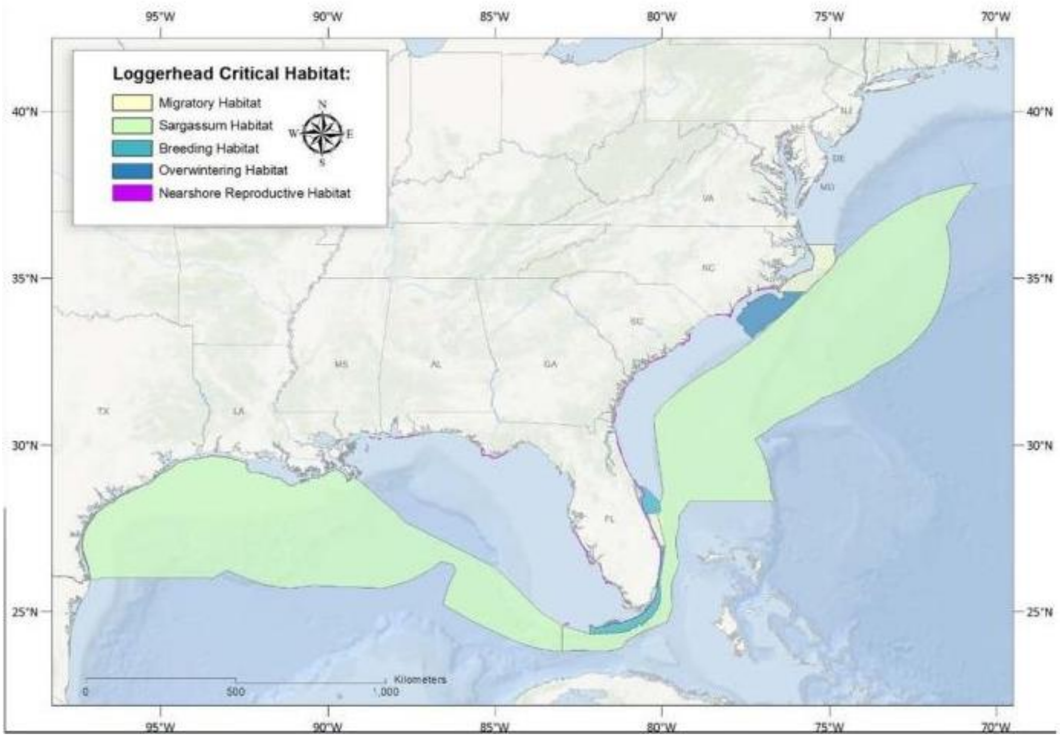

Figure 7: Designated critical habitat for loggerhead sea turtles.

3.2.3 Incidental Take of Other Species

In addition to the capture of fishery resources, mobile bottom-tending gear may also capture or interact with other ESA-listed and protected species. In addition to other ESA-listed species (e.g. shortnose sturgeon), multiple marine mammals occur within the action area. All marine mammals are federally protected under the Marine Mammal Protection Act (MMPA) (16 U.S.C. § 1361). Interactions with other ESA-listed species and marine mammals have been documented in commercial trawling fisheries in the New England region as well as the fishery-independent trawl surveys. The proposed fishery resource survey methodology is consistent with both the NEAMAP and NEFSC trawl survey protocols, and is spatially constrained to areas that overlap with the NEFSC survey area. These protocols include the target tow durations of 20 minutes, tow speeds up to 3.2 knots, and survey operations restricted to daylight hours.

During the time period of 2004 to 2024, four interactions with marine mammals were recorded during NEFSC trawl operations. Of the four interactions, two resulted in mortalities of the captured marine mammal (short-beaked common dolphin and grey seal), the remaining two marine mammal interactions (harbor porpoise and common dolphin, both in 2021) were both determined to be deceased prior to capture. The two mortalities that occurred between 2004 and 2024, included a grey seal interaction with the NEFSC bottom trawl spring survey during daylight hours in 2015, however the disposition of the seal at the time of capture is not clear. The second interaction that resulted in a mortality occurred in 2007 during the NEFSC bottom trawl fall survey. This interaction was with a short -beaked common dolphin, however the interaction occurred during non-standard survey operations (a gear testing trip) with a longer tow duration (45 minutes) and during overnight operations. Given the location of the proposed survey within the offshore waters and agreed to survey protocols, interactions with other ESA-listed species and marine mammals are not likely to occur, therefore the authorization of incidental take is not being analyzed in this EA.

3.3 Social and Economic Environment

A variety of human activities may occur in the action area such as commercial fishing, recreational fishing, recreational boating, ecotourism, and other commercial uses, such as shipping. For the purposes of this EA, commercial and recreational fisheries are likely the most affected resource. Additionally, activities associated with fisheries research are likely to be impacted and affect the social and economic environment. Fisheries research informs and provides guidance for the management and sustainability of federally managed commercial, recreational, and subsistence fisheries in the region. Currently, fisheries research activity in the action area is predominantly undertaken by NOAA’s Northeast Fisheries Science Center (NEFSC). The NEFSC conducts multiple surveys from the northern border of the United States to Cape Hatteras, North Carolina. These surveys include biannual (spring and fall) bottom-trawl surveys that directly inform fishery management decisions, including fishery catch limits for federally managed species.

3.3.1 Commercial Fisheries

The latest economic data available for U.S. fisheries, *Fisheries Economics of the United States 2020*, analyzed data for the New England (Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island) and the Mid-Atlantic (Delaware, Maryland, New Jersey, New

York, and Virginia) regions (NMFS 2023). Key commercial species for the New England region include American lobster, Atlantic herring, Atlantic mackerel, bluefin tuna, cod and haddock, flounder, goosefish, quahog clam, sea scallop, and squid. Key species for the Mid-Atlantic region include Atlantic lobster, Atlantic surf clam, blue crab, eastern oyster, menhaden, quahog clam, sea scallop, squid, striped bass, and summer flounder (NMFS 2023). For 2020, the landings revenue in New England totaled $1.2 billion and in the Mid-Atlantic totaled $512.6 million.

In 2020, the commercial fishing and seafood industry in Massachusetts generated the largest employment impacts in the New England Region with 127,680 jobs. Massachusetts also generated the largest sales impacts ($14.8 billion), value-added impacts ($5.6 billion), and income impacts ($3.6 billion) (NMFS 2023). In 2020, the commercial fishing and seafood industry in New Jersey generated the largest employment impacts in the Mid-Atlantic region with 53,313 jobs. New Jersey also generated the largest sales impacts ($11.2 billion), value-added impacts ($3.9 billion), and income impacts ($2.3 billion) (NMFS 2023).

3.3.2 Recreational Fisheries

NMFS estimates recreational fishing activity based on expenditures of marine recreational anglers (Lovell et al. 2020). In the New England Region in 2020, recreational fisherman took 16 million trips and generated $544.4 million in trip expenses. Massachusetts and Connecticut led the region in the greatest expenditures resulting in employment (Massachusetts 1,951 jobs, Connecticut 956 jobs), sales (Massachusetts $244.5 million, Connecticut $118.4 million), generated income (Massachusetts $119.5 million, Connecticut $50.4 million), and value-added (Massachusetts $170.1 million, Connecticut $91.6 million). Key recreational species included Atlantic cod, Atlantic mackerel, bluefin tuna, bluefish, little tunny, scup, striped bass, summer flounder, tautog, and winter flounder.

In the Mid-Atlantic Region in 2020, recreational anglers took 49.1 million fishing trips. New Jersey and New York led the region in the greatest expenditures resulting in employment New Jersey 4,455, (New York 4,872 jobs), sales (New Jersey $296.5 million, New York $189.1 million), generated income (New Jersey $296.5 million, New York $189.1 million), and value-added (New Jersey $469.4 million, New York $328.1 million). Key recreational species included Atlantic croaker, black sea bass, bluefish, scup, spot, striped bass, summer flounder, tautog, weakfish, and winter flounder.

3.3.3 Fishing Communities

Fisheries management is of importance to traditional, recreational, and/or commercial value to the communities of the region (NMFS 2009). Fishing communities have been identified by NMFS because of their links to commercial and/or recreational fishing. Marine fisheries off the northeast coast of the United States are managed by two different regional fishery management councils, the NEFMC and the MAFMC . The NEFMC encompasses the coastal states from Maine through Connecticut, while the MAFMC includes coastal states from New York to Virginia. In addition, the Atlantic States Marine Fisheries Commission (ASMFC) was formed by the 15 Atlantic coast states and coordinates the conservation and management of near shore fishery resources shared by member states through the creation of FMPs. North Carolina, South Carolina, Georgia and Eastern Florida communities have also been included because some fisheries overlap between the MAFMC and the South Atlantic Fishery Management Council (SAFMC) (Colburn et al 2010).

3.4 Historic Places, Scientific, Cultural, and Historical Resources

Shipwrecks are the primary historical, scientific, and cultural resource expected to occur within the proposed action area. Known shipwreck locations are currently included on NOAA nautical charts and/or NOAA Coast Survey's Automated Wreck and Obstruction Information System (AWOIS). Offshore wind development site-specific lease area preconstruction site assessment surveys may identify previously unknown shipwreck locations. The exact number of shipwreck locations that occur within and adjacent to the action area is currently unknown, however over 25 wrecks have been identified.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This section presents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. These are defined at 40 CFR 1508.1(g), and these definitions are presented below. For the purpose of this analysis, NMFS considered the type of impact (direct, indirect, or cumulative), intensity (e.g., severity or magnitude) of the impact, and duration of the impact of the proposed action, as well as the context (significance of the action is analyzed in several contexts, e.g., the affected interests and the affected region). The magnitude or intensity of a known or potential impact is defined on a spectrum ranging from no impacts to major impacts. The potential impacts could be either beneficial or adverse. The terms minor, moderate, and major are used and their definitions have been informed by the NEPA and ESA regulations. The duration of the potential impact takes into account the permanence of an impact; either short or long term impacts, which are also defined below.

Type of impact:

- **Direct Impact:** A known or potential impact caused by the proposed action or project that occurs at the time and place of the action.
- **Indirect Impact:** A known or potential impact caused or induced by the proposed action or project that occurs later than the action or is removed in distance from it, but is still reasonably expected to occur.
- **Cumulative Impact:** A known or potential impact resulting from the incremental effect of the proposed action added to other past, present, or reasonably foreseeable future actions.

Magnitude/Intensity:

- **Minor:** The action would have only a small impact on protected species. That impact, when adverse, may disturb a few individuals and alter their behavior temporarily, however it is not likely to adversely affect those individuals. Population-level impacts (for example to migration, feeding and reproductive behavior) would not occur at a level that may result in reduced reproduction or an appreciable reduction in the likelihood of survival or recovery for the species. Changes to protected species' habitats (critical habitat) are minimal and do not appreciably differ from previous or natural conditions. Changes to habitat function are small and inconsequential.
- **Moderate:** The action has a more noticeable impact on protected species. That impact, when adverse, may widely and frequently disturb individuals, and the action may have the potential to adversely affect those individuals. Population level impacts (for example to migration, feeding, and reproductive behavior) may occur. Changes to protected species' habitats (critical habitat) would be apparent when compared to previous or natural conditions. Changes to habitat function are measurable.
- **Major:** The action has an obvious impact on protected species. That impact, when adverse, may result in harassment of individuals at sub-lethal or lethal levels, and the action may have the potential to jeopardize those populations and adversely modify critical habitat. Population level impacts (for example to migration, feeding and reproductive behavior) are likely to occur. Changes to protected species' habitats (critical habitat) would be obvious when compared to previous or natural conditions. Changes to habitat function are immediately apparent and measurable over time.

Duration of Potential Impacts:

- **Short-Term Impact:** A known or potential impact of limited duration, relative to the proposed activity and the environmental resource. For the purposes of this analysis, these impacts may vary from instantaneous to lasting minutes, hours, days, or up to 5 years. One to 5 years-worth of data aligns with the Before-After-Control-Impact (BACI) framework as recommended by BOEM (BOEM, 2019)
- **Long-Term Impact:** A known or potential impact of extended duration, relative to the proposed activity and the environmental resource. For the purposes of this analysis, these improvements or disruptions to a given resource would last longer than 5 years.

4.1 Environmental Consequences of Action Alternatives

Short-term, minor to moderate direct and indirect impacts are expected to occur to ESA-listed species when SMAST fisheries surveys result in incidental takes of any species of Atlantic sturgeon or sea turtles, including live releases and potential mortalities. Incidental capture of sturgeon and sea turtles in the fisheries surveys may have short-term or long-term negative impacts on the individuals captured. It is important to recognize that an adverse effect on a single individual or a small group of animals does not necessarily translate into an adverse effect on the population or species, unless it results in reduced reproduction or survival of the individual(s) that causes an appreciable reduction in the likelihood of survival or recovery for the species.

In order for the proposed action to have an adverse effect on a species, the take of individual animals during survey operations would first have to result in: 1) direct mortality, 2) serious injury that would lead to mortality, or 3) disruption of essential behaviors such as feeding or spawning, to a degree that the individual's likelihood of successful reproduction or survival was substantially reduced. That mortality or reduction in the individual's likelihood of successful reproduction or survival would then have to result in a net reduction in the number of individuals of the species or DPS. In other words, the loss of the individual or its future offspring would not be offset by the addition, through birth or emigration, of other individuals into the population. In order for the proposed action to have an adverse effect on the species, the adverse impacts to individuals would need to be linked to a net loss to the species that would have to be reasonably expected, directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of the listed species in the wild.

4.1 Environmental Consequences Common to All Alternatives

Essential Fish Habitat and Habitat Areas of Particular Concern

Mobile bottom-tending fishing activities occur throughout the action area. The substrates within the action area are predominantly fine-grained substrates that are less susceptible to adverse long-term trawling impacts. The alternatives considered in this EA are not expected to cause adverse impacts to the quality and/or quantity of EFH.

Historic Places, Scientific, Cultural, and Historical Resources

Shipwrecks are found throughout the action area, however the proposed trawl survey is not expected to interact with these resources. Known shipwreck locations are expected to be avoided as they have the potential to damage the survey gear and result in incomplete tows. Further, neither of the alternatives considered are expected to occur in or indirectly affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural, or historical resources or preclude their availability for other scientific, cultural, or historic uses. Thus, effects on such resources are not anticipated under any alternative.

4.2 Effects of the No Action Alternative (Alternative 1)

Effects on Atlantic Sturgeon and Sea Turtles

An alternative to the proposed action is no action, specifically that an ITP would not be issued. . In this EA, NMFS assumes that for the No Action Alternative, the pre-construction bottom-trawl surveys to assess fisheries resources within and adjacent to the MA/RI WEA included in the ITP application and conservation plan would not be conducted or SMAST would use alternative methods to collect fisheries data (e.g., eDNA, baited underwater video, ropeless traps). In either case, there would not be a need for an ITP because take of listed species would not be expected, resulting in a direct beneficial effect for Atlantic sturgeon and sea turtles.

Social and Economic Effects

Under the No Action Alternative, it is expected that the collection of baseline fisheries resource data using demersal bottom-trawl gear prior to the construction of offshore wind developments would not occur. AlternativelySMAST could use other survey methods that avoid impacts to ESA-listed species. However, the use of alternative survey methods (e.g. eDNA, baited underwater video, ropeless traps, etc.) would not be consistent with existing methods used for fisheries management in the area. The use of such alternative survey methods that are not readily integrated into existing fisheries resource surveys conducted throughout the New England and Mid-Atlantic regions could result in negative socioeconomic effects to fisheries if fisheries managers have to rely on insufficient data to inform management decisions. The potential for impacts to fisheries independent surveys conducted by NMFS as a result of offshore wind development in SNE, and the adverse socioeconomic effects of such impacts to the regional fisheries and ocean ecosystem productivity, are described in Hare et al. (2022). Specifically, it is expected that future NEFSC surveys in the action area would be impacted as a result of offshore wind development; and the potential for offshore wind developer sponsored fisheries resource surveys within the action area could mitigate these impacts if the survey methods and protocols are consistent with the existing NEFSC surveys. However, if future NEFSC surveys are not considered for mitigation and there is a lack of necessary data from within WEAs, fisheries managers are likely to have to take a more restrictive approach due to the deficiency of data from these areas.

Further, under the No Action Alternative, if baseline data is not collected prior to the authorization of projects by BOEM, adequate baseline fisheries resource data may not be collected that could help to distinguish between potential offshore wind development effects to fisheries resources and other drivers of change to fisheries resources over time (e.g. climate change, shifts in managed species distributions and abundance, etc.). As described in Hare et al. (2022) and Methratta et al. (2023), if survey methods inconsistent with NEFSC survey protocols are employed to collect fisheries resource data, the use of the collected data by fisheries managers to support sustainable management is likely to be limited. While NMFS cannot know for certain how such pre-construction baseline fisheries resource data limitations may affect fisheries management and resources, it is likely that the limitations would result in indirect, minor to moderate, long-term adverse socioeconomic effects to commercial and recreational fisheries.

4.3 Effects of Take under Alternative 2 - Issue Incidental Take Permit as Requested in Application (Preferred Alternative)

Implementation of Alternative 2 has the potential to result in both beneficial and adverse effects on sturgeon and sea turtle species. The issue most relevant to this analysis is the potential for impacts on the incidentally captured sturgeon and sea turtles and the effects of Alternative 2 are described below.

4.3.1 Effects on Atlantic Sturgeon

Fishery survey operations under different DO, temperature, and salinity regimes may vary the effects of net capture on Atlantic sturgeon. Research has revealed that sturgeon survival is affected by a relationship between temperature, DO, and salinity. Jenkins et al. (1993), Secor and Gunderson (1998), Niklitschek (2001), Secor and Niklitschek (2002), and Niklitshek and Secor (2009) demonstrated shortnose and Atlantic sturgeon survival in a laboratory setting was affected by reduced DO, increased temperature, or increased salinity. Likewise, Altinok et al. (1998), Sulak and Clugston (1998), Sulak and Clugston (1999), and Waldman et al. (2002) reported high temperatures, low DO, and high salinities result in lower survival of Gulf sturgeon. Atlantic sturgeon experience lower survival when water temperatures exceed 28° C (Niklitshek and Secor 2005). Mayfield and Cech (2004) estimated the lethal water temperature for green sturgeon in the wild at 27° C. Such temperatures are greater than typical peak surface temperatures during the summer months in the action area, but as the fisheries resource survey would be conducted during all four seasons, surveys completed during the summer months have the greatest potential to result in increased stress and injury to captured sturgeon. Individual sturgeon may react differently to changes in environmental conditions such as water quality, salinity, and stress associated with incidental capture.

Handling and restraining sturgeon may cause short-term stress responses. Sturgeon may inflate their swim bladder when held out of water (Moser et al. 2000), and if they are not returned to neutral buoyancy prior to release, they would float and be susceptible to sunburn and predation. The ITP application and conservation plan specifies multiple minimization and mitigation measures to reduce handling stress of captured sturgeon (see Section 2.2.2.2, above), including the use of Atlantic sturgeon safe handling and release guidelines. Such minimization and mitigation measures are employed during the NEAMAP and NEFSC fisheries surveys and no sturgeon mortalities have been documented as a result of incidental capture and handling during either survey. Based on the handling and release guidelines that SMAST has committed to follow, the direct impacts from handling are anticipated to be short-term and minor in effect.

It is possible that Atlantic sturgeon released alive could succumb to post-release mortality or sub-lethal effects resulting in reduced reproductive efforts after being handled (Moser and Ross

1995). However, we have no records of serious injury or mortality as a result of Atlantic sturgeon interactions with either the NEAMAP or NEFSC surveys to date. These surveys have been ongoing for decades and the proposed SMAST fisheries survey methodology is consistent with these long-term surveys. In consideration of the short tow times and priority handling of any sturgeon that are captured, we do not anticipate the serious injury or mortality of any Atlantic sturgeon captured in the trawl gear. Individuals may experience minor injuries (minor abrasions or scrapes) but are expected to fully recover in a short period of time with no lasting effects on individual health or fitness.

Implementation of the proposed mitigation and monitoring measures that would be required under the ITP would provide with the added benefit of conducting genetic sampling of incidentally captured sturgeon and tracking of any incidentally captured PIT-tag fish, and SMAST has committed to having their genetic samples analyzed. While there is the potential for direct and indirect adverse, short-term, minor to moderate effects to individual Atlantic sturgeon, there is also potential indirect, minor to moderate, short to long-term benefits from the knowledge that would be gained from processing genetic samples and PIT tag tracking of captured individuals. Further, research by Fox et al. (2019) has shown that tagging and telemetry is a feasible approach to developing post-release mortality estimates for sturgeon, thus the data collected during the handling of incidentally caught sturgeon and the maintenance of existing telemetry arrays within and outside the action area can help inform post-release mortality of sturgeon following release.

Atlantic sturgeon critical habitat is not located within the action area, so no impacts on critical habitat are anticipated.

4.3.2 Effects on Sea Turtles

Sea turtles are particularly prone to entanglement in fishing gear because of their body configuration and behavior. Sea turtles can be wedged (i.e., held by a mesh or meshes around the body) or become entangled when their mouth, maxillae, scutes, snout, or other projections become entangled in netting. Entanglement may lead to struggling that subsequently wraps the sea turtle in additional webbing. The impacts from incidental capture in trawl nets, handling, and release of live sea turtles are anticipated to be direct, short-term, minor to potentially moderate effects. However, sea turtles released alive from trawl nets may later succumb to injuries sustained at the time of capture or from netting otherwise still attached when they are released (known as post-release or post-interaction mortality), resulting in long-term, moderate impacts. Post-interaction mortality results from delayed effects of physiological disturbances or traumatic injuries caused by capture (NMFS 2022a). Some may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. These behavioral changes may make sea turtles more susceptible to recapture within a short period of time. Numerous factors affect the survival rate of entangled sea turtles: activity level and condition of the sea turtle (i.e., disease and hormonal status); and how much netting, if any, was attached to the sea turtle at release.

Bottom trawl nets can also cause sea turtles to be forcibly submerged. Although sea turtles can stay submerged for 20-180 minutes during voluntary dives, forced submergence due to net entanglement can be lethal (Lutz and Bentely 1985). Generally, when sea turtles are underwater, their bodies create energy for their cells in a process that uses oxygen from their lungs. Sea turtles that are stressed from being forcibly submerged due to capture in fishing nets and those struggling to escape or surface for air will rapidly deplete their oxygen stores. Since they must continue to create energy with or without oxygen, when their oxygen stores are used up, they begin to create energy via a process that does not require oxygen (i.e., anaerobic glycolysis). However, this process can significantly increase the level of a certain type of lactic acid in a sea turtle's blood (Lutcavage and Lutz 1997); if the level gets too high, death can occur. Numerous factors affect the survival rate of forcibly submerged sea turtles: the size (larger sea turtles can dive for longer), activity level and condition of the sea turtle (i.e., disease and hormonal status); the ambient water temperature (anaerobic glycolysis may begin sooner during the warmer months); net submergence time, and the number of times forced submergences have recently occurred to the animal. The physiological damage incurred due to net entanglement may affect the turtle's behavior and reduce its chances of survival post-release, and recovery from lactic acid build up can take over 15 hours, depending on the length of time submerged and level of acidosis (Lutz and Dunbar-Cooper 1987).

The probability of mortality has been documented to be related to trawl duration with increased tow duration leading to an increased probability of mortality (Henwood and Stuntz, 1987, Sasso and Epperly, 2006). Short tow durations (<30 min.) have been documented to have a negligible likelihood of mortality (Sasso and Epperly, 2006). Based on the analysis by Sasso and Epperly (2006), as well as additional information from state and federal bottom trawl surveys (NMFS and NEAMAP), it is likely that tow times less than 30 minutes minimize mortality risk from forced submergence for sea turtles caught in demersal trawl gear. Further, SMAST tows would be of 20-minute duration; and due to this short duration time, no mortalities are anticipated. NMFS will require, through its ITP, that SMAST implement these tow protocols, which should result in at most direct and indirect, minor, short-term adverse effects to any individual sea turtle(s) caught in trawl gear.

SMAST has committed to implementing safe handling and care protocols as well as avoidance and minimization measures in the ITP application and conservation plan. Specifically, trained observers would be aboard the research vessel when sea turtles are likely to occur within the action area (between June 1 and November 30). The observer would be posted on all vessel transits during all phases of the project to observe for protected species and communicate with the captain to take avoidance measures as soon as possible if one is sighted as detailed below. The trained lookout would maintain a vigilant watch and monitor a Vessel Strike Avoidance Zone (500 m) at all times to maintain minimum separation distances from ESA-listed species. If the trained lookout is a vessel crew member, this would be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts would receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. Further, any observations of sea turtles would be reported to seaturtlesightings.org as well as other working vessels in the area. Reporting observations would increase awareness and vigilance with the goal of reducing potential interactions. Additionally, reports of sea turtles would provide data on the spatial and seasonal distribution and occupancy of sea turtles within and adjacent to the MA/RI WEA. Such data could allow for a better understanding of both the current distribution of sea turtles within the action and how sea turtles in the action area respond to offshore wind development. The collection of sea turtle sighting data within and adjacent to the MA/RI WEA prior to construction of offshore wind developments would result in no take, and direct and indirect, minor to moderate, short to long-term beneficial effects.

4.4 Cumulative Impacts

A cumulative impact is the impact on the environment resulting from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or non-federal) or person undertaking such other actions (40 CFR 1508.1(g)(3)). Significance from the proposed action cannot be avoided if it is reasonable to anticipate a significant cumulative impact on the environment. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time. Sturgeon and sea turtles face numerous natural and anthropogenic direct and indirect threats that shape their status and affect their ability to recover. As many of the threats are similar in nature for listed sea turtle and sturgeon species, those identified in this section below are discussed in a general sense for all listed sea turtles and sturgeon, unless otherwise specified.

4.4.1 Fisheries

Sturgeon

Current and future recreational and commercial fishing activities in state and federal waters may capture, injure, or kill sturgeon. However, it is not clear to what extent these future activities would affect listed species differently than current fishery activities. Atlantic sturgeon populations occur within and outside of the zone of influence of the ITP to be issued to SMAST. Historically, one of the major contributors to declines in Atlantic sturgeon populations was direct commercial harvest of this fish. A coast-wide moratorium on harvesting Atlantic sturgeon was implemented in 1998 pursuant to Amendment 1 of the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fishery Management Plan for Atlantic sturgeon (ASMFC 1998). Retention of Atlantic sturgeon from the U.S. Exclusive Economic Zone (EEZ) was prohibited by NMFS in 1999 (64 FR 9449; February 26, 1999). While the intentional harvest of Atlantic sturgeon in federal waters has been prohibited since 1999, unintended bycatch in state and federally managed fisheries still occurs. However, there is limited observer coverage of federal fisheries that interact with Atlantic sturgeon. As a result, the total number of Atlantic sturgeon interactions with fishing gear in federal waters is unknown. Even when a fish is observed, captured, and released alive, the rate of post-release mortality is unknown. Impacts from poaching are unknown. Specific information on interactions with sturgeon within all fisheries operating in the action area is not available. Fisheries impact to sturgeon are likely to continue into the foreseeable future.

Sea turtles

Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and a threat to future recovery, for all of the sea turtle species (Lewison et al. 2013, NMFS and USFWS 2013a, 2013b, 2015, 2020, 2023). Alteration of prey abundance and alteration of bottom habitats from bottom tending fishing gear (e.g., bottom trawlers) have also been identified as a threat to sea turtles.

Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries and similar fisheries in international waters and foreign nation waters. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters and similarly across their range in the waters of other countries. These fishing methods include trawls, gill nets, purse seines, hook-and-line gear [including bottom longlines and vertical lines (e.g., bandit gear, handlines, and rod-reel)], pound nets, and trap fisheries.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries (Lewison et al. 2013). Bottom longlines and gill net fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, west Africa, central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

State and federal managed commercial and recreational fisheries are reasonably certain to occur within and outside the zone of influence of the proposed ITP in the foreseeable future, therefore interactions of sea turtles with these fisheries are anticipated to continue into the foreseeable future.

4.4.2 Non-Fishery In-Water Activities

Dredging and disposal

Sturgeon

Navigation channel construction and maintenance may both alter sturgeon spawning habitat resulting in a loss of spawning grounds and directly cause injury or mortality by entrainment during dredge operations. Dredging operations may impact sturgeon by destroying benthic feeding areas, disrupting spawning migrations, altering local hydrology, and resuspending fine sediments in habitat that covers required substrate. Because sturgeon are benthic omnivores, the modification of the benthos from dredging activities in the action area has likely affected the quality, quantity, and availability of sturgeon prey species. Periods of low DO concentrations and high water temperature can result in physiological stress (Campbell and Goodman 2004, Jenkins et al. 1993, Secor and Gunderson 1998, Secor et al. 2000) and poor body condition (Flournoy et al. 1992) for sturgeon. Stress symptoms may include immobility or reduced movement (Jenkins et al. 1993, Crocker and Cech Jr. 1997, Wilkens et al. 2015), increased ventilation rates, and decreased metabolism (Secor and Niklitschek 2001). Low DO levels can reduce growth, feeding, and metabolic rates. Fish may swim to the surface in low oxygen conditions to receive more oxygen-rich water at the air-water interface (Secor and Niklitschek 2001, NMFS 2010). Hence, even a minor decrease in DO from dredging or dredge-related activities during these times can be harmful or fatal to sturgeon in rivers. This is particularly relevant when the dredged sediment contains high concentrations of organic material, these sediments often have high oxygen demands, and will actively absorb DO from the water column, lowering the oxygen available for other aquatic life. Dredging these sediments can expose them to the water column where they can further degrade water quality beyond the changes in DO from dredging other types of sediments. During times when DO is low, sturgeon may seek refuge from stressful environmental conditions by "hunkering" down and aggregating in deep, cool holes (Hastings et al. 1987, Collins et al. 2002). Additionally, sturgeon seek refuge from unsuitable water quality conditions (*e.g.*, extreme temperatures and salinities) and during these times can tightly aggregate in relatively small areas within a river (*e.g.*, a section that was <1 km in length) (Collins et al. 2002). When sturgeon aggregate in a particular location, there is an increased risk of take via direct interaction with dredge equipment. In addition, if they are aggregating in an area to seek refuge from stressful water quality conditions, dredging or dredge-related effects that force sturgeon to move from the area of refuge to a location that cannot support their physiological needs can also be harmful or fatal. Dredging and disposal impacts to sturgeon are likely to continue into the foreseeable future.

Sea turtles

The construction and maintenance of federal navigation channels are known to incidentally interact with sea turtles and have caused sea turtle mortalities. Hopper dredges can entrain and kill sea turtles. Dredging may also alter foraging habitat and relocation trawling associated with the project may injure or kill sea turtles and displace the turtles out of their preferred habitat. Whole sea turtles and sea turtle parts have been observed in hopper dredging operations from New York through Florida. Between 1980 and 2003, the last time a comprehensive report was prepared by the U.S. Army Corps of Engineers, 508 sea turtles were incidentally taken during dredging activities at 38 locations throughout the southeastern U.S. (Dickerson et al. 2004). Most sea turtle encounters with hopper dredges result in serious injuries or mortalities.

Due to beach erosion in some winters, dredged materials are commonly borrowed from offshore shoals to deposit onto beaches, generally for recreational purposes. Harbor and channel dredging can indirectly affect sea turtles by degrading habitat, such as altering benthic foraging areas, decreasing the number and abundance of prey species, and reducing water quality by increasing turbidity and releasing potential contaminants into the water column (Ramirez et al. 2017). Trailing suction hopper dredges and other support vessels may strike slow-moving sea turtles or entrain sea turtles in the draghead, as it moves across the seabed. Such direct impacts often result in severe injury and/or mortality. Nesting success can be reduced by inappropriate quality sand deposited onto nesting beaches, or nests can be directly injured by sand deposited over nests. Dredging and beach nourishment impacts to sea turtles are likely to continue into the foreseeable future.

Water cooling systems

Sturgeon and sea turtles entering coastal or inshore areas have also been affected by entrainment and/or impingement in the cooling-water intake systems (CWIS) of electrical generating plants. Impingement means physical contact with the intake screens during withdrawal of cooling water by sea turtles or sturgeon large enough to be retained by traveling screens. To keep condensers from clogging with solid materials and biota, many power plant CWIS use a combination of large-and finer-mesh screens. Typically, the large-mesh screens or bar racks are fixed in place while the finer-mesh screens can move to facilitate cleaning. These movable screens are called traveling screens. As the water passes through these screens, organisms larger than the mesh openings can be impinged against the screens. Because of their more limited swimming abilities, most fish impinged are less than 1 year old and sea turtles usually have an underlying condition leaving them susceptible to impingement. The survival rate for impinged species is species specific and varies with size, season, and depends on several other power plant-related factors, such as intake velocity, plant design, and operating conditions.

Entrainment means the transport through the CWIS of sturgeon that pass through the mesh openings of the intake screens, as they are too small to be retained by the traveling screens. Planktonic organisms are susceptible to entrainment because their small size and limited swimming ability reduce the potential for escape from the entrained water mass and allow passage through the mesh of the traveling screens. Entrained fish are typically limited to the younger life stages of fish and this is the case for sturgeon. Any entrained larvae pass through the circulating pumps and condenser tubes along with the cooling water. The cooling water and any entrained fish larvae then enter the discharge canal or conduit for return to the estuary. During their passage through the plant, entrained individuals experience a variety of stresses, some of which may cause death. Survival rates for fish larvae entrained by power plants depend on the species' hardiness as well as their responses to thermal stresses. Water cooling impact to sturgeon and sea turtles are expected to continue into the foreseeable future.

<u>Vessel interactions</u>

Sturgeon

Sturgeon are susceptible to vessel interactions as a result of vessel hull or propeller strikes from deep vessel hulls in shallow waters or as sturgeon move up in the water column. Large vessels have typically been implicated because of their deep draft relative to smaller vessels, which increases the probability of vessel collision with demersal fishes like sturgeon, even in deep water (Brown and Murphy 2010). There is no directed survey for sturgeon strandings and all records are opportunistically reported by the public or resource managers that happen to find an animal, usually on a beach or river bank. Vessels (federal and private, commercial and recreational) would continue to operate in the area for the foreseeable future, and the impacts described above would likely persist.

Sea turtles

Vessel strikes represent a recognized threat to air breathing marine species including sea turtles and these injuries are commonly observed in stranded animals. Vessel strikes can lead to the injury, debilitation, harassment, and/or mortality of sea turtles (Dwyer et al. 2003). Vessel strikes are a poorly-studied threat, but have the potential to be an important source of mortality to sea turtle populations (Work et al. 2010). The magnitude of these interactions is not currently known. The Sea Turtle Stranding and Salvage Network's reports include evidence of vessel interactions (*e.g.*, carapace damage from propeller and skeg impact injuries) with sea turtles. It is not known how many of these injuries occur pre- or post-mortem. It is likely that the interactions with commercial and recreational vessels result in a higher level of sea turtle mortality than what is documented, since some carcasses would not reach the beach. Minor vessel collisions may cause injuries that weaken or otherwise affect sea turtles that can then become vulnerable to predation, disease, and other natural or anthropogenic hazards.

Vessels in the action area may include federal, private, and commercial vessels. Federal vessels include those maintained by the U.S. Navy, U.S. Coast Guard, and NOAA. Private and commercial vessels also have the potential to interact with sea turtles. Vessel activities may result in the lethal (*e.g.*, boat strike) and non-lethal (*e.g.*, harassment) impacts to ESA-listed species that could prevent or slow a species' recovery. However, fishing vessels represent only a portion of marine vessel activity. Due to reduction in vessel speed during fishing operations, collisions are more likely when vessels are in transit. As fishing vessels are smaller than large commercial tankers and container ships, and slower than recreational speed boats, collisions are less likely to result in mortality. Commercial fishing vessel activity is not likely to increase in the foreseeable future along the Atlantic coast. While allowable catch levels may increase as fish stocks are rebuilt, associated increases in catch rates may preclude the need to increase effort to obtain allowable catch. Conversely, recreational vessel activity may increase as human populations on the coast continue to grow and access to the ocean increases. Vessels (federal and private, commercial and recreational) will continue to operate in the area for the foreseeable future, and the impacts described above will likely persist.

<u>Stream alteration</u>

Dams and their operations are a cause of major instream flow alteration. Hill (1996) identified the following impacts of altered flow to anadromous fishes by dams: (1) altered DO concentrations and temperature; (2) artificial destratification; (3) water withdrawal; (4) changed sediment load and channel morphology; (5) accelerated eutrophication and change in nutrient cycling; and (6) contamination of water and sediment. Activities associated with dam maintenance, such as dredging and minor excavations along the shore, can release silt and other fine river sediments which can be deposited in nearby spawning habitat. Dams may reduce the viability of sturgeon populations by removing free-flowing river habitat. Seasonal deterioration of water quality can be severe enough to kill fish in deep storage reservoirs that receive high nutrient loadings from the surrounding watershed (Cochnauer 1986). Important secondary effects of altered flow and temperature regimes include decreases in water quality, particularly in the reservoir part of river segments, and changes in physical habitat suitability, particularly in the free-flowing part of river segments or areas downstream. The most commonly reported factor influencing year-class strength of sturgeon species is flow during the spawning and incubation period (Jager et al. 2002). Stream alterations may result in increased adverse impacts to sturgeon in the foreseeable future as a result of increased water quality impacts in altered streams from climate change effects (e.g. increased water temperature and runoff from increased storm activity), however future dam removal and stream restoration in the northeast region could reduce adverse impacts in the foreseeable future.

4.4.3 Coastal Development and Erosion Control

Coastal development can result in the loss or degradation of sturgeon habitat and deter or interfere with sea turtle nesting, affect nesting success, and degrade nesting habitats for sea turtles. The structural modification of shorelines or waterways may result in a loss of connectivity to spawning habitat or significantly altered depths, rates of sedimentation, substrate and/or water flow that degrades sturgeon habitat. Structural impacts to sea turtle nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Lutcavage et al. 1997, Bouchard et al. 1998). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion, respectively (Ackerman 1997, Witherington et al. 2003, Witherington et al. 2007). In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchlings as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting wave patterns. The negative effects of coastal development and erosion control activities to listed species are not expected to dissipate in the future.

Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991). Coastal counties are presently adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting. Protective measures could reduce adverse impacts in the foreseeable future; however, the effects of artificial lights from human activities along the coast are expected to persist.

4.4.4 Environmental Contamination

Environmental contaminants include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Non-point sources from terrestrial activities have caused reductions in water quality leading to degradation of habitat for sturgeon and sea turtles. Chemical contamination may have effects on listed species' reproduction and survival. Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (*e.g.*, DDT, PCBs, and PFCs), and others that may cause adverse health effects to sea turtles (Iwata et al. 1993, Grant and Ross 2002, Garrett 2004, Hartwell 2004). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area. Excessive turbidity due to coastal development and/or construction sites may also influence sea turtle or sturgeon foraging ability.

Sturgeon

The effects of changes in water quality (temperature, salinity, DO, contaminants, etc.) in rivers and coastal waters inhabited by sturgeon are expected to be more severe for those populations that occur at the southern extreme of the sturgeon's range (*e.g.*, the action area), and in areas that are already subject to poor water quality as a result of eutrophication. Heavy metals and organochlorine compounds accumulate in sturgeon tissue, but their long-term effects are not known (Ruelle and Henry 1992, Ruelle and Keenlyne 1993). Elevated levels of contaminants, including chlorinated hydrocarbons, in several other fish species are associated with reproductive impairment (Cameron et al. 1992, Longwell et al. 1992, Drevnick and Sandheinrich 2003, Hammerschmidt et al. 2002), reduced egg viability (von Westernhagen et al. 1981, Giesy et al. 1986, Billsson et al. 1998, Mac and Edsall 1991, Matta et al. 1997), reduced survival of larval fish (Berlin et al. 1981, Giesy et al. 1986), delayed maturity (Jørgensen et al. 2004) and posterior malformations (Billsson et al. 1998). Pesticide exposure in fish may affect antipredator and homing behavior, reproductive function, physiological development, and swimming speed and distance (Beauvais et al. 2000, Scholz et al. 2000, Moore and Waring 2001, Waring and Moore 2004). It should be noted that the effect of multiple contaminants or mixtures of compounds at sublethal levels on fish has not been adequately studied. Atlantic sturgeon use marine, estuarine, and freshwater habitats and are in direct contact through water, diet, or dermal exposure with multiple contaminants throughout their range (Atlantic Sturgeon Status Review Team 2007). Trace metals, trace elements, or inorganic contaminants (mercury, cadmium, selenium, lead, etc.) are another suite of contaminants occurring in fish. Post (1987) states that toxic metals may cause death or sublethal effects to fish in a variety of ways and that chronic toxicity of some metals may lead to the loss of reproductive capabilities, body malformation, inability to avoid predation, and increased susceptibility to infectious organisms.

Waterborne contaminants may affect the aquatic environment. Issues such as raised fecal coliform and estradiol concentrations affect all wildlife that utilize riverine habitat. The impact of many of these waterborne contaminants on sturgeon is unknown, but they are known to affect other species of fish in rivers and streams. These compounds may enter the aquatic environment via wastewater treatment plants, agricultural facilities, as well as runoff from farms (Folmar et al. 1996, Culp et al. 2000, Wildhaber et al. 2000, Wallin et al. 2002) and settle to the bottom, therefore affecting benthic foragers to a greater extent than pelagic (Geldreich and Clarke 1966). For example, estrogenic compounds are known to affect the male to female sex ratio of fish in streams and rivers via decreased gonadal development, physical feminization, and sex reversal (Folmar et al. 1996). Although the effects of these contaminants are unknown in Atlantic sturgeon, Omoto et al. (2002) found that varying the oral doses of estradiol-17β or 17α methyltestosterone given to captive hybrid “bester” sturgeon (*Huso huso* female × i male) could induce abnormal ovarian development or a lack of masculinization. These 64 compounds, along with high or low DO concentrations, can result in sub-lethal effects that may have negative consequences on small populations. Environmental contamination impacts to Atlantic sturgeon are not expected to diminish in the foreseeable future.

Sea turtles

Sea turtles may also be affected directly or indirectly by fuel oil spills. Fuel spills involving fishing vessels are common events. However, these spills are typically small amounts that are unlikely to affect listed species unless they occur adjacent to nesting beaches or in foraging habitats. Larger spills may result from accidents, although these events are rare and generally involve small areas. Fuel spills may impact nesting beaches, bottom habitat, and benthic resources, but it is unknown to what extent oil releases from recreational and commercial vessels or shoreline activities such as fueling facilities may affect sea turtles in migratory or foraging areas. Immediately after an oil release, direct contact with petroleum compounds or dispersants used to respond to spills may cause skin irritation, chemical burns, and infections (Lutcavage et al. 1995). Inhalation of volatile petroleum vapors can irritate lungs and dispersants have a surfactant effect that may further irritate or injure the respiratory tract, which may lead to inflammation or pneumonia (Shigenaka et al. 2010). Ingestion of petroleum compounds may remain in the turtle's digestive system for days (Van Vleet and Pauly 1987), which may affect the animals' ability to absorb or digest foods. Absorption of petroleum compounds or dispersants may damage liver, kidney, and brain function as well as causing anemia and immune suppression as seen in seabirds that have ingested and absorbed petroleum compounds (Shigenaka et al. 2010). Exposure to an oil release can cause long-term chronic effects such as decreased survival and lowered reproductive success may occur.

Persistent petrochemical products in the marine environment are frequently encountered by sea turtles. Tarballs are frequently observed sealing the mouths and nostrils of small sea turtles. Witherington (1994) found evidence of tar in the gastro-intestinal tracts of over one-third of the post-hatchling sea turtles examined offshore of Florida in 1993 and evidence of tar ingestion was documented in 20 percent of neonate loggerhead sea turtles examined along the Gulf Stream (Witherington 2002). Van Vleet and Pauly (1987) concluded that the source of tar observed on stranded sea turtles in the Gulf of Mexico originated from crude oil tanker discharges and had a significant impact on marine turtles in the eastern Gulf of Mexico.

Threats of oil releases and discharges from vessels are greatest in port areas, shipping lanes, and areas of heavy recreational vessel use. Oil releases caused by oil and gas development and transportation activities, as well as oil releases from vessels or shoreline activities such as fueling facilities adjacent to nesting beaches, may directly affect sea turtles and nesting beaches. During the decade between 1992 and 2001, sea turtles were identified as resources at risk in 73 oil releases. Nine of these releases occurred along Florida's Atlantic coast (Milton et al. 2003). The April 20, 2010, explosion of the Deepwater Horizon (DWH) oil rig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2015). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil is collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may have had sub-lethal effects or caused environmental damage that were predicted to affect other sea turtles into the future. Further, the continued exposure of sea turtles to vessel and land based oil releases is likely to continue into the future.

<u>Marine debris</u>

Marine debris is known to adversely impact sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (*e.g.*, tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (*i.e.*, leatherbacks and oceanic stage juveniles of all species). Ingested debris can block the digestive tract, causing death or serious injury (Lutcavage et al. 1997, Laist et al. 1999). Plastic may be ingested out of curiosity or due to confusion with prey items. Marine debris consumption has been shown to depress growth rates in post-hatchling loggerhead sea turtles, increasing the time required to reach sexual maturity and increasing predation risk (McCauley and Bjorndal 1999). Sea turtles can also become entangled and die in marine debris, such as discarded nets and monofilament line (NRC 1990, Lutcavage et al. 1997, Laist et al. 1999). The effects of environmental contamination to listed species is not expected to change in the future.

4.4.5 Climate Change

Climate change in Massachusetts and Rhode Island

The following is a comprehensive summary of baseline climate change conditions in Rhode Island and Massachusetts as reported in the 2022 NOAA National Centers for Environmental Information, State Climate Summaries (Frankson et al. 2022). Temperatures in Rhode Island have increased by almost 4° F since the beginning of the 20^{th} century, with the number of hot days has been above the long-term average since the 1990s and the greatest number occurring during the most recent 6-year period of 2015–2020. Temperatures in Massachusetts have risen almost 3.5° F since the beginning of the 20th century, and the highest multiyear average since 1950 (11.5 days per year) occurred during the 2015–2020 period. The number of warm nights has been steadily increasing since 1995, with the highest multiyear average occurring during the same 2015–2020 period.

Sea surface temperatures in the Northeast U.S. Shelf Ecosystem continued to be above average in early 2023. This warming shift began around 2010, marked by a increase of nearly 1°C in many of the shelf ecosystem (NMFS 2024). This warming trend in both terrestrial and marine environments highlights the broader impacts of climate change on the northeastern United States and its adjacent marine ecosystems.

Total annual precipitation for Rhode Island has generally been above average in recent decades, however Rhode Island experienced severe drought in 2016 and extreme drought in 2020, straining water supplies. The annual average precipitation is projected to increase for Rhode Island, with those increases coming in the winter and spring. Precipitation in Massachusetts is abundant but highly variable from year to year. The driest conditions were observed in the early 1910s and again in the 1960s, with wetter conditions occurring since the 1970s. The wettest consecutive 10-year interval on record was 2005–2014, averaging about 51 inches per year, well above the long-term (1895–2020) annual average of 45.4 inches. Massachusetts experienced extreme drought during 2016–2017 and again in 2020, straining water supplies. During 2005–2014, Massachusetts experienced the largest number of 2-inch extreme precipitation events, about 30% above the long-term average. In March 2010 alone, three intense rainstorms led to extensive flooding throughout the state and southern New England, with estimated damages exceeding $2 billion. The heaviest rain fell in eastern Massachusetts, with more than 19 inches recorded near Jamaica Plain, Middleton, and Winchester.

Since 1900, global average sea level has risen by about 7–8 in (0.18-0.20 m). However, tide gauge recordings in Newport between 1930 and 2020 show an average rate of sea level rise of 0.11 inches (2.83 mm) per year, equivalent to about 11 inches over a century. This has caused an increase in tidal floods associated with nuisance-level impacts. Nuisance floods are events in which water levels exceed the local threshold (set by NOAA's National Weather Service) for minor impacts. These events can damage infrastructure, cause road closures, and overwhelm storm drains As sea level has risen along the Rhode Island coastline, the number of tidal flood days (all days exceeding the nuisance level threshold) has also increased, with the greatest number occurring in 2017. Due to local land subsidence, sea level rise along most of the coastal Northeast is expected to exceed the global average rise. A sea level rise of two feet, without any changes in storms, would more than triple the frequency of dangerous coastal flooding throughout most of the Northeast.

Extreme weather events common to Rhode Island and Massachusetts include severe storms (coastal, winter, and thunderstorms), often accompanied by flooding, and on occasion, tropical storms and hurricanes. The states' coastlines are highly vulnerable to flood damage from winter and hurricane events. FEMA disaster declarations in Rhode Island were sought 4 out of the last 10 years. Landfalling hurricanes produced hurricane-force winds in Rhode Island 6 times from 1900 to 2019, and in Massachusetts 7 times between 1900 and 2020. The Great New England Hurricane (Category 3) of 1938 was one of the most destructive and powerful storms ever to impact southern New England. Storm tides of 12 to 15 feet were recorded for Narragansett Bay, and downtown Providence was submerged under a storm tide of 20 feet. In October 2012, Superstorm Sandy (a post-tropical storm) caused a storm surge 9.4 feet above normal high tide in Providence, resulting in extensive coastal flooding. In Massachusetts, the 2012 storm impacts included strong winds, record high storm tides, flooding of some coastal areas, and loss of power for 385,000 residents. One year earlier, Hurricane Irene brought heavy rainfall and strong southeast winds of up to 70 mph, knocking down power lines and leaving half of Rhode Island's one million residents without power. A number of weather stations in central and western Massachusetts recorded more than 4 inches of rainfall during August 27–29, 2011, with a few locations exceeding 7 inches, including Granville Dam and Westhampton. Both hurricanes demonstrated the region's vulnerability to extreme weather events.

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts

Sturgeon

Information regarding the vulnerability of Atlantic sturgeon to climate change suggests it poses a greater threat than previously anticipated. Ocean temperatures in the U.S. northeast shelf and surrounding northwest Atlantic waters have increased faster than the global average over the last decade (Pershing et al. 2015). New projections for the U.S. northeast shelf and northwest Atlantic Ocean suggest that this region will warm two to three times faster than the global average (Saba et al. 2016). Global climate change affects all components of marine ecosystems, including human communities. Physical changes that are occurring and will continue to occur to these systems include sea-level rise, changes in sediment deposition; changes in ocean circulation; increased frequency, intensity and duration of extreme climate events; changing ocean chemistry; and warming ocean temperatures. A first-of-its-kind climate vulnerability assessment, conducted on 82 fish and invertebrate species in the U.S. northeast shelf, concluded that Atlantic sturgeon from all five DPSs were among the most vulnerable species to global climate change (Hare et al. 2016).

Increased water temperatures as a result of climate change could mean a decrease in the amount of DO in surface waters. Atlantic sturgeon rely on a variety of water quality parameters to successfully carry out their life functions. Low DO and the presence of contaminants modify the quality of Atlantic sturgeon habitat and in some cases, restrict the extent of suitable habitat for life functions. Secor (1995) noted a correlation between low abundances of sturgeon during this century and decreasing water quality caused by increased nutrient loading and increased spatial and temporal frequency of hypoxic (low oxygen) conditions. Of particular concern is the high occurrence of low DO coupled with high temperatures in the river systems throughout their range. Sturgeon are more highly sensitive to low DO than other fish species (Niklitschek and Secor 2009) and low DO in combination with high temperature is particularly problematic for Atlantic sturgeon. Studies have shown that juvenile Atlantic sturgeon experience lethal and sublethal (metabolic, growth, feeding) effects as DO drops and temperatures rise (Niklitschek and Secor 2005, Niklitschek and Secor 2009, Secor and Gunderson 1998). Sturgeon are already susceptible to reduced water quality resulting from various factors: inputs of nutrients; contaminants from industrial activities and non-point sources; and interbasin transfers of water and climate change is likely exacerbating the challenges to sturgeon. Still, more information is needed to better determine the full and entire suite of past and ongoing impacts of climate change on sturgeon in the action area.

Sea turtles

The Intergovernmental Panel on Climate Change (IPCC 2019) assessed the consequences of climate change on sea turtles. Sea level rise and storm events are expected to result in a loss of sandy beaches through increased erosion and sediment loss that will result in a reduction of available nesting habitat (Fish et al. 2005, Fuentes et al. 2010, Reece et al. 2013, Katselidis et al. 2014, Patino-Martinez et al. 2014, Pike et al. 2015, Marshall et al. 2017). Changes in beach morphology, dune scarping, vegetation loss, and reduction in beach area are likely to reduce availability of sea turtle nesting sites, and potential for landward migration of the beach profile is limited due to human development. As temperature directly affects important sea turtle life history traits, including: hatchling size, sex, viability, and performance, one of the greatest concerns is the effect of temperature on hatchling emergence rates and sex ratios (Hays et al. 2003, Pike 2014, Dudley et al. 2016, Santos et al. 2017, Santidrián Tomillo et al. 2014, Patrício et al. 2017). Changes in ocean temperature as a result of climate change are expected to indirectly impact sea turtles by altering the abundance and distribution of their prey (Polovina 2005, Doney et al. 2012, Sydeman et al. 2015, Briscoe et al. 2017). Sea turtles require habitat associated with bathymetric and mesoscale features that aggregate their prey, and the persistence and location of these features are linked to variations in climate and may be affected by expected climate change impacts (Baez et al. 2013, Bjorndal et al. 2017, Santora et al. 2017). The IPCC (2019) assessment indicates with high confidence that climate change is likely to alter foraging success, juvenile recruitment, breeding phenology, growth rates, and population stability in the foreseeable future. Climate change is expected to impact ESA-listed species and their habitat in the action area in the foreseeable future.

4.4.6 Other Threats

Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that have been documented in the region. These threats can range from local and limited to wide-scale, and impact hundreds or thousands of animals.

<u>Predation</u>

Sturgeon

Very little is known about natural predators of Atlantic sturgeon. However, Gadomski and Parsley (2005) have shown that catfish and other species do prey on juvenile sturgeon, and concerns have been raised regarding the potential for increased predation on juvenile Atlantic sturgeon by the introduced flathead catfish (Brown et al. 2005). Other documented predators of sturgeon species, in general, include sea lampreys, gar, striped bass, common carp, northern pikeminnow, channel catfish, smallmouth bass, walleye, fallfish, grey seal, and sea lion (Scott and Crossman 1973, Kynard and Horgan 2002, Gadomski and Parsley 2005). However the extent is unknown. Predation of Atlantic sturgeon is not expected to substantially change in the foreseeable future.

Sea turtles

Predation by various land and ocean predators is a threat to developing nests and emerging hatchlings, juvenile and adult sea turtles. The primary natural predators of sea turtle nests and hatchlings are mammals (including raccoons, dogs, pigs, skunks, foxes, and mongooses) insects and lizards (Heithaus 2013). Emergent hatchlings are preyed upon by mammals as well crabs and birds on land and fish, sharks, and birds after they enter the water (Heithaus 2013). Juveniles and adults experience fairly low predation rates, however on land they are known to be the prey of large mammals such as jaguars, and crocodiles. In water juveniles and adults have been documented being killed by killer whales and sharks (Heithaus 2013). In addition to natural predation, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species in certain parts of their range (NMFS and USFWS 2008). Predation of sea turtles is not expected to substantially change in the foreseeable future.

Offshore wind development

In recent years, plans for offshore wind energy within the ranges of Atlantic sturgeon and sea turtles have emerged. In the Mid-Atlantic region, an offshore wind pilot project off of Virginia installed two turbines in 2020, and in the action area multiple offshore wind projects are underway, including Vineyard Wind 1 (under construction) and South Fork Wind Farm that was completed in March 2024. Multiple call and lease areas throughout the rest of the New England and the Mid-Atlantic region are at various stages in the regulatory process. In the MA/RI WEA, an additional four projects have been approved by BOEM, including SouthCoast Wind (2024); New England Wind (2024); Sunrise Wind (2023); and Revolution Wind (2023). Currently, the impact of offshore wind energy to Atlantic sturgeon and sea turtles is unknown, but likely to range from no impact to moderately adverse, depending on the number and locations of projects that occur, as well as the effects of mitigation efforts.

4.4.7 Actions Taken to Reduce Threats

Sturgeon
Beginning in the late 1990s federal and state actions have been taken to prohibit the intentional harvest of sturgeon throughout their range. Atlantic sturgeon benefit from the use of devices designed to exclude other species from trawl nets, such as Turtle Excluder Devices (TEDs). TEDs and bycatch reduction device requirements may reduce Atlantic sturgeon bycatch in southeast trawl fisheries (ASSRT 2007). NMFS has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992 to reduce the potential for incidental mortality of sea turtles in commercial trawl fisheries. These regulations have been refined over the years to ensure that TED effectiveness is maximized through more widespread use, and proper placement, installation, floatation, and configuration (*e.g.*, width of bar spacing) with the aim of gaining greater conservation benefits for Atlantic sturgeon.

Sea turtles
Actions have been taken to reduce human-caused impacts to sea turtles from various sources, particularly since the early 1990s. Some actions have resulted in significant steps towards reducing the recurring sources of mortality of sea turtles and improving the status of all sea turtle populations in the Atlantic and Gulf of Mexico. For example, the TED regulations such as those published on February 21, 2003 (68 FR 8456) and September 20, 2020 (85 FR 59198), and pelagic longline regulations implementing the use of specific hook and bait types significantly reduces the impacts of trawl and longline fisheries on sea turtles (NMFS SEFSC 2009). Other actions include lighting ordinances, in situ nest protection and predation control to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immature, benthic immature, and mature age classes from various fisheries and other marine activities. Summaries of these actions to reduce threats to sea turtles can be found in the 5-year reviews and status reviews (NMFS and USFWS 2007a, 2007b,, 2013b, 2015, 2020, 2023, Conant et al. 2009, Seminoff et al. 2015).

4.4.8 Conclusion and Summary of Cumulative Effects

Sturgeon
Overall, the preferred alternative would not be expected to have more than short-term adverse effects on Atlantic sturgeon that are captured and released alive. The impacts of incidental capture and release are not expected to have more than direct, minimal to moderate short-term adverse effects on individual animals and increased stress levels from the capture and handling are expected to dissipate rapidly.

The proposed ITP would authorize the incidental capture of sturgeon, resulting in non-lethal impacts. Effects of past and ongoing human threats (*e.g.*, fisheries, vessel traffic, etc.) occurring in the range of the ESA-listed sturgeon considered in this analysis have contributed to their current status. Based on the analysis in this draft EA, NMFS expects that issuance of the proposed ITP (preferred alternative) would not result in significant environmental impacts, appreciably reduce the species likelihood of survival and recovery in the wild, or adversely affect spawning, mortality rates, or recruitment rates. In particular, NMFS expects that issuance of the proposed ITP would not likely affect reproductive sturgeon adults in a way appreciably reducing their reproductive success, survival of their young, or the number of young annually recruiting into the breeding populations. The incremental impact of the proposed authorization of takes of limited numbers of Atlantic sturgeon incidental to the otherwise legal fisheries resource survey, when added to other past, present, and reasonably foreseeable future actions, would not likely result in population-level effects.

Sea turtles
As noted above, sea turtles found in the affected environment for this ITP may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in an

area can potentially be affected by activities anywhere within this wide range. A number of human activities have contributed to the current status of listed sea turtle species in the action area. Some of those activities, (*e.g.*, commercial harvesting of individuals as well as eggs) no longer occur in the U.S. yet are still a problem in some countries. Other human activities are ongoing and appear to be directly or indirectly affecting these species. The most significant threats affecting sea turtles in the Atlantic are fisheries, and there are many conservation activities directed at reducing this threat. Other environmental impacts to turtles may result from vessel operations, discharges, dredging, military activities, oil and gas development activities, industrial cooling water intake, aquaculture, recreational fishing, vessel traffic, coastal development, habitat degradation, directed take, and marine debris. Impacts to sea turtles in the action area also include sources of natural mortality as well as influences from oceanographic and climatic features in the action area. Circulation and productivity patterns influence prey distribution and habitat quality for listed species. The effects of climatic variability on sea turtles in the action areas and the availability of prey remain largely undetermined; however, it is likely that any changes in weather and oceanographic conditions resulting in effects on population dynamics (*i.e.*, sex ratios) as well as prey availability would have dire consequences for sea turtle species.

The proposed ITP would authorize the incidental capture of sea turtles and NMFS expects that effects of such capture would be limited to non-lethal impacts.. Effects of past and ongoing human threats (*e.g.*, fisheries, vessel traffic, etc.) occurring in the range of the ESA-listed sea turtles species and DPSs considered in this analysis have contributed to their current status. Based on the analysis in this draft EA, NMFS expects that issuance of the proposed ITP would not result in significant environmental impacts, appreciably reduce the species likelihood of survival and recovery in the wild, or be likely to adversely affect reproductive or mortality rates. The incremental impact of the authorization of takes of limited numbers of sea turtles incidental to the otherwise legal fisheries resource survey, when added to other past, present, and reasonably foreseeable future actions, would not likely result in population-level effects.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

This document was prepared by the Endangered Species Conservation Division of NMFS' Office of Protected Resources (F/PR3) in Silver Spring, Maryland.

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Appendix A: Responses to public comments on SMAST's Incidental Take Permit Application and Conservation Plan

A *Federal Register* notice was published to inform the public of receipt of the application and allow for comments to be submitted on SMAST's ITP application and conservation plan (ITP No. 27490). On July 6, 2023 (88 FR 43082), NMFS published the Notice of Receipt of the SMAST June 13, 2023, ITP application and conservation plan for the incidental take of ESA-listed sturgeon and sea turtles. Two requests to extend the comment period were submitted on August 7, 2023, the last day of the open comment period. In response to the extension requests, on August 16, 2023, NMFS published a notice in the *Federal Register* (88 FR 55668) reopening the comment period for 15 days. The second public comment period ended on August 31, 2023, and 3 comments were received. NMFS thanks all commenters for their comments and input on SMAST's application and conservation plan.

Comments and responses below have been summarized and are not associated with the specific commenter.

Comment: One commenter expressed concern over the adequacy and potential for bias in the applicants provided assessment of impacts to ESA-listed species and requested that NMFS perform its own analyses to evaluate the effects of the requested take on ESA-listed species and populations.
Response: NMFS appreciates the commenters' concern regarding the scientific robustness and potential for bias in any analysis provided by an applicant. NMFS works with applicants to ensure that the analysis included in the ITP application and conservation plan use the best available science. Specifically, ESA section 10(a)(2)(A)(i) requires that the applicant provided conservation plan must specify: "the impact which will likely result from such taking" in order for NMFS to deem the ITP application adequate and complete. NMFS further evaluates and conducts its own analysis (as presented and discussed in the draft EA) on the potential for take and analysis of the effects of such take to ESA-listed species where interactions with ESA-listed species are reasonably certain to occur. Further, NMFS conducts an intra-service consultation pursuant to section 7 of the ESA prior to the consideration of permit issuance to ensure that the effects of the requested take are mitigated to the maximum extent practicable.

Comment: Two commenters expressed concerns with the survey design, including the proximity of the reference sites to the impact area, the number of reference sites, the lack of inclusion of multiple ecologically relevant stratum or gradients into the study design, the selected experimental design including both the selected Before-After-Control-Impact (BACI) approach and project by project approach versus a Before-After-Gradient design or regional approach. The two commenters noted that changes to the survey design may also result in reduced take of ESA-listed species.
Response: In response to public comments regarding the study design, we requested the applicant provide additional information regarding the selected experimental design, location of

potential reference areas, and the need for multiple reference areas for the selected BACI design. The additional information was included in Section 4.2.3 of the revised application dated December 3, 2024. Additionally, the applicant increased the survey effort (i.e. number of annual and seasonal sampling tows) to increase the statistical power of the selected experimental design to detect changes and to allow for strata to be included in the final analysis should it be deemed necessary or useful to understand shifts in species abundance and distributions. The increase of survey effort did not result in the request of additional take of any ESA-listed species.

Comments outside the scope of the ITP Application and Conservation Plan

Comment: One commenter expressed general concern of financial and environmental issues related to wind turbines.
Response: NMFS thanks the commenters for their concern, but notes that the ITP application and process does not include the authorization of offshore wind components or development.

Comment: One commenter expressed concern regarding the need to offset offshore wind impacts to federally conducted fisheries surveys, requested that funds be provided to implement the Federal Survey Mitigation Strategy, and that developer sponsored fisheries surveys should not be relied upon to mitigate impacts to federal fisheries surveys that may result from offshore wind development. The commenter also expressed concern over the potential of offshore wind to affect commercial fisheries distributions and fishing patterns that could result in differential interactions of commercial fisheries with ESA-listed species.
Response: NMFS appreciates the commenters' concern regarding the potential for offshore wind to affect federally operated fisheries surveys and commercial fisherman operations. However, the action before NMFS for consideration is the issuance of a permit for the incidental take of ESA-listed species during the otherwise lawful activity of conducting fisheries surveys. NMFS does note that the applicant has proposed survey methods consistent with Northeast Area Monitoring and Assessment Program (NEAMAP) surveys that are conducted in state waters and designed to be consistent with with federally operated fisheries surveys, and has noted any discrepancies (e.g. data that will not be collected during the applicants survey) between the applicants survey methodologies and the NEAMAP survey methods.[5]

[5] Bonzek, C.F., J. Gartland, R.A. Johnson, and J.D. Lange, Jr. 2008. NEAMAP Near Shore Trawl Survey: Peer Review Documentation. A report to the Atlantic States Marine Fisheries Commission by the Virginia Institute of Marine Science, Gloucester Point, Virginia