NOAA Fisheries and BOEM Federal Survey Mitigation Implementation Strategy - Northeast U.S. Region

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1. Executive Summary

Offshore wind energy development plays an important role in climate change mitigation through the development of renewable energy. This new ocean use focuses on energy production and its development must consider other ocean uses, including food production and wildlife conservation. The National Marine Fisheries Service (NOAA Fisheries) and the Bureau of Ocean Energy Management (BOEM) share a commitment to develop offshore wind energy, while protecting biodiversity and promoting ocean co-use. There are many elements to achieve these goals, including mitigation of the impact of offshore wind energy development on NOAA Fisheries surveys. These surveys are essential for sustainably managing our nation's fisheries, promoting the protection and recovery of marine mammals and endangered and threatened species, and conserving coastal and marine habitats and ecosystems for future generations. These surveys are also critical to

understanding the impacts of climate change on marine resources and marine ecosystems.

This Implementation Strategy describes the approach NOAA Fisheries and BOEM will use to mitigate the impacts of offshore wind energy on NOAA Fisheries surveys. This Implementation Strategy is specific to the Northeast U.S. region, and can serve as a model for other NOAA Fisheries regions (e.g., Gulf of Mexico, West Coast). This Implementation Strategy has five goals:

1. Mitigate the impact of offshore wind energy development on NOAA Fisheries surveys

2. Evaluate and to the extent practicable integrate wind energy development monitoring studies with NOAA Fisheries surveys

3. Collaboratively plan and implement NOAA Fisheries survey mitigation with partners, stakeholders, and other ocean-users based on the concepts of co-production, best scientific information available, and local and traditional ecological knowledge

4. Adaptively implement the Federal Survey Mitigation Program and the Federal Survey Mitigation Implementation Strategy recognizing the long-term nature of the surveys and the dynamic nature of wind energy development, survey technology and approaches, marine ecosystems, and human-uses of marine ecosystems

5. NOAA Fisheries and BOEM coordinate execution of the Federal Survey Mitigation Implementation Strategy and share experiences and lessons-learned with other regions and countries where offshore wind energy development is being planned and underway

From these five goals, more discrete objectives are defined, and within these objectives, specific actions are identified. This Implementation Strategy also defines stakeholders, partners, and other ocean users that will be engaged throughout (per Goal 3) and identifies potential resources for successful implementation. A joint NOAA Fisheries-BOEM Implementation Team will be formed (per Objective 5) and will oversee the completion of the defined actions and conduct regular reviews of progress and update identified actions (per Objective 4).

2. Issue Description

Renewable energy, including offshore wind energy, plays an important role in climate change mitigation by reducing demand from conventional energy sources and in turn reducing greenhouse gas emissions. The Bureau of Ocean Energy Management (BOEM) of the Department of the Interior (DOI) is responsible for offshore renewable

energy development in Federal waters. In 2009, DOI announced the final regulations for the Outer Continental Shelf (OCS) Renewable Energy Program, which was authorized by the Energy Policy Act of 2005 (EPAct). These regulations provide a framework for issuing leases, easements and rights-of-way for OCS activities that support production and transmission of energy from sources other than oil and natural gas. On March 29, 2021, the Biden-Harris Administration announced a goal to deploy 30 gigawatts (GW) of offshore wind in the United States OCS by 2030, while protecting biodiversity and promoting ocean co-use[1]. At the time of the March 2021 announcement, there were 17 Atlantic renewable energy lease areas and 14 Construction and Operations Plans (COPs) in various stages of review to help meet the Administration's goal. On October 13, 2021, DOI announced plans to hold up to seven new offshore lease sales by 2025 in the Gulf of Maine, New York Bight, Central Atlantic, and Gulf of Mexico, as well as offshore of the Carolinas, California, and Oregon [2]. In February 2022, six lease areas off of New York and New Jersey were auctioned [3].

In the development goals for offshore wind energy, the importance is recognized of simultaneously protecting biodiversity and promoting ocean co-use. The National Oceanic and Atmospheric Administration National Marine Fisheries Service (hereafter NOAA Fisheries) of the Department of Commerce (DOC) is responsible for stewardship of the nation’s living marine resources including fisheries, marine mammals, endangered and threatened species, and their habitats and ecosystems. These responsibilities are authorized by the Marine Mammal Protection Act (1972), the Endangered Species Act (1973), the Magnuson–Stevens Fishery Conservation and Management Act (1976), the Fish and Wildlife Coordination Act (1934), and several other laws and policies[4]. These laws require a robust and participatory scientific and management framework to maintain sustainable fisheries, to protect and recover marine mammals and endangered and threatened species, and to conserve the habitats upon which these species depend. In general, a precautionary approach[5] is applied: the greater uncertainty in the science, the more restrictive the management measures (e.g., lower fishing quotas, fewer incidental take authorizations). Further, many of the processes of fisheries management, and to a lesser extent marine mammal and endangered and threatened species management, directly involve stakeholders as a component of the statutes. This approach forms the basis of robust and informed decision making. NOAA Fisheries also takes an ecosystem-approach to managing living marine resources, recognizing the interconnectedness of ecosystem components and the value of resilient and

[1] White House Fact Sheet: Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs
[2] Department of Interior Press Release - Secretary Haaland Outlines Ambitious Offshore Wind Leasing Strategy
[3] Biden-Harris Administration Sets Offshore Energy Records with $4.37 Billion in Winning Bids for Wind Sale
[4] NOAA Fisheries - Laws and Policies
[5] Code of Federal Regulation - 50 CFR 600.350(d)(3)(ii)

productive ecosystems (including the human communities on which they depend) to the fisheries, marine mammals, endangered and threatened species, and their habitats[6].

Nationally, NOAA Fisheries assesses the status of approximately 450 fishery stocks, 200 marine mammal stocks, and 165 threatened and endangered species (recognizing that some marine mammals are also endangered). These assessments rely on more than 50 long-term, standardized surveys, many of which have been ongoing for more than 30 years (see Box 1 for the definition of a NOAA Fisheries survey). Each survey uses different methods, platforms, and designs, with the goal of providing information on a subset of species to support sustainable management. For example, bottom trawl surveys provide information on bottom fishes, plankton surveys provide information on the early life stages of fishery species as well as ocean production (phytoplankton and zooplankton), and aircraft and vessel visual surveys provide information on the abundance and distribution of whales, dolphins, and seals. Owing to the precautionary approach, increased uncertainty in the data originating from these surveys typically results in more restrictive management. As a result, NOAA Fisheries has made extensive efforts to maintain consistency in surveys over time to reduce uncertainty and increase accuracy and precision [7,8]. Sustaining these surveys with consistent sampling designs and methods is an essential feature of their value, allowing NOAA Fisheries to examine the status and trends of the managed species consistently through time.

These long-time series surveys also form a critical basis for understanding the effect of climate change on marine ecosystems. Data from these surveys are used in regional, national, and international climate assessments as well as regional ecosystem status reports. Data from these surveys are also widely used in scientific investigations. Marine ecosystems of the U.S. are among the best understood and best managed in the world, largely as a result of NOAA Fisheries surveys. Changes to the platform, design, or methods of NOAA Fisheries surveys could decrease the quality and quantity of data, thereby negatively impacting NOAA Fisheries' ability to

[6] NOAA Fisheries - Ecosystem Based Fisheries Management Policy

[7] In response to a change in vessel and sampling gear in 2008, the Northeast Fisheries Science Center Bottom Trawl Survey conducted an extensive year-long calibration experiment involving two research vessels (old and new) and including more than 380 side-by-side collections to develop calibration coefficients between the two gears. (see Miller TJ, Das C, Politis PJ, Miller AS, Lucey SM, Legault CM, Brown RW, Rago PJ (eds). 2010. Estimation of Albatross IV to Henry B. Bigelow calibration factors. Northeast Fish Sci Cent Ref Doc. 10-05: 233 p.)

[8] Aircraft surveys of marine mammal and sea turtle abundance use line transect methods that utilize an effort-weighted detection function, which describes how the platform-altitude specific detectability decreases with increasing distance from the transect line. Changes to aircraft and altitude require development of new detection functions (see Palka D 2020. Cetacean Abundance in the US Northwestern Atlantic Ocean: Summer 2016. Northeast Fisheries Science Center Reference Document 20-05: 65p).

Box 1 - Definitions

NOAA Fisheries Survey - Survey is a general term used to denote standardized data collection in the field as opposed to the laboratory. In this document, we define a NOAA Fisheries Survey more narrowly as the standardized data collection over long-time periods designed and used to support NOAA Fisheries mission, which includes fisheries, marine mammals, endangered species, habitats, and marine ecosystems. As a rule-of-thumb, a survey needs to be conducted for at least 10 years to be used quantitatively in NOAA Fisheries scientific advice.

NOAA Fisheries and BOEM Federal Survey Mitigation Program Implementation Strategy (also termed the Implementation Strategy): The overall approach for developing, implementing, and adapting NOAA Fisheries survey mitigation in response to the impacts of offshore wind development. The Strategy is described in this document.

NOAA Fisheries Federal Survey Mitigation Program (also termed the Mitigation Program). The activities conducted to mitigate the effect of offshore wind energy development on NOAA Fisheries surveys. The program consists of a six-component framework to address the four general impacts.

NEFSC Survey-Specific Mitigation Plans - Detailed plans that provide background on an impacted survey, specific stakeholders for the data collected, description of impacts of offshore wind development, planned mitigation measures, proposed schedule, and estimated costs. These plans will also identify mechanisms to ensure they are adaptive and have a defined peer-review process. These plans are part of the NOAA Fisheries Federal Survey Mitigation Program.

Project-Specific Monitoring Studies - Many wind energy developments have initiated studies of their project areas. These studies have different objectives, designs, and sampling protocols. Further, these studies are conducted over a defined time period, typically for 1-2 years before construction and 1-2 year post-construction. Owing the heterogeneity in the studies and their limited time duration, the data collected in largely incompatible with the objective of NOAA Fisheries Surveys.

meet its statutory responsibilities and the broader goal of understanding and sustaining marine ecosystems, particularly in the face of a rapidly changing climate.

During the environmental review of the first offshore wind energy project in federal waters under the National Environmental Policy Act [9], BOEM and NOAA Fisheries identified major adverse impacts [10] to the NOAA Fisheries surveys conducted in the

[9] Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement March 2021.

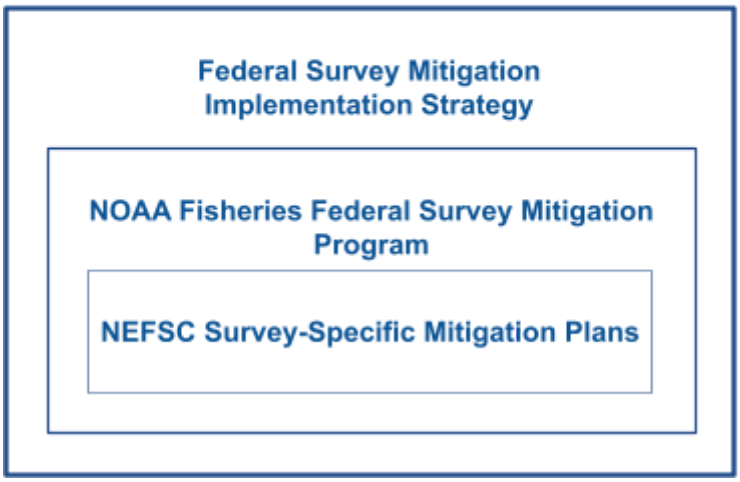
[10] Major adverse impacts are defined as i) mitigation would reduce adverse impacts somewhat during the life of the proposed Project, including decommissioning; ii) the affected activity (NOAA Fisheries Surveys) would have to adjust to significant disruptions due to large local or notable regional adverse impacts of the project; and iii) the affected activity (NOAA Fisheries Surveys) may retain measurable effects indefinitely, even after the impacting agent is gone and remedial action is taken.(see Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement March 2021)

Northeast region. In response to this defined impact, NOAA Fisheries and BOEM agreed to develop and implement a NOAA Fisheries Federal Survey Mitigation Program (Mitigation Program). Here, we describe the Implementation Strategy for the Mitigation Program. The focus is the Northeast U.S. but this Implementation Strategy will inform similar Mitigation Programs in other regions as NOAA Fisheries and BOEM work to achieve the shared goal of promoting offshore wind energy development, protecting biodiversity, and protecting ocean co-use.

3. Implementation Strategy Framework

The purpose of this Federal Survey Mitigation Implementation Strategy is to describe the approach NOAA Fisheries and BOEM will use for mitigating the impacts of offshore wind energy development on NOAA Fisheries surveys, with specific application to the Northeast U.S. Region (Maine to North Carolina). This Implementation Strategy calls for the development of a Federal Survey Mitigation Program as a specific action. The Mitigation Program will include survey-specific mitigation plans for each impacted survey including both vessel and aerial surveys (see Figure 1). This Implementation Strategy is intended to guide the implementation of the Mitigation Program through the duration of wind energy development in the Northeast U.S..

Figure 1. Relationship between this NOAA Fisheries BOEM Federal Survey Mitigation Implementation Strategy and the NOAA Fisheries Federal Survey Mitigation Program and NEFSC Survey-Specific Mitigation Plans



The concept of survey mitigation described here is in the context of the Council of Environmental Quality definition of mitigation.[11]

- Avoiding the impact altogether by not taking a certain action or parts of an action

[11] Code of Federal Regulations - 40 CFR §1508.1(s)

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- Compensating for the impact by replacing or providing substitute resources or environments

For offshore wind developments with approved Construction and Operations Plans (COPs), the opportunity to avoid impacts has passed for NOAA Fisheries surveys. In these cases, this Implementation Strategy focuses on mitigating the impact over time through changes and additions to NOAA Fisheries surveys. Impacts that are unable to be mitigated through this Implementation Strategy (or by other means) would be tracked and communicated to document the loss in data quantity, accuracy, and precision and the subsequent effects on NOAA Fisheries science advice and products.

For developments without approved COPs, and for new lease areas, there is opportunity to avoid or minimize the impacts to NOAA Fisheries surveys. In these cases, the Implementation Strategy focuses on continuing to document the impacts in the environmental review process and considering the impacts in the definition and approval process of future wind energy lease areas and lease sales. If these impacts are not avoided or minimized, this strategy can be used to mitigate the impacts.

Consistent with BOEM guidance and in response to individual state requirements, developers are starting to conduct project-specific impact monitoring studies [12]. The specific purpose of these monitoring studies vary by project but are generally aimed at characterizing natural resources[13] and evaluating the impact of offshore wind energy development on these resources in the given project area. Many of these project-specific monitoring studies are not currently expected to mitigate federal survey impacts: these studies have varying durations, are using different methods and designs, and the methods are not calibrated to federal survey methods. However, there could be value of these data collection efforts to the federal survey needs with modifications to the designs, methods, and implementation of these impact monitoring studies. There are some wind energy developer-funded studies that are contributing to the needs of federal survey mitigation (e.g., evaluation of new cameras for marine mammal aerial surveys). This Implementation Strategy will

[12] Vineyard Wind - Fisheries Studies and Science

[13] Defined as: land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources (see Department of the Interior - Natural Resources and Services)

evaluate these project specific activities for their potential contribution to the larger-scale federal survey mitigation effort.

During the environmental review of the first offshore wind energy project in federal waters[14], four impacts to NOAA Fisheries surveys were identified:

- Preclusion of NOAA Fisheries sampling platforms from the wind development area due to operational and safety limitations
- Impacts on the random-stratified statistical design, which is the basis for scientific assessments, advice, and analyses
- Alteration of benthic and pelagic habitats, and airspace in and around the wind energy development, requiring new designs and methods to sample new habitats
- Reduced sampling productivity through navigation impacts of wind energy infrastructure on aerial and vessels surveys

Federal survey mitigation in response to offshore wind development involves developing and deploying new approaches to surveying in and around offshore wind energy developments that generate comparable data to the impacted surveys. These new approaches must be calibrated to current approaches to minimize the impact on the temporal integrity of the long-time series data. Additionally, these approaches must be continued for the duration of the projects to continue the temporal integrity of the long-time series. The new approaches must also be standardized across offshore wind energy development projects to ensure the spatial integrity of the impacted surveys. To meet these requirements, six components of federal survey mitigation were defined during the first environmental review of an offshore wind development in federal waters[15]:

- *Evaluation of survey designs*: Evaluate and quantify effects and impacts of proposed project-related wind development activities on scientific survey operations and on provision of scientific advice to management.
- *Identification and development of new survey approaches*: Evaluate or develop appropriate statistical designs, sampling protocols, and methods, while determining if scientific data quality standards for the provision of management advice are maintained.
- *Calibration of new survey approaches*: Design and carry out necessary calibrations and required monitoring standardization to ensure continuity, interoperability, precision, and accuracy of data collections.

[14] Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement March 2021
[15] Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement March 2021

- *Development of interim provisional survey indices*: Develop interim ad hoc indices from existing non-standard data sets to partially bridge the gap in data quality and availability between pre-construction and operational periods while new approaches are being identified, tested, or calibrated.

- *Wind energy monitoring to fill regional scientific survey data needs*: Apply new statistical designs and carryout sampling methods to effectively mitigate survey impacts due to offshore wind activities from operations for the operational life span of the project.

- *Development and communication of new regional data streams*: New survey approaches will require new data collection, analysis, management, dissemination, and reporting systems. Changes to surveys and new approaches will require substantial collaboration with fishery management, fishing industry, scientific institutions, and other partners.

The overlap between NOAA Fisheries surveys and offshore wind energy development in the Northeast region is substantial. There are currently more than 17 offshore wind energy projects in various stages of development in the Northeast totaling more than 1.7 million acres [16]. New areas were leased in February 2022 and there are also several additional potential lease areas and planning areas in the region. In terms of NOAA Fisheries surveys, there are currently 13 surveys (Table 1) that will be impacted by current wind energy development. As the footprint of offshore wind energy development grows, additional surveys may be impacted and the impacts to existing surveys will likely increase. These surveys support management of more than 40 fisheries in the region, more than 30 marine mammal species, and 14 threatened and endangered species. Further, these surveys support numerous other science products produced by NOAA Fisheries, including ecosystem and climate assessments. NOAA Fisheries surveys have occurred in the region since the early 1960's, and, as a result, the Northeast U.S. Shelf Ecosystem is one of the best understood marine ecosystems in the world - a remarkable fact resulting from decades of investment of hundreds of scientists, thousands of fisher's, and hundreds of millions of dollars.

This Implementation Strategy develops a framework for mitigating the impacts of offshore wind development on NOAA Fisheries surveys. The Implementation Strategy defines goals, objectives, and actions. Goals are broad primary outcomes expected from implementation of this strategy. From these goals, objectives are defined, which are measurable activities to attain the goals. The goals and objectives presented here are meant to be generally applicable to the issue of mitigating the impacts of offshore wind energy development on NOAA Fisheries surveys. This Implementation Strategy also identifies actions, which are well defined

[16] Bureau of Ocean Energy Management - State Activities

steps that are planned to be taken over the next year as implementation of this strategy. These actions are specific to the Northeast region and are applicable to the Northeast Fisheries Science Center. Recognizing that similar impacts will occur in other regions, the Implementation Strategy can also be used in other regions (e.g. Southeast, Gulf of Mexico, and West Coast) to develop similar mitigation programs.

4. Goals, Objectives, and Actions

This Federal Survey Mitigation Implementation Strategy defines five goals, sixteen objectives, and numerous actions

Goals are presented first so the primary outcomes of this Federal Survey Mitigation Implementation Strategy are clear. Then the goals, objectives, and actions are presented to describe the steps that will be taken to achieve the goals. Actions are intended to be taken over the next one to two years and revisited annually. Goals are numbered 1 to 5. Objectives and Actions are numbered hierarchically from the Goals (e.g., 2.1 for Objective 1 of Goal 2, and 2.1.2 for Action 2 of Objective 1 of Goal 2). Table 2 includes Goals, Objectives, and Actions accompanied by information on the lead organization, funding status, completion date, and expected products.

Goals

1. Mitigate the impact of offshore wind energy development on NOAA Fisheries surveys

2. Evaluate and to the extent practicable integrate wind energy development monitoring studies with NOAA Fisheries surveys [17]

3. Collaboratively plan and implement NOAA Fisheries survey mitigation with partners, stakeholders, and other ocean-users based on the concepts of co-production[18], best scientific information available [19], and local and traditional ecological knowledge[20]

[17] Extant practicable is used recognizing that some wind energy development monitoring studies may not meet the scientific requirements of NOAA Fisheries surveys and some data from these monitoring studies may not be accessible or may not be in a form that are useable by NOAA Fisheries.
[18] Iterative and collaborative processes involving diverse types of expertise, knowledge and actors to produce context-specific knowledge and pathways towards a sustainable future (see footnote 20, 21)
[19] Best scientific information available is a standard established in the ESA, MMPA, and MSFMCA that includes relevance, inclusiveness, objectivity, transparency and openness, timeliness, verification and validation, and peer review, as appropriate - Code of Federal Regulation 50 CFR § 600.315
[20] Local ecological knowledge refers to LEK refers to a form of experiential information about the natural environment that is accumulated by interacting with it on a regular basis (see Farr ER et

4. Adaptively implement the Federal Survey Mitigation Program and the Federal Survey Mitigation Implementation Strategy recognizing the long-term nature of the surveys and the dynamic nature of wind energy development, survey technology and approaches, marine ecosystems, and human-uses of marine ecosystems

5. NOAA Fisheries and BOEM coordinate execution of the Federal Survey Mitigation Implementation Strategy and share experiences and lessons-learned with other regions and countries where offshore wind energy development is being planned and underway

Goals, Objectives, and Actions

Goal 1. Mitigate the impact of offshore wind energy development on NOAA Fisheries surveys.

Objective 1.1. Develop, implement, and track the Federal Survey Mitigation Program, which includes Survey-Specific Mitigation Plans that address the four impacts of wind energy development on surveys and that describe the six components of survey mitigation (see the Issue Description above)

Action 1.1.1. Produce Survey-Specific Mitigation Plans for the Federal Survey Mitigation Program for all impacted surveys

Action 1.1.2. Develop the workflow for identifying federal survey mitigation needs in a timely manner as part of the permitting and leasing framework.

Action 1.1.3. Complete the Survey Simulation Experimentation and Evaluation Project (SSEEP)

Action 1.1.4. Review New England Fishery Management Council's Scallop Survey Working Group Recommendations

Action 1.1.5. Review Regional Wildlife Science Entity (RWSE) recommendations for survey mitigation efforts including a passive acoustic monitoring (PAM) network and novel camera technologies

al.,(2018). Effects of fisheries management on local ecological knowledge. Ecology and Society, 23(3).)

Objective 1.2. Obtain, use, and report on resources to implement the Federal Survey Mitigation Program and Survey-Specific Mitigation Plans

Action 1.2.1. Review resources available and perform funding gap analysis relative to this Implementation Strategy and Survey-Specific Mitigation Plans

Action 1.2.2. Develop proposals and requests for project-scale funds to support aspects of the Survey Mitigation Program

Objective 1.3. Continue to seek support for survey mitigation from developers and other sources

Action 1.3.1. Develop inventory of plan components that could be funded or completed in-whole or in-part by developers or other parties

Action 1.3.2. Develop measures that could be implemented as lease terms, plan conditions, or other mechanisms that bring a clear consistent application of support to this Implementation Strategy from lessees

Goal 2. Evaluate and to the extent practicable integrate wind energy development monitoring studies with NOAA Fisheries surveys.

Objective 2.1. Develop and apply regional standards and requirements to wind-energy development project-specific monitoring and data accessibility

Action 2.1.1. Develop regional standardized project-specific monitoring protocols to address NOAA Fisheries survey needs

Objective 2.2. Evaluate compatibility of project-specific monitoring studies with NOAA Fisheries survey standards and requirements

Action 2.2.1. Evaluate existing project-specific monitoring plans relative to the Federal Survey Mitigation Program needs

Action 2.2.2. Review existing data sharing, data access and data documentation for project specific monitoring plans

Action 2.2.3. Develop template to review future project specific monitoring plans relative to Federal Survey Mitigation Program needs

Action 2.2.4. Review project-specific monitoring plans as to their ability to evaluate the impact of the development on the marine ecosystem

Goal 3. Collaboratively plan and implement NOAA Fisheries survey mitigation with partners, stakeholders, and other ocean-users based on the concepts of co-production, best scientific information available, and local and traditional knowledge.

Objective 3.1. Provide information regarding impacts to NOAA Fisheries surveys in wind energy development planning and approval processes

Action 3.1.1. Document and analyze impacts of offshore wind energy development on NOAA Fisheries surveys during the environmental review process for individual projects

Objective 3.2. Use public comment and partner and stakeholder input in developing, implementing and reviewing this Federal Survey Mitigation Implementation Strategy and the Federal Survey Mitigation Program

Action 3.2.1. Complete Synthesis of the Science Report and use results in the development of Survey-Specific Mitigation Plans (Objective 1.1) and documenting the impact of offshore wind development on NEFSC surveys (Objective 3.1)

Action 3.2.2. Incorporate input from the Survey Simulation Experimentation and Evaluation Project (SSEEP) Workshops and New England Fishery Management Council's Scallop Survey Working Group into Survey-Specific Mitigation Plans (Objective 1.1)

Action 3.2.3. Hold Second Synthesis of the Science Workshop to examine the interactions between floating wind technology and fisheries (including surveys)

Action 3.2.4. Complete Second Synthesis of the Science Report and use results in the development of Survey-Specific

Mitigation Plans (Objective 1.1) and documenting the impact of offshore wind development on surveys (Objective 3.1)

Action 3.2.5. Collaborate with partners in the peer-review of products originating from the Synthesis of the Science Workshop, the Survey Simulation Experimentation and Evaluatoion Project (SEEP) Workshops, and the NEFMC Sea Scallop Survey Working Group

Objective 3.3. Use peer-review processes as appropriate to ensure elements of the Federal Survey Mitigation Program represent the best science available

Action 3.3.1. Include peer-review plans in Survey-Specific Mitigation Plans (Objective 1.1)

Goal 4. Adaptively implement the Federal Survey Mitigation Program and the Federal Survey Mitigation Implementation Strategy recognizing the long-term nature of the surveys and the dynamic nature of wind energy development, survey technology and approaches, marine ecosystems, and human-uses of marine ecosystems

Objective 4.1. Assess the Federal Survey Mitigation Implementation Strategy annually to evaluate progress, reassess goals, objectives, and resources available, and define actions for the next year

Action 4.1.1. Implementation Team meet quarterly to assess Implementation Strategy progress, review input received, and update actions (see Action 5.1.1)

Objective 4.2. Assess Federal Survey Mitigation Program annually to evaluate progress, re-assess assumptions, objectives and resources available, and define actions for the next year

Action 4.2.1. Implementation Team meet annually to assess the Federal Survey Mitigation Program and Survey-Specific Mitigation Plans, review input received, and propose plan updates (see Action 5.1.1)

Objective 4.3. Track and report on the impacts of offshore wind energy development on ongoing survey operations and products

Action 4.3.1. Develop and update annually a dashboard for tracking the mitigation of impacts of offshore wind energy

development on NOAA Fisheries surveys (see Action 5.3.3)

Objective 4.4. Track the development of new survey approaches and introduce new approaches to the Survey-Specific Mitigation Plans and the Federal Survey Mitigation Program during annual review

Action 4.4.1. Implementation Team will release an annual Request for Information (RFI) for survey technologies to be considered as part of the Federal Survey Mitigation Program and summarized information received for review by NOAA and BOEM (see Action 5.1.1)

Objective 4.5. Track and report on offshore wind energy development in the U.S. including planning, leasing, site assessment, construction, operation, and decommissioning

Action 4.5.1. Develop and update monthly dashboard for planning areas, leased areas, site assessment activities, construction and operation activities, and decommissioning activities including area, number of turbines, and energy production (see Action 5.3.3)

Objective 4.6. Track changes in the ecosystem that may impact survey mitigation

Action 4.6.1. Review the NOAA Fisheries / NEFSC State of the Ecosystem Report and document any changes in ecosystem status that may impact survey mitigation

Goal 5. NOAA Fisheries and BOEM coordinate execution of the Federal Survey Mitigation Implementation Strategy and share experiences and lessons-learned with other regions and countries where offshore wind energy development is being planned and underway

Objective 5.1. NOAA Fisheries and BOEM successfully collaborate to lead execution of this Implementation Strategy

Action 5.1.1. Establish a joint NOAA Fisheries - BOEM Implementation Team to oversee implementation of this strategy.

Action 5.1.2. Hire a Program Manager to oversee this Implementation Strategy for the Northeast region

Action 5.1.3. Provide training on collaboration and co-production of knowledge to BOEM and NOAA Fisheries staff involved in the implementation of this strategy

Objective 5.2. Communicate lessons-learned during the planning and implementation of this Federal Survey Mitigation Implementation Strategy

Action 5.2.1. Complete document entitled *"Principles and Best Practices for Developing Regional Survey Mitigation Implementation Strategies and Program Plans"*

Action 5.2.2. Continue involvement in the ICES Working Group on Offshore Wind Development and Fisheries

Action 5.2.3. Provide updates of Strategy Implementation to ROSA, RWSE, and other relevant groups.

Objective 5.3. Communicate on the Federal Survey Mitigation Implementation Strategy

Action 5.3.1. Communicate on the development and finalization of this Implementation Strategy.

Action 5.3.2. Complete a communication plan for this Implementation Strategy

Action 5.3.3. Develop a NOAA website linked to BOEM website to describe and track the Federal Survey Mitigation Program and the Survey-Specific Mitigation Plans

6. Partners, Stakeholders, and Other Ocean Users

This Implementation Strategy calls for a broadly collaborative approach to develop and implement survey mitigation. This collaborative approach aims to follow the principles of *knowledge co-production* where scientific design, data collection, analysis, and application is conducted collaboratively, inclusively, and in a manner that respects, engages, and facilitates contributions from different stakeholder groups with the goal of addressing the gap between knowledge and decision-making

[21, 22]. As such, NOAA Fisheries will lead the Implementation Strategy in close partnership with BOEM. And the design and application of the Implementation Strategy and the Mitigation Program by NOAA Fisheries and BOEM will be guided by open and transparent processes that allow for the meaningful involvement of scientific survey partners and stakeholders.

In developing the collaborative framework for implementing this Strategy, NOAA and BOEM will engage with numerous partners, many of whom are also stakeholders. More broadly, NOAA and BOEM will engage with ocean users and the American public, recognizing the oceans are a public resource. There are a group of specific partners and stakeholders involved in NOAA Fisheries sustainable fisheries, marine mammal and endangered species, aquaculture, and habitat conservation responsibilities. There are also a number of specific partners and stakeholders involved in offshore wind energy development. Finally, there are a number of scientific and knowledge partners and stakeholders. All these organizations, institutions, individuals, and the broader public have various interests in the outcomes of this Implementation Strategy. Most are also partners or will be partners in implementing this strategy. As part of this Implementation Strategy, NOAA Fisheries and BOEM will seek input, participation in, and communicate with these groups, institutions, and organizations. These interests will vary by geographic region. For the Northeast region of the U.S., these groups, institutions, and organizations include, but are not limited to:

- *NOAA Fisheries Greater Atlantic Region Fisheries Office* (GARFO) works in partnership with NOAA Fisheries Northeast Fisheries Science Center and the Interstate Fisheries Commission and Fishery Management Councils to conserve and manage marine fisheries and protect and restore essential fish habitat through the Magnuson-Stevens Fishery Conservation and Management Act, and to protect marine wildlife through the Endangered Species Act and Marine Mammal Protection Act. The Northeast Fisheries Science Center will work with counterparts at GARFO to ensure management needs and input are fundamental to the design and implementation of the Federal Survey Mitigation Program.
- *Federally-recognized Tribes* are important partners, and NOAA Fisheries and BOEM will work to ensure an accountable process for meaningful and timely consultations on actions with tribal implications.
- *Mid-Atlantic and New England Fisheries Management Councils* are composed of fisheries stakeholders on the Mid-Atlantic and New England and responsible for the sustainable management of our nation's fisheries in federal waters under the Magnuson-Stevens Fisheries Management and

[21] Norström et al. 2020. Principles for knowledge co-production in sustainability research
[22] Cook et al. 2021. Co-production processes underpinning the ecosystem services of glaciers and adaptive management in the era of climate change

Conservation Act. NOAA Fisheries surveys and data collection support stock assessments, which provide the basis for setting Annual Catch Limits. NOAA Fisheries surveys and data collection also provide data for a number of other management actions including determining allocations, defining Essential Fish Habitat and designation protected areas. NOAA Fisheries also work with the Northeast Trawl Advisory Panel whose objectives are germane: understanding the existing NOAA Fisheries / NEFSC trawl survey gear performance and methodology, evaluating the potential to complement or supplement this and other regional research surveys, and improving understanding and acceptance of NOAA Fisheries / NEFSC trawl survey data quality and results.

- *Atlantic States Marine Fisheries Commission* (ASMFC) is composed of representatives from the coastal states bordering the Atlantic Ocean. Similar to the Fisheries Management Councils, the Commission is responsible for managing fisheries, but in state waters under the Atlantic Coastal FIsheries Cooperative Management Act. There is also joint management with the Fisheries Management Councils for some fisheries. NOAA Fisheries surveys and data collection support stock assessments, which provide the basis for setting Annual Catch Limits. NOAA Fisheries surveys and data collection also provide data for a number of other management actions including determining allocations and protecting fish habitat.
- *Atlantic Scientific Review Group (ASRG)* advises NOAA Fisheries on the status of marine mammal stocks under Section 117 of the Marine Mammal Protection Act. The ASRG is a representation of marine mammal and fishery scientists and members of the commercial fishing industry mandated to review the marine mammal stock assessments and provide advice to the NOAA Assistant Administrator for Fisheries.
- *States* are important partners in offshore wind energy development, setting renewable energy goals and agreeing to purchase offshore wind energy. States are also important partners in living marine resource management, working closely with NOAA on sustainable fisheries, wildlife conservation, aquaculture development, and habitat conservation. States request NOAA Fisheries survey data to support a variety of planning activities related to offshore wind task forces and a variety of needs related to energy procurement and stakeholder outreach (e.g., fisheries working groups). NOAA Fisheries have supported data and analysis requests and requests to review some state required fisheries monitoring plans from coastal zone management agencies, fisheries and environmental agencies, and state energy agencies. States have been proactive in establishing developer-supported funds that support data collection priorities and communication mechanisms (including ROSA).
- *Commercial and Recreational Fishing Industry* is a highly diverse group of fishers, dealers, processors, retailers, restaurants, and suppliers that are involved in catching fish and shellfish. NOAA Fisheries surveys and data

collection support fisheries management, which in turn has direct effects on industry's livelihood.

- *Fishing communities* are important social and economic groups that reside in specific locations and share common dependency on commercial, recreational, or subsistence fishing or on directly related fisheries dependent services and industries. These communities are defined in Section 600.345 National Standard 8 (MSA).
- *Offshore Wind Energy Leaseholders, Grantees, and Operators* - Offshore wind industry companies will work with BOEM to address the necessary components of the Federal Survey Mitigation Program as specifications and requirements are developed through the leasing, site assessment, development, operations, and decommissioning project phases.
- *Responsible Offshore Development Alliance* (RODA) is a membership-based coalition of fishing associations, companies, and fishermen with an interest in improving the compatibility of wind and commercial fishing. BOEM, RODA, and NMFS have a ten year memorandum of understanding[23] that includes collaborating on fisheries research and to improve coordination between fisheries and offshore wind management.
- *Regional Wildlife Science Entity (RWSE)* is a public-private partner forum to support regional planning, coordination, and collaboration on research and monitoring for wildlife and offshore wind energy.
- *Responsible Offshore Science Alliance (ROSA)* is a non-profit organization that advances regional research and monitoring of fisheries and offshore wind interactions.
- *Environmental Non-Governmental Organizations* in general have a mission to protect the environment. Each particular organization has different focal areas and approaches.
- *Cooperative Institute for the North Atlantic Region (CINAR), NOAA Sea Grant Programs, Science Center for Marine Fisheries and other collaborative research partners*- NOAA Fisheries and BOEM will work with CINAR, NOAA Sea Grant Programs, Science Center For Marine Fisheries (SCEMFIS) and other collaborative research partners such as universities and regional collaborative science entities (e.g., Northeastern Regional Association of Coastal Ocean Observing Systems, the Massachusetts Marine Fisheries Institute and the Rhode Island Fisheries Institute) to advance the necessary scientific methods, designs, analysis, and data collection.
- *Scientists* broadly use NOAA Fisheries survey data for a number of scientific uses. Their understanding of potential changes to NOAA Fisheries surveys is critical to ensure the science they produce is robust, accurate, and precise.

[23] Memorandum of Understanding Between the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, Bureau of Ocean Energy Management And The Responsible Offshore Development Alliance

7. Communication and Outreach

Internal and external communication and outreach is critical for the success of this Federal Survey Mitigation Implementation Strategy. NOAA Fisheries and BOEM will have an open and transparent process for communication and outreach with each other, with partners, and with stakeholders to support the goals of this Implementation Strategy.

The objectives of communication and outreach will be to:

- *Inform* those that may be affected by the Federal Survey Mitigation Program of the plan, process, progress, and how they may be affected.
- *Allow input* by providing clear opportunity for stakeholders to comment on and contribute to the Federal Survey Mitigation Program.
- *Develop and build a collaborative environment* to provide for dynamic interaction between stakeholders and partners with the goal of improving and implementing the Federal Survey Mitigation Program.
- *Emphasize scientific processes* including peer-reviewed publications, scientific presentations, independent peer-review, and publicly accessible data and documents.

The primary mechanisms for communication and outreach will consist of:

- *Publications* - Scientific publications are a foundation of the scientific process. This improves the quality of the science, ensures the results are publicly available, and provides a record of the scientific progress of the Federal Survey Mitigation Program.
- *Scientific Presentations* - NOAA Fisheries and BOEM will be proactive in presenting and communicating the mitigation plan to scientists, policy makers, partners, stakeholders and the public whenever appropriate. Such meetings may include scientific conferences, regional planning meetings, and information seminars.
- *Workshops* - Theme-based workshops, such as the Survey Simulation Experimentation and Evaluation Project (SSEEP) workshops, will be used to develop different components of the Federal Survey Mitigation Program. Most will be open to the public; some will be based on invitation. These workshops will serve to develop and inform specific areas related to the Federal Survey Mitigation Program.
- *Solicitation of Comments* - There will be opportunities for stakeholders and the public in general to submit comments and input on the plan. The NOAA / BOEM public comment process will be used.
- *Public access to information* - Relevant documents will be posted online and available to the public on a website dedicated to the Federal Survey Mitigation Implementation Strategy.

- *Press releases / science briefs* - All important events, such as meetings announcements, completion and start of project and plans will be announced via press releases. Summaries of progress and projects will be communicated in various publicly oriented scientific communications.
- *Independent Scientific Peer Review* - Independent peer review panels will be used to evaluate different components of the Federal Survey Mitigation Program. These components include the Survey-Specific Mitigation Plans, changes in statistical designs, and new survey approaches. Current review processes will be used including Fishery Management Councils Scientific and Statistical Committees, the Atlantic Scientific Review Group, and the Council of Independent Experts. Additional review processes may also be used including the International Council for the Exploration of the Sea and the National Academy of Sciences. Peer-review reports will be made publicly available.

8. Resources

This Federal Survey Mitigation Implementation Strategy will be used over the next 30+ years and the Federal Survey Mitigation Program will involve most, if not all, NOAA Fisheries surveys. As such, the effort to mitigate the impact of offshore wind development on NOAA Fisheries surveys will be complex and take extensive resources. The scale of wind energy development in the region continues to increase and thus the scale of federal survey mitigation also increases. DOI's announcement of intent to lease additional areas in the Northeast, Southeast, Gulf of Mexico, and West Coast makes federal survey mitigation a national issue with specific regional requirements since NOAA Fisheries surveys are regionally designed and executed owing to the nature of discrete regional Large Marine Ecosystems. The complexity and cost of this effort very likely means that multiple funding sources will be needed to meet the goals of this Implementation Strategy. Several other approaches have been discussed including legislation to direct leasing revenues towards this effort, or requiring developers to contribute to survey mitigation through lease conditions. These and other options will be tracked through this Implementation Strategy and used if they become available (Objective 1.2).

Here we list some of the potential funding sources.

NOAA Fisheries / NEFSC Permanent Funding - Although the FY22 Administration's Budget request included $8.4M for NOAA Fisheries / NEFSC survey mitigation. This amount would partially fund the Federal Survey Mitigation, this was not part of the FY22 omnibus bill. Therefore, NOAA Fisheries has not yet received any dedicated funding for the survey mitigation effort. The development of Survey-Specific Mitigation Plans updated to include potential impacts from new lease areas in the

region (Action 1.1.1) will provide an updated cost estimate. This updated estimate will then allow a formal funding gap analysis to be performed (Action 1.2.1).The success of this Implementation Strategy and of the Federal Survey Mitigation Program requires these resources, otherwise risking the goal of protecting biodiversity and promoting ocean co-use.

NOAA Project Funding - There are a number of funding opportunities within NOAA that could support components of the Federal Survey Mitigation Program. As part of this Implementation Strategy, NOAA Fisheries / NEFSC will continue evaluating opportunities as they develop and then request funding as appropriate. As an example, NOAA Fisheries / NEFSC scientists successfully competed for FY21 Office of Marine and Aircraft Operations UxS Operations Center opportunity to start the development of an autonomous HabCam. This project will evaluate and develop new technologies for the NOAA Fisheries / NEFSC Sea Scallop surveys, one of the surveys impacted by offshore wind energy development. Similarly, NOAA Fisheries / NEFSC scientists successfully competed for FY21 NOAA National Oceanographic Partnership Program funding to take initial actions to adapt marine mammal surveys for operations in offshore wind development, to evaluate the use of eDNA as a survey method that can be conducted within offshore wind energy developments.

BOEM Environmental Studies Program - BOEM's Environmental Studies Program (ESP) collects data and monitors human, marine, and coastal environments to identify potential ecological, economic, and social impacts resulting from potential OCS activity. Leveraging partnerships to satisfy common scientific needs is a central component of BOEM's approach to gathering robust scientific information for its decisions and consultation processes. For example, the ESP is currently funding an early step in this Implementation Strategy, through an interagency agreement with NOAA. The study is entitled "Development of a Strategy to Evaluate Impacts of Offshore Wind Energy on the NOAA National Marine Fisheries Service Surveys". The outcomes from this study are reflected in Action 1.1.2. BOEM's ESP has an annual budget of (~$25M) and the FY22 Administration's budget request included an increase of $10M to conduct environmental studies that support clean energy development as well as climate science and conservation and that inform BOEM understanding and policy decisions.

BOEM Renewable Energy Program - is supported by a substantial investment in research. Current studies include those aimed at setting design standards for offshore renewable energy facilities appropriate for U.S. waters. Recently completed studies studied axial cyclic loading of jacket piles, suction bucket foundation feasibility, corrosion and fatigue life, Pacific Region geologic hazards, and wind density and wake effects. The results of BOEM's scientific and technology research are used to inform policy decisions, environmental analysis, mitigation, and

monitoring protocols on environmental and cultural issues. In the FY22 Administration's budget request there was an increase of $5M to address impacts of offshore energy on the human and marine environment. There was also an increase of $7M to support research and stakeholder engagement.

Offshore Wind Developer Support - Developers may support this effort under multiple pathways. 1) Developers could voluntarily contribute funds to this effort; 2) developers could contribute in-kind support such as vessel time or filling information gaps specifically identified in survey-specific mitigation plans as part of the developer's project-specific environmental monitoring plan, and 3) developers may be required to provide funds through lease or plan approval conditions. As part of this Implementation Strategy, BOEM and NOAA will continue to identify the impacts of offshore wind development on NOAA Fisheries surveys and will continue to work with developers to mitigate these impacts (Objective 2.1). To aid in this effort, part of this Implementation Strategy is to develop regional standards for project-level monitoring (Objective 2.2) and formally evaluate the consistency of developer-funded project-level monitoring with the requirements of NOAA Fisheries surveys.

Other Support - There are a number of elements of this Implementation Strategy that could be supported by other entities. However, this support will need to fit into the overall Implementation Strategy. These elements will be identified per Action 2.1.2.

- *Other Federal Agencies* - Other Federal agencies, such as the Department of Energy, have funded environmental and technology improvements related to offshore wind energy development.
- *States* - States are establishing programs related to examining and mitigating the effects of offshore wind energy development on state resources. Since fisheries are both national and state resources, the application of these funds to components of the Federal Survey Mitigation is possible.
- *Non-Governmental Organizations (NGOs)* - A number of NGO's, foundations, and philanthropic interests have interests related to marine ecosystem science and management and related to offshore wind energy development. Since NOAA Fisheries surveys are foundational to our understanding of marine ecosystems, some components of the Federal Survey Mitigation Program could be supported by NGOs.
- *Fishing Industry* - The fishing industry already supports NOAA Fisheries surveys through data collection (e.g., Industry-based surveys, Research Set-Aside Programs, NOAA Fisheries / NEFSC Bio-sampling Program), survey collaboration (e.g., NOAA Fisheries / NEFSC Gulf of Maine Cooperative Bottom Longline Survey), advice and evaluation (e.g., Northeast Trawl Advisory Panel), and cooperative funding programs (e.g., Science

Center For Marine Fisheries). Building on these collaborative efforts will result in support for the Fisheries Survey Mitigation Programs.

- *Fishery Management Councils and Marine Fisheries Commission* - The fisheries management entities support work related to improving management including the evaluation and development of science products. As partners and stakeholders in the Implementation Strategy, support for the implementation of the strategy may be possible (e.g., NEFMC Scallop Survey Working Group).

9. Acronyms Used

BOEM - Bureau of Ocean Energy Management
DOC - Department of Commerce
DOI - Department of the Interior
NEFMC - New England Fishery Management Council
NEFSC - Northeast Fisheries Science Center
NOAA - National Oceanic and Atmospheric Administration
OCS - Outer Continental Shelf

10. Acknowledgements

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Table 1

Table 1. List of NOAA Northeast Fisheries Science Center Surveys Impacted by Offshore Wind Development in the Northeast U.S. Region

Survey	Year Started	Survey Design (Sampling Gear)	Major Applications
Autumn Bottom Trawl Survey	1963	Random Stratified (Bottom Trawl)	Abundance, distribution, length, age, sex, weight, diet, and maturity samples, components of Ecosystem Monitoring survey
Spring Bottom Trawl Survey	1968	Random Stratified (Bottom Trawl)	Abundance, distribution, length, age, sex, weight, diet, and maturity samples, components of Ecosystem Monitoring survey
Sea Scallop Dredge Survey / Integrated Benthic Habitat Survey	1979	Random Stratified (Dredge) Line Transect (HabCam)	Abundance, distribution, biomass, size and sex of sea scallops and other benthic fauna
Atlantic Surfclam and Ocean Quahog Surveys	1980	Random Stratified (Hydraulic Dredge)	Abundance, distribution, biomass, size and sex of Atlantic surfclam and ocean quahog
Northern Shrimp Survey	1983	Random Stratified (Commercial Shrimp Trawl)	Abundance, distribution, biomass, and size
Gulf of Maine Cooperative Bottom Longline Survey	2014	Randomly Stratified (Bottom Longline)	Abundance, distribution, length, age, sex, weight, diet, and maturity samples, components of Ecosystem Monitoring survey
Ecosystem Monitoring Survey (6 times per year)	1977	Random Stratified [linked to Bottom Trawl Survey Design] and fFxed Stations (Plankton, Oceanographic, and Visual Sampling)	Phytoplankton, zooplankton, ichthyoplankton, carbonate chemistry, nutrients, marine mammals, sea birds
North Atlantic Right Whale Aerial Surveys	1998	Line Transects (Visual)	Right Whale population estimates; dynamic area management
Marine Mammal and Sea Turtle Aerial Surveys	1993	Line Transects (Visual)	Abundance and spatial distribution of marine mammals and sea turtles for stock assessments
Marine Mammal, Sea Turtle, and Seabird Ship-based Surveys	1991	Line Transects (Visual along w/ Plankton and Oceanographic Sampling)	Abundance and spatial distribution of marine mammals, sea turtles, and sea birds for stock assessments
Seal Aerial Abundance Surveys	1990	Surveys over Haul-out Sites and Pupping Colonies (photographic)	Abundance, distribution, migration (tagging) for assessments of harbor and gray seals

Coastal Shark Bottom Long-line Survey	1986	Fixed station (bottom long-line)	Abundance, distribution, life history, migrations (tagging)
Cooperative Atlantic States Shark Pupping and Nursery Longline/Gillnet Survey	1998	Random stratified and fixed station (longline and gillnet)	Abundance, distribution, life history, migrations (tagging)

Table 2

Table 2. List of Goals, Objectives, and Actions with details on lead for each action, whether the action is funded or not, and anticipated completion date for the action, and anticipated products. Abbreviations for Leads are as follows: BOEM - Bureau of Ocean Energy Management; NEFSC - Northeast Fisheries Science Center; NOAA - National Oceanic and Atmospheric Administration; IT - Joint NOAA / BOEM Implementation Team; ST - Strike Team (the authors of this Implementation Strategy)

	Goals		Objectives		Actions	Lead	Funded	Completion Date	Anticipated Product
1	Mitigate to the maximum extent practicable the impact of offshore wind energy development on NEFSC survey programs.	1.1	Develop, implement, and track the Federal Survey Mitigation Program, which includes Survey-Specific Mitigation Plans that address the four impacts of wind energy development on surveys and that describe the six components of survey mitigation (see the Issue Description above)	1.1.1	Produce Survey-Specific Mitigation Plans for the Federal Survey Mitigation Program for all impacted surveys	NEFSC	Y	Sep 2022	Initial survey-specific mitigation plans that address the four impacts of wind energy development on surveys and includes the six components of the survey mitigation program defined in this strategy. Plans will describe stakeholders who use the collected data and partners who are involved in the survey.
				1.1.2	Develop the workflow for identifying federal survey mitigation needs in a timely manner as part of the permitting and leasing framework.	IT	N	Sep 2022	Document workflow for identifying survey mitigation needs as wind energy development continues
				1.1.3	Complete the Survey Simulation Experimentation and Evaluation Project (SSEEP)	NEFSC	Y	Sep 2022	Using a simulation model, identify several survey design options and the implications of changes to fisheries independent surveys with specific focus on the NEFSC multi-species

									bottom trawl survey
				1.1.4	Review New England Fishery Management Council's Scallop Survey Working Group Recommendations	NEFSC	Y	Sep 2022	NEFSC develops proposed actions resulting from the recommendations provided by the New England Fishery Management Council
				1.1.5	Review Regional Wildlife Science Entity (RWSE) recommendations for survey mitigation efforts including a passive acoustic monitoring (PAM) network and novel camera technologies	NEFSC	Y	Sep 2022	NEFSC develops proposed actions resulting from the recommendations provided by the RWSE
		1.2	Obtain, use, and report on resources to implement survey mitigation program and overall survey-specific mitigation plans	1.2.1	Review resources available and perform funding gap analysis relative to this Implementation Strategy and Survey-Specific Mitigation Plans	IT	N	Sep 2022	A summary of funding available for the survey mitigation program compared to costs of program estimated from survey-specific mitigation plans
				1.2.2	Develop proposals and requests for project-scale funds to support aspects of the Survey Mitigation Program	NEFSC / BOEM	Y	ongoing	Proposals submitted to various funders. Proposals tracked as part of Action 1.2.1
		1.3	Continue to seek support for survey mitigation from developers and other parties	1.3.1	Develop inventory of plan components that could be funded or completed in-whole or in-part by developers or other parties	IT	N	Dec 2022	Publicly available recommendations of survey mitigation program components that could be funded by developers or other parties
				1.3.2	Develop measures that could be implemented as lease terms, plan conditions, or other mechanisms that bring a clear consistent application of support to this Implementation Strategy from lessees	IT	N	Dec 2022	A policy document that describes various measures

2	Evaluate and to the extent practicable integrate wind energy development monitoring studies with NOAA Fisheries surveys.	2.1	Develop and apply regional standards and requirements to wind-energy development project-specific monitoring and data accessibility	2.1.1	Develop regional standardized project-specific monitoring protocols to address NOAA Fisheries survey needs	NEFSC	N	Dec 2022	NOAA Fisheries Technical Memorandum provided to developers following the leasing process
		2.2	Evaluate compatibility of project-specific monitoring studies with NOAA Fisheries survey standards and requirements	2.2.1	Evaluate existing project-specific monitoring plans relative to the Federal Survey Mitigation Program needs	NEFSC	N	Dec 2022	Publicly available comparison of project specific monitoring plans relative to NEFSC survey needs
				2.2.2	Review existing data sharing, data access and data documentation for project specific monitoring plans	IT	N	Dec 2022	Publicly available document that reviews existing data access and documentation for project specific monitoring plan and activities. Document is updated annually
				2.2.3	Develop template to review future project specific monitoring plans relative to Federal Survey Mitigation Program needs	IT	N	Jul 2022	NEFSC produce a template for future review
				2.2.4	Review project-specific monitoring plans as to their ability to evaluate the impact of the development on the marine ecosystem	NEFSC	N	ongoing	Formal comments made to developers through BOEM on developer lead project-specific monitoring plans.
3	Collaboratively plan and implement NOAA Fisheries survey mitigation with partners, stakeholders, and other ocean-users based on the concepts of co-production, best scientific information	3.1	Provide information regarding impacts to NOAA Fisheries surveys in wind energy development planning and approval processes	3.1.1	Document and analyze impacts of offshore wind energy development on NOAA Fisheries surveys during the environmental review process for individual projects	NEFSC	Y	ongoing	Develop and use a tracking system to document and analyze impacts on NEFSC surveys. Make the tracker available on the program website (see Action 5.3.3). Update annually.

	available, and local and traditional knowledge.								
		3.2	Use public comment and partner and stakeholder input in developing, implementing and reviewing this Federal Survey Mitigation Implementation Strategy and the Federal Survey Mitigation Program	3.2.1	Complete Synthesis of the Science Report and use results in the development of Survey-Specific Mitigation Plans (Objective 1.1) and documenting the impact of offshore wind development on NEFSC surveys (Objective 3.1)	NEFSC / BOEM / RODA	Y	Sep 2022	Synthesis of the Science Report
				3.2.2	Incorporate input from the Survey Simulation Experimentation and Evaluation Project (SSEEP) Workshops and New England Fishery Management Council's Scallop Survey Working Group into Survey-Specific Mitigation Plans (Objective 1.1)	NEFSC	N	Sep 2022	Inform survey-specific monitoring plans developed as part of Action 1.1.1
				3.2.3	Hold Second Synthesis of the Science Workshop to examine the interactions between floating wind technology and fisheries (including surveys)	NEFSC / BOEM / RODA	Y	Sep 2022	Complete Second Synthesis of the Science Workshop
				3.2.4	Complete Second Synthesis of the Science Report and use results in the development of Survey-Specific Mitigation Plans (Objective 1.1) and documenting the impact of offshore wind development on surveys (Objective 3.1)	NEFSC / BOEM / RODA	Y	Apr 2023	Complete report and inform survey-specific monitoring plans developed as part of Action 1.1.1

				3.2.5	Collaborate with partners in the peer-review of products originating from the Synthesis of the Science Workshop, the Survey Simulation Experimentation and Evaluation Project (SEEP) Workshops, and the NEFMC Sea Scallop Survey Working Group	IT	N	Dec 2022	Inform survey-specific monitoring plans developed as part of Action 1.1.1
		3.3	Use peer-review processes as appropriate to ensure elements of the Federal Survey Mitigation Program represent the best science available	3.3.1	Include peer-review plans in Survey-Specific Mitigation Plans (Objective 1.1)	NEFSC	Y	Sep 2022	Include plans is survey-specific monitoring plans developed as part of Action 1.1.1
4	Adaptively implement the Federal Survey Mitigation Program and the Federal Survey Mitigation Implementation Strategy recognizing the long-term nature of the surveys and the dynamic nature of wind energy development, survey technology and approaches, marine ecosystems, and human-uses of marine ecosystems	4.1	Assess the Federal Survey Mitigation Implementation Strategy annually to evaluate progress, reassess goals, objectives, and resources available, and define actions for the next year	4.1.1	Implementation Team meet quarterly to assess Implementation Strategy progress, review input received, and update actions (see Action 5.1.1)	IT	Y	May 2022	Quarterly updated implementation strategy
		4.2	Assess Federal Survey Mitigation Program annually to evaluate progress, re-assess assumptions, objectives and resources available,	4.2.1	Implementation Team meet annually to assess the Federal Survey Mitigation Program and Survey-Specific Mitigation Plans, review input received, and propose plan updates (see	IT	Y	May 2022	Annually updated survey-specific mitigation plans

			and define actions for the next year		Action 5.1.1)				
		4.3	Track and report on the impacts of offshore wind energy development on ongoing survey operations and products		Develop and update annually a dashboard for tracking the mitigation of impacts of offshore wind energy development on NOAA Fisheries surveys (see Action 5.3.3)	IT	N	Sep 2022	Incorporate dashboard into program website as part of Action 5.3.3
		4.4	Track the development of new survey approaches and introduce new approaches to the Survey-Specific Mitigation Plans and the Federal Survey Mitigation Program during annual review	4.4.1	Implementation Team will release an annual Request for Information (RFI) for survey technologies to be considered as part of the Federal Survey Mitigation Program and summarized information received for review by NOAA and BOEM (see Action 5.1.1)	IT	N	Mar 2023	Summary of survey technologies for applicability to NEFSC survey
		4.5	Track and report on offshore wind energy development in the U.S. including planning, leasing, site assessment, construction, operation, and decommissioning	4.5.1	Develop and update monthly dashboard for planning areas, leased areas, site assessment activities, construction and operation activities, and decommissioning activities including area, number of turbines, and energy production (see Action 5.3.3)	IT	N	Dec 2022	Incorporate dashboard into program website as part of Action 5.3.3
		4.6	Track changes in the ecosystem that may impact survey mitigation	4.6.1	Review the NOAA Fisheries / NEFSC State of the Ecosystem Report and document any changes in ecosystem status that may impact survey mitigation	NEFSC	N	Sep 2022	Summary provided to Implementation Team

5	NOAA Fisheries and BOEM coordinate execution of the Federal Survey Mitigation Implementation Strategy and share experiences and lessons-learned with other regions and countries where offshore wind energy development is being planned and underway	5.1	NOAA Fisheries and BOEM successfully collaborate to lead execution of this Implementation Strategy	5.1.1	Establish a joint NOAA Fisheries - BOEM Implementation Team to oversee implementation of this strategy.	NOAA / BOEM	Y	May 2022	A clearly defined team forms to lead implementation of this strategy
				5.1.2	Hire a Program Manager to oversee this Implementation Strategy for the Northeast region	NEFSC	N	Sep 2022	A NOAA Fisheries / NEFSC Program manager is hired
				5.1.3	Provide training on collaboration and co-production of knowledge to BOEM and NOAA Fisheries staff involved in the implementation of this strategy	NOAA / BOEM	N	Jul 2022	Training is conducted
		5.2	Communicate lessons-learned during the planning and implementation of this Federal Survey Mitigation Implementation Strategy	5.2.1	*Complete document entitled "Principles and Best Practices for Developing Regional Survey Mitigation Implementation Strategies and Program Plans"*	ST	Y	Jun 2022	A document is completed that describes the process used to develop regional survey mitigation implementation program plans. The intent is to inform similar activities in other regions in the U.S. A briefing for NOAA and BOEM leadership will accompany this document.
				5.2.2	Continue involvement in the ICES Working Group on Offshore Wind Development and Fisheries	NOAA / BOEM	Y	ongoing	Contribution to Working Group products including workshops, reports, and publications.
				5.2.3	Provide updates of Strategy Implementation to ROSA,	IT	N	Sep 2022	Annual updates of activities provided to ROSA, RWSE, and others

					RWSE, and other relevant groups.				
		5.3	Communicate on the Federal Survey Mitigation Implementation Strategy	5.3.1	Communicate on the development and finalization of this Implementation Strategy.	ST	Y	May 2022	A finalized implementation strategy, a joint NOAA/BOEM press release announcing completion of strategy development, presentation to stakeholders regarding the strategy including the MAFMC, NEFMC, ASMFC, ROSA, RWSE, and oneNOAA Seminar. Finalized plan will be posted on the website developed per Action 5.2.1
				5.3.2	Complete a communication plan for this Implementation Strategy	IT	N	Sep 2022	A formal communication plan to use during implementation of this strategy
				5.3.3	Develop a NOAA website linked to BOEM website to describe and track the Federal Survey Mitigation Program and the Survey-Specific Mitigation Plans	IT	N	Sep 2022	A website on the NOAA webpage that describes the programs and provides status information on progress.