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July 1, 2021

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Re: CRMC Federal Consistency review of the **South Fork Wind** project
Docket No. BOEM-2018-0010; U.S. Army Corps of Engineers NAN-2020-01079-EME; and CRMC File 2018-10-082

Dear Ms. Lefton and Messrs. Bennett and Hardy,

The Rhode Island Coastal Resources Management Council ("CRMC") has completed its Coastal Zone Management Act ("CZMA") federal consistency review of the proposed South Fork Wind ("SFW") offshore wind renewable energy project within the Bureau of Ocean Energy Management ("BOEM") Lease Area OCS-A 0517[1]. The SFW Construction and Operations Plan ("COP") project envelope describes the project including up to 15 wind turbine generators ("WTGs") in the 6 to 12 megawatt ("MW") range, monopile foundations with pile diameter up to 11 m diameter, a single offshore substation and an alternating current electric submarine export cable of 138 kV that will make landfall at the Town of East Hampton on Long Island,

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[1] On January 16, 2020, approximately 15 months after BOEM issued its NOI on October 19, 2018, for the SFW Draft Environmental Impact Statement ("DEIS"), Deepwater Wind New England, LLC submitted an application to BOEM requesting an assignment of 13,700 acres of OCS-A 0486 to Deepwater Wind South Fork, LLC. BOEM approved the assignment on March 23, 2020, with the new lease number OCS-A 0517.

New York. The SFW lease area is approximately 13,700 acres in size and is located on Cox Ledge approximately 19 miles east-southeast of Block Island (Town of New Shoreham), Rhode Island. Pursuant to 15 C.F.R. § 930.4 the CRMC is issuing a **conditional concurrence** in this matter as detailed herein.

The CZMA at 16 U.S.C. §§ 1451 *et seq.*, provides that a state with a federally-approved coastal management program may review any proposed activity requiring a federal license or permit if the activity would affect any land or water use or natural resource of the state's coastal zone. In this matter SFW is an applicant seeking a federal license or permit from BOEM, which is the lead federal agency for renewable energy projects on the outer continental shelf ("OCS"). Accordingly, the CRMC has federal consistency review authority for the SFW project pursuant to the CZMA and its regulations at 15 C.F.R. part 930, subpart E, as Rhode Island has a federally-approved coastal management program, the BOEM authorization for the project is included on the CRMC's list of federal license or permit activities, and the project is located within a CRMC geographic location description ("GLD") on the OCS as approved by the National Oceanic and Atmospheric Administration ("NOAA") Office for Coastal Management. The CRMC's enforceable policies applicable to the SFW project are found in the Rhode Island Code of Regulations at 650-RICR-20-05-11.10[2].

On October 22, 2018, Deepwater Wind South Fork[3], LLC ("DWSF") filed a Consistency Certification with the CRMC as required by 15 C.F.R. §§ 930.57 and 930.76(a)(2) along with a COP dated September 2018, for the proposed SFW project. Since that initial filing DWSF, now known as South Fork Wind, LLC, has filed COP revisions dated May 2019, February 2020, July 2020, and May 2021, with BOEM. As part of the CRMC's federal consistency review we considered and reviewed the CZMA consistency certification, the COPs, information filed by SFW throughout the CRMC federal consistency review period, BOEM's DEIS issued on January 8, 2021, BOEM's South Fork Wind Farm and South Fork Export Cable - Essential Fish Habitat

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[2] The SFW project was reviewed under the CRMC Ocean SAMP enforceable policies in effect at the time of the consistency certification filing with the CRMC in October 2018. The Ocean SAMP enforceable policies have since been amended as approved by NOAA in February 2020.

[3] As of November 7, 2018, Deepwater Wind South Fork, LLC is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind project is a 50/50 joint venture between Ørsted and Eversource. Deepwater Wind South Fork, LLC is now known as South Fork Wind, LLC

Assessment with NOAA Trust Resources for NOAA's National Marine Fisheries Service, dated April 2021, and the U.S. Army Corps of Engineers Clean Water Act Section 404/Section 10 permit application. In addition, the CRMC also considered the information provided by the CRMC Fishermen's Advisory Board ("FAB"). The CRMC's enforceable policies of the Ocean Special Area Management Plan ("Ocean SAMP") are codified under the State's uniform code of regulations at 650-RICR-20-05-11.10.

The CRMC's federal consistency review period commenced on October 22, 2018, upon SFW filing its federal consistency certification and necessary data and information with the CRMC pursuant to 15 C.F.R. § 930.57, 930.58 and 930.76. Subsequently, the CRMC issued its three-month notice, as required by 15 C.F.R. § 930.78(a), to SFW and BOEM on January 16, 2019, that described the status of the CRMC's ongoing federal consistency review, specified the issues that SFW needed to address for consistency with CRMC's enforceable policies of the Ocean SAMP, and requested additional information necessary for the CRMC's review. See Appendix 8 in attachment. The specific information requested was an alternative wind farm layout showing an increase in spacing between WTGs to 1 nautical mile; confirmation of the specific trenching equipment (hydraulic or mechanical) for cable installation; a graphic(s) showing the proposed SFW and South Fork Export Cable ("SFEC") project elements in relation to the CRMC identified glacial moraines as depicted within CRMC enforceable policies §§ 11.10.2(F) and (G) of the Ocean SAMP; and a detailed and robust fisheries monitoring plan. Over the course of CRMC's two and one-half year review in this matter, the CRMC received the necessary data and information to make its federal consistency decision in accordance with 15 C.F.R. part 930.

BOEM received a request from SFW on April 8, 2019, to pause the federal review of the SFW project for the purpose of updating the COP with additional survey work to characterize and analyze a proposed expanded SFW work area to address environmental and navigational issues. On August 21, 2020, BOEM lifted the pause and resumed its review of the SFW COP. Based on the current schedule we anticipate that BOEM will issue a final decision on the SFW COP before the end of 2021. The CRMC's original due date for its federal consistency decision was April 22, 2019, based on SFW's filing of their consistency certification with the CRMC on October 22, 2018. Nevertheless, pursuant to 15 C.F.R. § 930.60(b), the CRMC and SFW mutually agreed and entered into nine (9) sequential agreements[4] to stay the CRMC six-month review period until July 2, 2021.

The CRMC spent substantial time and resources to evaluate SFW's consistency certification, the multiple iterations of the SFW COP (last revised May 2021), BOEM's SFW DEIS, BOEM's SFW EFH analysis, and additional materials provided by SFW, the CRMC FAB and other interested parties, including public comments, over the course of CRMC's federal consistency review. The CRMC's CZMA federal consistency analysis and findings are described in detail in the attached *CRMC Staff Project Review and Federal Consistency Analysis*. As a result of the CRMC staff's extensive review, we determined that it was necessary to minimize the project scope in order to meet the CRMC enforceable policy at 650-RICR-20-05-11.10.2(B), which requires the applicant to demonstrate that "all feasible efforts have been made to avoid damage" to Areas of Particular Concern (glacial moraine) resources and values. The SFW project area includes areas that contain glacial moraine resources and values that support uses or resources of Rhode Island's coastal zone that are similar to areas in state waters designated as Areas of Particular Concern. Project construction to include the maximum number of 15 turbine foundations would be inconsistent with the enforceable policy, when only 12 turbine foundations are necessary to meet the purpose and need of the SFW project, and to demonstrate that all feasible efforts have been made to avoid damage to glacial moraine. This matter is discussed in detail within the attached CRMC staff analysis. The applicant has indicated that they will be using an 11 MW WTG for the SFW project. Therefore, the CRMC conditional concurrence is premised on the following condition:

1. The project will include <u>no more than 12 turbine foundations</u> to minimize the anticipated substantial long-term or permanent impacts to glacial moraine on the South Fork

[4] The first stay agreement was executed on February 14, 2019, and the CRMC's federal consistency decision date was due October 25, 2019. The second stay agreement was executed on October 1, 2019, with a CRMC decision date of April 24, 2020. The third stay agreement was executed on March 17, 2020, with a decision date of August 31, 2020. The fourth stay agreement was executed on June 22, 2020, with a decision date of January 31, 2021. The fifth stay agreement was executed on December 23, 2020, with a decision date of March 31, 2021. The sixth stay agreement was executed on February 23, 2021, with a decision date of May 12, 2021. The seventh stay agreement was executed on April 23, 2021, with a decision date of June 1, 2021. The eighth stay agreement was executed on May 25, 2021, with a CRMC decision date of June 22, 2021. The ninth and final stay agreement was executed on June 17, 2021, with a CRMC decision date of July 2, 2021. All executed stay agreements are contained in Appendix 3 of the enclosure.

project site, which provides complex habitats that support commercial and recreational marine species that are relied upon by Rhode Island based coastal users.

This condition is necessary to meet the CRMC enforceable policy at 650-RICR-20-05-11.10.2(B). And, while the applicant has agreed to microsite turbine foundation locations where feasible and within the limitations specified in BOEM's regulations at 30 C.F.R. § 585.634 to minimize impacts, it is expected that micrositing in and of itself for some locations will not be sufficient to avoid or minimize impacts to glacial moraine and important natural habitats. Thus, limiting the number of turbine foundations from a maximum possible total of 15 to no more than 12 will reduce the impacts to glacial moraine from turbine foundation installation, inter-array cable installation, the removal and relocation of large boulders, the placement of foundation scour protection and secondary cable protection. The CRMC condition will allow the applicant to demonstrate that "all feasible efforts have been made to avoid damage" to glacial moraine resources and values, which are the same or similar to Areas of Particular Concern as described in enforceable policy 650-RICR-20-05-11.10.2(B). In addition, the CRMC condition for a maximum of no more than 12 turbine foundations (using the 11 MW WTGs) still allows the SFW project to meet its purpose and need to generate and deliver 130 MW of renewable offshore wind generated electricity and meet its contractual obligation with the glacial Authority. The applicant verbally agreed to the CRMC proposed condition for a maximum of 12 wind turbine foundations at the Council's May 25, 2021, public meeting in this matter, but to our knowledge has not submitted to BOEM a written acknowledgement of their agreement with the CRMC condition.

In the applicant's September 28, 2020 mitigation proposal, South Fork Wind, LLC acknowledges the need for mitigation to impacted fishermen in order to meet the CRMC's mitigation enforceable policies §§ 11.10.1(C), (G) and (H). The CRMC cannot require monetary compensation for mitigation as part of its CZMA federal consistency decision. Therefore, the CRMC could not object for failure to pay a compensation amount or include a condition that an applicant must pay a compensation amount. However, the CRMC and an applicant can mutually agree that a monetary compensation amount is sufficient to meet enforceable policies §§ 11.10.1(C), (G) and (H). As a result of extensive mitigation negotiations conducted between the CRMC, the CRMC's Fishermen's Advisory Board ("FAB") and South Fork Wind from October

2020 through May 2021, South Fork Wind has agreed to provide a fisheries mitigation compensation fund for enforceable policies §§ 11.10.1(C), (G) and (H). This includes $5.2 million[5] to be distributed into a Commercial Fisheries Compensation Fund and a Coastal Community Fund as part of their overall mitigation package to offset unavoidable impacts to Rhode Island based fishermen that will be impacted by the proposed SFW project. See the discussion under CRMC enforceable policies as detailed in the attached *CRMC Staff Project Review and Federal Consistency Analysis.* The direct compensation fund is intended for claims of direct impact to compensate Rhode Island fishermen for loss of access or reduction of harvest, which is a liability fund needed to meet BOEM requirements. The fisheries mitigation was negotiated between the CRMC, South Fork Wind and the FAB in accordance with enforceable policy § 11.10.1(H). The FAB, however, recommended to the CRMC that the proposed fisheries mitigation in their view was insufficient to mitigate for unavoidable impacts to Rhode Island based fishermen.

Pursuant to 15 C.F.R. §§ 930.4 and 930.78, and for the reasons detailed within the *CRMC Staff Project Review and Federal Consistency Analysis* (attached), the CRMC has determined that with the CRMC condition for the project minimization alternative of no more than 12 turbine foundations in combination with the applicant's proposed compensatory mitigation and other mitigation measures, including their proposed Navigational Enhancement and Training Program, that the proposed activity complies with the enforceable policies of the Rhode Island coastal management program. Based on our review of the SFW project and its effects on Rhode Island coastal resources and uses in the Rhode Island coastal zone, the CRMC **conditionally concurs** with the consistency certification filed with the CRMC by SFW in this matter that the activity **as conditioned** by the CRMC is consistent with the Rhode Island coastal program enforceable policies.

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[5] The "Commercial Fisheries Compensation Fund" will be funded with $3,500,000 for compensation to commercial and for-hire charter fishing operations for mitigating impacts arising from direct impacts/losses from the construction and operation of SFW. An additional $750,000 will fund direct impacts/losses from decommissioning of the SFW project. And, a "Coastal Community Fund" will be funded with $950,000 to provide grants for initiatives supporting the general betterment of coastal communities in Rhode Island. The establishment and funding of each are detailed in the *Agreement Regarding the Establishment and Funding of the Rhode Island Fisheries Direct Compensation Program and Coastal Community Fund* executed on June 30, 2021 by the CRMC and South Fork Wind, LLC. This agreement is not needed or part of the CZMA federal consistency process. Rather, it is for state purposes with disputes to be remedied under Rhode Island state law. See Appendix 30 of the enclosure.

Should the above-referenced project be modified in any manner during BOEM's review of the COP or after approval of the COP, such that the project would have effects on Rhode Island coastal resources or uses that are substantially different than originally proposed, BOEM may require the applicant to provide additional CZMA federal consistency review, pursuant to 15 C.F.R. part 930, and BOEM regulations.

Pursuant to the Federal consistency regulations, if the requirements of paragraphs (a)(1) through (3) of 15 C.F.R § 930.4 are not met, then all parties shall treat the CRMC's conditional concurrence as an objection. The applicant has the right to appeal an objection to the U. S. Secretary of Commerce, Herbert C. Hoover Building, 14th Street and Constitution Avenue, NW., Washington, DC 20230, with a copy to NOAA's Office of General Counsel, Oceans and Coast Section, 1305 East West Highway, Room 6111 SSMC 4, Silver Spring, Maryland 20910, within 30 days of receipt of the CRMC's conditional concurrence. A copy of the appeal should also be sent to the CRMC Executive Director, Stedman Government Center, 4808 Tower Hill Road, Wakefield, RI 02879. Because of the COVID-19 emergency, the applicant should also notify via email the Section Chief of the NOAA Office of General Counsel, Oceans and Coasts Section (adam.dilts@noaa.gov) that a Notice of Appeal was mailed to the Secretary and NOAA.

Please contact me should you have any questions concerning this decision at jwillis@crmc.ri.gov or call me at 401-783-3370.

Sincerely,

Jeff M Willis

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat
Enclosure
cc: Jeffrey L. Payne, Ph.D., Director, NOAA OCM
Stephan A. Ryba, Chief, Regulatory Branch, U.S. Army Corps of Engineers, New York District
Governor Daniel McKee
RI Congressional delegation
Jennifer Cervenka, CRMC Chair and CRMC members
David Kaiser, NOAA OCM
Kerry Kehoe, NOAA OCM

CRMC Project Review and Federal Consistency Analysis

A. Project Description

The South Fork Wind (SFW) offshore wind renewable energy project as described within the construction and operation plan (COP) includes up to fifteen (15) wind turbine generators (WTGs) in the 6 to 12 megawatts (MW) range and associated foundations, one offshore substation (OSS) with associated foundation, an inter-array submarine cable network connecting the WTGs and the OSS and the 138 kV submarine export cable that will connect the SFW project in federal offshore waters into New York state waters to the existing mainland electric grid on Long Island in East Hampton, New York. The SFW project is located within BOEM Renewable Energy Lease Area OCS-A 0517 (previously part of OCS-A 0486) and is located on Cox Ledge approximately 19 miles east-southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York. See Figure 1. The purpose and need for the SFW project is to generate renewable wind energy from the proposed offshore wind farm and to provide 130 MW of electricity to the East Hampton, NY substation in accordance with the purchase and power agreement between South Fork Wind, LLC[1] and the Long Island Power Authority. As part of the project SFW plans to develop an operation and maintenance facility that will be located onshore at either Montauk in East Hampton, New York or Quonset Point in North Kingstown, Rhode Island. SFW made several changes to the SFW layout during the CRMC's review period. Specific details are provided in Section D herein covering the period from SFW's initial October 2018 filing to the final iteration as presented in the February 2020 amended COP.

[1] Since South Fork Wind, LLC, is a subsidiary of Ørsted U.S. Offshore Wind, the terms "SFW" and "Ørsted" may be used interchangeably throughout this document.

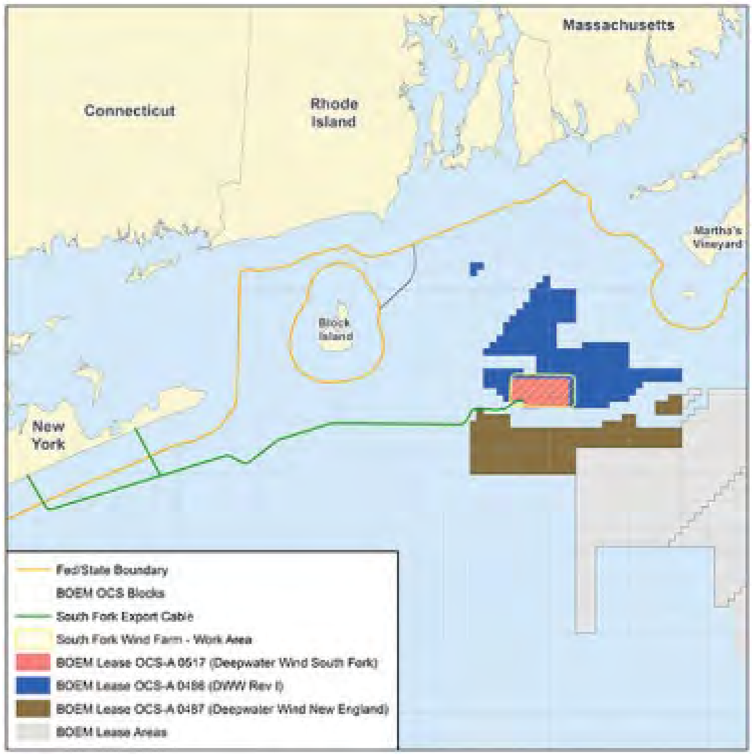

Figure 1: South Fork Wind Farm proposed project area and export cable route is entirely within federal offshore waters in BOEM lease area OCS-A 0517. Source: BOEM.

B. Federal Consistency

SFW filed its Construction and Operations Plan with BOEM on June 29, 2018 seeking a federal license to construct and operate the proposed SFW project within federal waters of the OCS. BOEM issued a Notice of Intent (NOI) in the Federal Register on October 19, 2018 under Docket No. 2018-0010 to prepare an Environmental Impact Statement for the project, and subsequently held a public scoping meeting in Narragansett, RI on November 8, 2018 to receive public input and written comments from interested stakeholders on the proposed SFW project. SFW filed its federal consistency certification[2] and necessary data and information with the CRMC pursuant to 15 C.F.R. §§ 930.57 and 930.76(a)(2) on October 22, 2018 and the project was assigned CRMC file 2018-10-082. CRMC notified SFW on October 24, 2018 that the consistency certification did not meet the requirements of 15 C.F.R. § 930.57 and requested that

[2] SFW incorrectly stated within Section 1.3.4 of their September 2018 COP that it "voluntarily" filed a consistency certification with Rhode Island. The SFW project is a listed activity for purposes of federal consistency within the CRMC's federally approved 2011 geographic location description, and thus, DWSF was obligated to file a consistency certification with Rhode Island pursuant to 15 C.F.R. part 930.

a proper certification be filed promptly with the CRMC. On November 13, 2018 SFW refiled with the CRMC a corrected consistency certification that met the federal requirements. The SFW corrected consistency certification and Appendix A (Coastal Zone Management Consistency Statements) were included in subsequent COP revisions.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC § 1451 *et seq*., and the CZMA's implementing regulations at 15 C.F.R. part 930, subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities. The proposed SFW project includes "offshore wind facilities" and "underwater cables," which are listed threshold activities when located within the CRMC's 2011 geographic location description (GLD), for permits and licenses under the U.S. Department of the Interior (BOEM is an agency under DOI) for OCS activities. The issuance or approval of leases, permits, easements, rights-of-way, exploration plans, development plans, production plans, and other authorizations, as appropriate, pursuant to the Outer Continental Shelf Lands Act (43 U.S.C. § 1331 *et seq*.) as amended by the Energy Policy Act of 2005 (42 U.S.C. § 15801 *et seq*.) for the construction, operation, maintenance and/or support activities related to OCS energy development are included in Table 2 of the CRMC's approved federal consistency list (http://www.crmc.ri.gov/regulations/Fed_Consistency.pdf). After developing and adopting the Ocean SAMP in 2010, the CRMC submitted to the NOAA Office of Coastal Management (OCM) the Ocean SAMP enforceable policies[3], the associated GLD that was coincident with the Ocean SAMP planning boundary, and proposed revisions to the CRMC federal consistency list with a request for NOAA OCM to approve them as program changes to the RI coastal management program pursuant to 15 C.F.R. part 923. On September 30, 2011 NOAA OCM granted approval as requested by the CRMC and thereafter the listed activities were subject to CRMC federal consistency review.

The CRMC issued a public notice on March 4, 2019 for the SFW project in accordance with 15 C.F.R. §§ 930.61 and 930.77(b) and requested interested parties to file written comments with the CRMC on or before April 30, 2019. See Appendix 1. One set of written comments were submitted on behalf of the Conservation Law Foundation, the Natural Resources Defense

[3] Enforceable policies are defined at 15 C.F.R. § 930.11(h).

Council and the National Wildlife Federation. Their collective comments were primarily concerned with the potential impacts from the SFW project on critically endangered North Atlantic Right whales. See Appendix 2. The issue of protection and management of this species, however, is the responsibility of NOAA National Marine Fisheries Service (NMFS).

Pursuant to 15 C.F.R. part 930 subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities, the CRMC as the State's authorized coastal zone management agency must make a determination and issue a written decision as to whether the proposed SFW project is consistent with the enforceable policies of the State's federally approved coastal management program, specifically the CRMC's Ocean Special Area Management Plan codified in the Rhode Island Code of Regulations at 650-RICR-20-05-11. The CRMC's concurrence of SFW's consistency certification for the SFW project is required before BOEM may approve or approve with conditions the SFW CCOP pursuant to 30 C.F.R. § 585.628(f).

The CRMC and SFW agreed to eight (8) separate stay agreements over the course of CRMC's review of the SFW project as follows:

1st stay agreement executed on February 14, 2019 with a CRMC decision date of October 25, 2019;

2nd stay agreement executed on October 1, 2019 with a CRMC decision date of April 24, 2020;

3rd stay agreement executed on March 17, 2020 with a CRMC decision date of August 31, 2020;

4th stay agreement executed on June 22, 2020 with a CRMC decision date of January 31, 2021;

5th stay agreement executed on December 23, 2020 with a CRMC decision date of March 31, 2021;

6th stay agreement executed on February 23, 2021 with a CRMC decision date of May 12, 2021;

7th stay agreement executed on April 23, 2021 with a CRMC decision date of June 1, 2021;

8th stay agreement executed on May 25, 2021 with a CRMC decision date of June 22, 2021; and

9th stay agreement executed on June 17, 2021 with a CRMC decision date of July 2, 2021. Accordingly, the CRMC federal consistency decision is due no later than **July 2, 2021** pursuant to 15 C.F.R. § 930.77 and 930.78. See Appendix 3 for all executed stay agreements.

C. Coastal Effects Analysis

The following coastal effects analysis was prepared to establish context for the CRMC federal consistency decision and demonstrate the coastal effect(s) that are reasonably foreseeable resulting from the South Fork Wind project, even though the project is located within the CRMC's 2011 GLD and the project is a listed federal activity and presumed to have coastal effect(s) on Rhode Island coastal uses or resources.

NOAA's regulations state "[t]he term 'effect on any coastal use or resource' means any reasonably foreseeable effect on any coastal use or resource resulting from a federal agency activity or federal license or permit activity (including all types of activities subject to the federal consistency requirement under subparts C, D, E, F and I of this part.) Effects are not just environmental effects, but include effects on coastal uses. Effects include both direct effects which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects which result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects are effects resulting from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable actions, regardless of what person(s) undertake(s) such actions." See 15 C.F.R. § 930.11(g).

The South Fork Wind project located within BOEM lease area OCS-A 0517 is also located within the CRMC's 2011 geographic location description (GLD), which is coincident with the CRMC's Ocean Special Area Management Plan (Ocean SAMP) boundary. On September 29, 2011 NOAA approved the CRMC's request to include the 2011 GLD as part of the State's coastal program including additions to the CRMC's federal consistency list (NOAA file number RI-2011-2). The NOAA approved federal consistency list includes leases, licenses and permits issued by the Department of the Interior for federal waters within the 2011 GLD with the presumption that such federal activities would likely have a coastal effect on Rhode Island coastal uses and resources. Nevertheless, we have included the following detailed coastal effects analysis specifically for the South Fork Wind project to demonstrate its potential impacts on Rhode Island coastal uses and resources.

The SFW project is located on a submerged geological feature known as Cox Ledge on nautical charts. It is located approximately 16 nautical miles east-southeast of Block Island. Commercial fishing for multiple species is conducted in this area and it is also a popular location for offshore For-Hire charter and private recreational fishing vessels. SFW relied upon two primary sources of information, vessel trip reports (VTR) and vessel monitoring system (VMS), for commercial and charter boat fishing activity for their analysis of potential economic impacts resulting from the SFW project and export cable to Long Island as detailed in Section 4.6.5 of the SFW COP, including COP Appendix Y - Commercial and Recreational Fisheries Technical Report. The reporting of data, however, is not specific to the SFW development area, but rather the RI/MA wind energy area (WEA), which is composed of BOEM lease areas OCS-A 0486 and 0487 (the former Deepwater Wind leases). The combined area of these two leases now held by Ørsted is 164,750 acres and the SFW lease (OCS-A0517) area is 13,700 acres accounting for 9% of the RI/MA WEA. A number of the tables within Appendix Y of the COP report annual average revenues and landings from the RI/MA WEA for various species and compare them as a percentage of total values from annual average revenues and landings for *all* fishing activity from Maine to North Carolina. It appears that the intended effect is to demonstrate that a relatively small percentage, as compared to the Atlantic coast, of the various species landings and revenues are harvested within the MA/RI WEA, and a smaller percentage yet from the SFW. Nevertheless, the Cox Ledge offshore area including the SFW lease is a highly diverse fisheries habitat area due to glacial moraine and changes in bathymetry that create an assemblages of marine organism that contribute to the richness of species diversity and value as a coastal resource that Rhode Island based coastal uses rely upon. And, as we pointed out in the February 28, 2019 Vineyard Wind federal consistency decision (CRMC file 2018-04-055), fisheries biomass is not uniformly distributed either spatially or temporally within the MA-RI WEA, and thus smaller areas like the SFW project may account for a substantial portion of an overall commercial harvest landings value.

1. The affected coastal uses (*i.e.*, commercial and recreational fishing industry) and resources (*i.e.*, fish, shellfish and crustaceans)

The primary affected Rhode Island **coastal uses** within the South Fork Wind (SFW) lease area OCS-A 0517 are the Rhode Island-based commercial fishing fleet, the recreational charter (For-Hire) fleet and the private recreational fishing fleet that fish and navigate within the lease area. The largest proportion of the Rhode Island-based commercial and recreational charter fleets rely primarily upon port infrastructure that is located at Point Judith (Port of Galilee) in Narragansett and Newport, including several other smaller Rhode Island ports. Approximately 60% of all Rhode Island-based commercial fishing revenues during the period of 2008 to 2019 from the SFW lease area were landed in the Port of Galilee (NOAA, 2020). In addition, the Port of Galilee accounts for 88% of all Rhode Island For-Hire boat trips within the RI-MA wind energy area (Kirkpatrick, 2017).

The Rhode Island fisheries and seafood sector spans commercial fishing and shellfishing, fishing charters, processing, professional service firms, retail and wholesale seafood dealers, including importers and exporters, service and supply firms, and tackle shops. These 428 firms generated 3,147 jobs and $538,330,000 of gross sales in 2016. Including the spillover effects across all sectors of the Rhode Island economy, the total economic impact was 4,381 jobs and an output of $419,830,000 (+/- 11.6%). The commercial fishing sector in Rhode Island as estimated in 2016 provided 1711 jobs with gross sales of $88,390,000 for the Rhode Island economy. See URI 2018.

As reported by NOAA (2020) the affected **coastal resources** within the South Fork Wind lease area OCS-A 0517 include the following most impacted commercially harvested species that are targeted by the Rhode Island based commercial fishing industry according to the respective species revenue rankings for harvest years 2008 through 2019, they are: Sea Scallop, Monkfish, Lobster, Skates, Longfin Squid, Channeled Whelk, Summer Flounder, Cod and Silver Hake. These species are harvested using mobile gear such as bottom and mid-water trawls targeting Skates, Longfin Squid, Summer Flounder; dredges for harvesting Sea Scallops; and fixed gear, particularly traps for American Lobster and Jonah crab and gillnets to harvest Monkfish. The primary affected coastal resources within the South Fork lease area as targeted by the Rhode Island based For-Hire and Private recreational fishing fleet include highly migratory species (HMS) such as bluefin tuna, mahi mahi, blue sharks and mako sharks (Kneebone and Capizzano, 2020). In addition, the Cox Ledge area supports one of the premier Atlantic cod fishing locations in all of Rhode Island Sound due to the presence in this location of critical fish habitat essential for this species. As an example, see: https://www.thefisherman.com/hot-spot/coxes-ledge-%C2%96-northern-section/. And, studies document the importance of Cox Ledge and surrounding area for cod spawning from late fall to early spring (NEFMC, 2016; Kovach *et al*., 2010). Furthermore, the CRMC's Ocean SAMP specifically identifies Cox Ledge as an area of particular importance, which is used by commercial fishing interests with fixed gear as well as mobile gear and recreational fishermen. See Ocean SAMP Chapter 5.

2. Where and in what densities the uses and resources are found

Rhode Island Sound including Cox Ledge is a biologically productive area that contains an abundance of finfish, shellfish and crustacean species, marine mammals, sea turtles, and birds. Rhode Island Sound is characterized by a seasonal flux of offshore organisms where every spring and summer, there is an influx of planktonic organisms from offshore. Larger organisms, including commercially and recreationally important finfish and crustacean species as well as whales and other marine mammals, follow this source of food inshore. This seasonal influx of plankton also includes larvae of commercially important species such as lobster and menhaden, which spawn offshore but grow to adulthood further inshore. Cox Ledge is known to be an ecologically and historically important habitat for many fish and invertebrate species in Southern New England, with notable abundances of sea scallops and lobster. The CRMC Ocean Special Area Management Plan identified Cox Ledge as having the highest ecological value of anywhere in the 1,467 square mile study area. And, The Nature Conservancy's mapping and weighted persistence analysis over three decades found Cox Ledge to be above average and far above average for fish species and very high for sea scallops in terms of species persistence and diversity (Petruny-Parker *et al*., 2015).

<u>Commercial Fishing Activity</u>

Commercial fishing activity resulting in Rhode Island landings is conducted throughout Rhode Island Sound, including Cox Ledge the location of the South Fork Wind (SFW) project. During 2019 alone NOAA (2020) reports that within the SFW lease area Rhode Island based commercial fishing vessels had a total of 1466 fishing trips by 87 vessels out of Point Judith, 101 trips by 5 vessels berthed in Newport and 162 trips by 7 vessels out of Little Compton. Rhode Island based commercial fishing vessels accumulated more trips (1729) to South Fork than all other state's trips combined (768). Thus, Rhode Island based vessels accounted for 69% of all commercial fishing activity in 2019 on the SFW lease area. In addition, NOAA (2020) reports that Rhode Island based commercial fishing vessels made a total of 6745 vessel trips to the RI-MA WEA (OCS-A 0486, 0487 and 0517) of which there were 1729 trips specifically associated with the SFW lease area. Despite the relatively small area of the SFW lease at 13,700 acres, it accounted for 25% of all total trips in 2019 within the RI-MA WEA, which has a combined area of 164,750 acres. Therefore, even though the South Fork lease represents only 8.3% of the entire RI-MA WEA it accounted for one-quarter of all Rhode Island commercial fishing trips in 2019 within the RI-MA WEA. This fact points to the significance of the South Fork site and its location on Cox Ledge, which is important marine habitat. A NOAA NMFS three-year fisheries study that began last year (2020) of Atlantic cod and other commercial fish species within the RI-MA WEA and specifically Cox Ledge points to the importance of this specific area of the SFW project. See: https://www.fisheries.noaa.gov/feature-story/scientists-collecting-data-commercial-fish-species-wind-energy-lease-areas-0.

As reported by NOAA the top three most impacted species harvested within the SFW project area during the 12-year reporting period of 2008-2019 are Sea Scallop ($387,000), Monkfish ($362,00) and American Lobster ($324,000). Using VMS[4] data the Northeast Ocean Data Portal online viewer at northeastoceandata.org provides commercial fishing intensity maps for a number of fisheries resources. Recently, the web portal has included the specific BOEM renewable energy lease boundaries to allow analysis of potential impacts of offshore wind projects on existing and historic fishing activity based on the best available data. The Northeast Ocean Data Portal, however, does not provide fishing intensity maps for American lobster or a relatively new emerging and important fishery for Jonah crab. Although Rhode Island-based fishing vessels commercially harvest American lobster and Jonah crab within the SFW lease area, these lobster-only permitted vessels currently have no federal mandatory reporting requirement, and this includes VTR [5] or VMS. Accordingly, the density of fishing activity and

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[4] Vessel Monitoring Systems (VMS) is a general term to describe systems that are used in commercial fishing to allow environmental and fisheries regulatory organizations to track and monitor the activities of fishing vessels.

[5] Operators of NOAA Fisheries Greater Atlantic Region permitted commercial fishing vessels are required to submit a vessel trip report (VTR) for every fishing trip regardless of where the fishing occurs or what species are targeted, with the exception of those vessels that possess only a lobster permit. VTRs are required in order to

the resource is not accounted for in the Northeast Ocean Data Portal data, and landings for lobster and Jonah crab are estimated by NOAA through dealer reports. The SFW lease is located within Lobster Management Area 2 (established by the Atlantic States Marine Fisheries Commission (ASMFC)) in which Rhode Island based commercial vessels harvest American lobster and Jonah crab with fixed gear (pots). See Figure 2 below for the overlap of the SFW lease and Lobster Management Area 2. The fixed gear typically involves 30-40 pots strung together with a ground line (trawls) and marked at both ends with surface buoys (typically a high-flyer buoy) to mark the location of the pot trawls.

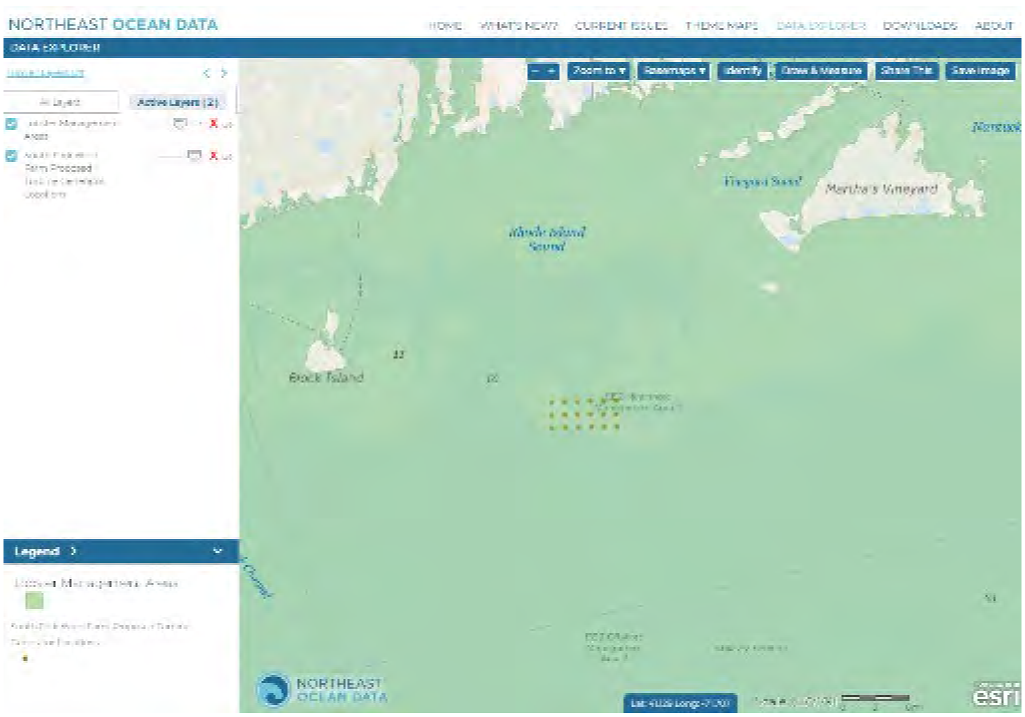

Figure 2. The SFW turbine foundations (dots) are shown in the center of the image within Lobster Management Area 2. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

Fishing activity is interpreted by the Northeast Ocean Data online viewer as vessels traveling less than 4 knots (< 4 knots) indicating that a vessel would be towing a net (mid-water or bottom trawl) to harvest fish or a dredge in the case of scallop fishing. As shown in Figures 3 and 4 below, there is scallop dredging activity in and around the SFW lease area, and significant

provide information on when and where catch occurred. Operators of all federally permitted vessels must complete a VTR prior to landing.

scallop dredging activity along the proposed SFW export cable (SFEC) route to Long Island, NY. The level of activity shown varies from low to medium-high intensity between the years of 2011-2014 and 2015-2016 within the lease boundary, but it also shows the variable nature of fishing whereby the targeted species density within a specific location varies from year to year. Nonetheless, both Figures 3 and 4 show medium-high to high intensity levels immediately west of the SFW lease boundary in the location of the proposed SFW export cable to Long Island, NY. Rhode Island commercial fishermen have indicated that this area of the SFW project and the associated export cable route to Long Island is important and productive scallop fishing grounds.

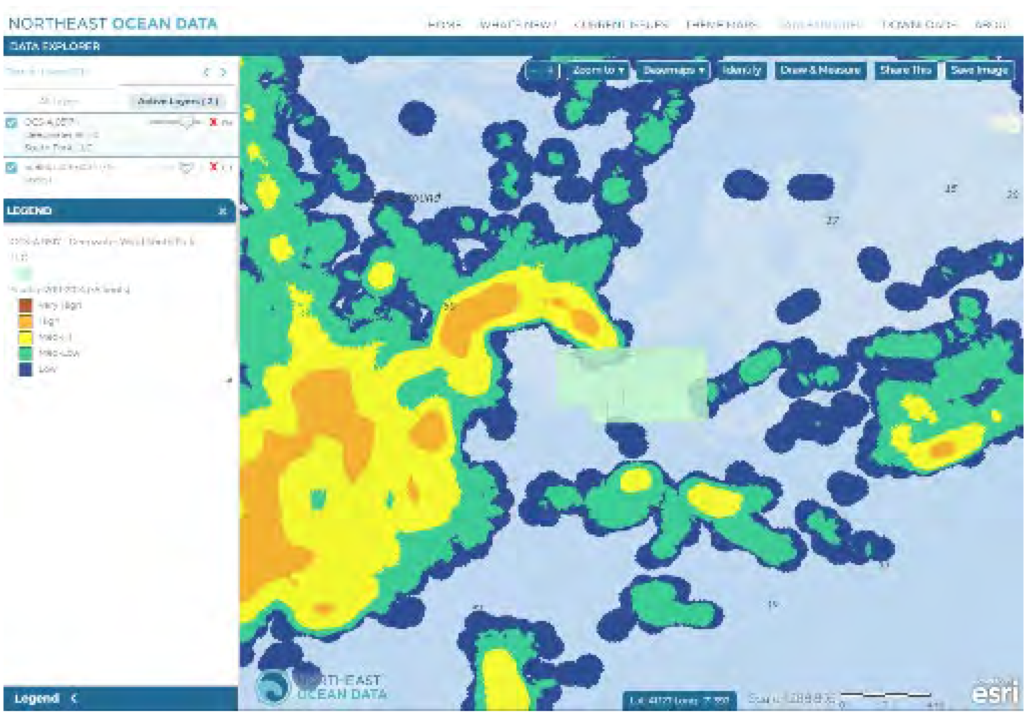

Figure 3. Scallop fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

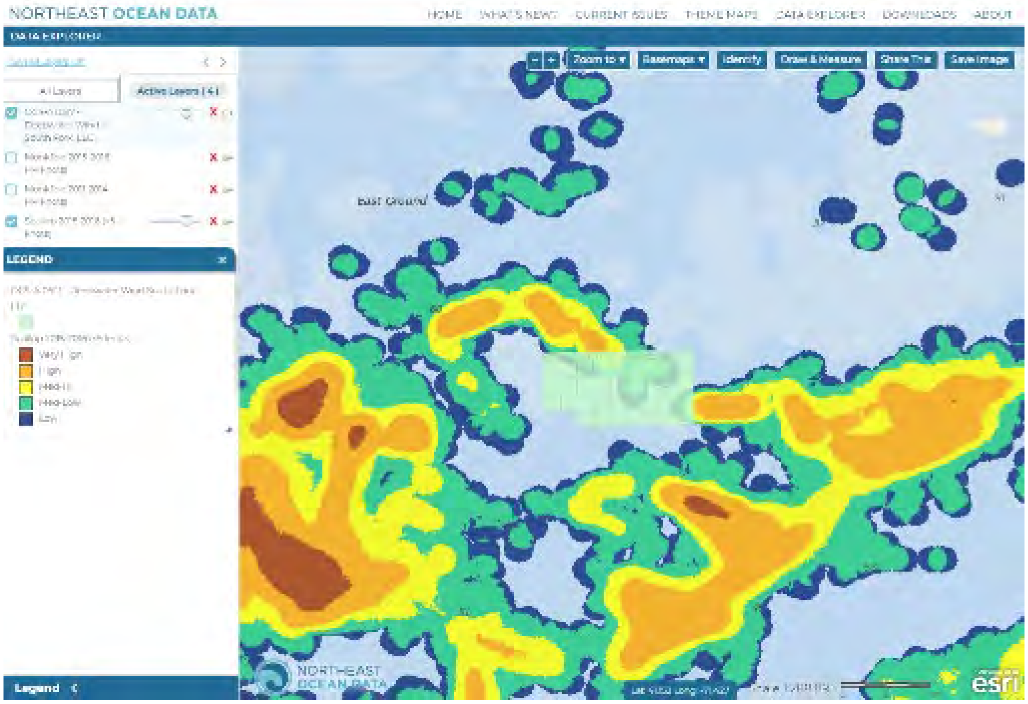

Figure 4. Scallop fishing activity 2015-2016. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

The Monkfish harvest from the SFW lease is listed by NOAA (2020) as the second highest revenue of all commercial species harvested by Rhode Island based vessels from this particular area. Again, vessel speeds less than 4 knots is interpreted by the Northeast Ocean Data portal to indicate the setting or tending of gill nets, which are the primary method of harvesting this species. Figures 5 and 6 show the level of fishing activity is predominantly medium-high to high intensity during years of 2011-2014 and predominantly medium-low to medium high in the years 2015-2016. The fishing activity intensity for Monkfish is Medium-High to Very High in the area west of the lease boundary and the location of the export cable to Long Island, NY.

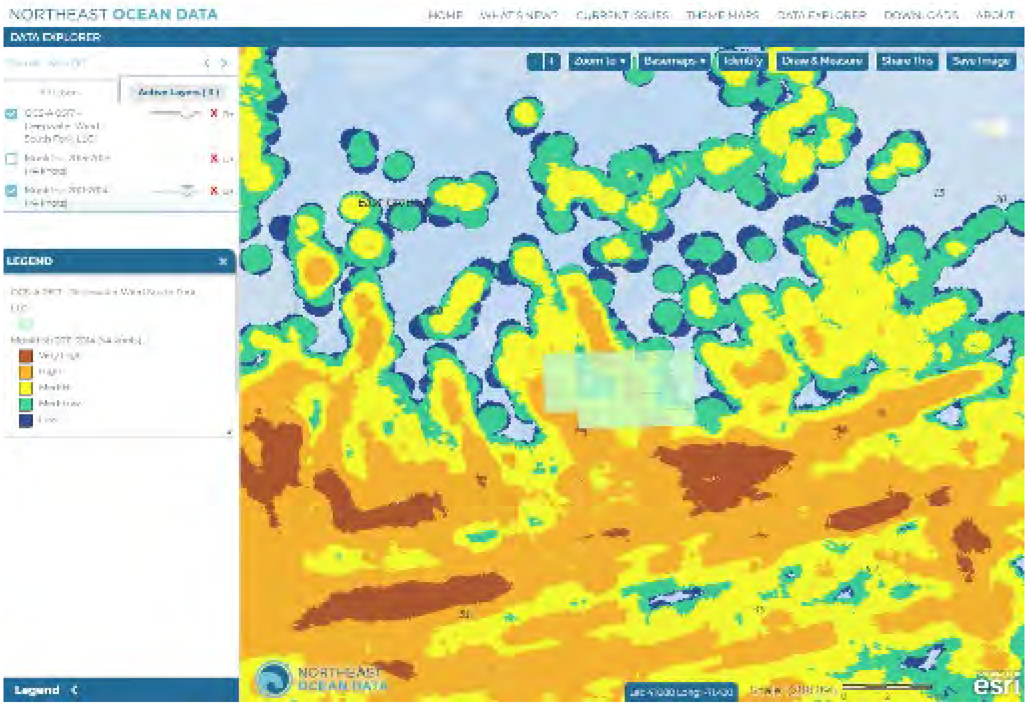

Figure 5. Monkfish fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

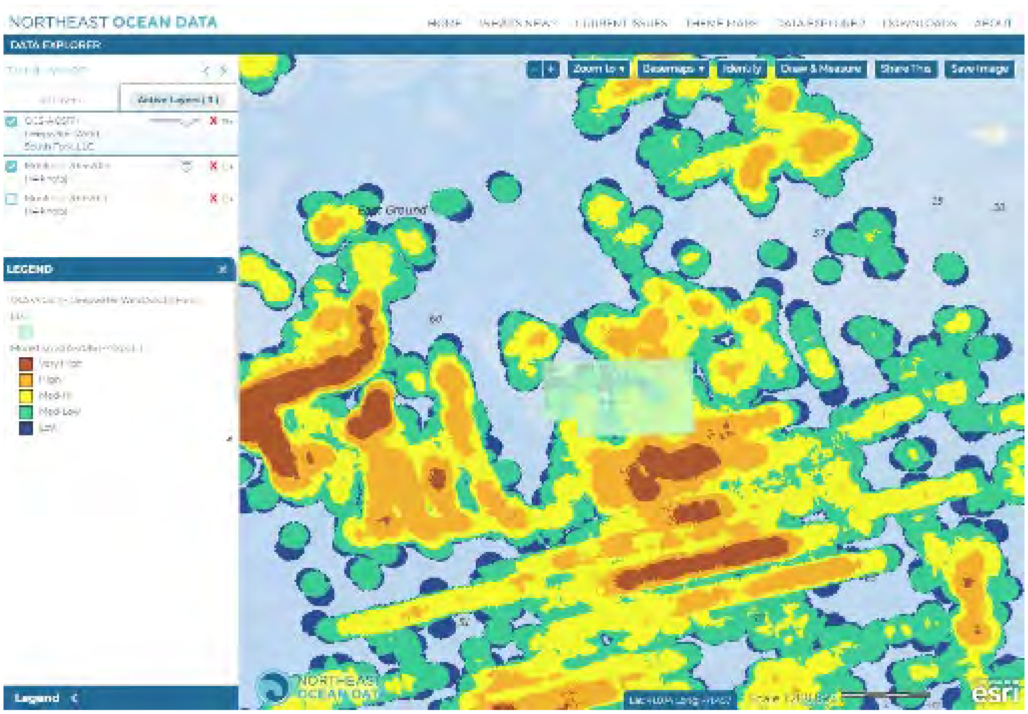

Figure 6. Monkfish fishing activity 2015-2016. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

The mobile gear activity for multispecies (groundfish) fishing activity at least for the years 2011-2014 show low to medium-low fishing intensity in Figure 7. Ground fish activity for years 2015-2016, however, do not show an intensity of effort with the SFW lease area and are not included herein. Atlantic Cod fish are primarily harvested by commercial vessels using mobile gear bottom trawls, and their reporting is aggregated with other groundfish species under the Northeast Multi-species Fishery Management Plan. Cod fish are one of the top ten impacted species by landings data harvested from within the SFW project area with a 12 year (2008-2019) aggregate landing of 32,000 pounds as reported by NOAA (2020). It is important to note that there are no commercial Atlantic cod fish landings reported by NOAA for the two immediate adjacent lease areas (OCS-A 0486 and 0487) associated with the RI-MA WEA. Consequently, as reported by NOAA, the SFW project site is the **only** area within the RI-MA WEA where economically viable quantities of Atlantic cod fish have been harvested.

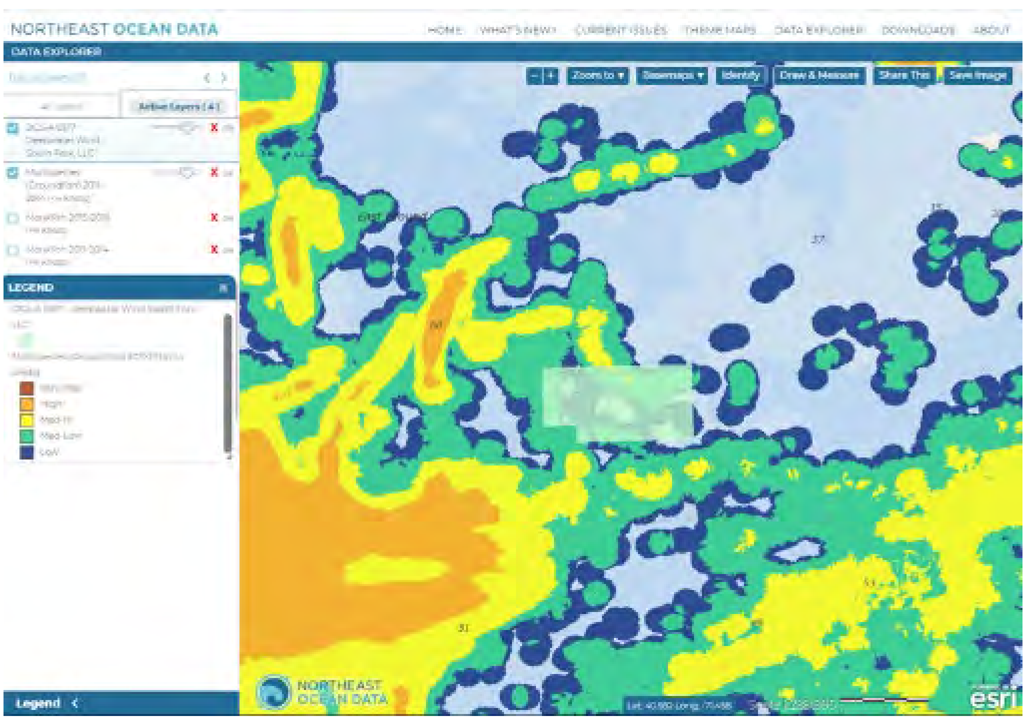

Figure 7. Multispecies (groundfish) fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

The overall trends for cod fish have been declining since the 1980’s in southern New England offshore waters and the Gulf of Maine as reported in the Northeast Fisheries Science

Center Stock Assessment (NEFSC, 2019). Importantly, however, the fact that commercial landings of cod fish are reported by NOAA as being harvested only from within the SFW lease and not within the two adjacent Ørsted lease areas demonstrates the significance of Cox Ledge as important habitat for Atlantic Cod. Indeed, NOAA has acknowledged the importance of Cox Ledge because of its significant habitat value for marine fauna and essential fish habitat (EFH) (NOAA, 2017). Federal law defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1853(a)(7) and § 1802(10). The RIDEM Division of Marine Fisheries reports that anecdotal evidence from recreational fishermen suggests that the abundance of cod has increased significantly over the past 15 years in frequently fished areas south of Rhode Island, which includes Cox Ledge. See RIDEM 2021 at 2 (Appendix 4). Additionally, NOAA reports that a persistent winter aggregation of cod fish occurs on Cox Ledge that supports a “burgeoning recreational fishery” (NOAA 2020a).

BOEM anticipates direct effects to essential fish habitat as a result of the SFW project footprint, the SFEC and surrounding areas that could be measurably affected by project construction and installation. See BOEM SFW DEIS at 3-4. And, the applicant’s COP states in part that “EFH and EFH-designated species will be affected by construction, installation, decommissioning, and O&M of the SFWF and SFEC.” See SFW COP Appendix O at 2-31. Indeed, in the figure below obtained from the SFW DEIS reveals that upwards of a dozen wind turbine foundations may be located within complex habitat, including both alternative WTGs 16A and 17A, and one WTG and the one OSS foundation are located within potentially complex habitat. In addition, a substantial portion of the inter-array cable that will connect the WTGs will be installed within complex and potentially complex habitat.

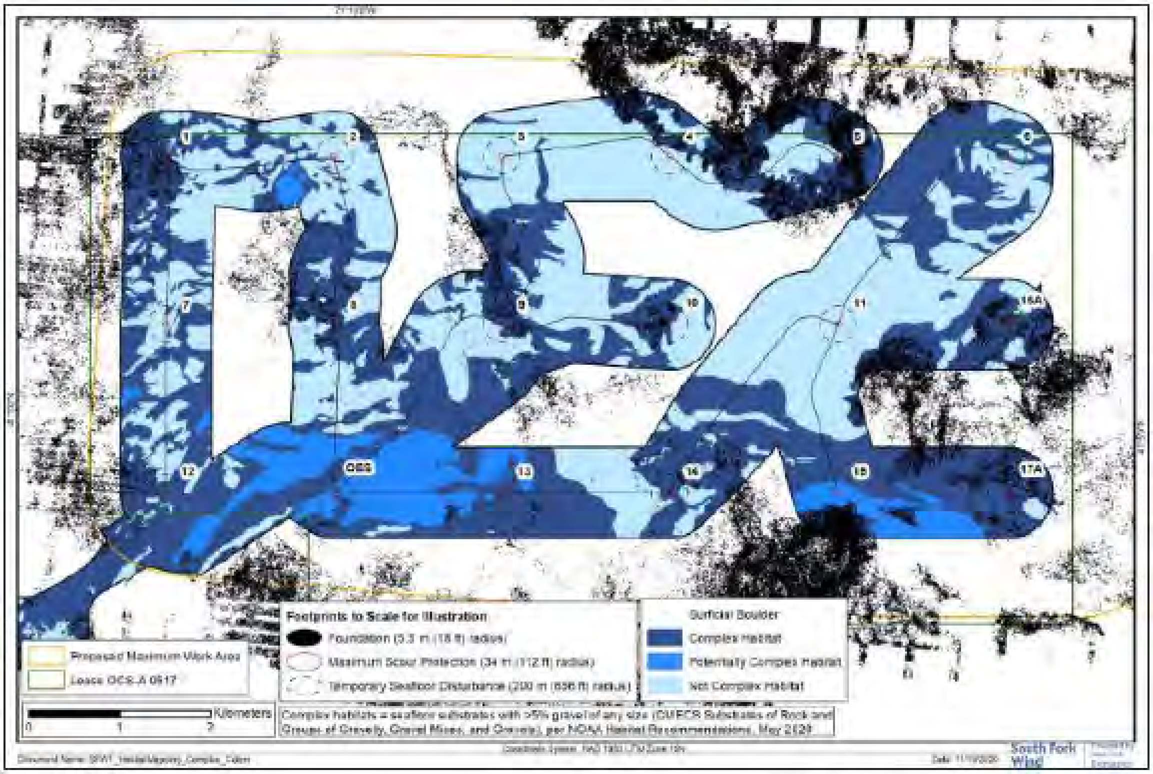

Figure 8. Layout of the proposed South Fork wind farm overlain on habitat within the lease area. The areas composed of black dots indicate the presence of surficial boulders. Source: Figure 3.4.2-1 of the BOEM SFW DEIS at 3-6.

<u>Recreational Fishing - Charter (For-Hire) and Private vessels - Activity</u>

The South Fork Wind lease OCS-A 0517 comprises an area of approximately 13,700 acres or approximately 21.4 square miles and is located directly on Cox Ledge an area of approximately 35 square miles. The SFW lease area is approximately 61% of the entirety of Cox Ledge. During late spring, party and charter boats are almost exclusively targeting cod fish, with most of the cod fishing occurring on Cox Ledge and south of Block Island (CRMC Ocean SAMP, Chapter 5, 2010). As noted above, Cox Ledge has been identified by NOAA as a known aggregation of cod fish and it is for this reason charter boats are targeting cod fish in this particular location. Further, a study of baseline recreational fishing effort for highly migratory species (e.g., tuna, sharks, etc.) in southern New England and the associated wind energy area reported that the highest amount of effort was exerted at Cox Ledge (Kneebone and Capizzano, 2020).

A pilot project involving Connecticut, New York and Rhode Island charter boat captains in collaboration with the Northeast Regional Planning Commission, SeaPlan, the Atlantic Coastal Cooperative Statistics Program, state and federal fisheries managers, and others developed a preliminary understanding of important areas for the For-hire charter fishing industry through a comprehensive mapping effort in 2016. The blue polygons shown in Figure 9 below identify fishing areas frequented by Rhode Island charter boat captains. In particular, one of the polygons overlying Cox Ledge is the exact location of the proposed SFW project. A preliminary draft March 2021 report from the Rhode Island Saltwater Anglers Association (RISAA) provides survey results for the 2019 and 2020 fishing seasons indicate that of 2389 boat fishing trips with a disclosed location 147 of those trips (6.15%) were specifically to Cox Ledge. See Appendix 5. The RISAA survey results show the importance of Cox Ledge as an important recreational fishing destination. Rhode Island Charter boat captains and other Rhode Island based private vessel recreational anglers indicate that Cox Ledge is the premier cod fishing destination within Rhode Island Sound, especially in the early spring season.

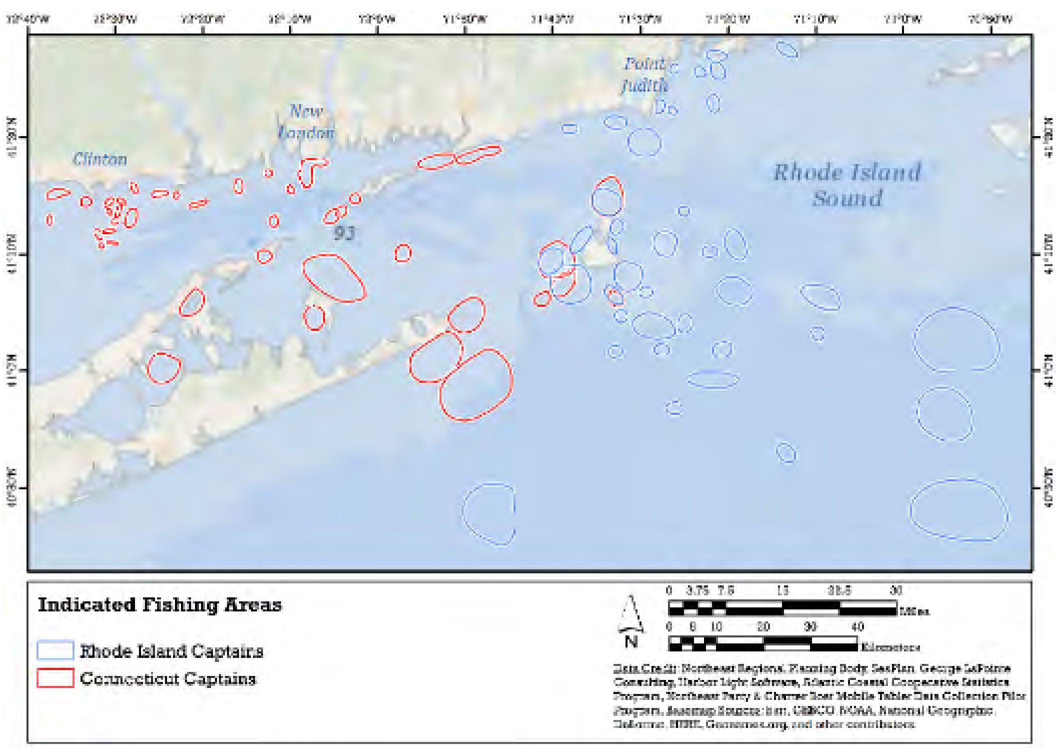

Figure 9. The blue polygon located directly below “Rhode Island Sound” in the graphic is approximately where the SFW project is proposed on Cox Ledge. Source: Figure 8 of the 2016 Party and Charter Vessel Mapping Study. https://www.openchannels.org/literature/15610

The SFW project area includes designated essential fish habitat for 40 different fish and invertebrate species, with the distribution of designated habitats varying by species and life stage. See BOEM 2021 at 65. Based on the preceding information it is clear that there is an abundance of multiple species fishery resources, including essential fish habitat for cod, located within the SFW lease area and along the export cable route to Long Island, NY that are important and significant to Rhode Island uses. The Rhode Island based commercial and recreational fishing interests depend upon these coastal resources within the South Fork Wind lease area, and the benefits they provide to the Rhode Island shoreside fishing community and the overall state economy.

3. How the state has a specific interest in the resource or use. Be specific in showing their connection to the coastal zone of the state (e.g., economic values, harvest amounts, vulnerabilities, seasonal information relevant to the proposed activity)

<u>Commercial Fishing Activity</u>

The largest proportion of the Rhode Island commercial fishing fleet is berthed in the Port of Galilee (Narragansett), the state's largest producer of commercial fish landings, which in 2016 resulted in $59 million (63%) of a statewide total of $93.9 million in commercial fishing landings revenues (NMFS 2017). In addition, the RI commercial fishing sector provided 1711 jobs in 2016 (Sproul, 2018). Based on work completed by Sproul (2018) he calculated the multiplier effect and determined that for every $1 of commercial fishing landings in RI generates $3.06 in economic impact to the state. Thus, using his economic multiplier the NMFS reported 2016 RI commercial landings resulted in over $287 million of economic impact for the state. In addition, a large number of For-Hire recreational charter vessels are also berthed at Galilee. For example, Kirkpatrick (2017) reported that of 109 For-Hire charter vessels with exposure to the RI-MA wind energy area (RI-MA WEA) 96 charter vessels or 88% were berthed in Narragansett. The For-Hire charter boat industry represents an important segment of Rhode Island's recreational fishing industry that supported 182 jobs with $20 million in gross sales in 2016 (Sproul, 2018). The total state economic impacts of Rhode Island recreational fishing expenditures (based on 2016 data) has been calculated by NOAA at $270,081,000 (NMFS, 2018) and accounts for a total of 4,381 jobs (Sproul 2018). This data suggests that the combined total economic impact of Rhode Island based commercial and recreational fishing activities results in over $557 million annually to the Rhode Island economy supporting nearly 6100 jobs.

As of October 2020 NOAA has established an online portal "Socioeconomic Impacts of Atlantic Offshore Wind Development" to aid in the assessment of commercial fisheries landings within specific offshore wind energy lease areas. See: https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development. NOAA (2020) reports the following select commercial gear type rankings with the twelve year 2008-2019 top landings total from South Fork for each specific gear type.

Table 1. Twelve Year Total Landings (Pounds) with Select Gear Types for South Fork Wind

Gear Type	**Landings (pounds)**
Bottom Trawl	1,011,000
Gillnet-Sink	684,000
Midwater Trawl	414,000
Dredge-Clam	175,000
Pot-Lobster	124,000
Dredge-Scallop	45,000
Pot-Other	34,000
Handline	4000
Total	**2,682,000**

The top three most valuable species harvested within the SFW project area during the 12-year reporting period of 2008-2019 are: Sea Scallop (44,000 pounds valued at $384,000); Monkfish (266,000 pounds valued at $362,000); and American Lobster (71,000 pounds valued at $324,000). See Table 2 below. Including the other top landed species within the South Fork lease area the total NOAA reported landings of 2,682,000 pounds during the 12-year period was valued at $2,351,000. Of particular note is that the South Fork lease is the only lease within the MA-RI WEA where Atlantic cod fish commercial landings are reported by NOAA. There were

32,000 pounds valued at $82,000 over the reporting period. NOAA also reports that Rhode Island commercial fishing vessels accounted for 58% of all state landings revenue from the South Fork lease area during the reporting period of the ten most impacted state ports (MA, NY and RI) by revenue. Accordingly, Rhode Island commercial fishing vessels are the dominant federally licensed vessels harvesting fisheries resources that are located within the South Fork lease area, and thus an important resource area to Rhode Island based coastal uses.

Table 2. Twelve year total landings and revenue for the most impacted species harvested within the South Fork Wind lease area. Source: (NOAA 2020)

Species	**Landings (pounds)**	**Revenue ($)**
Sea Scallops	44,000	384,000
Monkfish	266,000	362,000
American Lobster	71,000	323,000
Skates	703,000	205,000
Longfin Squid	101,000	117,000
Channeled Whelk	15,000	117,000
Summer Flounder	30,000	91,000
Cod	32,000	82,000
Silver hake	147,000	77,000
Total	**1,410,000**	**1,758,000**

The OCS-A 0517 developer entity South Fork Wind, a joint venture between Ørsted and Eversource (a Massachusetts based energy distributor), engaged the Woods Hole Oceanographic Institute (WHOI) to develop a fisheries mitigation framework for the SFW project, *Economic Impact of South Fork Wind on the Rhode Island Commercial Fisheries*, dated September 28, 2020 (Report). See Appendix 6. WHOI estimated landings revenues using NOAA data with a baseline 2008-2018 period of analysis for the SFW lease area and calculated an average annual value of $145,016 (2019$) attributable to Rhode Island commercial landings. Factoring the indirect and induced effects, WHOI calculated that the potentially affected commercial landings result in $255,000 to $700,000 in total (lump sum) present value economic impact to the Rhode Island economy. However, these values do not account for potential losses during operations (as explained below) and their claim of zero or minimal impacts are not supported by the data. In fact, WHOI acknowledges in their report that future commercial fishing landings are likely to vary "because there is uncertainty about the impact of wind farm construction and operation on fish stocks and landings." See Report at 4. WHOI assumes that there will be no fishing activity within 50% of the wind lease area (WLA) during 8 months of construction and decommissioning activities (the SFW COP indicates that the construction and decommissioning phases may be as long as 2 years each). In addition, WHOI's initial estimates did not include Rhode Island based For-Hire charter and recreational fishing economic impacts, which are substantial to the Rhode Island economy (see more discussion below). Following meetings between the CRMC, FAB and SFW adjustments were made to the WHOI estimates to address concerns expressed by the CRMC and FAB. In a filing titled *Update to "Economic Impact of South Fork Wind to Rhode Island Commercial Fisheries"* dated December 15, 2020, WHOI made adjustments for construction effects, including direct and indirect effects, by about $75,000; adjustments for downstream impacts of $21,800; and the addition of charter boat activity (assuming no net adverse impacts during the wind farm operations phase) of $221,335. See Appendix 7 .The net effect of the WHOI adjustments results in an increase of $318,135 in Rhode Island economic exposed value. Accordingly, the total (lump sum) present (2019$) value economic impact to the Rhode Island economy estimated by WHOI is $1,018,000.

The CRMC's Fishermen's Advisory Board (FAB) engaged URI environmental and natural resource economist Thomas Sproul to review NOAA data and the WHOI reports, and he determined that the average annual Rhode Island commercial fishing landings value from South Fork was $277,957 based on the NOAA data and adjusted for gillnet and scallop landings. In estimating the Rhode Island commercial fisheries landings exposure based on historic landings over the life of the SFW project, CRMC staff applied the methodology developed by Vineyard Wind and Dennis King of King and Associates, LLC that was filed with the Massachusetts Coastal Zone Management (MACZM) program in March 2020 as part of the MACZM federal consistency review for the Vineyard Wind 1 (800 MW) project. See:
https://static1.squarespace.com/static/5a2eae32be42d64ed467f9d1/t/5ee122f4c0502b68b9dc41cf

/1591812875587/MA+Fisheries+Compensatory+Mitigation+Plan+-+May+2020.pdf. Applying the Vineyard Wind methodology of an annual escalator of 2.5% and a shoreside impact factor (0.942) as agreed upon between WHOI and Dr. Sproul to the average annual RI commercial landings from the SFW lease area from both WHOI ($145,016) and the FAB ($277,957) results in $12,363,924 to $22,593,723 of economic impact exposure to the state of Rhode Island over the 30-year life of the SFW project. Including the average annual Rhode Island commercial landings revenues of $51,031 reported by WHOI along the proposed SFW export cable route (Beach Lane) increases the range of economic impact exposure to the state of Rhode Island by an additional $4,349,319. Therefore, the total combined estimated **commercial landings** economic impact exposure for Rhode Island based commercial fishing operations is between $16,713,243 and $26,943,042 over the life of the SFW project.

Recreational Fishing - Charter (For-Hire) and Private vessels - Activity

Overall the regional party and For-Hire charter recreational fishing revenue reported on Cox Ledge is consistently high across all time periods studied (2006 to 2014) and with significantly more individual anglers as compared to other southern New England habitat alternatives as shown in Table 71 of the Omnibus Essential Fish Habitat Amendment 2, Vol. 4 the (NEFMC and NMFS 2016). As indicated above, 6.15% of all boating angler trips reported in the 2021 RISAA survey results were specifically to Cox Ledge. Dr. Sproul using the RISAA survey results and additional research information specifically for recreational fishing demand and values calculated a revised annual exposure value for Rhode Island based recreational fishing at $450,744 (his previous estimate was $983,260) following discussions with WHOI and Industrial Economics staff. As presented in the December 15, 2020 update report, WHOI estimated charter boat revenues for the SFW project at $112,341 per year (2019$) with a 3% multiplier using the estimated percentages of recreational fishing exposure in the RI-MA WEA as presented in Kirkpatrick (2017). WHOI's estimate is only for charter boats and does not include Rhode Island based recreational fishing economic exposure.

CRMC applied the WHOI 3% annual growth multiplier for charter boats to the WHOI and FAB estimated SFW average annual charter boat revenues of $112,341 and $129,700, respectively. This results in 30-year values of $5,344,671 and $6,170,531 of Rhode Island based charter boat revenues. Applying the WHOI multiplier of 0.6 to calculate shoreside economic impacts results in a 30-year project life economic exposure value for Rhode Island **charter boat activity** at South Fork estimated at $8,551,474 and $9,872,850.

The estimated annual average **recreational fishing (non-charter)** values for SFW lease area were determined by the FAB to be $450,744, which result in 30-year project life economic exposure values of $18,007,162. After reviewing the RISAA data Industrial Economics on behalf of SFW estimated an annual average recreational value of $231,000. Thus, the combined economic exposure for both c**harter** and **recreational** for Rhode Island attributable over the 30-year lifetime from the SFW lease area is estimated at between $17,777,334 and $27,880,012.

In summary, the net combined total of **commercial**, **charter** and **recreational** fishing economic exposure value for Rhode Island attributable to the SFW lease area, including the SFEC, over the 30-year project lifetime is estimated at between **$34,490,577** and **$54,823,054**. Any assessments, however, of these exposure values for Rhode Island should be adjusted from 2019 dollars to 2023 dollars to account for the 30 year project life starting from the beginning of the SFW project construction, which is currently anticipated to begin in 2023. Importantly, the FAB anticipates a 50-80% loss for commercial, charter and recreational fishing activities during the operational phase of the SFW project. Accordingly, the range of potential losses to the Rhode Island economy over the 30-year project lifetime from these fishing activities based on the FAB estimates could be between **$25,236,868 and $40,378,988**. Based on the WHOI/IE economic estimates for SFW, the range of potential losses to the Rhode Island economy over the life of the SFW project using the FAB estimated 50-80% loss range could be between **$15,070,629** and **$24,113,006**.

Table 3. Estimated Rhode Island economic exposure attributable to the SFW project

Category	Data Source	Average Annual Value $	30-year Value $	Shoreside Multiplier	Total 30-Year Economic Exposure $
Commercial (SFWF)	WHOI	145,016	6,366,593	0.942	12,363,924
	FAB	277,957	11,634,255	0.942	22,593,723
Commercial (SFEC)	WHOI	51,031	2,239,608	0.942	4,349,319
Charter	WHOI	112,341	5,344,671	0.6	8,551,474
Charter	FAB	129,700	6,170,531	0.6	9,872,850

Recreational (non-charter)	IE	231,000	9,225,860	0	9,225,860
Recreational (non-charter)	FAB	450,744	18,007,162	0	18,007,162

Notes:
FAB: Fishermen's Advisory Board
WHOI: Woods Hole Oceanographic Institute – consultant to Ørsted
IE: Industrial Economics - consultant to Ørsted
Commercial 30-year project value obtained using Vineyard Wind 2.5% annual growth multiplier.
Charter boat 30-year project value obtained using WHOI 3% annual growth multiplier.
Recreational (non-charter) 30-year project value obtained using annual CPI 1.9% multiplier.
All amounts are in 2019 dollars and would need to be adjusted for the planned SFW project start in 2023. Using a 1.9% CPI increase, the adjustment is equivalent to increasing all amounts in the table by 7.8%

4. Where the proposed activity overlaps with these resources, uses and values

As shown in Figure 10 below, the proposed South Fork wind farm lease consists of 13,700 acres (21.4 square miles) and is located on Cox Ledge, which is approximately 35 square miles. Accordingly, the SFW lease covers approximately 61% of Cox Ledge. The BOEM SFW DEIS indicates that the fifteen (15) turbines foundations, associated scour protection, inter-array cables and any secondary cable protection within the lease area will result in approximately 34.6 acres of permanently altered bottom habitat. The DEIS also indicates that the WTG foundations and associated scour protection in the form of boulders and concrete mats would displace or alter approximately 278 acres of seabed long-term (life of the project). Approximately 12.5 acres of scour protection would be required where boulder substrates prevent burial of the inter-array cable. In addition, an estimated 15.4 acres of scour protection would be required for portions of the offshore SFEC where cable burial is not possible. And, approximately 255 acres of boulder relocation may occur to prepare the seabed for the cable. DEIS at H-75. Importantly EFH for Atlantic cod fish is present in both the SFWF and the SFEC that supports all life stages of Atlantic cod fish (i.e., eggs, larvae, juvenile and adults). See BOEM 2021 at 66. Thus, the SFW project could result in long-term impacts to over 300 acres, and much of this acreage may be EFH for Atlantic cod, which could be detrimental to this historic and important commercial and recreational fish species.

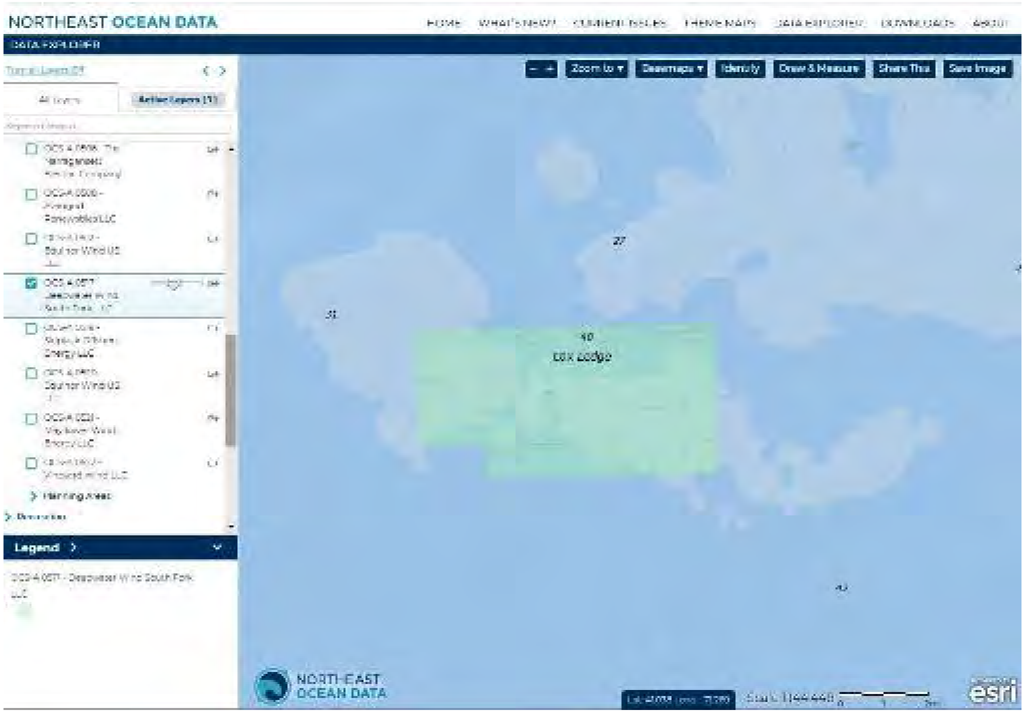

Figure 10. An overlay of the SFW lease OCS-A 0517 shown as the shaded light green area in the center of the image with Cox Ledge, the underlying gray shaded area. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

Based upon the preceding figures above and analysis of publicly available NOAA data, and the supporting data submitted to the CRMC by both the SFW developer and the FAB, the CRMC staff has determined that substantial commercial, charter and recreational fishing activity by Rhode Island based vessels occurs within the SFW lease area and along the proposed SFW export cable route to Long Island, NY.

5. Impacts to the resources or uses from the proposed activity

This section describes anticipated impacts to Rhode Island coastal resources or uses. Section 6 below describes whether some of these impacts result in reasonably foreseeable effects to Rhode Island coastal resources or uses. The proposed construction, operation and decommissioning activities for the South Fork wind farm and export cable to Long Island, NY could have numerous impacts to the aforementioned Rhode Island coastal resources and uses. It is expected that the construction phase of the SFW project, including installation of the export cable to Long Island, NY will be approximately 2-years. The operational life of the project is 25-years and BOEM is allowing up to 2-years to decommission the project after the 25-year lease ends. Accordingly, potential impacts to Rhode Island based coastal uses and resources may occur over approximately a 30-year period. See BOEM SFW DEIS.

Impacts on fishing access and activity: The potential impact on fisheries from offshore energy development and operation has been a particular concern in the waters off southern New England and along the Atlantic coast. This issue has been recognized by BOEM and has been the focus of recent study initiatives funded by the agency (Kirkpatrick *et al*. 2017; Petruny-Parker *et al*. 2015; Farrell *et al*. 2014; Minerals Management Service 2009).[6] BOEM has further recognized that conflicts can arise between commercial fishing activities and renewable energy projects located in the OCS. BOEM's 2007 OCS Alternative Energy Final Programmatic EIS states "[c]ommercial fishing methods with the highest potential for conflicts with OCS operations are bottom trawling (potential for snagging on cables, pipelines, and debris) and surface longlining (potential for space-use conflicts with OCS construction and service vessels). Both fishing methods could have space-use conflict interactions if fixed OCS facilities were to be located in previously fished areas." See Section 4.2.23.1 of FPEIS at 4-123.

The SFW COP and BOEM's SFW DEIS describe temporary and long-term (life of the project) impacts to the benthic habitat within the SFW lease area and export cable route to Long Island, NY. Temporary disturbance includes approximately 255 acres of boulder relocation for installation of the inter-array cable. See SFW COP at 3-13. Long-term impacts within the lease area to the benthic habitat include 14.6 acres for monopile foundations, 7.5 acres for cable protection at approach to foundations and 10.2 acres for secondary cable protection of the inter-array cables. Approximately 21.4 miles of inter-array cables will be installed for the SFW project. *Id* at 3-7 and 3-13. Table 3.4.2-2 of the DEIS shows long-term disturbance of 126.8 acres in total that would impact benthic habitat on the SFW lease. See BOEM DEIS at 3-16. The wind turbine foundations and associated scour protection, foundation cable protection, secondary cable protection and any potentially exposed cable pose hazards for commercial and recreational

[6] Dating back to 2009, with regard to Cape Wind: "The draft environmental impact statement and public hearings for the Cape Wind Energy project revealed that commercial fishing is a critical area that must be investigated thoroughly prior to any type of siting. Currently many of the shallow shoals that provide fish resources are also areas where wind developers are interested in placing wind parks. These areas also have potential to be recreational areas where boaters and recreational fisherman frequent. Therefore studies are needed that assess the impact from OCS alternative energy activities with respect to commercial fishing and recreation. This information will undoubtedly be needed for planning purposes and decision making."

fishing activities and impact their operations. The proposed wind turbine foundations and associated structures present snag obstacles for anchors, fixed gear (gill nets and lobster pots) and mobile gear (trawl nets and dredges). Moreover, Rhode Island based commercial fishing mobile bottom gear is used in the vicinity of the project. These fishing techniques might penetrate the seabed, contact unburied cables that are otherwise protected, or contact cables that have become unburied over time, potentially resulting in damage to the fishing gear, a hazard to the vessel, and/or damage to the SFW submarine power cables. Commercial bottom trawling and dredging fishing activities pose a risk, and are expected in the vicinity of the SFW project area and export cable route. See SFW COP Appendix X at 73 (updated January 7, 2021).

The CRMC anticipates that the construction and the placement of WTG monopile foundations, inter-array cables and the export cable for the SFW project will have both short- and long-term impacts on commercial, charter and recreational fisheries activities. The construction and installation activity at South Fork will temporarily **displace** fishermen from their traditional operating areas as a result of construction safety exclusion zones surrounding turbine foundations and the inter-array cable. Displacement of Rhode Island based commercial and charter vessels may also occur through the general increase in wind farm construction and supply vessel traffic during the SFW construction and installation phase. As a matter of fact, the temporary displacement of commercial fishing activity did indeed occur during the construction and installation phase of the Block Island wind farm in 2015. Rhode Island-based commercial fishermen have persistently indicated that space-use conflicts will arise as WTGs are installed within offshore waters, and they indicate that existing commercial fishing mobile and fixed-gear operations will be constrained by the location and spacing of wind turbine foundations based on currently planned and reasonably foreseeable OCS renewable energy development plans. Thus, we anticipate similar displacement during the SFW project construction and installation activities.

The BOEM DEIS for the SFW project issued in January 2021 describes a number of potential <u>unavoidable</u> impacts to commercial fisheries and for-hire recreational fishing interests resulting from the project as specified within Section 4.1.1 of the DEIS. These unavoidable impacts include:

1. A disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore project elements;

2. A disruption to harvesting activities during operations of offshore wind facilities;
3. Changes in vessel transit and fishing operation patterns; and
4. Changes in risk of gear entanglement or target species.

See BOEM DEIS at 4-1.

The offshore wind developers holding leases on the OCS in southern New England (Equinor, Mayflower Wind, Ørsted and Vineyard Wind) submitted a collaborative proposal for a 1 X 1 nautical mile (NM) uniform grid layout and spacing of wind turbine foundations to the U.S. Coast Guard on November 1, 2019 in response to the commercial fishing industries concerns about earlier wind farm proposed layouts that were detrimental to existing fishing activity. To be clear, the uniform 1 X 1 NM grid is a compromise for both the wind industry and for the commercial fishing industry. The wind industry would prefer to install turbines in the most efficient layout possible to maximize energy-generating capacity. On the other hand, even with the 1 X 1 NM grid layout, commercial fishermen will have to modify their fishing gear and methods to fish within a turbine array where at present there are no offshore structures to impeded fishing activity. For the fixed gear fisheries like gillnet and lobster pots, each of these fisheries will have to modify the length of gillnet and pot trawl gear (an added expense) to fit between turbines spaced 1 NM apart.

Presently in the offshore waters of Rhode Island Sound fixed gear is set along east-west lines corresponding to Loran C coordinate lines 0's and 5's, which are spaced approximately 0.6 NM apart. This has been historic practice of the commercial fishing industry for more than two decades to minimize conflict between the mobile gear (draggers) and fixed gear operations. Under the uniform 1 X 1 NM grid turbine layout, all fixed gear (gillnets and lobster pot trawls) will have to be set in between the turbines on the east-west rows so that mobile gear operators will be able to tow nets or dredges within the 1 NM wide lanes between turbine foundation rows to avoid entanglement with fixed gear. For every 10 rows of turbine foundations (spaced 1 NM apart) the fixed gear fisheries will be limited to setting 10 rows of fixed gear, whereas absent the turbine foundations fishermen typically would be able to set 14 or more strings of gear spaced approximately 0.6 NM between the rows of gear. Thus, fixed gear fishermen will likely lose forty percent (40%) or more of their fixed gear sets within any given area of wind turbine foundations, including the South Fork lease area. Accordingly, fixed gear fishermen will lose landings revenues due to a diminished number of fixed gear sets in the presence of turbine foundations in a 1 X 1 NM uniform grid pattern.

The CRMC's Fisherman's Advisory Board has advised the CRMC and the SFW developer that it expects a 100 % loss during the construction (2 years) and decommission phases (up to 2 years) and a 50-80% loss of commercial fishing, For-Hire charter and recreational fishing revenues during the operational phase of the project. In particular they cite a loss of fixed gear as explained above, difficulty setting up gear between the turbine foundations and the inability to fish during peak season due to poor visibility from frequent summer fog conditions (safety issue) with the uncertainty as to whether fixed gear can be retrieved. The FAB also anticipates commercial losses for mobile gear due to navigation safety issues and increased conflicts with fixed gear. Mobile gear fishermen have also indicated they expect to encounter additional "hangs" on the bottom due to proposed boulder movement as described within the SFW COP, inter-array cables becoming unburied, among other issues associated with offshore wind development. For commercial scallop harvesters (which is the highest value species landed within the SFW lease) especially, there is the added concern that the so-called 'reef effect' described by the developer as a positive outcome from foundation and scour protection placement will displace scallops with low value blue mussels. The FAB has also indicated that charter and recreational fishermen anticipate losses due to the 'reef effect' displacing desirable sport fishing species, in particular Atlantic cod, and they anticipate losses due to the impracticality of drift fishing methods inside a wind turbine array. The CRMC has determined that these issues raised by the FAB are reasonably foreseeable concerns that are likely to occur with construction, operation and decommissioning of the SFW project as described within the COP. Accordingly, the range of potential lost fishing opportunities and revenue losses by Rhode Island based coastal users are reasonably foreseen despite the proposed 1 X 1 nautical mile uniform grid layout and spacing of the wind turbine foundations.

Environmental impacts on fisheries resources: Offshore construction and the placement of offshore structures may impact fish stocks and the habitats upon which they rely. Offshore construction activities, including pile-driving, the disturbance or removal of bottom sediments, and the relocation of boulders for inter-array cable placement can have significant impacts on marine life and habitats. Habitat changes associated with offshore construction may include loss of natural habitats; the addition of high-relief habitats around offshore structures; redistribution or displacement of habitats important for fish spawning, nursery, or foraging activities; the creation of micro habitats from shading effects; and the introduction of new electromagnetic fields; these are all likely to affect fish and invertebrate species at all life stages in a variety of ways (Petruny-Parker et al. 2015). Habitat disturbance may include sediment disturbance and settling, resultant increased turbidity of the waters in the construction area, and the installation of new infrastructure (MMS 2007). Disturbances may also include changes in circulation patterns at the surface and the seafloor that could affect patterns of larval drift and settlement, upwelling events and productivity cycles that influence fish production, and sedimentation processes that affect trophic interactions and species assemblages (Petruny-Parker et al. 2015).

Construction development phases are expected to have the greatest impacts on fishery resources because of pile driving and cable installation activities (Bailey et al. 2014). For example, pile-driving and increased vessel traffic associated with these activities can result in significant underwater noise. Potential impacts of sound on marine fish species include pathological, physiological, and behavioral effects (BOEM 2014). Underwater noise has the potential to affect fish species by affecting animal feeding, reproduction, vocalization, and other behaviors necessary for survival, or causing injury or death (Thompsen et al. 2006). It could also result in increased larval mortality for fish and invertebrate species or could affect migration patterns, reproductive behaviors, or species distributions (Petruny-Parker et al. 2015). BOEM's 2014 Environmental Assessment (EA) of the Massachusetts WEA reported that intense impulsive signals such as pile driving can cause fish kills, and that less intense signals can cause behavioral changes. Studies have shown that squid are expected to avoid the WEAs during all development phases (Degraer et al. 2013 and NEFMC 2014). There are concerns about the potential impact of noise and vibration on squid, which rely on statocysts, which act like accelerometers for balance and motion detection (Mooney et al. 2010). Another study has illustrated that Atlantic cod, another targeted species within the South Fork lease area, and part of the Multispecies FMP, alter their behavior in response to pile driving sounds (Mueller-Blenkle et al. 2010). The recently issued BOEM *Essential Fish Habitat Assessment with NOAA Trust Resources* states that construction of the SFW project "involves activities that would generate underwater noise <u>exceeding established thresholds for mortality</u> and permanent or temporary injury."(Emphasis added) See BOEM 2021 at 103.

Appendix J1 of the SFW COP addresses underwater construction noise associated with monopile foundation installation and potential effects on marine mammals, turtles, fish, and eggs and larvae. The SFW COP anticipates the installation of 11 m diameter piles driven to approximately 164 feet (50 m) into the seabed for fifteen turbine foundation locations. In addition, the proposed offshore substation will be installed within the SFW lease area on either a jacketed foundation or a monopile foundation. Pile driving activities will occur between May 1 and December 31 in an effort to minimize impacts to Right whale migration. The COP indicates that the foundations will be installed over a period of 24 to 48 hours per foundation, the duration of pile driving will be between 2 to 4 hours per foundation, and that foundation installation will occur over a period of 4 months. See SFW COP at 3-27. At issue is the behavioral effects threshold for finfish and potential lethality from pile driving activities generating a frequency-weighted cumulative sound exposure level (L_E) and the resulting adverse impacts to marine organisms. Of particular concern are fish with swim bladders used for hearing and the eggs and larvae of targeted species found at the South Fork project site, especially Atlantic cod which tend to aggregate for spawning activities at Cox Ledge during late fall to early spring (NEFMC, 2016; Kovach *et al.*, 2010).

As indicated above it is expected that pile driving will occur over a period of 2-4 hours. It may be necessary, however, to exceed that estimate under difficult pile driving circumstances based on bottom conditions. According to Table 4.1 Extent of Underwater Noise Effects from Impact Pile Driving during SFWF Construction by Exposure Category and EFH Species Hearing Group (BOEM 2021) there is an instantaneous lethal injury to eggs and larvae and fish with swim bladder involved in hearing (Atlantic cod) around each foundation. Accordingly, a total area of 163 acres or 1.2% of the SFW lease area will have instantaneous lethal results from pile driving noise that exceeds the mortality effect threshold for eggs and larvae and fish with swim bladder involved in hearing. In addition, should these same fish, eggs and larvae remain in the same exposure area over the entire 2-4 hour pile driving period for each foundation, then the cumulative exposure area increases to 7455 acres or 54% of the SFW lease area. See BOEM 2021 at 106. Given the geological complexity of the glacial moraine within the SFW lease area, it would seem prudent to consider that many of the pile foundations are likely to be difficult installations, which would increase the cumulative potential lethal effects of pile driving. Thus, we consider 7455 acres of cumulative injury impacts to be substantial. This scenario could potentially have serious consequences on the survivability of multiple fish species eggs and larvae during spring when pile driving is scheduled to commence as early as May 1 and could result in a significant impact to a year class of important species relied upon by Rhode Island based commercial and recreational fishing interests. In addition, WHOI estimates that commercial and recreational targeted fish species will be affected by pile driving noise within a 5 kilometer (km) buffer around the SFW lease area for the duration of pile driving. See SFW mitigation update Appendix 7. The SFW DEIS, however, indicates that the behavioral effects threshold for fish from the expected pile driving activity will be 41,818 feet (12.75 km), which is significantly greater than estimated by WHOI. Thus, the effects to fish behavior will extend almost 13 km beyond the lease area. Given that the pile driving is limited to the period of May 1 to December 31 and the SFW COP indicates pile driving will occur over a period of 4 months and WHOI estimates that fish will return to an area impacted by pile driving noise after 2 months, it is expected that commercial and recreational fishing activity will be adversely impacted over the spring, summer and fall fishing seasons.

The SFW COP states “The acreage of benthic habitat that is expected to be affected by construction (Section 4.1) is small relative to the total area of available surrounding habitat and EFH.” See COP at 4-149. Notwithstanding this statement, CRMC staff believe that the evidence demonstrates biodiversity and species richness unique to Cox Ledge and the SFW lease area. Additionally, NOAA has identified the importance of Cox Ledge as essential fish habitat for all life stages of Atlantic Cod. Thus, the ecological importance of this particular area is far greater than the COP would indicate. Additionally, in areas where foundations and associated scour protection are installed, direct impacts to benthic species through crushing and displacement of all life stages of species, including eggs and larvae are anticipated. See SFW COP at 4-151. Given this information and the large area susceptible to lethal effects as described above during pile driving activity, the construction activity for the SFW project has reasonably foreseeable significant impacts on important coastal resources and marine habitat located on Cox Ledge.

Once the construction and installation phase is completed, offshore structures may still have a variety of impacts on fisheries resources. The introduction of new structures in the water column may affect water flow around the structures, which may result in scour holes in the sea bed. Scouring and sediment transport is a particular concern at offshore wind sites (Nielsen 2014; Vanhellemont and Ruddick 2014). The new structures will likely become colonized by non-mobile organisms, as observed at the five Block Island wind farm turbine foundations, and may ultimately attract nuisance species or alter fish feeding and aggregation behaviors (Wilhelmsson et al. 2006, Gill and Kimber 2005). The likely outcome associated with the SFW project is the conversion of the existing EFH habitat mainly to Blue mussel and Black Sea Bass immediately surrounding the monopile foundations, based on the evolution of the ecosystem as observed at the Block Island wind farm. Importantly, Black Sea Bass are voracious predators of juvenile fish and lobsters and by introducing favorable habitat with the installation of vertical structure (foundations) it increases the likelihood of increased predation on juvenile Atlantic cod and lobsters on the SFW lease area. In expanding their range Black Sea Bass are displacing traditional species, and if their numbers increase due to foundation installation, then the transformation of the SFW area EFH will be accelerated. Additionally, the introduction of invasive species is always a potential issue when introducing new structures into the environment. Offshore structures such as wind turbines may generate some operational noise that, while less than construction noise, may affect some fish species (Gill 2005).

In summary, the construction, operation and decommissioning of the SFW project has reasonably foreseeable significant adverse impacts to the essential fish habitat of Cox Ledge.

Environmental impacts of submarine cables on fisheries resources: The installation of submarine cables will result in benthic habitat disturbance through the process of relocating boulders, plowing trenches for the cables and then burying them with new sediment; subsequent repairs and modification of these cables would create additional habitat disturbance. In fact, BOEM indicates 179.3 acres of long-term disturbance to benthic habitat along the export cable route. See BOEM SFW DEIS at 3-16. These disturbances, which include sediment disturbance, turbidity, construction-related underwater noise, and conversion to new habitat types, are most problematic for sessile benthic organisms (Johnson *et al*. 2008). Submarine electrical cables associated with offshore developments may also emit electromagnetic fields (EMF), which may have some effects on some fish species, especially sharks, rays, and bony fishes (Bailey *et al*. 2014; Gill *et al*. 2005). EMF may affect some fishes' ability to navigate, which could in turn affect fish feeding, breeding, migration, or other behaviors necessary for survival (Bailey *et al*. 2014; Gill *et al.* 2005, DONG Energy and Vattenfall 2006).

Impacts on navigation and ports: Based on current state renewable energy procurement contracts between CT, MA, NY and RI offshore wind energy companies are expected to begin construction of more than 3200 MW of offshore wind energy (approximately 250 WTGs at current technology limitations) within the next five or more years. Thus, it is anticipated that significant navigational impacts may occur by special purpose construction vessels, crew transport vessels, WTG component vessels, and other wind farm support vessels navigating between proposed OCS wind farms, state waters, and nearby ports. The level of offshore renewable energy construction activity that will occur in Rhode Island Sound is unprecedented for the Federal OCS, and at present the region's port side infrastructure is not sufficient to accommodate the expected level of wind energy needs for laydown areas, component fabrication, equipment storage, and shoreside dockage for special purpose vessels. Indeed, BOEM cautions that where there is a need for shoreside facility improvements "consideration should also be given to enhancing facilities not directly connected to the operation of offshore renewable energy development – especially if the renewable energy industry pushes other ocean users out of an existing port." See OCS Study BOEM 2012-083 at 201.

Based on CRMC's review of the Vineyard Wind and South Fork COP's it is anticipated that wind energy companies will likely use RI port facilities for material lay-down areas, fabrication, equipment storage, crew transportation and construction vessels. Given the limited space and current high usage of Rhode Island port facilities, the use of these facilities by the offshore wind energy companies will likely impact RI coastal uses by disrupting and competing for existing port uses and dockage. Additionally, the expected significant offshore wind industry navigation activity from construction, support and crew vessels will likely impact Rhode Island coastal uses by disrupting commercial and recreational boating traffic, scheduled sailing events and other navigational uses including ferry service in Rhode Island. Indeed, Rhode Island based commercial fishermen have complained for several years now that offshore wind energy developer contracted survey vessel activity has resulted in lost or damaged commercial fishing gear, namely fixed gear gillnets and lobster pots. With an increase in construction activity associated with the South Fork Wind project and other reasonably foreseeable wind energy projects it is anticipated that more frequent occurrences of damaged or lost commercial fishing gear will result from survey, construction and other wind energy project vessels activity.

Impacts on recreational boating and navigation: Newport is historically one of the United States largest sailing and yachting centers. The enthusiasm continues with events such as the 2015 Volvo Ocean Race which ended leg 8 and began leg 9 from Newport with a few weeks layover to promote the race and the health of the oceans drawing significant tourism from all over the US. Rhode Island was the only US port to host a stop for this race. Spectators for this event included families who traveled to Newport from locations in the US as far away as Virginia, Florida, Texas and California. The 2015 Volvo Ocean race generated an estimated $47.7 million to the Rhode Island economy (https://www.theoceanrace.com/en/news/12395_The-Ocean-Race-is-returning-to-Newport.html) and is scheduled to return to Newport in 2022. The promotional village that travelled in advance of the racers arrival included global participants and companies. In August 2017 the majestic J-Class fleet held it's championships out of Newport drawing spectators from all over the world. The newest J-Class yacht SVEA has a mast height of 53.75 m compared to the 26 – 32 m air gap for the SFW project. The sail plan for these yachts could be impacted by the rotor blades either by collision or by wake impacts. On May 7, 2018, due to the Rhode Island Sound traffic separation scheme (TSS) Exclusion Zone navigational restrictions, the Volvo Ocean Race sailed through the proposed SFW project area on its approach to Newport. Departure from Newport on May 20-21, 2018 saw the fleet avoid the Rhode Island Sound TSS Exclusion Zone and then proceed southeast through the northeastern edges of the MA WEA to avoid the Nantucket TSS Exclusion Zone and the Nantucket Shoals exclusion zone.

By extracting energy from the wind, turbines create a pulsing wake with a velocity deficit. At a minimum, these ocean racers will take precautions to avoid the wake generated by offshore wind turbines. The South Fork Wind Farm will have a small impact on such races due to its relatively small size of approximately 21 square miles. However, building out the remaining WEA leases comprising 1400 square miles will have a significant impact on these distance races. Following the Volvo Ocean Race example, the racers will be funneled into a narrow corridor to the western side of the Rhode Island Sound TSS exclusion zone which may cause a significant number of tacks after a long leg of an ocean race as the boats come into port. Leaving port will expose the high tech boats to the wakes of multiple wind farms over approximately 84 miles (depending on the actual course selection). A maximum impact may be that these events are no longer held in Newport detracting from the indirect shore side economic benefits. For example, consider the impact from only one of these events on the Rhode Island economy. The Volvo Ocean Race in 2015, with the only stop in North America at Newport, saw participation of approximately 130,000 people, more than half from outside of RI, with an economic impact of over $47 Million for this 13 day event (Raimondo 2015). Of the $47.7 million spent in 2018, $9 million was in restaurants and $7.8 million in lodging with 131,000 visitors at Fort Adams, 5,920 along the coast and 10,440 on boats totaling 147,360 visitors (Flynn 2021). The total economic impact of the 2018 race was estimated at $30 million due to prolonged adverse weather. Newport has been chosen as the only North American stop for the 2022 Ocean Race and the financial exposure of the RI non-profit Sail Newport is over $1 million (Flynn 2021). The 2022 Ocean Race will "Bring global attention to Newport and Rhode Island" and "Generate tens of millions of dollars in spending and economic impact" (Raimondo 2021). The proposed project alone may only provide an additional offshore challenge to race strategy to navigate in the steady wind and should be able to be avoided by these fleets.

6. The causal connection to the proposed activity, including how any impacts from the activity results in reasonably foreseeable effects on the state's coastal uses or resources

The Rhode Island based commercial fishing industry has made clear throughout the CRMC's review of the South Fork Wind project that the proposed 15 wind turbine locations (and one offshore substation foundation) within OCS-A 0517 will impact Rhode Island-based commercial fishing operations through the disruption of well-established historic mobile and fixed gear activity. The reasonably foreseeable coastal effect is that RI-based mobile commercial fishing gear operations will need to avoid turbine foundations or risk snagging trawl nets and scallop dredges and causing damage to equipment and costly repairs. In addition, secondary cable protection (concrete matting, fronded mattresses, rock bags, or rock placement) of the inter-array and export cables, when cable burial depth cannot be achieved, is also a significant issue with RI-based mobile gear operations. With the potential for up to 10 percent of the inter-array cable not achieving design burial depth, there could be up to 2.1 linear miles of additional secondary cable protection. In addition, the COP indicates that up to 5% of the SFEC will require secondary cable protection, which amounts to an additional commercial fishing gear snag potential of 2.9 linear miles. See COP at 3-13 and 3-37. The reasonably foreseeable effect is that the risk of commercial fishing gear snags increases the potential for gear loss, costly repairs and lost fishing time, along with a corresponding decrease in Rhode Island based fishing revenues.

Absent any data or studies to the contrary showing no impact, there are reasonably foreseeable adverse impacts to fish stocks from the turbine construction activity, especially with the acoustics from pile driving. Weilgart (2018) has shown that there are impacts to both juvenile and adult fish, including squid, resulting from various levels of anthropogenic generated underwater noise. Moreover, BOEM (2021) indicates that should these same fish, eggs and larvae remain in the same noise exposure area over the entire 2-4 hour pile driving period for each foundation, then the cumulative exposure area increases to 7455 acres or 54% of the entire SFW lease area. See BOEM 2021 at 35 and 106. In addition, to project construction noise, crushing, burial, and entrainment effects from construction will generate short-term effects on EFH. *Id* at 103. The reasonably foreseeable coastal effect is that such pile driving activity will likely diminish the coastal resources that RI-based commercial fishermen rely upon, thereby decreasing the economic viability of the RI-based commercial fishing industry.

Based on testimony from RI commercial fishermen the currently proposed 1 x 1 NM uniform wind turbine arrays will still disrupt established commercial fishing navigation and operation patterns as described in Section 5 above. The likely use of RI ports by Ørsted for material lay-down areas, fabrication, equipment storage, crew transportation and construction vessels will have a reasonably foreseeable effect on RI coastal uses by disrupting commercial and recreational boating, scheduled events and other navigational uses including ferry service in Rhode Island and southern New England waters. Fixed gear fishermen have reported increased gear damage and loss every time marine transportation has increased to or from RI port facilities. In particular, geophysical survey vessels working on behalf of Ørsted in the South Fork, Revolution and Sunrise project areas has resulted in fixed gear losses and damaged gear, as well as lost fishing time and income for Rhode Island based fishermen. Commercial fishing fixed gear (e.g., lobster traps and gill nets) losses increased apparently as a result of an increase of survey vessel activity in 2019 towing an array of geophysical sensor equipment upwards of 650 feet behind the vessel. See Figure 11.

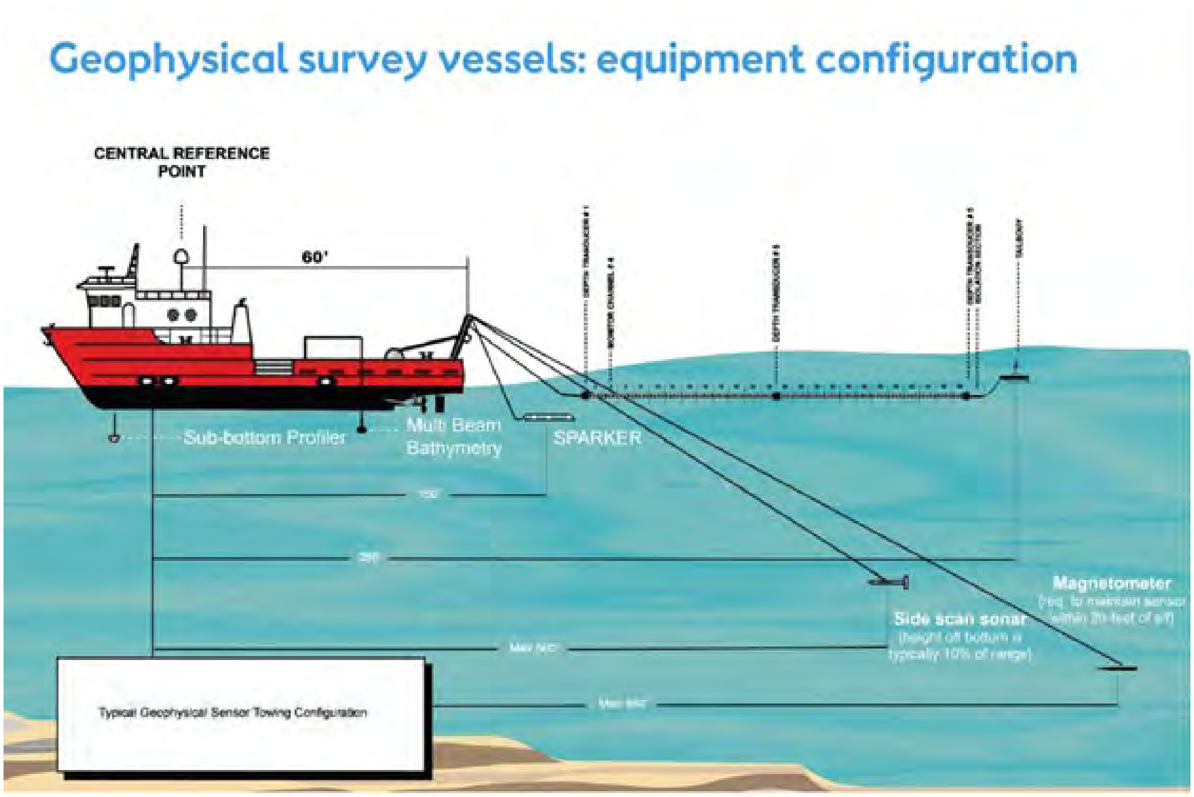

Figure 11: Typical geophysical survey vessel sensor towing configuration. Graphic courtesy of Ørsted.

Offshore wind projects cannot happen without adequate landside and port infrastructure. With more than 3200 MW of wind energy projects presently proposed within southern New England offshore waters, it is likely that Rhode Island ports will be heavily relied upon due to proximity to the project areas during construction of presently contracted offshore wind farms. This reliance will place a heavy burden on existing RI ports with competition for pier docking space and adjacent lay down area sufficient for wind farm component construction and assembly activities. The wind energy construction vessel traffic will also potentially jeopardize ongoing traditional RI coastal uses by affecting scheduled RI sailing events, RI ferry services, recreational boating traffic patterns, and commercial shipping transit into and out of Narragansett Bay. The reliance on Rhode Island ports by the offshore wind energy industry will have reasonably foreseeable coastal effects on Rhode Island coastal uses.

While construction-related exclusion zones may be temporary, the loss of one or two seasons has the potential to permanently shut down some of Rhode Island's commercial fishing businesses. (Note: the CRMC Ocean SAMP at §11.10.1(F) specifies that long-term impacts are defined as those that affect more than one or two seasons.) Even if exclusion zones around offshore structures are not formally designated, fishermen may find it dangerous or impractical to operate around the offshore structures, in cases of poor weather, in reduced visibility or when operating fishing equipment. In particular, the presence of offshore structures and related anti-scour devices, submarine cables, and other equipment may prohibit mobile gear fishermen, especially draggers and scallopers, from safely operating and deploying their gear around these structures (National Academies of Sciences, Engineering, and Medicine 2017; Mackinson et al. 2006). Such structures may also deter fixed gear fishermen from operating in the area because of concerns about potential collision with the structures, insurance coverage, or problems operating their fishing, navigation, and radar equipment (Mackinson et al. 2006).

The reasonably foreseeable effect of even the temporary displacement of a small number of Rhode Island based fishing vessels due to the South Fork project structures may result in cascading effects throughout Rhode Island's entire commercial fishery, as those displaced vessels will move elsewhere to fish, potentially increasing localized fishing effort and more likely creating gear conflicts in areas already fished by other fishing operations. Displacement occurred on a temporary basis during the construction of the Block Island wind farm (BIWF) as observed by the CRMC, but did not result in permanent displacement. The construction of the South Fork project will temporarily displace and could permanently displace some mobile and fixed gear fishermen who currently operate in the area for multiple species. As such, the reasonably foreseeable coastal effect is that the construction and installation of new offshore structures on the South Fork lease has the potential to significantly disrupt RI-based commercial fishing access and operations, charter boat operations and some recreational fishing effort. The result could lead to a reduction in total Rhode Island fish harvested and fishing related revenues for the state. There is a potential for significant commercial and recreational fishing losses to the Rhode Island economy over the 30-year life of the SFW project due to construction, operation and decommissioning phases.

As specified in Table 4.1.1-1 of BOEM's DEIS, the potential <u>unavoidable adverse impacts</u> from the SFW project to commercial fisheries and for-hire recreational fishing would be: (1) disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore project elements; (2) disruption to harvesting activities during operations of offshore wind facility; (3) changes in vessel transit and fishing operation patterns; and (4) changes in risk of gear entanglement or target species. See BOEM SFW DEIS at 4-1.

7. Why any proposed mitigation may be inadequate

When the 15 turbine SFW project was filed with the CRMC in 2018, the project was part of the larger OCS-A 0486 lease (Deepwater Wind lease). However, 15 months after BOEM initiated the DEIS review and CRMC began its federal consistency review, Ørsted submitted a request to BOEM on January 16, 2020 to assign a portion of Lease OCS-A 0486 (97,498 acres) to a different entity, DWSF. The lease assignment was approved by BOEM on March 23, 2020, and segregated the area assigned from Lease OCS-A 0486 and created a new, much smaller lease OCS-A 0517 (13,700 acres) corresponding to the defined geographic area of the SFW project identified in the COP. In so doing, however, the newly assigned lease area was essentially the same boundary as the SFW project area, and resulted in an unnecessary restriction of potential project alternatives, such as relocating turbines away from glacial moraine (CRMC Areas of Particular Concern) and outside of the project boundary, to avoid or minimize impacts to Cox Ledge resources and essential fish habitat within the SFW lease area. The SFW mitigation package as proposed on September 28, 2020 is inadequate to mitigate for the significant adverse impacts described herein and making the Rhode Island based commercial and recreational fisheries whole in accordance with the enforceable policies of the Ocean SAMP.

8. Empirical data and information that supports the effects analysis and can be shown to be reliable such as NEPA EIS documents; visualizes the affected area, resources and uses with maps; and shows intensities, concentrations, values, trends and vulnerabilities

CRMC staff relied upon the data as shown within the SFW COP, BOEM studies, BOEM's SFW DEIS, BOEM's SFW EFH analysis, NOAA, RIDEM fisheries data, the Northeast Ocean Data Portal data, and other reliable sources of data cited within the references section. This analysis has provided well documented maps developed from reliable data sources, including the Northeast Ocean Data Portal showing intensity of Rhode Island based commercial uses and resources within the South Fork Wind project area. The concentrations and economic values of the coastal resources that Rhode Island commercial and charter fishermen rely upon that are located within the South Fork Wind area are provided within the tables herein and are based primarily upon NOAA reported commercial landings and charter and recreational fishing values attributable to Rhode Island based coastal users.

D. Background and Procedural Matters

As noted above, the CRMC's Ocean SAMP and its enforceable polices were approved by NOAA OCM in 2011 as part of the Rhode Island coastal management program. During the first half of 2018 the format and content of the Ocean SAMP were modified for compliance with Executive Order 15-07 and the State's Administrative Procedures Act. The Ocean SAMP was reformatted, along with all other CRMC regulations, to be consistent with the Rhode Island Code of Regulations (RICR). See: https://rules.sos.ri.gov/organizations. And, former Chapter 11 - Policies of the Ocean SAMP, which contains the general policies and regulatory standards (enforceable policies) were codified as 650-RICR-20-05-11 in June 2018.

During the spring and summer of 2019 the CRMC began the process of amending 650-RICR-20-05-11 with guidance from NOAA OCM to address some enforceable policies issues identified by NOAA OCM during the CRMC's federal consistency review of the Vineyard Wind 800 MW offshore wind project, which was concluded in February 2019. Following a June 17, 2019 CRMC public workshop, public notice and a public hearing held on July 23, 2019, the Council adopted amendments to 650-RICR-20-05-11 that became effective as state regulations on October 6, 2019. NOAA OCM approved on February 12, 2020 the CRMC's request to integrate the amended 650-RICR-20-05-11 as a program change to the Rhode Island coastal management program. Thereafter, the amended enforceable polices will be applied for purposes of federal consistency. See: https://coast.noaa.gov/czmprogramchange/#/public/change-view/1214. SFW, however, filed its federal consistency certification with the CRMC before the current Ocean SAMP amendments became effective. Therefore, the CRMC has reviewed the SFW project in accordance with the June 2018 codified enforceable policies of 650-RICR-20-05-11.10 that were in effect at the time of SFW's consistency certification filing on October 22, 2018.

The CRMC engaged with the developer in multiple meetings over the course of the federal consistency review period to discuss additional information necessary for the CRMC review (as specified in the CRMC's January 16, 2019 3-month letter required by 15 C.F.R. § 930.78(a)) and CRMC enforceable policy issues. Many of these meetings included the CRMC's

Fishermen's Advisory Board, as the issues pertained to potential impacts to commercial and recreational fishing resulting from project design, layout, installation, operation and decommissioning. The meeting dates and subject are summarized in the following table.

Table 4. South Fork Wind Farm chronology of events following Construction and Operation Plan (COP) filing with the Bureau of Ocean Energy Management

Date	Event	Comments
2018		
6/29/18	Deepwater Wind files SFW COP with BOEM	WTG spacing was 0.86 NM on average and not in a uniform grid pattern
8/27/18	CRMC Fishermen's Advisory Board (FAB) and Habitat Advisory Board (HAB) meeting	SFW presents potential impacts to fishery, marine resources and habitat from the 15 WTG project
9/11/18	BOEM cooperating agency conference call for SFW COP	Discussion of BOEM Coordinated Project Plan, SFW permitting time table and DEIS milestones
Nov 2018	Deepwater Wind is purchased by Ørsted U.S. Offshore Wind.	The SFW project is a 50/50 joint venture between Ørsted and Eversource
10/19/18	BOEM issues Notice of Intent to prepare EIS for SFW	Rhode Island scoping meeting hosted by BOEM held in Narragansett on 11/8/18
10/22/18	Deepwater Wind files federal consistency certification with CRMC	Filing includes PDF file of COP dated September 2018
11/13/18	Deepwater Wind filing with CRMC	As requested by CRMC, Deepwater Wind files amended COP Appendix A (CZMA consistency certification) and a Draft Demersal Fisheries Resource Survey Protocol
11/15/18	CRMC distributes Deepwater Wind's draft fisheries survey protocol to FAB members and other stakeholders for review	
2019		
1/16/19	CRMC issues 3-month letter required by 15 C.F.R. § 930.78(a) to Deepwater Wind and BOEM	CRMC requests alternative layout with 1x1 NM grid layout and location of turbines in relation to glacial moraines consistent with Ocean SAMP enforceable policies §§ 11.10.2(F) and (G) and a detailed fisheries monitoring plan for establishing background fisheries resources prior to construction
2/14/19	CRMC and SFW/Ørsted execute 1st stay agreement	CRMC federal consistency decision due no later than October 25, 2019
2/21/19	BOEM cooperating agency conference call for SFW COP	BOEM discussed revised purpose and need statement, revised federal

		permitting schedule and a revised alternatives table for the DEIS
3/4/2019	CRMC issues public notice for SFW project pursuant to 15 C.F.R. § 930.61	Public comment period provided until 4/30/19
4/1/19	CRMC and SFW/Ørsted meeting at CRMC	Discussion of draft (revised March 2019) Demersal Fisheries Resource Survey
4/8/19	BOEM receives request from SFW/Ørsted to pause federal review of SFW for further survey and site characterization in anticipation of a revised COP	
May 2019	SFW/Ørsted files revised COP with BOEM	Project area shifted eastward with WTG spacing of 1.0 and 0.8 NM in east-west rows
6/10/19	CRMC and SFW/Ørsted meeting at CRMC	Discussion of revised (May 2019) COP draft Fisheries Research and Monitoring Plan and glacial moraines
8/20/19	CRMC Habitat Advisory Board (HAB) meeting	Ørsted presents revised WTG layout and revised (6/20/19) Fisheries Research Monitoring Plan
9/9/19	CRMC Fishermen's Advisory Board (FAB) meeting	Ørsted presents revised WTG layout and revised (6/20/19) Fisheries Research Monitoring Plan
9/20/19	CRMC and Ørsted meeting @ CRMC	Discussion of proposed changes to Information for Mariners page on Ørsted website and implementation of more accurate and timely notice on survey vessel locations
9/30/19	CRMC Fishermen's Advisory Board (FAB) meeting	Ørsted presents revised WTG layout, improved Mariner Briefing outreach and revised (September 2019) Fisheries Research Monitoring Plan
10/1/19	CRMC and SFW execute 2nd stay agreement	CRMC federal consistency decision due no later than April 24, 2020
Nov 2019	SFW files revised COP with BOEM and supplies same to CRMC	Updated Appendices
12/13/19	Ørsted files proposed power analysis plans	Ørsted provides a statistical power analyses for the proposed beam trawl surveys to address accuracy concerns by the FAB and others.
2020		
2/10/20	CRMC Fishermen's Advisory Board (FAB) meeting	Ørsted presents revised WTG 1x1 NM grid layout and proposed refinements to Fisheries Research Monitoring Plan
Feb 2020	SFW files revised COP with BOEM and supplies same to CRMC	Primary revision is new WTG foundation 1x1 NM grid layout consistent with 11/1/19 wind industry proposed grid

3/17/20	CRMC and SFW execute 3rd stay agreement	CRMC federal consistency decision due no later than August 31, 2020
3/26/20	BOEM cooperating agency conference call for SFW COP	BOEM discussed revised purpose and need statement, revised federal permitting schedule and a proposed new alternative for the DEIS
3/31/20	CRMC and SFW Zoom meeting	Discussion of wind turbine siting and glacial geology for compliance with Ocean SAMP § 11.10.2, as well as mitigation necessary under §§ 11.10.1(G) and (H)
5/11/20	SFW files fisheries monitoring plan with CRMC	South Fork Wind Fisheries Research and Monitoring Plan dated May 2020.
5/29/20	CRMC and SFW begin weekly online meetings	Discussion of ongoing projects and items of concern. CRMC still awaiting final glacial moraine report, final fisheries monitoring plan and Ørsted's proposed mitigation plan to address construction impacts.
6/22/20	CRMC and SFW execute 4th stay agreement	Stay to provide Ørsted sufficient time to prepare, present and negotiate a mitigation proposal with the CRMC and the FAB pursuant to the state enforceable policies. CRMC federal consistency decision due no later than January 31, 2021.
8/03/20	SFW files revised glacial moraine report with the CRMC	Revised "Glacial Moraine and Benthic Habitats" report, dated 7/31/20, filed with CRMC for review. CRMC requests outside subject matter expert review (Dr. John King and Dr. Bryan Oakley) to provide comments and recommendations on report to CRMC.
10/5/20	SFW files revised fisheries monitoring plan with the CRMC	SFW provides "South Fork Wind Fisheries Research and Monitoring Plan September 2020"
10/29/20	1st mitigation meeting between CRMC, SFW and FAB	SFW presentation of mitigation proposal and methodology including WHOI fisheries data analysis
11/5/20	2nd mitigation meeting between CRMC, SFW and FAB	Further discussion of DSWF mitigation proposal
11/19/20	3rd mitigation meeting between CRMC, SFW and FAB	Further discussion of DSWF proposal and presentation of FAB mitigation proposal
11/24/20	SFW files revised glacial moraine and benthic habitat report	SFW provides "Glacial Moraines and Benthic Habitats: Delineation of Seabed Classification and Benthic Habitats for

		South Fork Wind Farm and Export Cable" dated 11/23/20 that address CRMC questions and comments from Drs. King and Oakley
11/25/20	Meeting between CRMC, SFW and FAB	WHOI fisheries data discussion and questions
12/2/20	Meeting between CRMC, SFW and FAB	Discussion about data disparities between WHOI and FAB (Sproul) analyses
12/4/20	4th mitigation meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal. CRMC determines breakout sessions are necessary to make further progress
12/7/20	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
12/10/20	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
12/14/20	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
12/17/20	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
12/21/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
12/23/20	CRMC and SFW execute 5th stay agreement	CRMC CZMA federal consistency decision now due by March 31, 2021
2021		
1/4/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
1/7/21	Meeting between CRMC and SFW	SFW offers navigational enhancement and training program for Ørsted's three lease areas (SFW, Revolution and Sunrise)
1/11/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
2/8/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
2/11/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
2/15/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
2/23/21	CRMC and South Fork Wind enter into 6th stay agreement	CRMC CZMA federal consistency decision now due by May 12, 2021
3/18/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
3/30/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
4/1/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
4/5/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
4/7/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
4/8/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
4/9/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
4/12/21	Meeting between CRMC and SFW	Discussion of SFW mitigation proposal
4/15/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
4/22/21	Meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal
4/23/21	CRMC and South Fork Wind enter into 7th stay agreement	CRMC CZMA federal consistency decision now due by June 1, 2021
4/27/21	Meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal
4/30/21	Meeting between CRMC and FAB	Discussion of SFW mitigation proposal
5/3/21	Meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal

5/10/21	Meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal
5/12/21	Meeting between CRMC, SFW and FAB	Discussion of SFW mitigation proposal
5/25/21	CRMC and South Fork Wind enter into 8th stay agreement	CRMC CZMA federal consistency decision now due by June 22, 2021
5/25/21	CRMC semi-monthly meeting	Council hearing on staff federal consistency enforceable policy summary and recommendation. Presentations from SFW and FAB.
6/1/21	CRMC, FAB, SFW mitigation meeting	Discussion of mitigation implementation and terms
6/2/21	CRMC semi-monthly meeting	CRMC semi-monthly meeting for public testimony and Council deliberation and final decision on staff federal consistency recommendation.
6/17/21	CRMC and South Fork Wind enter into 9th stay agreement	CRMC CZMA federal consistency decision now due by July 2, 2021

1. SFW foundation layout

SFW confirmed with CRMC staff in August of 2018, two months before SFW's federal consistency certification filing with the CRMC, that the SFW turbine foundations would be designed with an east-west layout to be consistent with historic commercial fishing practices within the RI/MA WEA. The spacing between the proposed SFW turbine foundations, however, averaged only between 0.7 and 0.87 nautical mile and were less than the 1 NM minimum spacing between all turbine foundations in a uniform grid pattern as recommended by CRMC staff. The east-west alignment with a minimum 1 NM spacing between all turbines was originally requested by Rhode Island commercial fishermen during the CRMC's Vineyard Wind project federal consistency review (CRMC file 2018-04-055) which began in April 2018. This wind turbine foundation alignment and spacing was a position advanced and advocated for by the CRMC to BOEM and other federal agencies throughout the Vineyard Wind federal consistency review process. The importance of establishing a uniform grid of wind turbine foundations in an east-west orientation with 1 NM spacing between all turbine foundations is specified in great detail within the CRMC's federal consistency concurrence letter dated February 28, 2019 for the Vineyard Wind project. At the insistence of CRMC staff, BOEM included an alternative wind farm layout identified as Alternative D2 within the Draft Environmental Impact Statement (DEIS) for the Vineyard Wind project. Alternative D2 is consistent with the CRMC requested 1 NM spacing between turbine foundations in a uniform grid pattern oriented east-west and was selected by BOEM as a preferred alternative within the Final EIS issued on March 12, 2021 and the Record of Decision for the Vineyard Wind project issued by BOEM on May 10, 2021.

During the summer and fall of 2018 while CRMC was conducting its federal consistency review of the Vineyard Wind 1 project, other offshore wind energy companies recognized the necessity of accommodating historic commercial fishing operations by orienting offshore wind farm projects in an east-west uniform grid alignment in an effort so that both industries could co-exist within southern New England offshore waters. Nevertheless, the 1 NM spacing between turbines would require compromise from both industries. For Rhode Island based commercial fishermen it requires a modification to fixed gear equipment (gillnets and lobster/crab pots), changes in gear layout and operations, and for mobile gear commercial fishermen it means changing operations when mobilizing, towing and hauling back nets and dredges. The offshore wind industry also compromised, as the increased spacing between turbines reduces the density and results in a reduction of the overall potential maximum electrical energy production output for each specific project.

The SFW turbine layout was oriented east-west as shown in Figure 1 below included within the SFW 2018 COP submitted to BOEM. And, despite SFW's commitment to an east-west grid layout for the SFW, the spacing between turbine foundations for the two layout options was only 0.7 NM and 0.87 NM, not the 1.0 NM requested by the CRMC. On January 16, 2019 the CRMC issued its 3-month letter require by 15 C.F.R. § 930.78(a) to SFW requesting an "alternative layout showing an increase in spacing between WTGs to 1 nautical mile." See CRMC letter at 7 (Appendix 8).

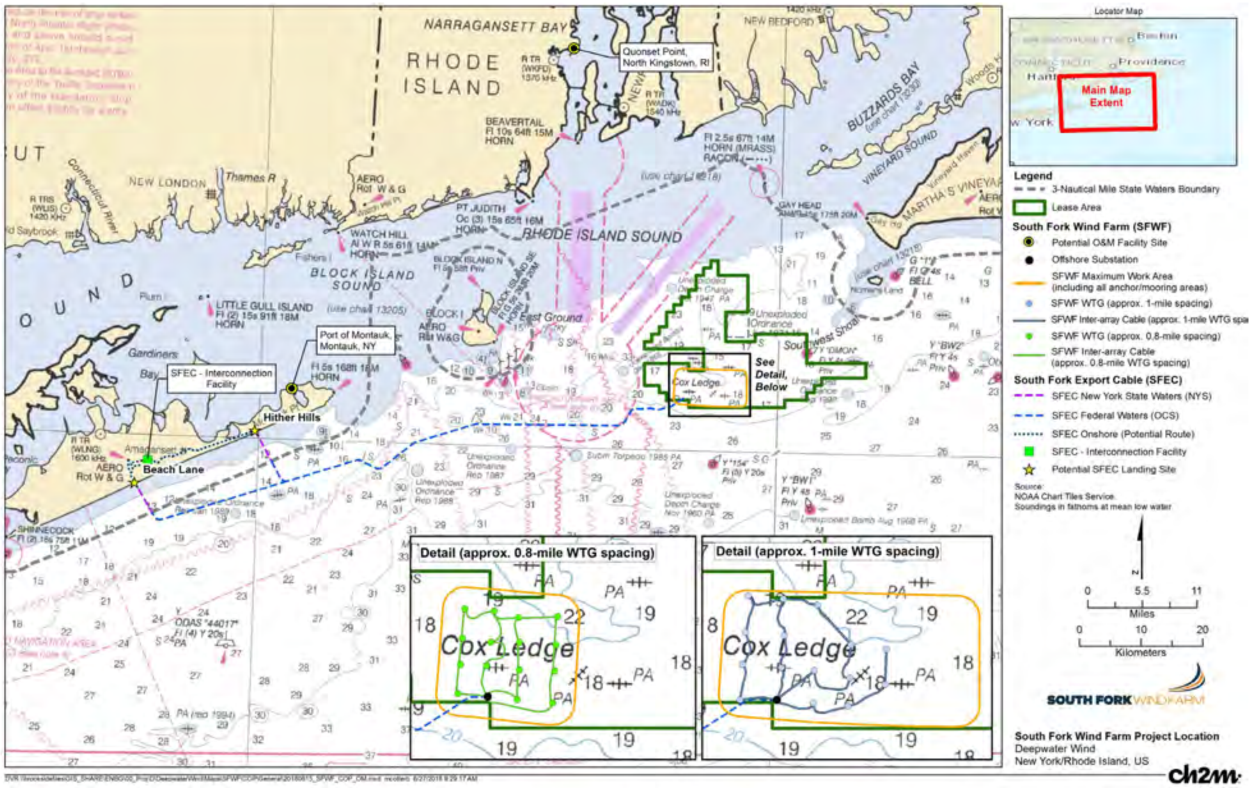

Figure 12: South Fork Wind Farm location with two optional wind turbine spacing options of 0.7 NM and 0.87 NM between turbine rows (Figure ES-1 of the September 2018 COP).

In a COP revision dated May 2019, SFW included two layouts depicting east to west corridors with approximately 0.7 NM to 1 NM between turbine rows. Both layouts also depict north to south corridors with average spacing of 0.70 NM between turbine foundations as shown in Figure 2, below. These revised layouts, however, still did not achieve the CRMC requested 1 NM spacing between all turbines within a uniform grid array. The SFW turbine layout remained unchanged in a subsequent COP revision dated November 2019.

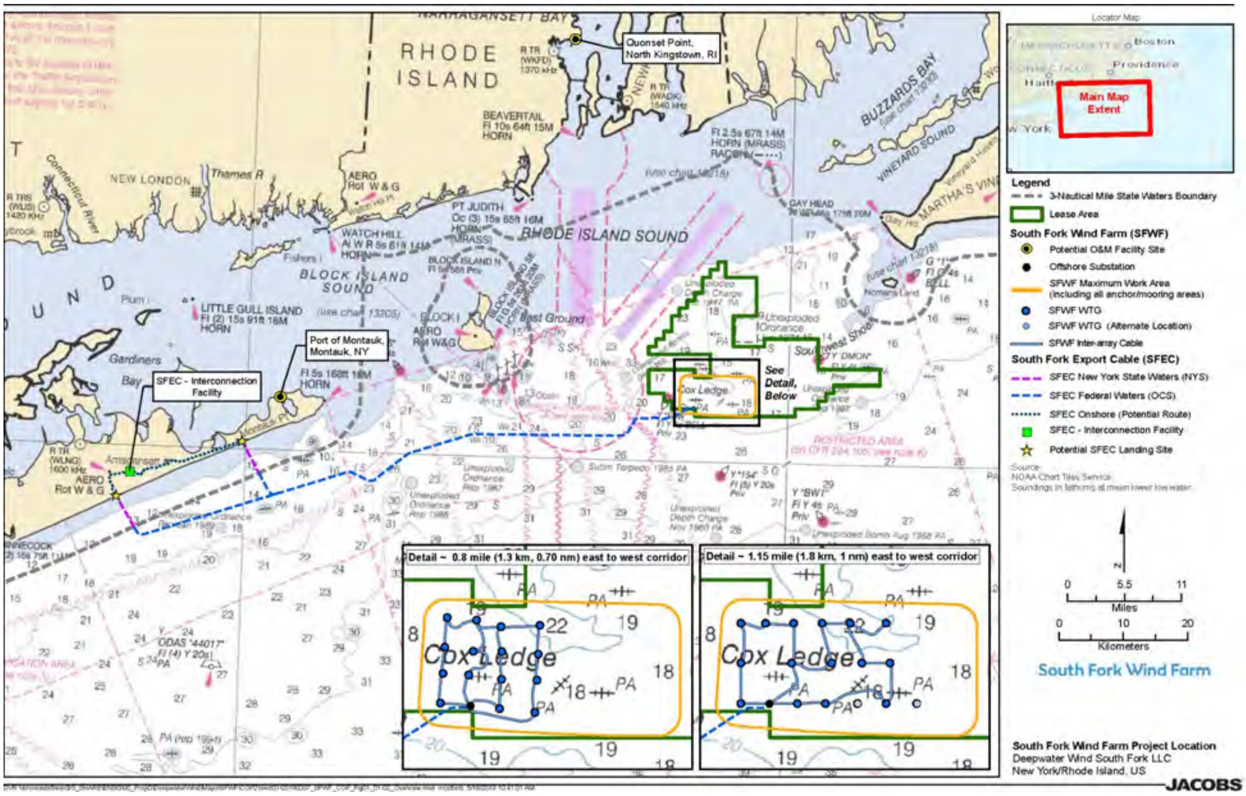

Figure 13: South Fork Wind Farm location with two optional wind turbine spacing options of 0.7 NM and 1 NM between rows (Figure ES-1 of the May 2019 COP).

On November 1, 2019 a consortium of renewable wind energy companies, including Ørsted, Vineyard Wind, Equinor and Mayflower Wind, that hold all the offshore leases with BOEM for the entire southern New England wind energy area[7] filed with the U.S. Coast Guard (USCG) a proposed collaborative "regional layout for wind turbines across our respective BOEM leases, and urge the Coast Guard, BOEM, and other regulators and stakeholders to support adoption of this 1 x 1 nautical mile (NM) uniform turbine layout with no additional designated transit corridors." See Wind Industry 11/1/2019 letter at 1 (Appendix 9). The wind energy consortium argued that based on an independent analysis of the proposed 1 x 1 NM grid it was unnecessary to include any designated wider transit lanes (e.g., 2 or 4 NM wide), as they would not enhance navigational safety. The proposed 1 x 1 NM grid layout, however, would

[7] The southern New England wind energy area is comprised of BOEM lease areas OCS-A 0486 (Deepwater Wind New England, LLC), OCS-A 0487 (Deepwater Wind New England, LLC), OCS-A 0500 (Bay State Wind, LLC), OCS-A 0501 (Vineyard Wind, LLC), OCS-A 0517 (South Fork Wind LLC) OCS-A 0520 (Equinor Wind US LLC), OCS-A 0521 (Mayflower Wind Energy, LLC) and OCS-A 0522 (Vineyard Wind, LLC). Deepwater Wind and Bay State Wind are subsidiaries of Ørsted U.S. Offshore Wind.

provide multiple lanes a minimum of 0.7 NM on the diagonal that in the opinion of the USCG are sufficient for navigation and search and rescue operations. The wind energy consortium proposal is shown in Figure 14, below.

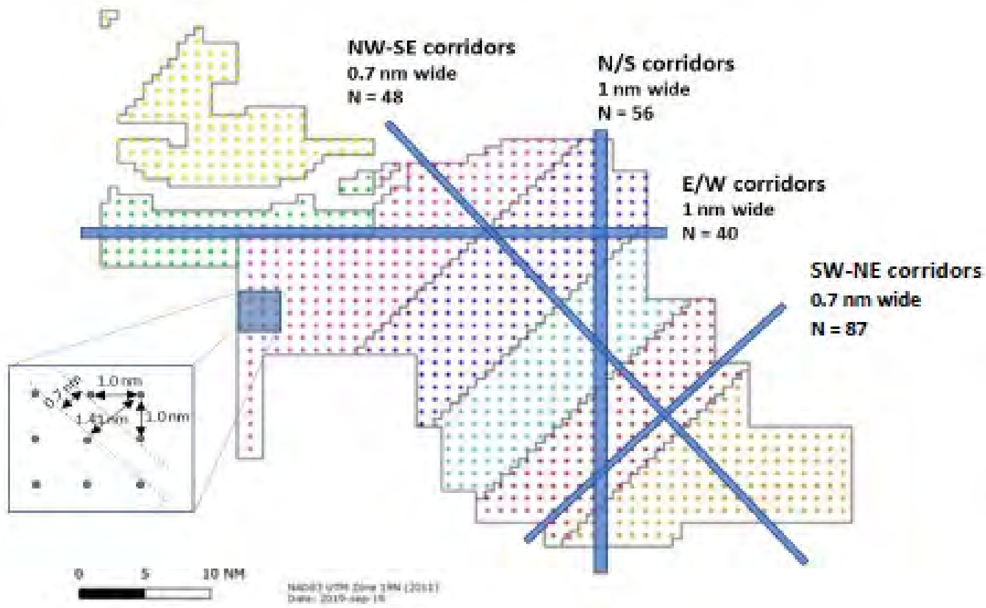

Figure 14: The 1 x 1 NM uniform grid proposed by southern New England BOEM renewable energy offshore lease holders on November 1, 2019. The spacing between turbine foundations in the east-west rows and the north-south columns is 1 NM. The spacing between turbine foundations in the northwest-southeast or northeast-southwest diagonals is 0.7 NM. Graphic from the November 1, 2019 wind energy developer consortium proposal.

On January 29, 2020, the U.S. Coast Guard issued notice in the Federal Register under docket USCG-2019-0131 indicating availability of their draft Massachusetts and Rhode Island Port Access Route Study (MARIPARS) to determine whether specific vessel routing measures would be necessary to provide for safe vessel access offshore of the Massachusetts and Rhode Island area as shown in Figure 15, below. The USCG concluded within the draft MARIPARS assessment (dated 1/22/2020) that specific navigation (transit) corridors could be useful to reduce risk to navigation. Nevertheless, standard vessel routing measures were unnecessary provided that the turbine foundation layout in the MA/RI wind energy area is developed along a standardized and uniform grid pattern. After review and consideration of public comments the USCG issued its final MARIPARS report on May 27, 2020 with a recommendation that "the MA/RI WEA's turbine layout be developed along a standard and uniform grid pattern with at least three lines of orientation and standard spacing to accommodate vessel transits, traditional fishing operations, and search and rescue (SAR) operations, throughout the MA/RI WEA. The adoption of a standard and uniform grid pattern through BOEM's approval process will likely eliminate the need for the USCG to pursue formal or informal routing measures within the MA/RI WEA at this time." See MARIPARS at 2 (https://www.navcen.uscg.gov/pdf/PARS/FINAL_REPORT_PARS_May_14_2020.pdf). The MARIPARS report included recommendations as follows:

(1) Lanes for vessel transit should be oriented in a northwest to southeast direction, 0.6 NM to 0.8 NM wide. This width will allow vessels the ability to maneuver in accordance with the COLREGS[8] while transiting through the MA/RI WEA;
(2) Lanes for commercial fishing vessels actively engaged in fishing should be oriented in an east to west direction, 1 NM wide; and
(3) Lanes for USCG SAR operations should be oriented in a north to south and east to west direction, 1 NM wide. This will ensure two lines of orientation for USCG helicopters to conduct SAR operations. *Ibid*.

Accordingly, the November 1, 2019 renewable wind energy consortium proposal for a uniform grid pattern of 1 x1 NM spacing between turbine foundations is consistent with the USCG MARIPARS recommendations to BOEM to accommodate vessel transits, traditional fishing operations, and USCG search and rescue operations throughout the MA/RI WEA.

[8] COLREGS – International Regulations for Preventing Collisions at Sea 1972

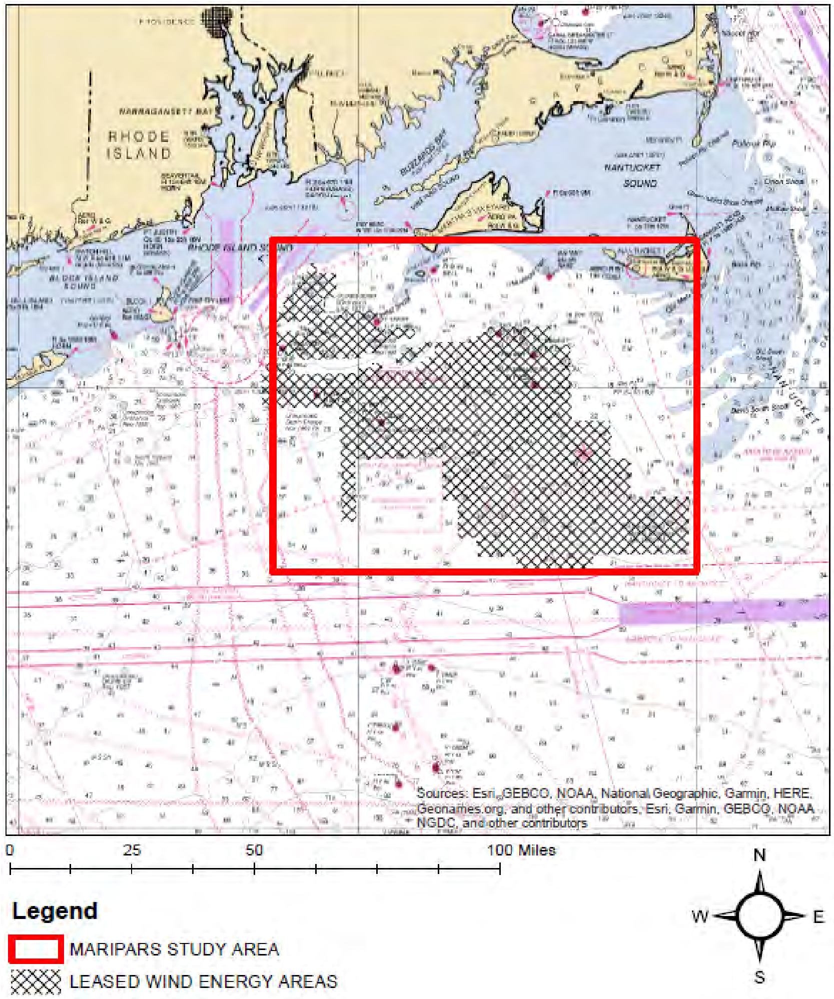

Figure 15: MA and RI Port Access Route Study Area from USCG-2019-0131.

SFW provided to the CRMC on March 2, 2020 a revised COP dated February 2020 that included revisions to a number of appendices, including confidential and proprietary materials protected from disclosure under 5 U.S.C. § 552(b)(4) and R.I. Gen. Laws § 38-2-2(4)(B). Importantly, SFW also modified the proposed SFW turbine layout as shown in Figure 16, below. SFW deleted its two previous turbine layout options and has committed to a single wind farm layout scenario with WTGs sited in a uniform grid with 1 by 1 NM spacing that appears to be consistent with the 1 x1 NM grid pattern advocated for by the CRMC and as put forth by the MA/RI wind energy area lease holders on November 1, 2019. See SFW COP at 1-23 and 2-8. SFW now intends to install its SFW turbines in the 1 x 1 NM grid as shown in Figure 16, but they also maintain that micro siting of turbine foundations may be unavoidable in the event of previously undetected geologic conditions becoming evident at the time of installation that would necessitate relocation of the foundation. Pursuant to BOEM regulations at 30 C.F.R. 585.634(c)(6) “changes in the location of bottom disturbances” of up to 500 feet are permissible without prompting the need for the developer to submit a revised COP.

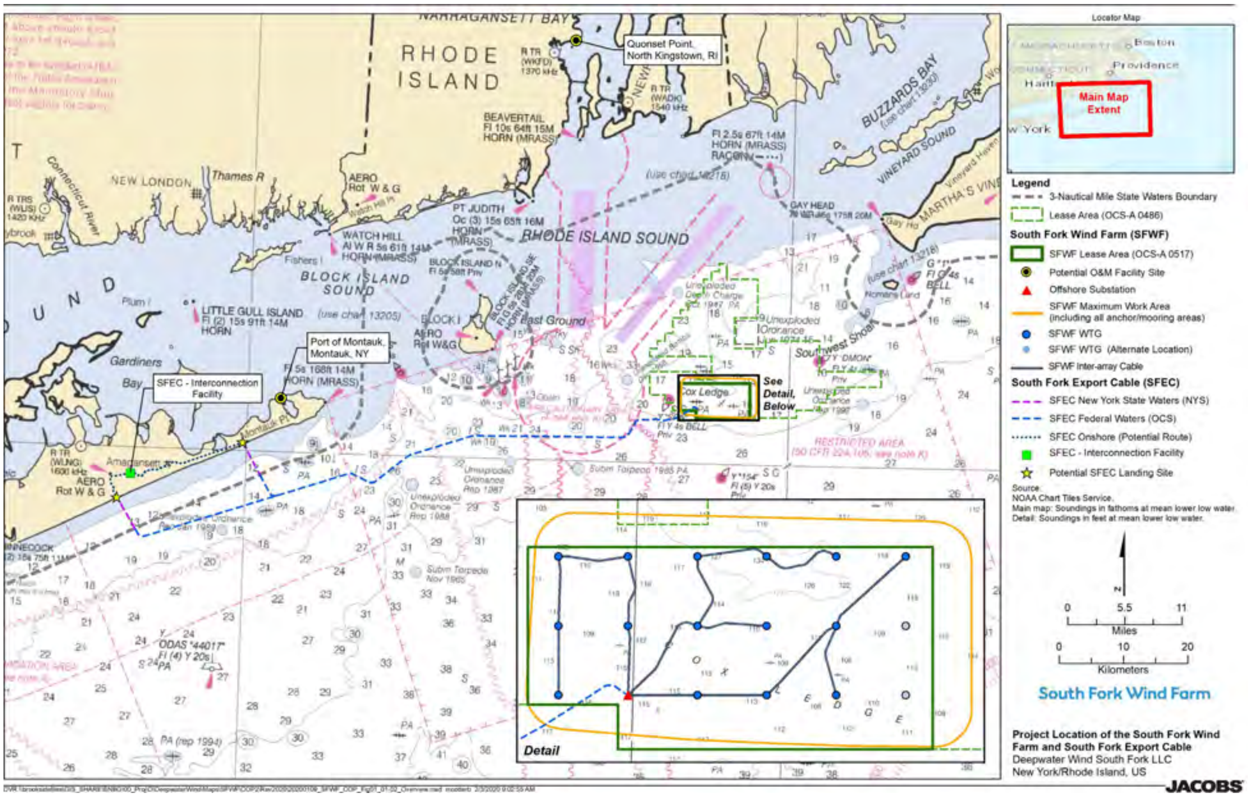

Figure 16: SFW turbine foundation layout showing 15 turbine locations, 2 alternate locations and the OSS in a uniform 1 x 1 nautical mile grid (Figure 1.1-2 of the February 2020 SFW COP).

2. SFW fisheries research and monitoring plan

A biological assessment of commercially and recreationally targeted species is a requirement of the CRMC’s Ocean SAMP enforceable policies and includes surveys performed at least four times: pre-construction (to assess baseline conditions); during construction; and at two different intervals during operation (i.e., one (1) year after construction and then post-construction). SFW indicated that it was “developing” a fisheries monitoring plan as specified in its September 2018 COP. To address the CRMC’s enforceable policies, SFW stated in Appendix A-2 Coastal Zone Management Consistency Statements: Rhode Island at page A-2-16, that “[t]he SFW is consistent with this policy. SFW conducted a desktop assessment of commercially and recreationally targeted species. SFW is currently developing a plan to further assess targeted species pre-construction and during construction and operations." After being notified by the CRMC on October 24, 2018 that additional information was necessary on the status of its fisheries monitoring plan, SFW subsequently provided to the CRMC on November 13, 2018 a draft plan titled "Demersal Fisheries Resources Survey Protocol - DRAFT." The CRMC on November 15, 2018 distributed the draft fisheries monitoring plan to FAB members and other interested stakeholders for review and comment. Then on January 16, 2019 the CRMC issued a letter to SFW, pursuant to 15 C.F.R. § 930.78, indicating that among other issues their draft fisheries monitoring plan lacked specificity to develop a comprehensive pre-construction baseline data set necessary to assess targeted commercial fisheries species that are typically harvested from the SFW project area. In that letter the CRMC requested a more robust fisheries monitoring plan that identifies the species to be monitored, what methods will be used and when the surveying will be conducted to demonstrate compliance with the CRMC's enforceable policy at § 11.10.9(C)(1).

SFW prepared a revised fisheries monitoring plan titled "South Fork Wind Farm: Fisheries Research and Monitoring Plan – Draft June 2019. The revised plan was submitted to the CRMC on June 13 and distributed to the FAB on June 14. The plan expanded on proposed sampling locations to include survey activity within the SFW project area and two adjacent reference areas located east and west of the project site. In addition, the revised plan included a proposed gill net survey and a beam trawl survey in an effort to determine a pre-construction baseline community composition. SFW was provided input and comments from CRMC staff and the CRMC Fishermen's Advisory Board at a September 9, 2019 FAB meeting. Based on stakeholder comments and input during the summer months as well as the September 9, 2019 FAB meeting, SFW prepared a further revised fisheries monitoring plan titled "South Fork Wind Farm: Fisheries Research and Monitoring Plan – September 2019. It was filed with the CRMC on September 20 and distributed the same day to the CRMC FAB in preparation for the September 30 FAB meeting. The revised plan included the following new elements:

- More detail on gear specifications and proposed beam trawl;
- Reduced emphasis on cod fish sampling;
- Added stomach sampling for monkfish and winter skates from gillnet survey; and
- Included sea scallop measurements in sampling protocols

SFW sought additional comments from the fishing community on the revised fisheries survey plan to further refine it as necessary to achieve optimal results for the fishing community and in meeting the CRMC enforceable policies. Recreational fishing interests on the FAB submitted email comments on September 23 and 24 indicating that recreationally harvested species were being overlooked and must be considered as part of the SFW surveying protocols. SFW indicated that they were working on addressing the issues raised by recreational fishing interests. In addition, written comments dated October 2, 2019 were submitted by the Commercial Fisheries Center of Rhode Island requesting an expansion of gear types to sample fish assemblages, a modification to the mesh size for the gill net survey and a continuation of a ventless trap survey. See Appendix 10. The RI Department of Environmental Management Division of Marine Fisheries (DEM DMF) provided written comments dated October 10, 2019 on the September 2019 SFW Fisheries Research and Monitoring Plan indicating several elements of the plan that could be enhanced to provide a transparent and more comprehensive survey assessment of fisheries resources in the project area. See Appendix 11. The DEM DMF letter also indicated that a power analysis, which is a statistical method of determining the level of sampling effort needed to detect ecologically meaningful differences, would be beneficial in the survey design. Commercial fishermen were concerned about the proposed beam trawl survey not being sufficient to characterize the fisheries resources in the SFW area and that absent a power analysis it was not possible to select reference sites for the SFW survey.

On December 12, 2019 SFW provided a power analysis for the SFW beam trawl survey to the FAB and CRMC. Subsequently, the DEM DMF provided comments dated January 3, 2020 indicating that "DMF finds the statistical power analysis approach logical." See DMF letter at 1 in Appendix 12. Following a request of CRMC FAB Chairman, Lanny Dellinger, at the February 10, 2020 FAB meeting, an ad hoc SFW Fisheries Monitoring Working Group of multiple stakeholders met on March 11, 2020 to identify priority species and gear types for monitoring at the SFW site and make recommendations to Ørsted and their fisheries monitoring contractor Inspire Environmental. Then on May 11, 2020 SFW filed with the CRMC its "South Fork Wind Fisheries Research and Monitoring Plan," dated May 2020. The plan was modified based on the comments provided by federal and state agencies, commercial fishermen and other stakeholders, and it now includes a gillnet survey, beam trawl survey, ventless trap lobster survey, ventless fish pot survey, acoustic telemetry for cod fish, and benthic survey elements that Ørsted started implementing in October 2020. The South Fork Wind Fisheries Research and Monitoring Plan was finalized in September 202 and a final version was filed with the CRMC on September 30, 2020. See Appendix 13. CRMC staff have concluded that the South Fork Wind Fisheries Research and Monitoring Plan meets the minimum required elements of the enforceable polices.

3. SFW fisheries communication plan and commercial fishing gear conflicts

SFW released its "South Fork Wind Farm Fisheries Communication and Outreach Plan" on May 31, 2018 as part of its outreach strategy with the fishing community to keep them informed of new project activities and developments, and to partner with and seek input from the fishing community. See: https://us.orsted.com/wind-projects/mariners. This communication plan also included a commitment by SFW for regular issuance of "Mariner Briefing" reports to the fishing community. In January 2019 SFW released a "Fishing Gear Conflict Prevention and Claim" document recognizing the possibility of interaction between the offshore wind survey and construction vessel activity and commercial fishing gear encounters. Then, during the summer of 2019 an increase in survey vessel activity being conducted for Ørsted on several of their lease areas in federal waters resulted in commercial fishing vessel and gear interactions. The survey vessel and fishing gear interaction situation was concerning enough such that the CRMC and RIDEM jointly issued a letter to Ørsted dated August 14, 2019 with a series of recommendations to improve fisheries communication and expected outcomes. See Appendix 14.

Ørsted also planned to conduct geophysical surveys within state waters for its proposed export cable route starting in September 2019 but, given the ongoing interactions and conflicts occurring in federal waters at that time between survey vessels and commercial fishing vessels, the CRMC requested specific conditions for survey vessel activity within state waters to minimize conflicts. The CRMC and Ørsted entered into a Memorandum of Understanding on October 11, 2019 in an effort to minimize survey and commercial fishing vessel interactions, while also limiting potential fishing gear loss. See Appendix 15. In the fall of 2019 with input from CRMC, Ørsted also improved their online "Information for Mariners" web page (https://us.orsted.com/mariners) and added additional information to the bi-weekly Northeast Survey Activity Mariners Briefing to include schedules of survey vessels and specific block locations within an Ørsted lease area or in state waters. Ørsted released on its web page a revised "Fisheries Communication and Outreach Plan," dated April 2020.

During 2019 and 2020, Ørsted and RI commercial fishermen were working through different iterations of a gear loss claim form that fishermen could file with Ørsted following a loss of gear attributable to survey vessel activity or, if necessary, in the future for wind farm construction vessel activity. Despite CRMC's insistent urging to reach agreement and finalize the fishing gear loss claims form process, there has been continued disagreement in the gear loss matter between Ørsted and commercial fishermen to address lost time and income to commercial fishermen resulting from survey/construction vessel inflicted gear loss. Ørsted has posted a revised "Fishing Gear Conflict Prevention and Claim Procedure" as of January 2021 on its web page (https://us.orsted.com/mariners). Nevertheless, it is not yet clear as to whether Rhode Island fishermen will be widely using this procedure for any potential fishing gear losses resulting from Ørsted contracted survey or construction vessels activities.

4. FAB and HAB meetings and issues

The SFW project meets the definition of a "large-scale offshore development" as specified in 650-RICR-20-05-11.3(H) and therefore, requires a meeting between the Fisherman's Advisory Board (FAB), the Habitat Advisory Board (HAB), the applicant, and the Council staff to discuss potential fishery-related impacts, such as, but not limited to, project location, construction schedules, alternative locations, project minimization and identification of high fishing activity or habitat edges and marine resource and habitat-related issues pursuant to 650-RICR-20-05-11.10.1(E) and (K).

The FAB, HAB, SFW and the CRMC first met regarding the SFW project on August 27, 2018, two months following SFW's filing of the SFW COP with BOEM, and before BOEM issued its NOI on November 19, 2018. The purpose of the combined FAB/HAB meeting on August 27, 2018 was for Ørsted to introduce the SFW project and to engage in discussion concerning potential fishery impacts and potential marine habitat and resources impacts. The CRMC and commercial fishermen immediately indicated that although turbine rows were aligned east-west, the turbine foundation spacing was not 1 nautical mile as has been continuously requested, rather the proposed spacing between turbine foundations averaged between 0.7 and 0.87 NM. Fishermen expressed concern regarding construction noise, in particular pile driving operations, and potential impacts to fisheries stocks. SFW indicated at the meeting that they intended to complete two-years of pre-construction, during construction and post-construction biological monitoring for the SFW project.

At the CRMC FAB meeting of September 9, 2019 SFW presented a revised turbine foundation layout and their Fisheries Research and Monitoring Plan (Draft June 2019). The spacing between turbine rows was increased to 1 NM, but the north south lanes were only spaced on average 0.7 NM, which did not create a uniform grid pattern. More importantly, however, the start of the meeting was dominated by FAB members who were upset over geophysical survey vessel interactions with commercial fishing gear. Fishermen complained of lost gear, predominantly lobster traps (fixed gear) that were missing or located a considerable distance from where the gear was initially set, allegedly by survey vessel interaction and poor communication from Ørsted to commercial fishermen (see preceding discussion in Section C.4, above). Ørsted promised to provide an update on survey vessel operations at the next scheduled FAB meeting on September 30. In addition, FAB chairman Lanny Dellinger requested a separate meeting with Ørsted and CRMC regarding the gear loss and compensation plan.

At the CRMC FAB meeting on September 30, 2019 Ørsted presented an updated survey vessel communication plan in an attempt to address concerns raised by fishermen and the CRMC at the September 9 FAB meeting. Ørsted's Mariner Briefings would be issued every Monday and Thursday to include a map of survey vessel activities within "survey zone" blocks with a list of active survey vessels and their projected 3-4 day outlook to help inform commercial fishermen. And although fishermen indicated that they appreciated Ørsted's efforts to improve communication, their fixed gear was allegedly still being towed up by survey vessels. It appeared that the primary issues is that survey vessels were operating round the clock and most likely were interacting with fixed gear during night time operations when some buoy and other fixed gear markers were less visible to survey vessel crew. Ørsted also presented a revised (September 2019) Fisheries Research and Monitoring Plan that added more detail on gear specifications and additional species monitoring, and which was provided to the CRMC and distributed to FAB members on September 20. Fishermen objected to Ørsted request to provide comments by September 23, before the September 30 FAB meeting. Commercial fishermen requested time to review the plan and provide comments at a later date. On October 18 FAB chairman Lanny

Dellinger filed a letter with CRMC indicating that the FAB requested a copy of the power analysis conducted for the SFW monitoring plan and that in the absence of such an analysis, FAB review of the monitoring plan and control site input, as requested by Ørsted, would not be possible. Ørsted submitted a letter on December 13, 2019 to the FAB via Attorney Desautel and copied to the CRMC providing additional information on the statistical power analysis for the proposed beam trawl survey and survey control site selection. In addition, RIDEM indicated that the power analysis was logical. See Appendix 11.

The next CRMC FAB meeting was held on **February 10, 2020** and Ørsted presented a summary of revisions to the SFW project as detailed in its February 2020 COP submittal to BOEM, namely a 1 x 1 NM uniform grid pattern for the SFW turbines. Ørsted also provided an update on its SFW fisheries research and monitoring plan. Fishermen, however, were still not convinced that the proposed monitoring would properly characterize the species and abundance within the SFW and reference site survey areas. Suggestions were made for adding acoustic telemetry and a graduated gill net mesh size along with using an otter trawl as is used for other surveys to increase the number of species caught. Following discussion on the fisheries survey, the FAB requested Fred Mattera of the Commercial Fisheries Center of Rhode Island (CFCRI) (https://www.cfcri.org) to organize a meeting between the fishing community, Ørsted and RIDEM DMF to meet and design a fisheries survey protocol that would be applied consistently not only to SFW, but potentially to all of Ørsted's southern New England offshore wind energy project sites. The CFCRI organized meeting was held on March 11, 2020.

5. FAB concerns regarding the SFW Site Assessment Plan

On January 6, 2020 Attorney Marisa Desautel representing the CRMC Fishermen's Advisory Board filed a letter with the CRMC alleging that the pending Ørsted SFW federal consistency matter before the CRMC was deficient in that Ørsted had not filed required information as part of their Site Assessment Plan (SAP), which was filed with BOEM in July 2017. Attorney Desautel argued that the CRMC's enforceable policies at 650-RICR-20-05-11.10.5(C)(1) required extensive reports and results of geotechnical, geological and biological surveys, including the results of fisheries surveys and supporting data as part of the SAP. The CRMC responded to Attorney Desautel in writing on January 10, 2020 indicating that the proposed activity under the SFW SAP was only for the installation of an offshore meteorological data collection buoy. The CRMC received from BOEM a consistency certification and all necessary data and information (NDI) for the proposed meteorological buoy installation activity as required pursuant to 15 C.F.R. § 930.76(b). The CRMC subsequently issued its concurrence for the installation activity on September 8, 2017 in accordance with the CZMA federal consistency regulations. See Appendix 16. The CRMC also indicated to Attorney Desautel that when the CRMC's Ocean SAMP was adopted by the Council in 2010 the enforceable policies specified in 650-RICR-20-05-11 for a SAP were developed to be consistent with the federal review process for offshore wind energy projects under BOEM's regulations at 30 C.F.R. § 585. In designing the federal regulations, BOEM originally intended to have a sequential submittal of an all-encompassing SAP followed by the applicant's COP. See Appendix 17 for correspondence. And, the Ocean SAMP enforceable policies were developed in 2010 to be reflective of BOEM's sequential process at that time.

More recently, however, BOEM is only using the SAPs for meteorological and limited geophysical and geological surveying activities, with the detailed biological assessments being required as part of an applicant's COP. And indeed, SFW has provided to the CRMC the information required under BOEM's regulations pertaining to the COP. Nevertheless, the CRMC's enforceable policies, as Attorney Desautel points out, specifies extensive information to be submitted by an applicant as part of the SAP. Notwithstanding those enforceable policies, the CRMC can only review the activity specified within the federal SAP application, in this case for the installation of a meteorological buoy only on the SFW lease area. Furthermore, the CRMC is limited by federal regulations (15 C.F.R. part 930) in the type and timing of information it may require, and it cannot require more information than BOEM requires in its application for a specific activity in federal waters. This is a point that the CRMC and Attorney Desautel continue to disagree upon, but it indicates that perhaps some of the SAP requirements in 650-RICR-20-05-11.10.5 may need to be reconsidered given the current BOEM permitting process, which has evolved over the last decade.

E. Review of State Enforceable Policies and Analysis

An enforceable policy is defined within the federal consistency regulations to mean "State policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a State exerts control over private and public land and water uses and natural resources in the coastal zone." See 15 C.F.R. § 930.11(h). The regulation further describes that an enforceable policy "shall contain standards of sufficient specificity to guide public and private uses." *Ibid*. The CRMC's enforceable policies for purposes of offshore renewable energy development as approved by NOAA OCM are contained within Chapter 11 of the CRMC's Ocean SAMP codified as 650-RICR-20-05-11. Specified proposed activities within offshore waters that are subject to federal consistency review for federal licenses or permits must be consistent with enforceable policies of the approved state management program. See 15 C.F.R. §§ 930.57(a) and 930.76(c).

As required by 15 C.F.R. §§ 930.57 and 930.76(a)(2) SFW filed a consistency certification stating "[t]he proposed activity complies with the enforceable policies of the Rhode Island approved management program and will be conducted in a manner consistent with such program." See SFW COP Appendix A. In addition, SFW provided responses to each of the Ocean SAMP enforceable policies within Appendix A-2. The corresponding SFW responses and the CRMC analysis are shown below for the selected Ocean SAMP enforceable policy analysis and discussion as to whether or not the SFW project meets the applicable enforceable policy.

Enforceable Policy § 11.10.1(C)

Offshore developments shall not have a significant adverse impact on the natural resources or existing human uses of the Rhode Island coastal zone, as described in the Ocean SAMP. In making the evaluation of the effect on human uses, the Council will determine, for example, if there is an overall net benefit to the Rhode Island marine economic sector from the development of the project or if there is an overall net loss. Where the Council determines that impacts on the natural resources or human uses of the Rhode Island coastal zone through the pre-construction, construction, operation, or decommissioning phases of a project constitute significant adverse effects not previously evaluated, the Council shall, through its permitting and enforcement authorities in state waters and through any subsequent CZMA federal consistency *reviews,* ***require that the applicant modify the proposal to avoid and/or mitigate the impacts or the Council shall deny the proposal***. (Emphasis added.)

SFW Response: The SFWF is consistent with this policy. The SFWF will not have significant adverse impact on the natural resources or human uses of the RI Ocean SAMP study area. It is expected that current activities will be able to continue post construction.

CRMC Analysis: The first part of the enforceable policy requires that the Council determine whether "there is an overall net benefit to the Rhode Island marine economic sector from the development of the project or if there is an overall net loss." Table 4.6.1 *Socioeconomic Region of Influence Communities* of the SFW COP indicates that Rhode Island could be a potential location for an operation and maintenance facility and that Providence may be considered as a port facility for assembly, staging and logistics for the SFW project. See SFW COP at 4-339. In addition, Table 4-1 of the *Economic Development and Jobs Analysis* for the South Fork Wind Farm and the South Fork Export Cable shows the total jobs and value added values for both the total U.S. and the state of New York only. The total value added impact (in 2018 dollars) of the SFW project will be $57.1 million for New York and $213.2 million for the United States during the expected two-year construction phase and a total value added impact of $3.9 million for New York and $9.5 million per year for the United States during the operations phase. The COP and the Appendix analysis report <u>do not</u> attribute any direct economic benefits specifically to the State of Rhode Island. See SFW COP Appendix AA (https://www.boem.gov/Appendix-AA/). Thus, neither the COP nor Appendix AA attribute any direct economic benefits to the state of Rhode Island as a result of the SFW project. CRMC staff inquired of the applicant as to whether there were any direct economic benefits to the state from the SFW project and received a document from Ørsted titled "South Fork Wind (SFW) estimated economic impact to RI," dated April 15, 2021. It reports that the SFW project's impact on RI economic development is estimated to be approximately $33 million in local investment and approximately 134 local jobs. See Appendix 18. These projections are based upon economic development plans that include development and procurement efforts to date as well as committed and planned investments by Ørsted, which apparently have been reviewed by RI Commerce.

There is the fact that Rhode Island based commercial fishermen specialize in targeting one or more species for their business model and they are all small businesses. Generations of commercial fishing family knowledge and territorial knowledge factor into their trade. There are significant risks and costs at a business by business scale compared to a project or regional scale. Care must be taken that the details are properly accounted for while comparing the economic balance. Additional indirect economic risk include shore side supply chain for this resource. This includes but is not limited to fish markets, distribution, processing, recreational fishing licenses, bait and gear sales, boat repairs, hotels, restaurants, shore side fish sales, fuel, travel, taxes and more. These support industries need to be accounted for in a granular way because industries like hotels may survive a decline in fishing effort, but companies that specialize, for example those that simply make ice for commercial fishing orders, may no longer be economically viable.

Changes required in the Federal and State sampling to assess the fishery stocks will result in a burden on the taxes of every Rhode Islander to fund the re-tooling of this important fisheries management research. The addition of structures in the water and the potential for any vessel to enter the area in inclement weather adds a risk of human mortality that currently does not exist. The potential exists for an insurance company to evaluate the evolving risk and deny coverage in specific areas. There is no way at the moment to predict how the insurance industry will respond until we have some experience operating within the wind farms. Overall, there will likely be a net loss to existing Rhode Island based marine businesses who either directly or indirectly profit from the fishery resources located within the proposed SFW project. Further discussion of the economic impacts is presented in § 11.10.1(H) below.

As shown in the CRMC South Fork Wind - Coastal Effect Analysis the net combined total of commercial, charter and recreational fishing economic exposure value for Rhode Island attributable to the SFW lease area over the 30-year project lifetime is estimated at between $30,141,258 and $50,473,735. Ørsted has acknowledged that there could be up to 100% losses to commercial landings during some portions of construction and decommissioning phases for the SFW project, but only acknowledges a 5% loss during the 25-year operational phase. The FAB, however, has estimated that there will be 100% losses during all construction and decommission phases and likely between 50-80% losses to commercial, charter and recreational fishing revenues during the 25-year operational phases. Based on CRMC analysis of the economic exposure data, the FAB estimated potential losses to the Rhode Island economy could be a range from $15,070,629 upwards to $40,378,988. See Appendix 19. Accordingly, based on the estimated 30-year project lifetime economic exposure range above, the FAB estimated losses could be substantial to the RI economy and equal or exceed Ørsted's SFW project RI economic development impact estimated at approximately $33 million. Therefore, given the uncertainties of Ørsted's economic estimate and the FAB estimated potential losses, CRMC staff cannot determine whether there will be an overall net benefit to the Rhode Island marine economic sector from the SFW project or if there will be an overall net loss.

The second part of the enforceable policy requires that "the applicant modify the proposal to avoid and/or mitigate the impacts or the Council shall deny the proposal." In the case of federal consistency, as in this matter, the Council would object to the project consistency certification in the event significant adverse effects from the project cannot be avoided or mitigated in accordance with the CRMC enforceable policies. The Bureau of Ocean Energy Management (BOEM) is the lead federal agency for the permitting of offshore wind projects in federal waters. BOEM issued a Draft Environmental Impact Statement (DEIS) for the SFW project on January 8, 2021 and it describes a number of potential unavoidable impacts to commercial fisheries and for-hire recreational fishing interests resulting from the SFW project as specified within Section 4.1.1 of the DEIS. These unavoidable impacts include:

1. A disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore project elements;
2. A disruption to harvesting activities during operations of offshore wind facilities;
3. Changes in vessel transit and fishing operation patterns; and
4. Changes in risk of gear entanglement or target species.

See BOEM DEIS at 4-1.

Indeed, the temporary displacement of commercial fishing activity did occur during the construction and installation phase of the Block Island wind farm in 2015 and 2016. As noted above BOEM anticipates disruption to commercial fishing harvesting activities during operations of offshore wind facilities, and the operational period of the SFW project is 25 years. The FAB has indicated that there will be changes in vessel transit and fishing operations as a result of the SFW project. And further, the FAB has indicated that there will be risk of gear entanglement due to wind farm construction vessels and the turbine foundations. As explained in the CRMC South Fork Wind - Coastal Effect Analysis commercial fixed gear fishermen (e.g., lobster pots and gillnets) will lose 40% or more of their gear sets conforming to a 1 x 1 NM uniform grid turbine wind farm layout as compared to current operations, as the fixed gear will only be set in between turbine foundations and only along the east-west rows of turbines so that mobile gear operations towing nets or dredges can operate the clear lanes between the rows of turbines.

As noted below in the discussion for § 11.10.2(B), the currently proposed SFW project includes up to 16 foundations (15 turbines, 1 OSS) in a 1 x 1 NM uniform east – west grid that aligns with the southern New England regional grid proposed by the offshore wind industry. The SFW project is located on a terminal glacial moraine. See COP at 4-79. It is a location rich with species and a complex benthic habitat, known as Cox Ledge, and has many similar attributes and characteristics as CRMC designated area of particular concern (APC) located within state waters as described in Ocean SAMP § 11.10.2(A). Cox Ledge is designated on nautical charts and in charter fishing brochures. The applicant asserts that current fishing activities will be able to continue once construction of the SFW project is completed (COP Appendix A-2). This indicates that current activities are expected to be disrupted during project construction as well as during the decommissioning phase. Direct impacts during the geophysical surveying, construction and decommissioning phases would affect commercial fishing, charter and recreational fishing, sightseeing and indirect shore side impacts. The addition to up to 16 foundations and cable armoring where the desired cable burial depth cannot be achieved will introduce structure to the environment that creates adverse impacts to existing Rhode Island based coastal uses and resources. The introduction of physical structure in the water column has a high probability to disrupt the ecosystem as has been observed at the Block Island Wind Farm and wind farms in Europe. Cox Ledge is one of the few remaining places in Rhode Island Sound that Atlantic cod are found at all life stages and the area is heavily targeted by charter and recreational fishing due to the current species diversity that is not found in other locations within the region. The bottom structure and habitat of the South Fork lease area are similar to the CRMC designated APC within state waters. In addition, it is an area of significance to the charter and recreational fishery as well as to commercial fishing operations. As such, the CRMC enforceable policies for APC presumptively excludes all offshore development within such areas. See further discussion below regarding CRMC enforceable policy § 11.10.2.

Pre-construction geophysical surveys were conducted to support the development of the SFW COP, and further survey vessel activity continues especially along the export cable route and in support of other planned offshore wind farms. The CRMC received numerous reports over the last 2 years of survey vessel operations impacting Rhode Island based commercial fishing vessels and fixed gear. Apparently, similar incidents from multiple states have been reported at various public meetings including the BOEM public scoping sessions of conflicts of the survey vessels with fixed commercial fishing gear. The survey vessel interactions included the loss of fixed gear and the displacement of mobile gear fishing activity during active geophysical surveys. Decreased fishing activity yield was also reported in the vicinity of the survey vessels, but recovery to recent catch levels was reported after the survey vessels exited an area. This indicates a temporary, but significant impact to Rhode Island based commercial fishing activity during the pre-construction phase of the proposed project.

During construction and decommission phases the CRMC expects significant disruption to existing Rhode Island based coastal uses and resources. The proposed 16 foundations are expected to be installed at a rate of one every 2-4 days at a time of the year to optimize avoidance of disruption to sensitive marine mammals like the Right whale. Pile driving of foundations is anticipated within the SFW COP to be 2-4 hours per pile, and the noise impact from the pile driving will be transmitted along the ocean sediment interface and to a less degree in the water column after being somewhat mitigated by noise mitigation bubble curtains. Nevertheless, it is expected as shown in Appendix J of the Cop that mortality to fish, eggs and larvae will occur around each pile, which will be an adverse impact. The disruption to the marine habitat is not confined to the lease area, but is governed by the nature of the substrate. The additional vessel activity in the area will introduce local mechanical disruption to the benthos and water column but also increase the ambient noise levels in the water column.

The construction activity includes the displacement of approximately 255 acres of existing boulders within the South Fork lease and along the export cable route that will change the benthic landscape for Rhode Island commercial fishermen who have been working these waters for decades. See SFW COP at 3-13. Some of these boulders within the SFW lease area are significantly large at up to 32 feet in diameter. *Id* at 4-79. Unless the developer provides detailed reports on boulder re-location, the commercial fishermen will be faced with additional challenges if and when they return to harvesting activities within these disturbed areas. As a point of reference, the installation of the Block Island Wind Farm did not meet its planned installation schedule, and was completed following significant delays. With the complexity of glacial deposits at the South Fork site, the possibility exists that the installation schedule will encounter delays and significant installation challenges, especially because the SFW project is farther offshore than the BIWF. The impacts of construction and decommissioning are expected to be significant, but constrained temporally with the recovery to the benthos expected to occur within several years under natural forcing conditions.

During the operational period, the SFW turbine and OSS foundation structures will remain in place causing alterations to existing Rhode Island based fishing activities. As discussed in CRMC's federal consistency concurrence for the Vineyard Wind 1 project, Rhode Island commercial fishermen proposed an east-west uniform grid wind farm layout with minimum 1 by 1 nautical mile spacing and transit corridors. The CRMC stated that this would allow continued harvesting by most commercial fishing with the necessity of modifications and adjustments to fishing gear and operations, which was a compromise by the fishing industry in an effort to adapt to wind farm structures and anticipated wind farm plans. In November 2019 the offshore wind industry holding leases in the southern New England OCS collaboratively joined together to propose a 1 by 1 NM uniform grid for this contiguous wind development area of approximately 1400 square miles. The SFW COP was modified again in February 2020 after an initial submission in 2018 to conform to this industry proposed southern New England regional wind farm layout. While the turbine spacing for each project may be wider than the developer's optimized spacing and layout, the size of commercially available wind turbine generators has increased allowing developers to reduce the infrastructure necessary to meet a specific project purpose and need. Nevertheless, the BOEM Supplemental Environmental Impact Statement (SEIS) for the Vineyard Wind 1 project indicates that even with the wind farm project conforming to the 1 x 1 NM uniform grid layout there will be **moderate** impacts to commercial fisheries and For-Hire recreational fishing operations. Moreover, BOEM's analysis anticipates that there will be **major** impacts to commercial fisheries and For-Hire recreational fishing activities following reasonably foreseeable future wind farm construction in the region. In fact, the recently issued Record of Decision (ROD) for the Vineyard Wind 1 project states "it is anticipated that there will be negative economic impacts to commercial fisheries. While Vineyard Wind is not authorized to prevent free access to the entire wind development area, due to the placement of the turbines it is likely that the entire 75,614 acre area will be abandoned by commercial fisheries due to difficulties with navigation." See Vineyard Wind ROD at 39 (https://www.boem.gov/renewable-energy/state-activities/final-record-decision-vineyard-wind-1). Accordingly, the CRMC expects that Rhode Island based coastal uses will be adversely affected and not able to continue at existing operational levels during the SFW project 25 year operational period.

The current so-called "gentlemen's agreement" within the Rhode Island commercial fishing community sets up alternating fixed and mobile gear lanes of operation on a 0.5-0.6 NM east-west grid within Rhode Island Sound. The addition of wind turbine foundation infrastructure on a 1 x 1 NM uniform grid will reduce the area available for fixed gear fishing by up to 50 percent. The risk of allision may require fishing operations to hire additional crew specifically for navigation within the wind farm and during transit when adverse weather, including fog, is expected. The interference impacts of the turbine foundation structures on vessel radar increases the risk of both collision and allision within the wind farm particularly in adverse visibility and poor weather conditions. Rhode Island based fishing vessels may choose to avoid the SFW project area when a vessel captain deems it unsafe to navigate within the area either for fishing activity or transiting to other fishing grounds. In adverse weather conditions, vessel transit may be require to be routed around the SFW project for safety concerns. Insurance underwriters for commercial and recreational fishing may deem that the safety and property risks are too great for them to offer policy coverage at any rate for vessels operating within or around the SFW project area. Rhode Island based commercial fishermen may not be able to harvest within the SFW project in adverse weather without significantly modifying their navigation electronics or adding crew for safe operations. In addition, NOAA will not be able to continue their stratified random fishery stock assessment surveys in the SFW project area because of safety concerns, especially due to vessel clearance with wind turbine rotor sweep. This may result in a reduction of NOAA NMFS harvest quotas assigned to Rhode Island commercial fishermen. And, if the fishermen are displaced from the SFW project area, the fishing pressure on the fishery resources outside of the project area could be impacted with resources and harvesting income being divided amongst more fishing vessels resulting in lower catch and revenues. This situation could result in a cascading effect that may point to the need for a reduction in the overall commercial fishing fleet to allow some commercial fishing businesses to remain solvent.

Rhode Island charter (For-Hire) and recreational fishing specifically target Cox Ledge for species diversity, particularly Atlantic cod and large highly migratory game fish. The combination of the bottom structure and the current dynamics creates an environment that attracts sport fish of interest including, but not limited to, Atlantic cod, tuna, pollock and sharks. Many charter businesses state “if you can’t find fish elsewhere, head to Cox Ledge,” they also state that the weather is a significant factor for a trip to Cox Ledge. Because of its popularity several recreational angler forums have dedicated channels for Cox ledge and what is being caught out there. A potential impact for charter and recreational anglers is for the large pelagic sport fish to use the foundations as cover. With the large amount of line out over the hours trying to land a large fish such as a tuna or shark it is unlikely if these Rhode Island based coastal uses would continue to fish within the SFW lease area on Cox Ledge due to the potential to lose a large hooked fish. In fact, the SFW COP *Navigation Safety Risk Assessment* states “drift fishing and trolling are common recreational fishing techniques used on Cox Ledge. There is the possibility that fishing lines or other gear may catch on Project structures or scour protection around the base of the foundation and be damaged or lost.” See SFW COP Appendix X at 74 (https://www.boem.gov/Appendix-X/).

The Rhode Island charter and recreational fisheries has a significant landside indirect component and can contribute to the tourists wrapping up their trip by purchasing seafood at dockside from the other commercial fishermen to round out their Rhode Island experience. And while the proposed SFW project is almost entirely in federal waters it is located in a region fished by Rhode Island based fishermen and frequented by recreational anglers from areas outside of Rhode Island. As noted above, it is estimated that the combined economic exposure for both charter and recreational economic impacts to Rhode Island that are attributable over the 30-year lifetime from the SFW lease area is estimated at between $17,777,334 and $ 27,880,012. Significant impacts to existing charter and recreational fishing operations will likely occur from the development and operation of the project. Accordingly, even a 50% loss of charter and recreational fishing economic exposure over the life of the SFW project would be significant to the state of Rhode Island ranging from $8,888,667 to $13,940,006.

BOEM’s SEIS for the Vineyard Wind 1 project indicates that for the entire region, the development of wind farms will result in continuous, long-term minor to moderate direct and indirect impacts to marine based businesses due to the presence of the new structures on the

OCS. See BOEM VW SEIS at ES-5 (https://www.boem.gov/renewable-energy/vineyard-wind-1-supplement-eis). BOEM has considered the regional economic benefits of supply chain and the impact of developing renewable energy resources into their analysis. The VW SEIS lists the potential direct impacts as entanglement, gear loss/damage, navigational hazards and risk of allision, fish aggregation, habitat alteration, effort displacement and space use conflicts.

Climate change is shifting species northward including Black Sea Bass, Scup and the American Lobster (RIDEM 2021). Despite this regional species shift, fishermen and ongoing monitoring (discussion at RI MFI fall 2019 meeting, 2021 communication from RI DEM, NEFMC 2020, Zemeckis et al. 2014) are observing increases in Atlantic cod near Cox Ledge. Sufficient spatial and temporal data do not exist to properly characterize the spawning activity (DeCelles et al. 2017). Metapopulation structure has been identified at fine spatial scales and is likely critical to the survival of the overall stock (McMannus 2021). A distinct southern New England cod stock has been found to exist on Cox Ledge with spawning known to occur between November and January and from February to April. Recreational angling for Atlantic cod is important on Cox Ledge and recreational angler reports support a significant increase in population over the past 15 years (Sheriff 2018). Early life stage Atlantic Cod require boulder, cobble and pebble substrates and return to the same spots to spawn (Zemeckis et al. 2017). Spawning is sensitive to disturbance (Dean et al. 2012). Given the available data, it appears that the SFW area holds unique traits that serve as a refuge for all life stages of Atlantic cod as well as a unique cod population that is growing in number compared to the regional trend of population decline.

The proposed SFW project will add structure to the area that extends through the water column with a significant potential to alter the species composition of the fish targeted on Cox Ledge and beyond. For each fish caught, there are several orders of magnitude of juvenile and larval stages that failed to survive to harvest and the same mortality applies to the prey of these fish (e.g. Andersen *et al.* 2016; Sprules and Barth 2016; Sheldon et. al. 1972, Peters 1983; Sheldon and Parsons 1967). Each fish caught represents millions of early life stage individuals. The addition of structure throughout the water column will alter the ecosystem and the ecosystem dynamics for every species at every developmental life stage. It has been observed that wind farm foundations provide structure for blue mussels to colonize (Block Island Wind Farm and European Wind Farms). The blue mussels deplete the phytoplankton biomass in the water. Fisheries species abundance in highly sensitive to phytoplankton biomass (e.g. Large *et. al.* 2015; Friedland *et.al.* 2019) and serves as a marker of ecosystem health. The structure provides refuge as well as feeding grounds for mobile species. Mavraki et al. (2021) studied the reef effect of wind farms and found that benthopelagic and benthic species utilize the structures as a feeding ground for the colonizing organisms and for undetermined reasons (digestive tract analysis revealed not all species were consuming fouling fauna), however their study indicated that pelagic species residence time was not increased. Ecosystem dynamics within wind farms is not well known and wind farms constructed on top of productive regions for early life stage and bio-diversity are not yet reported or studied. There also is a significant concern that sufficient baseline data to understand these changes does not exist for the South Fork area. With the level of surveying activity currently underway, it is not possible to obtain a clean and undisturbed ecosystem assessment for the area.

Observation at the Block Island Wind Farm and experience from Denmark (Baird 2020 lectures) have shown colonization of the foundations by blue mussels. As the ecosystem shift develops, this colonization can result in an anoxic benthos due to fecal pellet loading and subsequent microbial loop recycling with an impact range of hundreds of meters from each foundation (Baird 2020, ROSA 2020 State of the Science meeting). The blue mussels also are falling off the foundation as they accumulate and colonizing the benthos nearby. The blue mussels are an effective filter feeder and will remove plankton from the full water column including phytoplankton and suspended sediments. The impact on water column will scale with the local currents and exposure of the mussels to the flow. The mussels also attract fish who prey on them. Observations at the BIWF document a shift in species around the turbine foundations. The dominant species is Black Sea Bass, a species targeted by the inshore recreational fishermen. An increase in large sport fish has not been observed, but an increase in recreational fishing has been witnessed at the BIWF mainly due to the fact that the turbines are a large visual clue as to where fish may be found and are relatively close to shore reducing the gas and time required for a trip (Black Sea Bass and Tautog, Orsted fishinar November 2020). With the significantly increased distance to the proposed SFW project, it is uncertain if this attraction will remain due to fuel costs, transit time and safety risk if adverse weather were to develop. Also if the species of fish that colonize the foundations is found closer to shore, the desire for the additional risk and cost is projected to be low. The BIWF has served as a tourist attraction for unsuccessful fishing trips where on bad days charters can retain angler's interest by offering a sightseeing tour of the wind farm when fishing is poor. This is possible to add value due to its close proximity to land keeping additional fuel costs and transit times minimal. However, the additional distance to Cox Ledge presents a significantly greater cost and risk as added value to a slow fishing trip. Thus, the BIWF offers a much greater incentive for sightseeing than the proposed SFW project.

There are significant concerns that the atmospheric wake of the wind farm will alter surface flow. This can impact the local upwelling and circulation. Based on concerns from the European experience, NOAA is concerned about growing evidence that the wind farm wakes can lead to anoxic zones extending many kilometers downwind of the wind farms. This is an area of active investigation but indicates concerns for another avenue for primary production to be altered in the surface downstream of wind farm. As mentioned above, alteration of primary production alters then entire ecosystem. The USCG has expressed concerns (DOE meeting 2020) that the wake impacts on the surface circulation will alter their ability to model the surface for search and rescue (SAR) operations. They have called for more research into the ability to accurately model the impact of the wake deficit on the surface circulation. Note that these are regional impacts that will impact stakeholders many kilometers downwind of the actual lease area.

The potential for a cable to fail presents additional risk to the environment and users of the region. While it is unlikely that a cable will be cut by an anchor, this situation did occur in July 2020 at the 12 MW Ørsted Coastal Virginia Offshore Wind (CVOW) project. Its export cable was cut the day after it was laid by a ship anchor while weathering a storm. The CVOW export cable was still exposed after being laid and the cable trench had not yet been filled in. Cable failures and faults result in approximately 85% of insurance claims for offshore wind. This risk of failure is one reason to not bury the cables too deep to keep the repair costs down but also presents environmental disturbance and impacts when repairing the cable. Also the generation capacity is lost to the ratepayers (ISO New England) while the cable is severed from the grid. And, just recently Ørsted has revealed that some of its inter-array cables in their U.K and European wind farms have been damaged by scraping against scour protection (rocks) installed around the turbine foundations and they will need to spend as much as $489 million for urgent repairs over the next two years. Ørsted has identified a total of 10 projects in the U.K. and Europe that used the cable protection design that is subject to the observed failures. See:

https://www.theguardian.com/business/2021/apr/29/rsted-says-offshore-uk-windfarms-need-urgent-repairs.

The CRMC recognizes the importance of developing offshore wind renewable energy sources to combat and reduce adverse climate change impacts, and to meet state, regional and national greenhouse gas reduction goals as detailed within the Ocean SAMP. One of the primary CRMC goals is to have co-existing human service industries of offshore renewable energy and existing fishing industries that benefit Rhode Island, while maintaining the integrity and health of the marine ecosystem, coastal resources and coastal uses. The development of offshore wind under the Ocean SAMP was envisioned as a process in a controlled and scientifically supported way under the guidance of adaptive management with a regional view. The logical development pathway was to start with demonstration projects such and Block Island Wind Farm, CVOW and the floating wind turbine project effort in Maine. The next logical step is to scale development up to a small utility scale project based on the lessons learned from the first step. Lessons learned include both scientific and stakeholder relations. Then continue to learn and scale up. This allows proactive planning based on scientific best practices. The proposed SFW project is exactly aligned with this desired progression in size and scope. Nevertheless, the location of the SFW project on Cox Ledge, an area known for its biological diversity, is in our view one of the worst possible locations for this project. There is significant uncertainty and lessons yet to be learned without siting the SFW project directly on glacial moraine, including complex marine habitat with similar characteristics as CRMC designated APC in state waters. If the same site and project were located within state waters, at least 38% of the SFW lease area would be designated as APC. The selected project location will impact important marine habitat and species found within the SFW lease area that support Rhode Island based coastal uses.

The joint venture for the South Fork Wind project has made modifications to the SFW project during the CRMC federal consistency review. The primary modification came about with several iterations of the configuration and spacing of the wind turbine foundations from 2018 into 2020. Although the spacing between turbines averaged less than 1 NM in the May and November 2019 COP revisions, the February 2020 COP included the 1 x 1 NM uniform east-west grid layout consistent with the U.S. Coast Guard recommendation for the MA-RI wind energy area. Other modifications made by the developer include a gear loss claims process, and although there was considerable negotiation during 2020 to come to terms of agreement on a standardized framework and a business interruption component, the FAB ultimately could not agree to the process as proposed by Ørsted as it does not allow applicants to file multiple claims for gear loss in the same area and any payment will be considered a full release. These condition were not accepted by the fishing community. Nevertheless, the gear loss claims process is available from the Ørsted website: https://us.orsted.com/wind-projects/mariners. SFW has also developed a fisheries communication plan to provide notice to mariners of survey and construction activities and is available from the same preceding web page. Other modifications include the addition of automatic identification system (AIS), advanced cellular, and a very high-frequency coverage into the WTGs. And, SFW intends to target sufficient cable burial depth and microsite turbine foundations to minimize impacts to sensitive benthic habitat. See South Fork Wind letter dated March 11, 2021, Appendix 20. The primary modification to the SFW project is the adjustment in the turbine foundation layout to a uniform 1 x 1 NM grid in an effort to minimize impacts to commercial and recreational fishing activities. The CRMC, however, does not consider development and implementation of a gear loss claims process and a comprehensive fisheries communication plan to be modifications to the SFW project to avoid or minimize impacts resulting from the SFW project.

Despite the modifications made to the SFW project, including the planned 1 x 1 NM uniform grid layout, the developer asserts current commercial and recreational fishing activities are expected to be able to continue post construction with minimal to no impact. However, the installation of 16 foundations within glacial moraine and an area renown for attracting fish, commercial harvesters and recreational anglers, will result in a disruption to and in some cases exclude existing Rhode Island based coastal uses over the life of the project. For example, the FAB had estimated that there would be a loss to commercial fishing landings of between 50% and 80%. See FAB January 29, 2021 letter, Appendix 21. In addition, the U.S Army Corps of Engineers within the May 11, 2021 Record of Decision for the Vineyard Wind 1 project anticipates that there is the possibility that due to the placement of the turbines it is likely that the entire 75,614 acre area will be abandoned by commercial fisheries due to difficulties with navigation. Moreover, BOEM's DEIS for the SFW project declares the following potential unavoidable impacts to commercial fisheries and for-hire recreational fishing interests: disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore project elements; disruption to harvesting activities during operations of offshore wind facilities; changes in vessel transit and fishing operation patterns; and changes in risk of gear entanglement or target species. See BOEM DEIS at 4-1.

The enforceable policy at § 11.10.1(C) requires that "the applicant modify the proposal to avoid and/or mitigate the impacts." CRMC staff have determined that despite modifications made by the developer to the proposed SFW project it will have adverse impacts on the Rhode Island based coastal uses and resources during project construction, operation and decommissioning phases. Consequently, mitigation measures are required in accordance with enforceable policies §§ 11.10.1(G) and (H).

Enforceable Policy § 11.10.1(F)

The Council shall prohibit any other uses or activities that would result in significant long-term negative impacts to Rhode Island's commercial or recreational fisheries. Long-term impacts are defined as those that affect more than one or two seasons.

SFW Response: The SFWF (and SFEC) is consistent with this policy. There are no expected significant long-term negative impacts to Rhode Island's commercial or recreational fisheries from the SFWF (and SFEC).

CRMC Analysis: The turbine foundations and the inter-array cables will be installed over a period of 4 months each. The WTG installations on the foundations will be an additional 2 month period, while the duration of the OSS installation will be 1 month. See SFW COP at 1-47. In addition, WHOI on behalf of SFW conservatively assumed that fish would return within 2 months following pile driving construction noise. Therefore, it is likely that impacts from construction activity would persist beyond 6 months or more, and affect more than one or two seasons. The general construction sequence described in Section 3.1.3 of the COP is the installation of the pile foundations followed by installation of approximately 21 miles of the inter-array cable and any necessary secondary cable protection. Given the complexity of bottom geology due to the glacial moraine and the numerous boulders (see Figure 3.4.2-1 of the BOEM SFW DEIS at 3-6; Figure 8 herein), many of which may have to be relocated to allow foundation and cable installation, it is highly likely that construction duration estimates may be exceeded beyond the COP time periods. From our experience with the Block Island Wind Farm there were numerous construction delays that significantly extended the anticipated construction duration. And given that pile driving activities will be limited to only the period between May 1 and December 31 of any year, it is possible that between weather delays and engineering constraints or installation difficulties, the anticipated construction time periods could very well be exceed beyond one or two seasons.

The enforceable policy § 11.10.1(F) considers any negative impact to Rhode Island's commercial or recreational fisheries that exceeds "one or two seasons" to be a significant long-term impact. As discussed above for enforceable policy § 11.10.1(C), absent mitigation in accordance with enforceable policies §§ 11.10.1(G) and (H), there will likely be significant adverse, long-term effects to Rhode Island-based commercial and recreational fishing activities that operated and continue to operate within the SFW project area.

Enforceable Policy § 11.10.1(G)

The Council shall require that the potential adverse impacts of offshore developments and other uses on commercial or recreational fisheries be evaluated, considered, and mitigated as described in § 11.10.1(H) of this Part.

SFW Response: The SFWF (and SFEC) is consistent with this policy. DWSF has conducted an assessment of commercial and recreational fisheries within the region, which encompasses the SFWF (and SFEC). The SFWF (and SFEC) is not expected to have major long term impacts on commercial or recreational fisheries. Environmental protection measures have been identified to mitigate any potential impacts from the SFWF.

CRMC Analysis: As shown above in the analyses for §§ 11.10.1(C) and (F) the CRMC staff have determined that there will be adverse impacts on commercial or recreational fisheries from the SFW project. Therefore, mitigation is required under this enforceable policy and in accordance with § 11.10.1(H).

Enforceable Policy § 11.10.1(H)

For the purposes of fisheries policies and standards as summarized in Ocean SAMP Chapter 5, Commercial and Recreational Fisheries, §§ 5.3.1 and 5.3.2 of this Subchapter, *mitigation is defined as a process to make whole those fisheries user groups that are adversely affected by proposals to be undertaken, or undertaken projects, in the Ocean SAMP area. Mitigation measures shall be consistent with the purposes of duly adopted fisheries management plans, programs, strategies and regulations of the agencies and regulatory bodies with jurisdiction over fisheries in the Ocean SAMP area, including but not limited to those set forth above in § 11.9.4(B) of this Part. Mitigation shall not be designed or implemented in a manner that substantially diminishes the effectiveness of duly adopted fisheries management programs. Mitigation measures may include, but are not limited to, compensation, effort reduction, habitat preservation, restoration and construction, marketing, and infrastructure improvements. Where there are potential impacts associated with proposed projects, the need for mitigation shall be presumed. Negotiation of mitigation agreements shall be a necessary condition of any approval or permit of a project by the Council. Mitigation shall be negotiated between the Council staff, the FAB, the project developer, and approved by the Council. The reasonable costs associated with the negotiation, which may include data collection and analysis, technical and financial analysis, and legal costs, shall be borne by the applicant. The applicant shall establish and maintain either an escrow account to cover said costs of this negotiation or such other mechanism as set forth in the permit or approval condition pertaining to mitigation. This policy shall apply to all large-scale offshore developments, underwater cables, and other projects as determined by the Council.*

SFW Response: The SFWF (and SFEC) is consistent with this policy. Environmental Protection Measures have been identified to mitigate any potential impacts from the SFWF (and SFEC). The SFWF Fisheries Communication Plan summaries the outreach conducted and includes a Fishing Gear Conflict Prevention and Compensation Plan that identifies measures to Prevent gear loss, as well as a claim procedure in the event that gear loss is caused by SFWF (and SFEC) activities.

CRMC Analysis: SFW, LLC has not sufficiently modified the proposed project to avoid adverse impacts to Rhode Island based coastal users and resources as a result of construction, operation and decommissioning of the proposed wind farm as explained herein. Therefore, mitigation is required to offset the adverse impacts. The developer submitted a mitigation proposal dated September 28, 2020 to the CRMC and which was subsequently distributed to the

FAB. See Appendix 6. The developer subsequently filed an update "*Economic Impact of South fork Wind to Rhode island Commercial Fisheries*" dated December 15, 2020 to address issues raised by the FAB. See Appendix 7. Additionally, the developer submitted a memorandum dated December 15, 2020 to address mitigation actions issues identified by the FAB. See Appendix 22. Multiple mitigation meetings were held between the CRMC, SFW and the FAB over the course of several months starting on October 29, 2020 and continuing into May of 2021. There was considerable disagreement between the parties on the value of commercial landings and the economic exposure of charter and recreational fishing conducted within the South Fork lease area and along the export cable route. In January 2021 SFW offered a Navigational Enhancement and Training Program that would provide $1 million for Doppler enhanced radar units and training for eligible vessels fishing within the South Fork, Revolution Wind and Sunrise Wind lease areas (all leases held by Ørsted). See Appendix 23.

On March 11, 2021 the developer submitted a memorandum to summarize modifications to the SFW project and their proposed comprehensive mitigation package, including direct monetary compensation to address project impacts. See Appendix 24. The FAB then submitted a document dated March 25, 2021 to respond to the developer's claims and perceived inaccuracies, as well as restating that the FAB expects a 50-80% loss of fishing revenues during the SFW project operation phase. See Appendix 25. In addition, the FAB submitted a letter dated April 20, 2021 to address the developer's comprehensive mitigation proposal and offered additional mitigation actions that should be considered, including: (1) recreating populations of important commercial and recreational species outside of the lease area; (2) avoid pile foundation driving during December-March and May-October; and (3) avoid pile driving within 9 km (summer) to 11 km (winter) of an active fishing vessel, among other non-compensatory mitigation recommendations. See Appendix 26. In correspondence dated May 24 and May 28, 2021 the developer summarized their proposed compensatory mitigation for SFW including the funding mechanism for the proposed Direct Compensation Find and the Coastal Community Fund. See Appendices 27 and 28, respectively.

A number of compensatory mitigation offers by the developer and counter offers by the FAB were proposed in an attempt to reach agreement on mitigating for potential economic losses and impacts to the resources in an effort to "make whole those fisheries user groups that are adversely affected by proposals" and to mitigated for adverse impacts as required under the enforceable policy. Despite significant CRMC staff efforts over the course of more than 30 meetings since October 2020, the three parties (CRMC, FAB and developer) were unable to reach an agreement on mitigation. In the applicant's September 28, 2020, mitigation proposal South Fork Wind, LLC acknowledges the need for mitigation to impacted fishermen in order to meet the CRMC's mitigation enforceable policies §§ 11.10.1(C), (G) and (H).

As a result of extensive mitigation negotiations conducted between the CRMC, the FAB and South Fork Wind from October 2020 through May 2021, South Fork Wind has agreed to provide a fisheries mitigation compensation fund for enforceable policies §§ 11.10.1(C), (G) and (H). This includes $5.2 million to be distributed into a Commercial Fisheries Compensation Fund and a Coastal Community Fund as part of their overall mitigation package to offset unavoidable impacts to Rhode Island based fishermen that will be impacted by the proposed SFW project. The direct compensation fund is intended for claims of direct impact to compensate Rhode Island fishermen for loss of access or reduction of harvest, which is a liability fund needed to meet BOEM requirements. The fisheries mitigation was negotiated between the CRMC, South Fork Wind and the FAB in accordance with enforceable policy § 11.10.1(H). The FAB, however, recommended to the CRMC that the proposed fisheries mitigation in their view was insufficient to mitigate for unavoidable impacts to Rhode Island based fishermen.

The CRMC cannot require monetary compensation for mitigation as part of its CZMA federal consistency decision. Therefore, the CRMC could not object to the applicant's consistency certification solely for failure to pay a compensation amount. The CRMC and an applicant, however, can mutually agree that a monetary compensation amount is sufficient to meet enforceable policies §§ 11.10.1(C), (G) and (H). Based on the proposed mitigation including the $5.2 million to be distributed into a Commercial Fisheries Compensation Fund and a Coastal Community Fund as part of the developer's overall mitigation package, CRMC staff conclude that the SFW project is consistent with enforceable policy § 11.10.1(H). The compensatory mitigation will be implemented in accordance with the *Agreement Regarding the Establishment and Funding of the Rhode Island Fisheries Direct Compensation Program and Coastal Community Fund* entered into by the CRMC and South Fork Wind, LLC and executed On June 30, 2021. See Appendix 30.

Enforceable Policy § 11.10.1(I)

The Council recognizes that moraine edges, as illustrated in Figures 3 and 4 in § 11.10.2 of this Part, are important to commercial and recreational fishermen. In addition to these mapped areas, the FAB may identify other edge areas that are important to fisheries within a proposed project location. The Council shall consider the potential adverse impacts of future activities or projects on these areas to Rhode Island's commercial and recreational fisheries. ***Where it is determined that there is a significant adverse impact, the Council will modify or deny activities that would impact these areas****. In addition, the Council will require assent holders for offshore developments to employ micro-siting techniques in order to minimize the potential impacts of such projects on these edge areas.* (Emphasis added.)

SFW Response: The SFWF (and SFEC) is consistent with this policy. The SFWF (and SFEC) has been sited to avoid areas of particular concern, including moraine edges. When avoidance is not possible, protection measures will be employed to avoid to minimize impact to any moraine edges.

CRMC Analysis: The SFW project has not been sited to avoid glacial moraine (APC). In fact, a number of turbine foundations and inter-array cables are presently proposed to be located within glacial moraine, despite the potential to microsite some foundations. The CRMC Fishermen's Advisory Board has indicated their preference that no part of the SFW lease area be developed due to the ecological and economic significance of Cox Ledge where the SFW project is sited. Cox Ledge has been designated the "crown jewel" by the Rhode Island based fishing community because it provides a unique spot for recreational and charter fishing activity with high probabilities to attract a large diversity of species including large pelagic predators which attract sport fishing from all over the East Coast, and Atlantic cod fish can be found there year round (Ocean SAMP Chapter 5). The Cox Ledge area provides critical ecosystem benefits for early life stages. The developer conducted more detailed high resolution benthic habit mapping than was available with the development of the Ocean SAMP more than a decade ago, and the information was provided to Federal and State agencies. The SFW analysis revealed that a number of the foundation locations will have to be micro-sited, as may be permissible under BOEM regulations at 30 C.F.R. § 585.634, in an effort to minimize impacts to glacial moraine.

As noted herein, the glacial moraine present on the SFW lease site meets the characteristics and definition of CRMC designated Areas of Particular Concern in enforceable polices §§ 11.10.2(A) and 11.10.2 (C)(3). And, although the developer intends to microsite turbine foundations in an effort to avoid or minimize impacts to glacial moraine, the presently proposed SFW project has not avoided significant adverse impacts to glacial moraine. See further discussion on glacial moraine in enforceable policy § 11.10.2(B). Therefore, mitigation measures are required in accordance with enforceable policies §§ 11.10.1(C), (G) and (H).

Enforceable Policy § 11.10.1(J)

The finfish, shellfish, and crustacean species that are targeted by commercial and recreational fishermen rely on appropriate habitat at all stages of their life cycles. While all fish habitat is important, spawning and nursery areas are especially important in providing shelter for these species during the most vulnerable stages of their life cycles. The Council shall protect sensitive habitat areas where they have been identified through the Site Assessment Plan or Construction and Operation Plan review processes for offshore developments as described in § 11.10.5(C) of this Part.

SFW Response: The SFWF (and SFEC) is consistent with this policy. The SFWF (and SFEC) is not expected to have negative effects on commercially and recreationally fished species and habitats. Siting of the SFWF (and SFEC) was informed by site specific habitat assessments. Impacts to habitat are expected to be short-term and localized. Environmental protection measures have been identified to minimize the potential impacts.

CRMC Analysis: A number of economically and ecologically important finfish species are found within the SFW lease area and along the export cable route, and are listed in Table 4.3-10 of the SFW COP. In addition the South Fork lease area has been identified by NOAA as containing essential fish habitat (EFH) for a number of fish species, including eggs, larvae, juvenile and adults that are listed in Table 7 of Appendix O - Essential Fish Habitat Assessment of the SFW COP. Within Section 2.4 it states “EFH and EFH-designated species will be affected by construction, installation, decommissioning, and O&M of the SFWF and SFEC based in part on the life stage and habitat-type of the organism at the time of various project activities.” See

SFW COP Appendix O at 2-31. Project effects to EFH include population level impacts to Atlantic cod, benthic habitat impacts, habitat conversion and community structure alteration, invasive species and sedimentation effects. Much of this EFH is associated with the glacial moraine geology and bottom structure within the SFW project site, and the glacial moraine issue is addressed within enforceable policy section § 11.10.2(B).

Given the project impacts described within the coastal effects section, the glacial moraine impacts identified herein and that the associated sensitive habitat areas will be impacted by construction, installation, decommissioning, and operation and maintenance (O&M) of the SFW project, it is necessary for the project alternative as recommended by CRMC staff to meet this enforceable policy whereby the Council shall protect sensitive habitat areas. We conclude that absent the CRMC staff recommended project alternative, as described below in enforceable policy § 11.10.2(B), to deduce the size of the SFW project to minimize impacts, the project is <u>not</u> consistent with this enforceable policy.

Enforceable Policy § 11.10.2(B)

The Council has designated the areas listed below in § 11.10.2(C) of this Part in state waters as Areas of Particular Concern. ***All large-scale, small-scale, or other offshore development, or any portion of a proposed project, shall be presumptively excluded from APCs****. This exclusion is rebuttable if the applicant can demonstrate by clear and convincing evidence that there are no practicable alternatives that are less damaging in areas outside of the APC, or that the proposed project will not result in a significant alteration to the values and resources of the APC. When evaluating a project proposal, the Council shall not consider cost as a factor when determining whether practicable alternatives exist. Applicants which successfully demonstrate that the presumptive exclusion does not apply to a proposed project because there are no practicable alternatives that are less damaging in areas outside of the APC must also demonstrate that all feasible efforts have been made to avoid damage to APC resources and values and that there will be no significant alteration of the APC resources or values. Applicants successfully demonstrating that the presumptive exclusion does not apply because the proposed project will not result in a significant alteration to the values and resources of the APC must also demonstrate that all feasible efforts have been made to avoid damage to the APC resources and values. The Council may require a successful applicant to provide a mitigation plan that protects* *the ecosystem. The Council will permit underwater cables, only in certain categories of Areas of Particular Concern, as determined by the Council in coordination with the Joint Agency Working Group. The maps listed below in § 11.10.2(C) of this Part depicting Areas of Particular Concern may be superseded by more detailed, site-specific maps created with finer resolution data.* (Emphasis added.)

SFW Response: The SFWF (and SFEC) is consistent with this policy. The SFWF (and SFEC) is located in federal waters, but within the RI Ocean SAMP study area, **and was sited to avoid Areas of Particular Concern**. When avoidance is not possible, protection measures will be employed to avoid or minimize impacts to Areas of Particular Concern. (Emphasis added)

CRMC Analysis: CRMC designated APC in state waters include: areas with unique or fragile physical features, or important natural habitats; areas of high natural productivity, among other attributes, and glacial moraine. In accordance with Ocean SAMP enforceable policy § 11.10.2(C)(3) areas of glacial moraine within state waters are defined as Areas of Particular Concern (APC) because they contain complex and valuable habitats for fish and other marine life that are important to commercial and recreational fishermen. The SFW project is located on a terminal glacial moraine that the SFW COP defines as a "high boulder hazard area." See COP at 4-79. In addition, during the execution of the 2017 geophysical survey for the SFW project, potentially challenging seabed conditions were detected that led to the decision to shift the wind farm area eastward. Multi-beam geophysical survey data identified the presence of dense cobble, rock, and boulders on the seabed in the western-most region of the originally proposed SFW survey area. *Id* at 2-7. In other words, the expansion of the proposed project area eastward was to avoid dense cobble, rock, and boulders, which constitute glacial moraine.

The SFW project is located on glacial moraine and the lease area has similar characteristics as described for CRMC designated APC, e.g., glacial moraine, an area with important natural habitat and high natural productivity, and substantial recreational value and high fishing activity. The South Fork DEIS categorizes glacial moraine and coarse sediment under complex habitat because boulders, cobbles, and pebbles dominate the sea floor in these areas. See DEIS at 3-5. And, as described above in Section C there are nine (9) wind turbine foundations located within complex habitat, including both alternative WTGs 16A and 17A, and one (1) WTG and the single OSS foundation are located within potentially complex habitat. See DEIS at 3-6.

On January 16, 2019 CRMC staff issued its 3-month letter required under 15 C.F.R. § 930.77(a)(3) that alerted Ørsted there were likely proposed turbine foundations located within CRMC identified glacial moraines as depicted within §§ 11.10.2(F) and (G) of the Ocean SAMP. The letter requested Ørsted to provide additional information to confirm whether proposed turbine foundations were or were not located within a glacial moraine, a moraine edge or an area of particular concern.

Ørsted engaged Inspire Environmental to review high resolution geological and geophysical survey data completed for the South Fork project and to develop maps depicting glacial moraines and benthic habitats. A report titled *Glacial Moraines and Benthic Habitats: Delineation of Seabed Classification and Benthic Habitats for South Fork Wind Farm and Export Cable* (Inspire report) was provided to the CRMC on March 19, 2020 (the last iteration of the Inspire report is dated November 23, 2020). See Appendix 29. Based on review of the Inspire report CRMC staff alerted Ørsted on March 24, 2020 that there were at least 5 turbine foundations located within CRMC designated APC and as such were presumptively excluded in accordance with the enforceable policies. CRMC staff also advised Ørsted that pursuant to the enforceable policies they would need to demonstrate that there are no practicable alternatives that are less damaging in areas outside of the APC and that all feasible efforts have been made to avoid damage to APC resources and values and that there will be no significant alteration of the APC resources or values. See Ocean SAMP § 11.10.2(B).

The Inspire report notes that the proposed turbine foundations 1, 8, 9, 10, the two alternative turbine foundations (16A and 17A) along with sections of the inter-array cable are located within glacial moraine (a total of six foundations). At the request of CRMC, Dr. John King and Dr. Bryan Oakley reviewed the Inspire report and provided comments on the methodology used to classify bottom habitat and recommendations for relocating turbine foundations and associated inter-array cable to avoid or minimize placement within glacial moraine. Ørsted has indicated that they intend to microsite turbine foundations within the permissible distance of 500 feet pursuant to BOEM's regulations at 30 C.F.R. § 585.634 in an effort to avoid or minimize impact to glacial moraine to the extent feasible given ongoing regulatory consultations and any engineering or installation constraints. And, given the complex nature of the SFW site geology, it is entirely possible that engineering constraints may limit micrositing capability, thereby limiting the usefulness of micrositing to reduce impacts. In addition, under the DEIS Fisheries Habitat Impact Minimization Alternative, BOEM would require the developer to exclude certain WTGs and associated cable locations within complex habitats should micrositing not be possible to maintain a uniform east–west and north–south grid of 1 × 1 NM spacing between WTGs with diagonal transit lanes of at least 0.6 NM wide. See DEIS at 2-9.

The SFW turbine foundation layout is consistent with the offshore wind industry's November 2019 proposed 1 x 1 NM uniform grid wind farm layout. See Appendix 9. In the figure below CRMC staff has identified several SFW turbine foundations and associated inter-array cables located within glacial moraine that would be designated as APC in state waters, as defined at Ocean SAMP § 11.10.2(C)(3). Based on this information Ørsted has not sited foundations and inter-array cables to avoid glacial moraine (APC) as asserted within their consistency certification. The CRMC enforceable policy at § 11.10.2(B) presumptively excludes all offshore development located within APC, which includes glacial moraine. The exclusion, however, is rebuttable if the applicant can demonstrate by clear and convincing evidence that there are no practicable alternatives that are less damaging in areas outside of the APC, or that the proposed project will not result in a significant alteration to the values and resources of the APC, and that "all feasible efforts have been made to avoid damage to the APC resources and values."

BOEM anticipates direct effects to essential fish habitat as a result of the SFW project footprint, the SFEC and surrounding areas that could be measurably affected by project construction and installation. See DEIS at 3-4. In addition, the SFW project is sited on Cox Ledge, an area of concern for federal fishery managers because it provides important habitat for commercially important species, including spawning habitat for Atlantic cod. As we note within the CRMC South Fork Wind - Coastal Effect Analysis, the SFW project is located on Cox Ledge, one of the most important areas in all of Rhode Island Sound for species richness and biodiversity, and an area identified by NOAA where Atlantic cod are known to aggregate and spawn. The CRMC Ocean SAMP makes repeated note of the importance of Cox Ledge, especially in Chapter 5 – Commercial and recreational Fisheries. NOAA suggests that the Cox

Ledge area supports a genetically differentiated spawning group of the regional Atlantic cod population (NOAA 2020a). The available information and scientific observations supports NOAA's finding that Cox Ledge contains significant and essential fish habitat, especially for Atlantic cod. Of the six criteria that define CRMC Areas of Particular Concern in § 11.10.2(A), at least four of these characteristic are applicable to the SFW project area. These include: areas with unique or fragile physical features, or important natural habitats; areas of high natural productivity; areas of substantial recreational value; and areas of high fishing activity.

Figure 17. South Fork Wind turbine locations (based on wind industry 1 x 1 uniform grid layout provided by Ørsted on 1/28/20) within the OCS-A 0517 lease area represented by red lines. The yellow shaded polygon areas are glacial moraine and meet the requisite criteria as Areas of Particular Concern (APC) as identified by the CRMC in the enforceable policies.

When the 15 turbine SFW project consistency certification was filed with the CRMC in October 2018, the project was located within lease OCS-A 0486 (Deepwater Wind lease). However, 15 months after BOEM initiated development of the SFW DEIS and CRMC had begun its federal consistency review, Ørsted submitted a request to BOEM on January 16, 2020 to assign a portion of Lease OCS-A 0486 (97,498 acres) to a different entity, DWSF. The lease assignment was approved by BOEM on March 23, 2020, and segregated the area assigned from Lease OCS-A 0486 and created a new much smaller lease assignment OCS-A 0517 consisting of 13,700 acres. In so doing, however, the newly assigned lease area was essentially the same boundary as the SFW project area, and unnecessarily restricted potential project alternatives to be considered under the EIS, such as relocating turbines out of glacial moraine or outside of the project boundary, to avoid or minimize impacts to Cox Ledge resources and essential fish habitat. Prior to BOEM's approval of the newly assigned lease area OCS-A 0517, cooperating agencies involved in the BOEM EIS process, including the CRMC, had advocated for an alternative for the SFW project that would have relocated turbines elsewhere within the OCS-A 0486 lease to reduce impacts to Cox Ledge habitat and resources. However, the CRMC and other state and federal cooperating agencies on the SFW project learned of the lease reassignment request after the fact, and were not able to provide comment or perspective on the lease reassignment request. BOEM provides an explanation within Table 2.1.5-1 Alternatives Considered but Dismissed from Detailed Analysis. See DEIS at 2-12. Nevertheless, in our opinion Ørsted created their own hardship in this matter by segregating the 0517 lease area from the much larger 0486 lease during BOEM's ongoing DEIS development process, and thus eliminated the feasibility for an alternative to relocate SFW turbine foundations to avoid damage to glacial moraine (APC) resources and values.

The SFW COP and DEIS indicate that the purpose of the SFW project is to develop a commercial-scale offshore wind energy facility in the area of the lease with wind turbine generators (WTGs), an offshore substation, and one transmission cable making landfall in Suffolk County, New York. The project would contribute to New York's renewable energy requirements, particularly the state's goal of 9,000 MW of offshore wind energy generation by 2030. The goal of the developer is to fulfill its contractual commitments to the Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017 resulting from LIPA's technology-neutral competitive bidding process.

The purchase and power agreement (PPA) between LIPA and Deepwater Wind South Fork, LLC executed on February 6, 2017 and subsequently amend in 2018 requires SFW, LLC to deliver 130 MW (previously 90 MW) of renewable wind energy to the LIPA (https://www.lipower.org/wp-content/uploads/2018/12/4-Recommendation-for-2019-Budget-

Approval-1.pdf). In addition, the DEIS indicates that the interconnection at the East Hampton substation is currently limited to no more than 130 MW, which matches the energy production requirement of the PPA with LIPA. See DEIS at D-3. Since the SFW project maximum design size specifications within the COP and as described in the DEIS allows up to a 12 MW WTG, then it stands to reason that only eleven (11) WTGs would be required to meet the purpose and need of the project and fulfill SFW's obligation to the LIPA under their PPA.

Offshore wind industry technology is rapidly changing and larger wind turbine generators are being planned for new projects. In fact, late last year Vineyard Wind requested BOEM to consider use of a 14 MW WTG (upgraded from previously planned 9.6 MW units) for the Vineyard Wind 800 MW project. BOEM has now issued its Final EIS and record of decision in the Vineyard Wind matter as of May 10, 2021. Therefore, it is highly likely that SFW will use the 12 MW WTGs for its project, which is within the range considered by the COP. The CRMC staff, however, only learned on May 23, 2021 from the developer that they had entered into a contract for 11 MW WTGs for the SFW project, which was subsequently verified by Ørsted. Thus, the staff assumption that the developer would likely use 12 MW WTGs was incorrect. Nevertheless, by using the 11 MW units for the SFW project the developer could further reduce impacts within the SFW lease on Cox Ledge by reducing the number of turbine foundations from 15 to 12, thus eliminating some turbine foundations that are located in areas that contain glacial moraine resources and values that support uses or resources of Rhode Island's coastal zone that are similar to areas in state waters designated as Areas of Particular Concern.. In April of this year BOEM submitted its *South Fork Wind Farm and South Fork Export Cable - Essential Fish Habitat Assessment with NOAA Trust Resources* to the National Marine Fisheries Service (NMFS) as required under federal law. Based on the significant area of glacial moraine complex bottom habitat shown in Figure 3.4.2-1 of the SFW DEIS we anticipate that that several turbine foundation locations may be eliminated for consideration by BOEM consistent with the Fisheries Habitat Impact Minimization Alternative (Section 3.4.2.2.5 of the DEIS) because micrositing of turbine foundations in and of itself will not be sufficient to avoid impacts to glacial moraine and important benthic habitat.

The CRMC enforceable policy at § 11.10.2(B) requires the developer to demonstrate that "all feasible efforts have been made to avoid damage to the APC resources and values." And, the enforceable policy at § 11.10.2(C)(3) specifies that glacial moraines are important habitat areas for a diversity of fish and other marine plants and animals because of their relative structural permanence and structural complexity. Despite the developer's intention to microsite turbine foundations locations to the extent feasible in consideration of engineering and installation constraints, several turbine foundations and inter-array cables will still be located within areas that contain glacial moraine. It is very likely that engineering constraints will limit the ability to microsite pile foundations, especially because buried boulders present a significant potential hazard to piled foundations at this site. See SFW COP at 4-79.

Given that there are multiple pile foundations and inter-array cables presently proposed within areas that contain glacial moraine resources and values that support uses or resources of Rhode Island's coastal zone that are similar to areas in state waters designated as Areas of Particular Concern, and the COP shows that more turbines are proposed than necessary to meet the purpose and need of the SFW project, it is our determination that the developer has not demonstrated that "all feasible efforts" have been made to meet the enforceable policy § 11.10.2(B). BOEM may approve fewer turbine foundations locations than currently proposed by the developer under the DEIS Fisheries Habitat Impact Minimization Alternative in consultation with NMFS concerning essential fish habitat issues. It is likely that NMFS will recommend that specific turbine foundations be removed for consideration by BOEM due to significant long-term-impacts to essential fish habitat within the SFW lease area. It is our conclusion that a state condition minimizing the number of WTG foundations and associated inter-array cables within areas that contain glacial moraine is a feasible alternative that allows the developer to meet the SFW project purpose and need to generate 130 MW for renewable energy goals, and importantly demonstrate compliance with the CRMC enforceable policy.

Thus, by using the 11 MW wind turbine generators, as permissible within the project design envelop, only 12 turbine foundations are necessary to meet the purpose and need of the SFW project and to meet its contractual obligation with the LIPA. This CRMC alternative would eliminate the currently proposed turbine foundations and inter-array cables that impact glacial moraine and important benthic habitat. The applicant verbally agreed to the CRMC proposed condition for a maximum of 12 wind turbine foundations at the Council's May 25, 2021, public meeting in this matter, but to our knowledge the developer has not submitted a written acknowledgement to BOEM of their agreement with the CRMC condition. Nevertheless, with the condition that the project will include no more than 12 turbine foundations to minimize the anticipated substantial long-term or permanent impacts to glacial moraine on the South Fork project site, which provides complex habitats that support commercial and recreational marine species that are relied upon by Rhode Island based coastal users, the CRMC concludes that the SFW project would be consistent with the enforceable policy § 11.10.2(B).

Enforceable Policy § 11.10.2(C)(3)

Areas of particular concern that have been identified in the Ocean SAMP area in state waters are described as follows: (3) Glacial moraines are important habitat areas for a diversity of fish and other marine plants and animals because of their relative structural permanence and structural complexity. Glacial moraines create a unique bottom topography that allows for habitat diversity and complexity, which allows for species diversity in these areas and creates environments that exhibit some of the highest biodiversity within the entire Ocean SAMP area. The Council also recognizes that because glacial moraines contain valuable habitats for fish and other marine life, they are also important to commercial and recreational fishermen. Accordingly, the Council shall designate glacial moraines as identified in Figures 3 and 4 in § 11.10.2 of this Part as Areas of Particular Concern.

SFW Response: The SFWF (and SFEC) is consistent with this policy. The SFWF (and SFEC) has been sited to avoid areas of particular concern. When avoidance is not possible, protection measures will be employed to avoid to minimize impact to glacial moraines.

CRMC Analysis: For the reasons stated above under CRMC enforceable policy § 11.10.2(B), which is relevant to this section, the CRMC finds that with the condition for no more than 12 turbine foundations that the SFW project is consistent with enforceable policy § 11.10.2(C)(3).

F. Conclusion

Pursuant to 15 C.F.R. §§ 930.4 and 930.78, and for the reasons detailed herein, the CRMC has determined that with the CRMC condition for the project minimization alternative of no more than 12 turbine foundations in combination with the applicant's proposed compensatory mitigation and all other mitigation measures, including the applicant's proposed Navigational Enhancement and Training Program, that the proposed activity complies with the enforceable policies of the Rhode Island coastal management program. Based on our review of the SFW project and its effects on Rhode Island coastal resources and uses in the Rhode Island coastal zone, the CRMC **conditionally concurs** with the consistency certification filed with the CRMC by SFW in this matter and that the activity **as conditioned** by the CRMC is consistent with the Rhode Island coastal program enforceable policies. In addition, CRMC staff have reviewed all other applicable enforceable polices of the Ocean SAMP at 650-RICR-20-05-11 not specifically identified above and have determined that the South Fork Wind project is consistent with those state enforceable policies.

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Appendices

Appendix 1 - CRMC South Fork public notice (3/4/19)

Appendix 2 – CLF, NRDC & NWF comments to CRMC (4/30/19)

Appendix 3 – Combined Stay Agreements

Appendix 4 – RIDEM memorandum to CRMC (3/12/21)

Appendix 5 – RISAA Draft angler location survey 2021

Appendix 6 – South Fork Mitigation proposal (9/28/20)

Appendix 7 - South Fork Mitigation proposal addendum (12/15/20)

Appendix 8 – CRMC 3-month letter (1/16/19)

Appendix 9 – Wind industry proposed 1 x 1 NM layout proposal (11/1/19)

Appendix 10 – RICFC fisheries monitoring plan comments (10/2/19)

Appendix 11 – RIDEM DMF fisheries monitoring comments (10/10/19)

Appendix 12 – RIDEM DMF fisheries monitoring comments (1/3/20)

Appendix 13 – SFW Fisheries Research & Monitoring Plan (9/30/20)

Appendix 14 – CRMC & RIDEM letter to Ørsted re: survey vessel activities (8/14/19)

Appendix 15 – CRMC – Ørsted MOU re: survey activities (October 2019)

Appendix 16 – CRMC BOEM Deepwater Wind SAP concurrence (9/8/17)

Appendix 17 – CRMC –FAB letter re: SAP (3/3/20)

Appendix 18 – Ørsted RI economic development estimate (4/16/21)

Appendix 19 – CRMC SFW estimated potential fishing losses (5/17/21)

Appendix 20 – SFW letter to CRMC (3/11/21)

Appendix 21 – FAB concerns re: SFWF and Cox Ledge (1/29/21)

Appendix 22 – SFW Project, Mitigation Settlement RI CRMC memorandum (12/15/20)

Appendix 23 - SFW-RI Navigational Enhancement and Training Program (1/8/21)

Appendix 24 - South Fork Wind, LLC's Comprehensive Mitigation Proposal (3/11/21)

Appendix 25 - FAB response to Orsted Submissions (3/25/21)

Appendix 26 – FAB response to Ørsted march 11 letter (4/20/21)

Appendix 27 – SFW amended mitigation proposal (5/24/21)

Appendix 28 – SFW fisheries mitigation funding mechanism (5/28/21)

Appendix 29 – SFW Glacial Moraines and Benthic Habitats report (11/23/20)

Appendix 30 – SFW fisheries mitigation agreement (6/30/21)

STATE OF RHODE ISLAND
COASTAL RESOURCES MANAGEMENT COUNCIL

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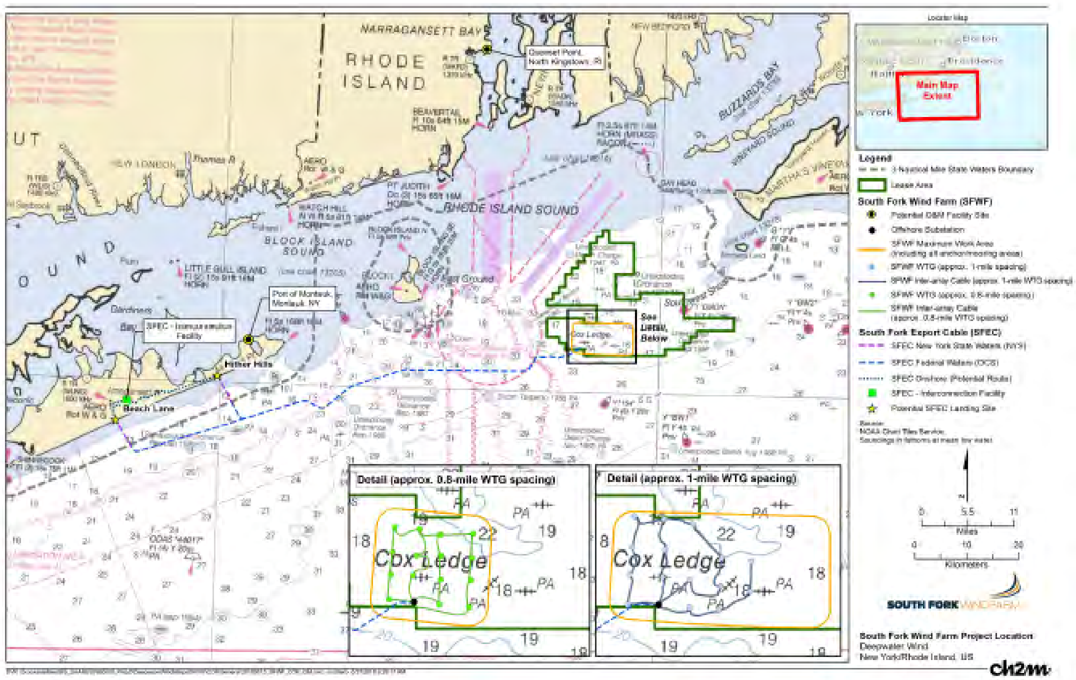
PUBLIC NOTICE

The Coastal Resources Management Council ("CRMC") is in receipt of a federal consistency certification filed by Deepwater Wind South Fork, LLC ("Deepwater Wind") on October 22, 2018 for the proposed construction and operation of an offshore wind energy project known as the South Fork Wind Farm ("SFWF"). It will consist of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY. The SFWF project will be located in offshore waters approximately 19 miles southeast of Block Island, RI within BOEM Lease Area OCS-A 0486 and the CRMC's 2011 Geographic Location Description (GLD). No portion of the project will be located within Rhode Island state waters (i.e., within 3 nautical miles of land).

Deepwater Wind filed its Construction and Operations Plan ("COP") with the Bureau of Ocean Energy Management ("BOEM") on June 29, 2018 for a federal license to construct and operate the proposed SFWF project. BOEM issued a Notice of Intent to prepare an Environmental Impact Statement for the proposed SFWF project on October 19, 2018 and held a public scoping meeting in Narragansett, RI on November 8, 2018. Deepwater Wind's federal COP along with other project information is available on the BOEM website at: https://www.boem.gov/South-Fork/.

Pursuant to 15 CFR Part 930 Subpart E (Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities), the CRMC as the State's authorized coastal zone management agency must make a determination as to whether the proposed SFWF project is consistent with the enforceable policies of the State's federally approved coastal management program, in particular the CRMC's Ocean Special Area Management Plan (650-RICR-20-05-11). The State's concurrence is required before BOEM may approve or approve with conditions the Deepwater Wind SFWF COP pursuant to 30 CFR § 585.628(f).

The CRMC and Deepwater Wind have entered into an agreement to stay the CRMC's six-month review period in this matter in accordance with 15 CFR § 930.60(b). The agreement was executed on February 14, 2019 and the CRMC's consistency decision in this matter will be due no later than **October 25, 2019**. Deepwater Wind's consistency certification, the COP and other information have been assigned CRMC file number **2018-10-082** and can be reviewed at the CRMC office during regular office hours (Monday-Friday 8:30 am to 4:00 pm) or on the CRMC website at http://www.crmc.ri.gov/windenergy/dwsouthfork.html.



The CRMC is providing this public notice on Deepwater Wind's consistency certification in accordance with 15 CFR § 930.61. All interested parties are invited to submit written comments concerning the proposed Project on or before **April 30, 2019**. Comments should be specifically directed to the issue as to whether the proposed SFWF project is consistent with the enforceable policies and standards of the Rhode Island Coastal Resources Management Program. The CRMC will hold a **public meeting** in this matter on a **date and place to be announced at a later date**.

Mailing Address for Public Comment Submissions:

Coastal Resources Management Council
Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879.
ATTN: Grover J. Fugate, CRMC Executive Director.

Comments may also be electronically filed with the CRMC at: cstaff1@crmc.ri.gov

Signed this 4th day of March 2019.

Jeffrey M. Willis, Deputy Director
Coastal Resources Management Council

Submitted electronically to: cstaff1@crmc.ri.gov

April 30, 2018

Grover J. Fugate
Executive Director
Rhode Island Coastal Resources Management Council
Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879.

Re: South Fork Wind Project -- Rhode Island Federal Consistency Certification (CRMC file number 2018-10-082)

Dear Mr. Fugate:

On behalf of Conservation Law Foundation, the Natural Resources Defense Council and National Wildlife Foundation, we submit the following comments to the Rhode Island Coastal Resources Management Council (CRMC) regarding the state of Rhode Island's federal consistency review of the South Fork Wind Farm. The proposed South Fork Wind Farm Project ("Project"), submitted by Deepwater Wind ("Deepwater Wind")[1] will consist of up to 15 wind turbine generators, submarine cable between the generators, an offshore substation located within federal waters and an export cable that will make landfall on Long Island, NY. The Project will be located in offshore waters approximately 19 miles southeast of Block Island, Rhode Island within Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0486 and the CRMC's 2011 Geographic Location Description. No portion of the project is located within Rhode Island state waters; however, this Project will have reasonably foreseeable impacts on Rhode Island's coastal resources.[2]

Our organizations applaud the State of Rhode Island's leadership to advance offshore wind power, which can bring significant environmental and economic benefits to the region when developed responsibly and with careful attention to avoid, reduce and mitigate impacts to coastal and marine wildlife. Our primary concern in reviewing this Project is the health and status of North Atlantic right whales -- particularly the potential adverse impacts of increased underwater noise and vessel traffic. Specifically, we are concerned that the Coastal Zone Management Consistency Statement for Rhode Island[3] submitted for the South Fork Wind Farm

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[1] Deepwater Wind was acquired by Orsted in October 2018. Because the Rhode Island Coastal Resources Management Council, in its notice of public comment on the South Fork Wind Farm project, refers to the project proponent as Deepwater Wind, we will do the same for the purposes of this comment letter.
[2] See http://www.crmc.ri.gov/windenergy/dwsouthfork/SFWF-CRMC_PubNotice_2018-10-082.pdf.
[3] Deepwater Wind voluntarily submitted to the Rhode Island Coastal Resources Management Council their "Coastal Zone Management Consistency Statements (New York, Rhode Island, and Massachusetts)," certifying that their proposal is consistent with enforceable program policies of the Rhode Island federally-approved Coastal Resource Management Program and in particular the Rhode Island Ocean Special Area Management Plan (Ocean SAMP). *See* https://www.boem.gov/Appendix-A/ and http://www.crmc.ri.gov/samp_ocean/finalapproved/RI_Ocean_SAMP.pdf The enforceable polices of the Ocean SAMP are codified in the Rhode Island Code of Regulations available at: https://rules.sos.ri.gov/organizations/subchapter/650-20-05.

Project does not adequately address the potential impacts of the Project on critically endangered North Atlantic right whales despite their persistent presence in significant numbers throughout the Project area.

Our organizations are deeply committed to the development of clean, renewable wind energy as expeditiously as possible and in an environmentally responsible manner. We support the development of offshore wind for its environmental and economic benefits, including access to a secure and sustainable energy source and mitigating the effects of climate change. The availability of offshore wind energy will facilitate our country's move away from outdated fossil fuels that have caused devastating and ongoing damage to the environment and to public health. The deployment of offshore wind at scale off the coast of New England presents enormous opportunities for the New England states in pursuit of decarbonizing the electric generation sector. The State of Rhode Island has been a leader in this effort, with the nation's first offshore wind project in operation, the recent contract for 400 MW of the Revolution Wind project, and the potential to contract for an additional 400 MW of offshore wind in the next year.

Our comments seek to ensure that Rhode Island retains its leadership role in the development of offshore wind resources while also leading in protection for vulnerable species in the marine ecosystem. When completing its federal consistency review the State must meet its obligations under the Coastal Zone Management Act of 1972, 16 U.S.C. § 1456, to ensure that the Project is consistent with the enforceable policies of its federally approved Coastal Resources Management Program.[4] With these comments we urge the State of Rhode Island to do everything in its power during its federal consistency review to ensure that potential adverse effects of offshore wind development on critically endangered North Atlantic right whales are mitigated to the maximum extent practicable.

I. Status and Threats to the Critically Endangered North Atlantic Right Whale and Other Large Whales

As the State of Rhode Island is aware, the conservation status of the North Atlantic right whale is dire. Listed as endangered under the U.S. Endangered Species Act for decades, recent scientific analysis confirms that the population has been declining since 2010 due to entanglements in commercial fishing gear and ship strikes. In the last two years, at least 20 animals have died, and the population is now estimated to be no more than 420 individuals. Moreover, females are more negatively impacted than males, surviving to only 30-40 years of age with an extended inter-calf interval of approximately ten years.[5]

[4] *See* the Rhode Island Ocean Special Area Management Plan Chapter 11 (Policies of the Ocean SAMP) at http://www.crmc.ri.gov/samp_ocean/finalapproved/RI_Ocean_SAMP.pdf. The enforceable policies and regulations of the Ocean SAMP are also contained in the Rhode Island Code of Federal Regulations, Subchapter 650-RICR-20-05, Part 11 available at https://rules.sos.ri.gov/organizations/subchapter/650-20-05.

[5] Pace III, R.M. *et al*., "State-space mark-recapture estimates reveal a recent decline in abundance of North Atlantic right whales," *Ecology and Evolution*, vol. 7, no. 21, pp. 8730-8741 (2017); Kraus SD, "*Marine mammals in the Anthropocene: Keeping endangered from becoming extinct*," Plenary speech. Society of Marine Mammalogy Biennial, Halifax, Canada (23 Oct 2017).

In the wake of an alarming number of deaths of North Atlantic right whales in 2017, NMFS declared an Unusual Mortality Event (UME),[6] which devotes additional federal resources to determining and—if possible—mitigating the source of excessive mortality. This designation is still in effect. Moreover, a UME was declared for the Atlantic population of humpback whales since January 2016 and minke whales since January 2017.[7] Elevated numbers of humpback whales have been found stranded along the Atlantic Coast since January 2016 and, in a little over three years, 88 humpback whale mortalities have been recorded (data through February 18, 2019), with strandings occurring in every state along the East Coast.[8] Fifty-nine minke whales have stranded between Maine and South Carolina from January 2017 to March 2019.[9] The declaration of three large whale UMEs by the agency in the past few years, for which anthropogenic impacts are a significant cause of mortality, demonstrates an increasing risk to whales from human activities along the east coast of the US.

Vessel strikes are a leading cause of large whale deaths.[10] Slow-moving and deep diving species that rest while on the surface or species that traverse or occupy shipping lanes are at highest risk. Moreover, even data available on incidence of vessel collision underestimates the actual number of animals struck, as animals struck but not recovered, or not thoroughly examined, cannot be accounted for. [11] North Atlantic right whales are particularly prone to ship-strikes given their slow speeds, their occupation of waters near shipping lanes, and the extended time they spend at or near the water's surface. [12] Some types of anthropogenic noise have been shown to induce sub-surface positioning in North Atlantic right whales, [13] and may displace whales into nearby shipping lanes, increasing the risk of ship-strike at relatively moderate levels of exposure; it is possible that offshore wind development activities could produce the same effects and should

[6] NOAA-NMFS "2017-2019 North Atlantic Right Whale Unusual Mortality Event." Available at: https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2019-north-atlantic-right-whale-unusual-mortality-event.

[7] NOAA-NMFS, "2016-2019 Humpback whale Unusual Mortality Event along the Atlantic Coast" available at: https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2019-humpback-whale-unusual-mortality-event-along-atlantic-coast; "2017-2019 Minke whale Unusual Mortality Event along the Atlantic Coast" available at: https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2019-minke-whale-unusual-mortality-event-along-atlantic-coast.

[8] *Supra note* 5; *see also*, https://www.newsday.com/long-island/suffolk/whale-washed-ashore-fire-island-1.18812449.

[9] *Supra note* 8.

[10] The South Fork Construction and Operations Plan notes that noise associated with construction interferes with right whale's ability to feed, *see* Appendix P 20, 35, and vessel collisions remain one of the leading causes of large whale injury and mortality, *id.* at 51 ("Vessel strike is consistently one of the most common causes of North Atlantic right whale mortality annually (Hayes et al., 2017).

[11] Reeves, R.R., Read, A.J., Lowry, L., Katona, S.K., and Boness, D.J., "Report of the North Atlantic Right Whale Program Review," 13–17 March 2006, Woods Hole, Massachusetts (2007) (prepared for the Marine Mammal Commission); Parks, S.E., Warren, J.D., Stamieszkin, K., Mayo, C.A. and Wiley, D., "Dangerous dining: surface foraging of North Atlantic right whales increases risk of vessel collisions." *Biology letters*, vol. 8, no. 1, pp. 57-60 (2011).

[12] NOAA-NMFS, Recovery plan for the North Atlantic right whale (August 2004).

[13] Nowacek, D.P., M.P. Johnson, P.J. Tyack, "North Atlantic right whales (*Eubalaena glacialis*) ignore ships but respond to alerting stimuli," *Proceedings of the Royal Society B: Biological Sciences*, 271 (1536). pp. 227-23 (2004).

therefore be treated conservatively. Ship noise is also known to cause elevated levels of stress hormones in right whales, increasing their risk of immunosuppression and reproductive failure.[14]

Multiple marine species have been observed to exhibit strong, and in some cases lethal, behavioral reactions to noise including sound levels well below the 160 dB threshold defined by NMFS for Level B take, leading to the scientific community for the National Marine Fisheries Service (NMFS) to revise its guidelines to avoid underestimating the impacts.[15] Further, we call your attention to the attached letter (Attachment A) addressed to BOEM and NMFS and dated September 19, 2018, in which five of the world's leading scientific experts on North Atlantic right whales provide their recommendations for "adequate and effective mitigation of impacts to the North Atlantic right whale during offshore wind development and operations." In this letter, right whale scientists recommend a seasonal prohibition for the Rhode Island/ Massachusetts and Massachusetts Wind Energy Areas on pile driving from January 1 to April 30 and "if development activities absolutely cannot be avoided" the implementation of an "enhanced mitigation protocol" for pile driving during the periods of May 1 to 14 and November 1 to December 31. The enhanced mitigation protocol would be project-specific and developed through "a participatory process that includes scientists, offshore wind developers, and environmental groups" and would be reassessed every two years because right whale distribution is "known to be shifting." Further, these scientists call for the implementation of noise reduction and attenuation technologies throughout the construction period to address potential impacts of noise, which they state is "one of the primary impacts to marine mammals from offshore wind development."

In the evaluation of potential impacts of offshore wind development, the assumption is often made that large whales can avoid impacts by moving to other available habitat for the duration of the activities of concern. However, scientists, including those employed by NMFS, recently published a paper highlighting the potential costs of habitat displacement.[16] Displacement from important breeding and feeding habitats resulted in negative energetic consequences for humpback whales, with possible impacts on calf growth potential.[17] These issues are of particular concern for migratory species, including the North Atlantic right whale, that may traverse multiple wind energy areas during its annual life cycle, and for whales that preferentially

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Rolland RM, Parks SE, Hunt KE, Castellote M and others (2012) Evidence that ship noise increases stress in right whales. Proc R Soc Lond B Biol Sci 279: 2363−2368.

[15] *E.g.*, Evans, D.L. and England, G.R., "Joint interim report: Bahamas marine mammal stranding event of 15-16 March 2000" (2001); Nowacek, D.P., Johnson, M.P., and Tyack, P.L., "Right whales ignore ships but respond to alarm stimuli," *Proceedings of the Royal Society of London B: Biological Sciences*, vol. 271, no. 1536(2004): 227-231; Parsons, E.C.M., Dolman, S.J., Wright, A.J., Rose, N.A., and Burns, W.C.G., "Navy sonar and cetaceans: Just how much does the gun need to smoke before we act?" *Marine Pollution Bulletin*, vol. 56(2008): 1248-1257; Tougaard, J., Wright, A.J., and Madsen, P.T., "Cetacean noise criteria high site fidelity." *Endangered Species Research*, vol. 32 (2017): 391-413. *Marine Pollution Bulletin*, vol. 90(2015): 196-208; Wright, A.J., "Sound science: Maintaining numerical and statistical standards in the pursuit of noise exposure criteria for marine mammals," *Frontiers in Marine Science*, vol. 2, art. 99 (2015).

[16] Forney, K.A., Southall, B.L., Slooten, E., Dawson, S., Read, A.J., Baird, R.W., and Brownell, Jr., R.L., "Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity." *Endangered Species Research*, vol. 32 (2017): 391-413.

[17] Braithwaite, J.E., Meeuwig, J.J., and Hipsey, M.R., "Optimal migration energetics of humpback whales and the implications of disturbance," Conservation Physiology, vol. 3, no. 1 (2015): cov001.

use some of the areas offshore Massachusetts, Rhode Island and New York as specific feeding habitats during large portions of the year, such as endangered fin whales.

Given the highly endangered status of the North Atlantic right whale, protection of this species should be a top priority, and it is important for the CRMC to consider the full range of potential impacts on all marine mammal species known to utilize the Project area, and surrounding areas, under federal consistency review. Further, considering the elevated level of threat to all federally protected large whale species and populations in the Atlantic, including waters of Rhode Island, and emerging evidence of dynamic shifts in the distribution of large whale habitat, any stressors posed by the proposed Project, in state and federal waters, must be mitigated to the fullest extent practicable.

II. North Atlantic Right Whales Are Present in the South Fork Wind Farm Project Area

Recent surveys by the Massachusetts Clean Energy Center, BOEM, and NMFS document the presence of North Atlantic right whales in significant numbers throughout the Massachusetts/Rhode Island Wind Energy Area including the proposed Project area (see figure below).[18] In fact, recent aggregations of right whales in this area, including animals that were observed feeding, prompted NMFS to implement a Seasonal Management Area with mandatory vessel speed restrictions from November 1 to April 30th annually to prevent significant injury and mortality due to ship strikes. Consistent aggregations of right whales have led to the implementation of repeated Dynamic Management Areas south of the Nantucket and Martha's Vineyard over the last several years.[19]

Consistent with the scientific literature, an appendix in the originally filed Construction and Operation Plan (COP) for this Project noted that "skim feeding is an important activity identified in impact assessments because first, it demonstrates a critical behavior (feeding) which could be disrupted by introduced noise; and secondly, it represents a vulnerable time for right whales to be exposed to ship strikes because they are active at or near the surface."[20] Thus, we urge the CRMC to do everything in its power during federal consistency review of the South Fork Wind Farm Project to ensure that the potential adverse effects of offshore wind on critically endangered North Atlantic right whales are properly analyzed and mitigated to the fullest extent practicable to meet all state standards for protected resources.

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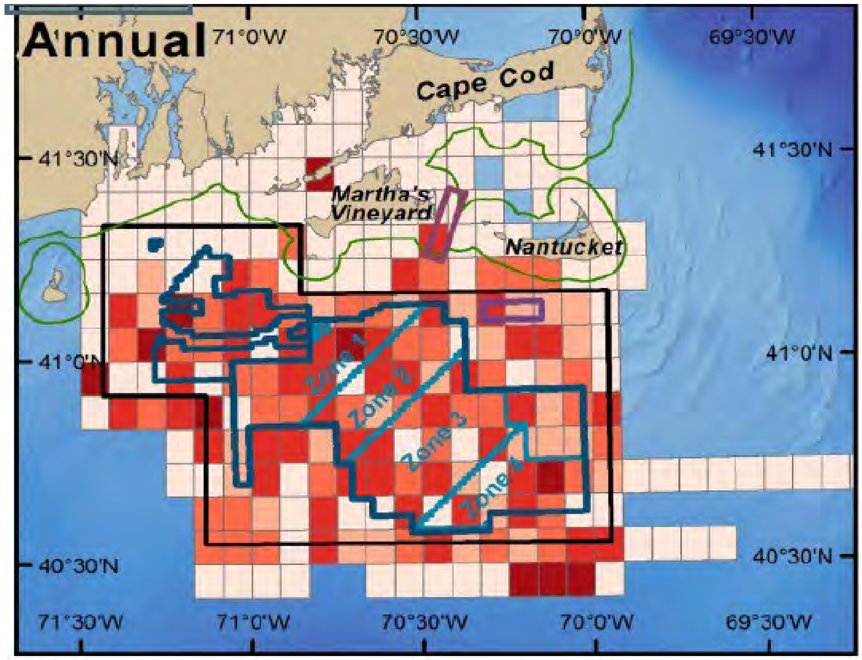
[18] Offshore Wind Marine Life Surveys available at http://www.masscec.com/offshore-wind-marine-wildlife-surveys; NOAA Fisheries Interactive North Atlantic Right Whale Sightings Map available at https://www.nefsc.noaa.gov/psb/surveys/; https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales (showing Block Island Seasonal Management Area November 1-April 30).

[19] https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales#dynamic-management-areas.

[20] *See* South Fork Wind Farm Construction and Operations Plan, Appendix P ("Assessment of Impacts to Marine Mammals, Sea Turtles and Sturgeon") at 32; note that the original Appendix P sited in this footnote was replaced by a new Appendix P on March 18, 2019. *See also* Parks et al. "Dangerous Dining. Surface foraging of North Atlantic Right Whales Increases Risk of Vessel Collisions," Biology Letters, 03 August 2011, https://doi.org/10.1098/rsbl.2011.0578.



Sightings per unit effort of endangered large whales (fin whale, humpback whale, sei whale, sperm whale, and North Atlantic right whale) shown seasonally and annually for all years combined (October 2011–June 2015).[21]

III. Coastal Zone Management Act and Federal Consistency Review

The Coastal Zone Management Act of 1972 was enacted to encourage coastal states to be proactive in managing their natural resources for their benefit and the benefit of the Nation, recognizing a national interest in coastal resources. 16 U.S.C. § 1451. It is a voluntary program and if a state elects to participate, it must develop and implement a coastal management program pursuant to federal requirements. *Id.* at 1455(d). Under the Act, federal actions, and the activities of non-federal applicants for federal authorizations and funding, within or outside the coastal zone that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone (also referred to as coastal uses or resources, or coastal effects) must be consistent to the maximum extent practicable with the enforceable policies of a coastal states federally approved Coastal Management Plan. *Id*. at 1456;15 C.F.R. 930.11(g).

Federal consistency review serves as an important tool for Rhode Island to exercise its right to preserve its coastal resources by giving states the authority to manage their resources in coordination with federal agencies by developing their own coastal management plan and the authority to review federal projects (as well those receiving federal licenses and permits), to ensure they meet state standards. Here, the Project's COP contemplates activity in federal waters offshore of Rhode Island and within Rhode Island's 2011 Geographic Location Description

[21] *See* Kraus, S.D., S. Leiter, K. Stone, B. Wikgren, C. Mayo, P. Hughes, R. D. Kenney, C. W. Clark, A. N. Rice, B. Estabrook and J. Tielens. 2016. Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles. US Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia. OCS Study BOEM 2016-054, at p. 39 (Table 14).

(GLD)[22] and, among other requirements, is subject to the Rhode Island CRMC federal consistency review and certification.

IV. The Rhode Island Ocean Special Area Management Plan

The federally approved Rhode Island Ocean Special Area Management Plan ("Ocean SAMP"), administered by Rhode Island's CRMC, was adopted in 2010 and encompasses nearly 1500 square miles of ocean waters. The Ocean SAMP is a federally recognized coastal management and regulatory tool for outer continental shelf exploration, development, and production activities.[23] As discussed above, state CZMA federal consistency decisions must be based on the reasonably foreseeable coastal effects of the proposed activity and the states enforceable policies as approved by NOAA as part of the state's federal approved CZMA program. To fulfill its mandate related to federal consistency review, the Ocean SAMP provides its enforceable policies in "Chapter 11 - Policies of the Ocean SAMP (650-RICR-20-05-11)." The enforceable policies of the Ocean SAMP are also codified in the Rhode Island Code of Regulations.[24]

The third Overall Regulatory Standard states:

> Offshore Developments ***shall not have a significant adverse impact on the natural resources*** or existing human uses of the Rhode Island coastal zone, as described in the Ocean SAMP. Where the Council determines that impacts on the natural resources or human uses of the Rhode Island coastal zone through the pre-construction, construction, operation, or decommissioning phases of a project constitute significant adverse effects not previously evaluated, the Council shall, through its permitting and enforcement authorities in state waters and through any subsequent CZMA federal consistency review, require that the applicant modify the proposal to avoid and/or mitigate the impacts or the Council shall deny the proposal.[25]

North Atlantic right whales are a natural resource that have been observed in and outside of the Ocean SAMP boundary area and GLD and must be adequately protected throughout their range both in Rhode Island state waters and in adjacent federal waters. For example, the Ocean SAMP notes their seasonal abundance (historically more likely in the spring and fall) and describes an event in April 2010 when nearly 100 North Atlantic right whales were spotted feeding in Rhode Island Sound.[26] In the absence of appropriate mitigation, the Project could have a significant adverse impact on North Atlantic right whales.

[22] Rhode Island has established a geographic location description associated with the Ocean SAMP, which includes the federal portions of Block Island Sound and Rhode Island Sound as well as portions of the Atlantic Ocean. See https://www.boem.gov/Appendix-A/, at p. A-2.
[23] 16 U.S.C. 1456(c)(3)(B); 15 CFR part 930, subpart E.
[24] *See* https://rules.sos.ri.gov/organizations/subchapter/650-20-05. Section 11.10 Regulatory Standards (formerly § 1160).
[25] Ocean SAMP Chapter 11, 650-RICR-20-05-11, Part 11.10.1 C.
[26] Chapter 2 (5-4-2011 Rhode Island Ocean SAMP), at 88-90.

V. Deepwater Wind's Consistency Statement Fails to Address North Atlantic Right Whales

The Consistency Statement fails to adequately address the potential adverse impacts of this Project on North Atlantic right whales or any other marine mammal. However, a robust analysis of this issue is required where offshore wind development may affect whales in the Project area, as well as in adjacent waters, in several ways including potential injury and harassment from noise during site assessment construction and operation, alterations of or interruptions to migration and feeding patterns, and vessel strikes.

Because it is reasonably foreseeable that the impacts of the Project in federal waters could have significant adverse effects on North Atlantic right whales in Rhode Island's coastal zone, and the Rhode Island whale watching and other ecotourism businesses that depend upon whales that occur in the Ocean SAMP boundary area and GLD, the federal consistency review should focus on these activities and provide mitigation to the fullest extent practicable, especially given the status of North Atlantic right whales.

VI. The Construction and Operation Plan

The Construction and Operations Plan (Appendix P)[27] notes that North Atlantic right whales occur in the South Fork Wind Farm Area year-round. For this Project "[c]etacean exposure probabilities were scaled using the Duke University Marine Geospatial Ecological Laboratory density models (Roberts et al. 2016), including an updated unpublished model for the North Atlantic right whale (Roberts et al. 2017, Roberts et al. 2018) that incorporates additional sighting data."

To minimize the impact of noise and vessels on marine mammals, Deepwater Wind has committed to the following measures:

• Exclusion and monitoring zones for marine mammals will be established for pile driving activities and HRG survey activities.

• Mitigation measures will be implemented for pile driving and HRG survey activities. These measures will include soft-start measures, shut-down procedures, marine mammal monitoring protocols, and use of qualified and NOAA-approved protected species observers, as appropriate.

• Pile driving activities will not occur at the SFWF from November 1 – April 30 to minimize potential impacts to the North Atlantic right whale.

• Vessels will follow NOAA guidelines for marine mammal strike avoidance measures, including vessel speed restrictions.

• All personnel working offshore will receive training on marine mammal awareness and marine debris awareness.

[27] https://www.boem.gov/Appendix-P/.

• DWSF will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.

• Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (Appendix D).

• The SFWF inter-array cable and SFEC - Offshore will be buried to a target depth of 4 to 6 feet (1.2 to 1.8 m).

In addition, Deepwater Wind has committed to "consider the use of technically and commercially feasible noise attenuation technology." [28] While all of the above types of mitigation measures are essential ingredients for a right whale protection plan, these measures fall short of providing the specificity necessary to ensure that the potential impacts to right whales are effectively mitigated. We understand that additional information on proposed mitigation will be forthcoming in the DEIS. Once completed, the DEIS for the Project must include increased specificity on effective mitigation of potential impacts to North Atlantic right whales and should be equivocal to measures discussed below.

VII. Specific Recommendations on Effective Mitigation of Potential Impacts to North Atlantic Right Whales

Responsible offshore wind development must take strong, precautionary actions to safeguard North Atlantic right whales as they are frequently sighted and acoustically detected in the Massachusetts/Rhode Island Wind Energy Area and surrounding waters. Our organizations, along with over a dozen additional wildlife conservation organizations, have endorsed the measures outlined below as Best Management Practices ("BMPs") for the protection of the North Atlantic right whale during wind energy construction and operations of fixed foundation offshore wind projects off the U.S. East Coast.[29] These BMPs are designed to: (i) reduce co-occurrence of development activities with this sensitive species; (ii) minimize and mitigate any impacts that do occur to the maximum extent practicable, including the prevention of any injury to right whales during construction; (iii) reduce risk of vessel collisions throughout the life of an offshore wind project; and (iv) ensure effective long-term monitoring of the health of marine life present at an offshore wind site to help guide the development of the American offshore wind industry. The below measures are intended to ensure that we can advance imperative, large-scale clean energy solutions while conserving the health of this iconic whale species. Note that as the science, technology, and regulations related to right whale protection and offshore wind power advance, our groups will periodically reexamine and update these BMPs.

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[28] *See* COP at pp. 4-215 and 4-216.

[29] https://www.clf.org/wp-content/uploads/2019/03/best-management-practices-north-atlantic-right-whales-during-offshore-wind-energy-construction-operations-along-us-east-coast-20190301.pdf.

1. Site selection

Offshore wind projects should not be sited in, at minimum, federally designated North Atlantic right whale critical habitat, as defined under the Endangered Species Act, until: (i) peer-reviewed scientific research determines that offshore wind activities are not likely to jeopardize the continued existence of North Atlantic right whales or adversely modify their habitat; and (ii) research informs the development of comprehensive mitigation measures. However, understanding that designated critical habitat may not include all important foraging, calving, and migratory areas for right whales, care should be taken when siting to avoid and minimize use of areas with consistent seasonal right whale aggregations.

2. Seasonal and temporal restrictions on construction

Construction activities, including any geophysical surveys necessary to advise final micro-siting decisions, with noise levels that could cause injury or harassment in marine mammals must not occur during periods of highest risk to North Atlantic right whales, defined as times of highest relative density of animals during their migration, and times when mother-calf pairs, pregnant females, surface active groups (indicative of breeding or social behavior), or aggregations of three or more whales (indicative of feeding or social behavior) are, or are expected to be, present, as supported by review of the best available science at the time of development.

Pile driving and geophysical survey activities should commence, with ramp-up, only during daylight hours and good visibility conditions to maximize the probability that North Atlantic right whales are detected and confirmed clear of the exclusion zone before these activities begin (see also 3, below). The activity can then continue into nighttime hours. If the activity is halted or delayed because of documented or suspected North Atlantic right whale presence in the area, developers must wait until daylight hours and good visibility conditions to recommence.

3. Monitoring exclusion zones during construction

For the North Atlantic right whale, a minimum exclusion zone of 1,000 meters should be established around all vessels conducting activities with noise levels that could result in injury or harassment to this species (e.g., pile driving and geophysical surveys). The size of the exclusion zone should be extended during periods of highest risk to right whales. The activity must be halted or delayed if a North Atlantic right whale is detected in the exclusion zone unless it must proceed for human safety reasons or because, in certain cases, stopping the pile installation mid-way through would result in an unusable turbine foundation.

To maximize the probability of detection of North Atlantic right whales, comprehensive exclusion zone monitoring is essential. At minimum, a combination of National Marine Fisheries Service ("NMFS") approved Protected Species Observers ("PSOs") to watch for whale presence and passive acoustic monitoring with underwater recorders located in proximity to the exclusion zone to detect when animals are vocalizing nearby should be required at all times. Staffing and shift-schedules should allow for each PSO to monitor a maximum of 180° during daylight hours. Aerial surveys would also provide a useful supplement to increase detection probability. At night, a combination of night-vision, thermal imaging, and passive acoustic monitoring should be used.

4. <u>Vessel speed restriction for the lifetime of the project</u>

All vessels operating within or transiting to/from lease areas should observe a speed restriction of ten knots during times when mother-calf pairs, pregnant females, surface active groups, or aggregations of three or more whales are, or are expected to be, present based on best available science. A compulsory vessel speed restriction of ten knots must be required of all industry vessels within any Dynamic Management Area ("DMA") established by NMFS. Crew transfer vessels may exceed a speed of ten knots only if additional monitoring measures are in place, including aerial surveys or a combination of vessel-based visual observers and passive acoustic monitoring. Any collision should be reported immediately following NMFS guidelines.

5. <u>Reduction of underwater noise during construction</u>

During construction, developers should commit to minimizing impacts of underwater noise on the North Atlantic right whale to the full extent feasible through: (i) the consideration and use of foundation types and installation methods that eliminate or reduce noise; and (ii) the use of technically and commercially feasible and effective noise reduction and attenuation measures, including the use of the lowest practicable source level.

6. <u>Commitment to scientific research and long-term monitoring</u>

Developers should commit to carrying out scientific research and long-term monitoring in lease areas to advance understanding of the effects of offshore wind development on marine and coastal resources, and the effectiveness of mitigation technologies (e.g., noise attenuation and thermal detection). Science should be conducted in a collaborative and transparent manner, utilizing recognized marine experts, engaging relevant stakeholders, and making results publicly available. Developers should coordinate with state and regional scientific efforts to ensure results from individual lease areas can be interpreted within a regional context and contribute to the generation of regional-scale data, which is required to address questions related to population-level change and cumulative impacts across the geographic range of the North Atlantic right whale. Developers should engage in regional and state ocean planning efforts and contribute scientific analysis and data as appropriate, including contributions to the regional ocean data portals.

7. <u>Contribution to species conservation efforts</u>

As a broad commitment to species conservation efforts, offshore wind developers should support mitigation approaches and strategies to reduce other stressors facing potentially affected species such as the critically endangered North Atlantic right whale (e.g., incidental entanglement in fishing gear).

* * *

In conclusion, we reiterate our support for responsibly developed offshore wind power and applaud the actions to date to advance this important climate and clean energy solution. We look forward to working together to ensure that all projects built meet the federal consistency requirements of the CZMA through compliance with Rhode Island's Ocean SAMP and are developed responsibly with strong protections in place for our most vulnerable coastal and marine wildlife.

Sincerely,

Priscilla M. Brooks, Ph.D.
Vice President and Director of Ocean Conservation
Conservation Law Foundation

Francine Kershaw, Ph.D.
Project Scientist, Marine Mammal Protection and Oceans, Nature Program
Natural Resources Defense Council

Catherine Bowes
Program Director, Offshore Wind Energy
National Wildlife Federation

September, 19th, 2018

Mr. James F. Bennett
Chief of the Office of Renewable
Energy Programs
Bureau of Ocean Energy Management
United States Department of the Interior
1849 C Street, NW
Washington D.C., 20240
james.bennett@boem.gov

Ms. Donna Wieting
Director, Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric
Administration
1315 East-West Hwy.
Silver Spring, Maryland 20910
donna.wieting@noaa.gov

Dear Mr. Bennett and Ms. Wieting,

We respectfully submit this letter presenting recommendations for adequate and effective mitigation of impacts to the North Atlantic right whale during offshore wind development and operations. These recommendations are based on our expertise as marine scientists working on North Atlantic right whales and marine mammal acoustics.

The most effective means of protecting North Atlantic right whales from injury and harassment from noise generated during the offshore wind construction phase is to implement a temporary prohibition on pile driving during periods of heightened vulnerability. Periods of heightened vulnerability are defined by the following criteria: (i) phases when a higher relative density of animals is present, or expected to be present, within the project site; and (ii) phases when mother-calf pairs, pregnant females, aggregations of three or more whales (including surface active groups; indicative of feeding or social behavior), or entangled animals, are, or are expected to be, present.

In line with the best available science on North Atlantic right whale distribution and abundance in the waters off Rhode Island and Massachusetts, we recommend the following seasonal prohibition on pile driving and, if development activities absolutely cannot be avoided, the implementation of an enhanced mitigation protocol during the following times for leases within the Rhode Island/Massachusetts and Massachusetts Wind Energy Areas:

- January 1st – April 30th: Prohibition on pile driving.
- May 1st – 14th and November 1st – December 31st: Enhanced mitigation protocol in place during pile-driving.

Temporary prohibitions should also be defined for all lease areas along the Atlantic coast based on the best data available for those regions. The enhanced mitigation protocol should be developed for individual offshore wind projects via a participatory process that includes scientists, offshore wind developers, and environmental groups. As North Atlantic right whale distribution is known to be shifting, we recommend the dates of these restrictions and the enhanced mitigation protocol be reassessed every two years by an independent advisory group based on the best scientific and commercial data available.

Noise reduction and attenuation technologies should also be required throughout the entire construction period to the maximum extent practicable, thereby directly addressing one of the primary impacts to marine mammals from offshore wind development.

The probability of serious injury or mortality of North Atlantic right whales significantly increases when vessels of any length are traveling at speeds greater than ten knots. Vessel-based right whale monitoring measures must be employed by the offshore wind industry, including the staffing of at least one PSO aboard industry vessels and the real-time acoustic monitoring of major vessel routes (*e.g.*, using fixed location hydrophones with real-time reporting to transiting vessels). In addition, all vessels operating within or transiting to/from lease areas are strongly urged to observe a speed restriction of ten knots during periods of time involving the confirmed presence of North Atlantic right whales or the expected presence of mother-calf pairs, pregnant females, and aggregations of three or more whales, based on best available science. A compulsory vessel speed restriction of ten knots must be required of industry vessels within any Dynamic Management Areas established by NOAA Fisheries.

We also encourage your agencies to incentivize the use of alternative vessel types by the offshore wind industry that would significantly reduce the risk to North Atlantic right whales (*e.g.*, hovercraft); the use of these vessels would significantly reduce the number of vessel speed mitigation measures presently required of the industry. Similarly, significant resources should be directed towards the research, development, and implementation of improved noise reduction and attenuation technologies for deployment during construction.

Thank you in advance for your consideration of our comments. We would be happy to meet with you or your staff to discuss our recommendations in more detail.

Sincerely,

Scott Kraus, Ph.D.
Vice President and Senior Science Advisor
Chief Scientist, Marine Mammals
Anderson-Cabot Center for Ocean Life
New England Aquarium

Ester Quintana, Ph.D.
Chief Scientist, Marine Mammal Surveys
Anderson-Cabot Center for Ocean Life
New England Aquarium

Aaron Rice, Ph.D.
Science Director, Bioacoustics Research Program
The Cornell Lab of Ornithology
Cornell University

Caroline Good, Ph.D.
Adjunct Research Professor
Nicolas School of the Environment
Duke University

Mark Baumgartner, Ph.D.
Associate Scientist
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February 15, 2019

Walter Cruickshank, Ph.D., Acting Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Messrs. Cruikshank and Bennett,

Pursuant to 15 CFR § 930.57, Deepwater Wind South Fork, LLC on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of a Construction and Operation Plan ("COP") for the proposed construction and operation of a wind energy project known as the South Fork Wind Farm ("SFWF"). The SFWF project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles southeast of Block Island within BOEM Lease Area OCS-A 0486 and within the CRMC's 2011 Geographic Location Description.

The proposed SFWF project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D - Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

Walter Cruickshank, Ph.D., Acting Director
James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
February 15, 2019
Page Two

The CRMC and Deepwater Wind South Fork, LLC have mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR § 930.60(b) to provide sufficient time for discussions, meetings and exchange of materials between Deepwater Wind South Fork, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11).

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this stay agreement as required by 15 CFR § 930.60(b). Pursuant to the attached stay agreement executed on February 14, 2019, the CRMC consistency determination decision date in this matter is now due no later than October 25, 2019. The CRMC requests BOEM not to issue a license or permit to Deepwater Wind South Fork, LLC until the requirements of 15 CFR Part 930, Subparts D and E have been satisfied. The CRMC will notify BOEM when it issues a final decision in this matter.

Please contact me at 401-783-3370 or email gfugate@crmc.ri.gov should you have any questions.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

cc Jeffrey Grybowski, Deepwater Wind South Fork, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

Deepwater Wind South Fork, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and Deepwater Wind South Fork[1], LLC, hereinafter referred to as "Deepwater Wind," hereby agree as follows.

Pursuant to 15 CFR § 930.57, Deepwater Wind filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind Farm, consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters southeast of Block Island within BOEM Lease Area OCS-A 0486. The proposed project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D – Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

Pursuant to 15 CFR § 930.60(b) the CRMC and Deepwater Wind have mutually agreed to the following dates to stay the CRMC six-month review period as specified herein.

[1] On October 8, 2018 Ørsted announced that it entered into an agreement with the D.E. Shaw Group to acquire a 100% equity interest in Rhode Island-based Deepwater Wind. In November 2018 federal regulators approved the merger of the two companies as a single organization named Ørsted US Offshore Wind.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: April 22, 2019
- Date during the 6-month review period that the stay begins: February 15, 2019
- Date that the stay ends: August 21, 2019
- Date the 6-month review period ends and the CRMC consistency decision is due: October 25, 2019

The CRMC will issue its consistency decision on or before **October 25, 2019** unless Deepwater Wind and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to October 25, 2019.

These agreements made and entered by:

Grover J. Fugate
Executive Director, CRMC

Date 2/14/19

Jeffrey Grybowski
Deepwater Wind South Fork, LLC

Date 2/14/19

cc: BOEM
NOAA OCM
CRMC Council members

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October 2, 2019

Walter Cruickshank, Ph.D., Acting Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Messrs. Cruikshank and Bennett,

Pursuant to 15 CFR § 930.57, Deepwater Wind South Fork, LLC on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of a Construction and Operation Plan ("COP") for the proposed construction and operation of a wind energy project known as the South Fork Wind Farm ("SFWF"). The SFWF project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles southeast of Block Island within BOEM Lease Area OCS-A 0486 and within the CRMC's 2011 Geographic Location Description.

The proposed SFWF project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D - Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The CRMC and Deepwater Wind South Fork, LLC on February 14, 2019 mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR § 930.60(b), and the CRMC decision date for the SFWF matter was extended until October 25, 2019 to provide sufficient time for discussions, meetings and exchange of materials between Deepwater Wind South Fork, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11).

In August 2019 BOEM announced that it would expand the cumulative impact analysis of offshore wind energy projects within its draft Environmental Impact Statement (EIS) for the Vineyard Wind project. BOEM is expected to supplement the Draft EIS for the Vineyard Wind project and has indicated that once the cumulative impact analysis methodology is developed and agreed to by cooperating federal agencies, the analysis apparently will be applied to all other pending and future offshore wind energy projects, which includes the SFWF. Since BOEM's August 2019 announcement concerning the Vineyard Wind project, federal review of other offshore wind energy projects has been paused. It is anticipated, however, that BOEM's review of the SFWF project will resume late 2019 or early 2020.

Therefore, the CRMC and Deepwater Wind South Fork, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement that was executed on October 1, 2019. The CRMC consistency determination decision date in this matter is now due no later than April 24, 2020.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). The CRMC requests BOEM not to issue a license or permit to Deepwater Wind South Fork, LLC until the requirements of 15 CFR Part 930, Subparts D and E have been satisfied. The CRMC will notify BOEM when it issues a final decision in this matter.

Please contact me at 401-783-3370 or email gfugate@crmc.ri.gov should you have any questions.

Sincerely,

Grover J. Fugate

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, Deepwater Wind South Fork, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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AMENDED AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

Deepwater Wind South Fork, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and Deepwater Wind South Fork[1], LLC, hereinafter referred to as "Deepwater Wind," hereby agree as follows.

Pursuant to 15 CFR § 930.57, Deepwater Wind filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind Farm (SFWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters southeast of Block Island within BOEM Lease Area OCS-A 0486. The proposed project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D – Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

BOEM announced in August 2019 that it would expand the cumulative impact analysis of offshore wind energy projects within its draft Environmental Impact Statement (EIS) for the Vineyard Wind project. BOEM is expected to supplement the Draft EIS for the Vineyard Wind

[1] Deepwater Wind South Fork, LLC is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

project and has indicated that once the cumulative impact analysis methodology is developed and agreed to by cooperating federal agencies, the analysis apparently will be applied to all other pending and future offshore wind energy projects, which includes the SFWF. Since BOEM's August 2019 announcement concerning the Vineyard Wind project, federal review of other offshore wind energy projects has been paused. It is anticipated, however, that BOEM's review of the SFWF project will resume late 2019 or early 2020.

The CRMC and Deepwater Wind entered into an agreement on February 14, 2019, pursuant to 15 CFR § 930.60(b) to stay the CRMC six-month review period with a CRMC decision due no later than October 25, 2019. Based on the recent BOEM announcements, CRMC and Deepwater Wind have now mutually agreed to the following dates to further stay the CRMC six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: October 25, 2019
- Date during the 6-month review period that the stay begins: October 1, 2019
- Date that the stay ends: March 31, 2020
- Date the 6-month review period ends and the CRMC consistency decision is due: April 24, 2020

The CRMC will issue its consistency decision on or before **April 24, 2020** unless Deepwater Wind and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to April 24, 2020.

This agreement made and entered by:

Oct 1, 2019

Grover J. Fugate
Executive Director, CRMC

Date

Deepwater Wind South Fork, LLC
By its agent, Orsted Wind Power North America LLC

10/1/2019

Melanie Gearon
Authorized Person

Date

And

10/1/2019.

Francis Slingsby
Authorized Person

Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island and Providence Plantations
Coastal Resources Management Council
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March 17, 2020

Walter Cruickshank, Ph.D., Acting Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Messrs. Cruikshank and Bennett,

Pursuant to 15 CFR § 930.57, Deepwater Wind South Fork, LLC on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind Farm ("SFWF"). The SFWF project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFWF project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D - Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The CRMC and Deepwater Wind South Fork, LLC on February 14, 2019 mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR §

[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF to be given the designation OCS-A 0517.

930.60(b), and the CRMC decision date for the SFWF matter was extended until October 25, 2019 to provide sufficient time for discussions, meetings and exchange of materials between Deepwater Wind South Fork, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11). An amended Stay Agreement was executed on October 12, 2019 that extended the CRMC federal consistency decision date until April 24, 2020.

On February 13, 2020 Ørsted filed a revised Construction and Operation Plan with BOEM, and on March 9, 2020 BOEM announced that it would be moving forward to remove the federal review pause for the SFWF project. In addition, the U.S. Coast Guard (USCG) is expected to announce in the coming months a final decision on its MA/RI Port Access Route Study for a 1 by 1 nautical mile grid configuration for all wind energy structures (turbines and offshore substations) within the MA/RI wind energy area.

Given these recent developments the CRMC and Deepwater Wind South Fork, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed on March 17, 2020. The CRMC federal consistency decision date in this matter is now due no later than **August 31, 2020**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). The CRMC requests BOEM not to issue a license or permit to Deepwater Wind South Fork, LLC until the requirements of 15 CFR Part 930, Subparts D and E have been satisfied. The CRMC will promptly notify BOEM when it issues a final federal consistency decision in this matter.

Please contact me at 401-783-3370 or email gfugate@crmc.ri.gov should you have any questions.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

cc: Melanie Gearon, Deepwater Wind South Fork, LLC
David Kaiser, NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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AMENDED AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

Deepwater Wind South Fork, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and Deepwater Wind South Fork[1], LLC, hereinafter referred to as "Deepwater Wind," hereby agree as follows.

Pursuant to 15 CFR § 930.57, Deepwater Wind filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind Farm (SFWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review authority pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930 Subpart D – Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

BOEM announced in August 2019 that it would expand the cumulative impact analysis of offshore wind energy projects within its draft Environmental Impact Statement (EIS) for the Vineyard Wind project. BOEM is expected to supplement the Draft EIS for the Vineyard Wind

[1] Deepwater Wind South Fork, LLC (DWSF) is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF to be given the designation OCS-A 0517.

project and has indicated that once the cumulative impact analysis methodology is developed and agreed to by cooperating federal agencies, the analysis will be applied to all other pending and future offshore wind energy projects, which includes the SFWF project. Since BOEM's August 2019 announcement concerning the Vineyard Wind project, federal review of other offshore wind energy projects has been paused. On February 13, 2020 Ørsted filed a revised Construction and Operation Plan with BOEM, and on March 9, 2020 BOEM announced that it would be moving forward to remove the federal review pause for the SFWF project. In addition, the U.S. Coast Guard (USCG) is expected to announce in the coming months a final decision on its MA/RI Port Access Route Study for a 1 by 1 nautical mile grid configuration for all wind energy structures (turbines and offshore substations) within the MA/RI wind energy area.

The CRMC and Deepwater Wind entered into the most recent agreement on October 1, 2019, pursuant to 15 CFR § 930.60(b) to stay the CRMC six-month review period with a CRMC consistency decision due no later than April 24, 2020. Based on the current announcements and expected actions by BOEM and the USCG, CRMC and Deepwater Wind have now mutually agreed to the following dates to further stay the CRMC six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: March 31, 2020
- Date during the 6-month review period that the stay begins: March 12, 2020
- Date that the stay ends: August 12, 2020
- Date the 6-month review period ends and the CRMC consistency decision is due: August 31, 2020

The CRMC will issue its consistency decision on or before **August 31, 2020** unless Deepwater Wind and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to August 31, 2020.

This agreement made and entered by:

Grover J. Fugate
Executive Director, CRMC

3/17/20
Date

Deepwater Wind South Fork, LLC
By its agent, Orsted Wind Power North America LLC

Melanie Gearon
Authorized Person

3/16/20
Date

And

Francis Slingsby
Authorized Person

3/16/2020.
Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island and Providence Plantations
Coastal Resources Management Council
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June 22, 2020

Walter Cruickshank, Ph.D., Acting Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Messrs. Cruikshank and Bennett,

Pursuant to 15 CFR § 930.76, Deepwater Wind South Fork, LLC on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC §§ 1451-1466 and the CZMA's implementing regulations at 15 CFR part 930 subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The CRMC and Deepwater Wind South Fork, LLC on March 17, 2020 had mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR § 930.60(b), and the CRMC decision date for the SFW matter was extended until August 31, 2020 to provide sufficient time for discussions, meetings and exchange of materials between Deepwater

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[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517.

Wind South Fork, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11). The amended Stay Agreement was executed on March 17, 2020 that extended the CRMC federal consistency decision date until August 31, 2020.

On May 14, 2020 the U.S. Coast Guard (USCG) released its final MA/RI Port Access Route Study (MARIPARS) report with recommendations for a 1 by 1 nautical mile (NM) grid configuration with an East-West, North-South orientation for all wind energy structures (turbines and offshore substations) within the MA/RI wind energy area to provide for continued historic commercial fishing activities, safe vessel navigation and to accommodate USCG search and rescue operations. The CRMC is anticipating that BOEM will accept the USCG MARIPARS recommendations and require them as a condition of COP approval for all wind energy projects in southern New England offshore waters. Ørsted has aligned the SFWF project for conformance with the 1 by 1 NM grid configuration and plans on filing additional information with the CRMC in the coming weeks so that the CRMC may evaluate the new information pursuant to its enforceable polices.

Given these recent developments the CRMC and Deepwater Wind South Fork, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed on June 22, 2020. **The CRMC federal consistency decision date in this matter is now due no later than January 31, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to Deepwater Wind South Fork, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a final federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis, Acting Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, Deepwater Wind South Fork, LLC
David Kaiser, NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel
James Boyd, Coastal Policy Analyst

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AMENDED AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

Deepwater Wind South Fork, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and Deepwater Wind South Fork[1], LLC, hereinafter referred to as "Deepwater Wind," hereby agree as follows.

Pursuant to 15 CFR § 930.76, Deepwater Wind filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind (SWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC §§ 1451-1466 and the CZMA's implementing regulations at 15 CFR part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

BOEM announced in August 2019 that it would expand the cumulative impact analysis of offshore wind energy projects within its draft Environmental Impact Statement (EIS) for the Vineyard Wind project (Docket No. BOEM-2020-0005). BOEM released the supplemental Draft

[1] Deepwater Wind South Fork, LLC (DWSF) is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517.

EIS for the Vineyard Wind project on June 12, 2020 and has previously indicated that the cumulative impact analysis methodology will be applied to all other pending and future offshore wind energy projects, which includes the SWF project. Since BOEM's August 2019 announcement concerning the Vineyard Wind project, federal review of other offshore wind energy projects has been paused. On February 13, 2020 Ørsted filed with BOEM a revised Construction and Operation Plan. BOEM, however, has yet to remove the federal review pause for the SWF project. In addition, Ørsted will be providing the CRMC with additional submissions for consideration by the CRMC pursuant to its enforceable policies. Thus, additional review time is warranted to achieve development of a mitigation plan and subsequent negotiations as required under the CRMC's enforceable policies.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest that the State have additional time to fully assess the proposed project's consistency with the State's enforceable policies, the CRMC and Deepwater Wind mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: August 31, 2020
- Date during the 6-month review period that the stay begins: June 22, 2020
- Date that the stay ends: November 23, 2020
  (70 days remaining in the 6-month review period)
- Date the 6-month review period ends and the CRMC consistency decision is due: January 31, 2021

The CRMC will issue its consistency decision on or before **January 31, 2021** unless Deepwater Wind and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to January 31, 2021.

This agreement made and entered by:

June 22 2020

Jeffrey M. Willis
Acting Executive Director, CRMC

Date

Deepwater Wind South Fork, LLC
By its agent, Orsted Wind Power North America LLC

Melanie Gearon

June 22, 2020

Melanie Gearon
Ørsted Authorized Person

Date

And

June 22, 2020

Robert Mastria
Ørsted Authorized Person

Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island
Coastal Resources Management Council
Oliver H. Stedman Government Center
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December 23, 2020

Walter Cruickshank, Ph.D., Acting Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Messrs. Cruikshank and Bennett,

Pursuant to 15 CFR § 930.76, Deepwater Wind South Fork, LLC on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 USC §§ 1451-1466 and the CZMA's implementing regulations at 15 CFR part 930 subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517.

The CRMC and Deepwater Wind South Fork, LLC on June 22, 2020 had mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR § 930.60(b), and the CRMC decision date for the SFW matter was extended until January 31, 2021 to provide sufficient time for discussions, meetings and exchange of materials between Deepwater Wind South Fork, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11).

Ørsted has been providing the CRMC with additional submissions for consideration by the CRMC and there is ongoing negotiations of a mitigation agreement pursuant to the CRMC's enforceable policy at 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted for mitigation negotiations. Accordingly, the CRMC and Deepwater Wind South Fork, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed on December 23, 2020. **The CRMC federal consistency decision date in this matter is now due no later than March 31, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to Deepwater Wind South Fork, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a final federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, Deepwater Wind South Fork, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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<u>AMENDED</u> AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

Deepwater Wind South Fork, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and Deepwater Wind South Fork[1], LLC, hereinafter referred to as "Deepwater Wind," hereby agree as follows.

Pursuant to 15 CFR § 930.76, Deepwater Wind filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind (SWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC §§ 1451-1466 and the CZMA's implementing regulations at 15 CFR part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

On June 12, 2020 BOEM released the Supplement to the Draft Environmental Impact Statement for the Vineyard Wind project (Docket No. BOEM-2020-0005) that included an analysis of reasonably foreseeable effects from an expanded cumulative activities scenario for

[1] Deepwater Wind South Fork, LLC (DWSF) is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

offshore wind development. BOEM indicated that it would be applying the cumulative impact analysis methodology to all other pending and future offshore wind energy projects, which includes the SWF project. On August 21, 2020 BOEM updated the federal Permit Dashboard and lifted the federal review pause for the SWF project. Ørsted has been providing the CRMC with additional submissions for consideration by the CRMC pursuant to its enforceable policies. And, there is ongoing negotiation of a mitigation agreement pursuant to 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted for mitigation negotiations.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest that the State have additional time to fully assess the proposed project's consistency with the State's enforceable policies, the CRMC and Deepwater Wind mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: January 31, 2021
- Date during the 6-month review period that the stay begins: December 23, 2020
- Date that the stay ends: February 20, 2021
  (39 days remaining in the 6-month review period)
- Date the 6-month review period ends and
  the CRMC consistency decision is due: March 31, 2021

The CRMC will issue its consistency decision on or before **March 31, 2021** unless Deepwater Wind and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to March 31, 2021.

This agreement made and entered by:

12/23/2020

Jeffrey M. Willis
Executive Director, CRMC

Date

Deepwater Wind South Fork, LLC
By its agent, Orsted Wind Power North America LLC

12/23/2020

Melanie Gearon
Ørsted Authorized Person

Date

And

Robert Mastria
Ørsted Authorized Person

___12/23/2020__________
Date

cc BOEM
NOAA OCM
CRMC Council members

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February 23, 2021

Amanda Lefton, Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: Deepwater Wind South Fork, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Ms. Lefton and Mr. Bennett,

Pursuant to 15 CFR § 930.76, South Fork Wind, LLC, formerly known as Deepwater Wind South Fork, LLC, on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators and an export cable that will make landfall on Long Island, NY, and will be located in federal offshore waters approximately 13 miles east-southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. § 1451 *et seq*. and the CZMA's implementing regulations at 15 C.F.R. part 930, subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

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[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517.

The CRMC and South Fork Wind, LLC on December 23, 2020 had mutually agreed to stay the CRMC six-month federal consistency review period in accordance 15 CFR § 930.60(b), and the CRMC decision date for the SFW matter was extended until March 31, 2021 to provide sufficient time for discussions, meetings and exchange of materials between South Fork Wind, LLC and the CRMC in order to meet the requirements of the CRMC's enforceable policies of the Ocean SAMP (650-RICR-20-05-11).

South Fork Wind has been providing the CRMC with additional submissions for consideration by the CRMC and there is ongoing negotiations of a mitigation agreement pursuant to the CRMC's enforceable policy at 650-RICR-20-05-11.10.1(H). In addition, BOEM issued a Notice of Availability on January 8, 2021 for the "Draft Environmental Impact Statement for Deepwater South Fork LLC's Proposed Wind Energy Facility Offshore Rhode Island." Thus, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies. Accordingly, the CRMC and South Fork Wind, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed on February 23, 2021. **The CRMC federal consistency decision date in this matter is now due no later than May 12, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to South Fork Wind, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a final federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, Deepwater Wind South Fork, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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<u>AMENDED</u> AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

South Fork Wind, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and South Fork Wind[1], LLC, formerly known as Deepwater Wind South Fork, LLC, hereinafter referred to as "South Fork," hereby agree as follows.

Pursuant to 15 CFR § 930.76, South Fork filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind (SWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters east-southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 *et seq*., and the CZMA's implementing regulations at 15 C.F.R. part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The most recent stay agreement between South Fork and the CRMC was executed on December 23, 2020 and it provided for the State's CZMA decision date on or before March 31, 2021. In the interim, South Fork has been providing the CRMC with additional submissions for

[1] South Fork, LLC is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

consideration by the CRMC pursuant to its enforceable policies. In addition, BOEM issued a Notice of Availability on January 8, 2021 for the "Draft Environmental Impact Statement for Deepwater South Fork LLC's Proposed Wind Energy Facility Offshore Rhode Island." And, there is ongoing negotiation of a mitigation agreement pursuant to 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest that the State have additional time to fully assess the proposed project's consistency with the State's enforceable policies, the CRMC and South Fork mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: March 31, 2021
- Date during the 6-month review period that the stay begins: February 23, 2021
- Date that the stay ends: April 5, 2021
  (37 days remaining in the 6-month review period)
- Date the 6-month review period ends and the CRMC consistency decision is due: May 12, 2021

The CRMC will issue its consistency decision on or before **May 12, 2021** unless South Fork and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its CZMA review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to May 12, 2021.

This agreement made and entered by:

Jeffrey M. Willis
Executive Director, CRMC

23 FEB 2021
Date

South Fork Wind, LLC
By its agent, Ørsted Wind Power North America LLC

Melanie Gearon
Ørsted Authorized Person

February 23, 2021
Date

And

Robert Mastria
Ørsted Authorized Person

February 23, 2021
Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island
Coastal Resources Management Council
Oliver H. Stedman Government Center
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April 23, 2021

Amanda Lefton, Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: South Fork Wind, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Ms. Lefton and Mr. Bennett,

Pursuant to 15 CFR § 930.76, South Fork Wind, LLC, formerly known as Deepwater Wind South Fork, LLC, on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators, one (1) offshore substation and an export cable ("SFEC") that will make landfall on Long Island, NY. The SFW project will be located in federal offshore waters approximately 13 miles east-southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. § 1451 *et seq*. and the CZMA's implementing regulations at 15 C.F.R. part 930, subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

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[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to Deepwater Wind South Fork, LLC. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

South Fork Wind, LLC has been providing the CRMC with additional submissions for consideration by the CRMC and there is ongoing negotiations of a mitigation agreement pursuant to the CRMC's enforceable policy at 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies. Accordingly, the CRMC and South Fork Wind, LLC have mutually have agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed today, April 23, 2021. **The CRMC federal consistency decision date in this matter is now due no later than June 1, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to South Fork Wind, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, South Fork Wind, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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<u>AMENDED</u> AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

South Fork Wind, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and South Fork Wind[1], LLC, formerly known as Deepwater Wind South Fork, LLC, hereinafter referred to as "South Fork," hereby agree as follows.

Pursuant to 15 CFR § 930.76, South Fork filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as the South Fork Wind (SWF), consisting of up to 15 wind turbine generators and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters east-southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 *et seq.*, and the CZMA's implementing regulations at 15 C.F.R. part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The most recent stay agreement between South Fork and the CRMC was executed on February 23, 2021 and it provided for the State's CZMA consistency decision date on or before May 12, 2021. In the interim, South Fork continues to provide the CRMC with additional

[1] South Fork, LLC is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

submissions for consideration by the CRMC pursuant to its enforceable policies. And, there is ongoing negotiation of a mitigation agreement pursuant to 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest that the State have additional time to fully assess the proposed project's consistency with the State's enforceable policies, the CRMC and South Fork mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: May 12, 2021
- Date during the 6-month review period that the stay begins: April 23, 2021
- Date that the stay ends: May 13, 2021
  (20 days remaining in the 6-month review period)
- Date the 6-month review period ends and
  the CRMC consistency decision is due: June 1, 2021

The CRMC will issue its consistency decision on or before **June 1, 2021** unless South Fork and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its CZMA review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to June 1, 2021.

This agreement made and entered by:

______________________________________ ___April 23, 2021________

Jeffrey M. Willis
Executive Director, CRMC

Date

South Fork Wind, LLC
By its agent, Ørsted Wind Power North America LLC

______________________________________ 4/23/2021

Melanie Gearon
Ørsted Authorized Person

Date

And

______________________________________ __4/23/2021____________

Robert Mastria
Ørsted Authorized Person

Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island
Coastal Resources Management Council
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May 26, 2021

Amanda Lefton, Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: South Fork Wind, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Ms. Lefton and Mr. Bennett,

Pursuant to 15 CFR § 930.76, South Fork Wind, LLC, formerly known as Deepwater Wind South Fork, LLC, on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators, one (1) offshore substation and an export cable ("SFEC") that will make landfall on Long Island, NY. The SFW project will be located in federal offshore waters approximately 13 miles east-southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. § 1451 *et seq*. and the CZMA's implementing regulations at 15 C.F.R. part 930, subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

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[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to Deepwater Wind South Fork, LLC. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

South Fork Wind, LLC has been providing the CRMC with additional submissions for consideration by the CRMC and there is ongoing negotiations of a mitigation agreement pursuant to the CRMC's enforceable policy at 650-RICR-20-05-11.10.1(H). Thus, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies. Accordingly, the CRMC and South Fork Wind, LLC have mutually have agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed yesterday, May 25, 2021. **The CRMC federal consistency decision date in this matter is now due no later than June 22, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to South Fork Wind, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, South Fork Wind, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
James Boyd, CRMC Deputy Director
Anthony DeSisto, Esq., CRMC Legal Counsel

State of Rhode Island
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 116
Wakefield, RI 02879-1900

(401) 783-3370
Fax (401) 783-3767

AMENDED AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

South Fork Wind, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and South Fork Wind[1], LLC, hereinafter referred to as "South Fork," hereby agree as follows.

Pursuant to 15 CFR § 930.76, South Fork filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as South Fork Wind, consisting of up to 15 wind turbine generators with one offshore substation, and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters east-southeast of Block Island within BOEM Lease Area OCS-A 0517[2]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 *et seq*., and the CZMA's implementing regulations at 15 C.F.R. part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The most recent stay agreement between South Fork and the CRMC was executed on April 23, 2021 and it provided for the State's CZMA consistency decision date on or before June 1, 2021. In the interim, the CRMC has been evaluating additional information submitted by

[1] South Fork, LLC is a subsidiary of Ørsted U.S. Offshore Wind. The South Fork Wind Farm project is a 50/50 joint venture between Ørsted and Eversource.

[2] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

South Fork and there have been continued negotiations of a mitigation agreement pursuant to 650-RICR-20-05-11.10.1(H). Therefore, additional review time is warranted to consider new information and complete mitigation negotiations as required under the CRMC's enforceable policies.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest that the State have additional time to fully assess the proposed project's consistency with the State's enforceable policies, the CRMC and South Fork mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: May 12, 2021
- Date during the 6-month review period that the stay begins: May 25, 2021
- Date that the stay ends: June 15, 2021
  (7 days remaining in the 6-month review period)
- Date the 6-month review period ends and the CRMC consistency decision is due: June 22, 2021

The CRMC will issue its consistency decision on or before **June 22, 2021** unless South Fork and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its CZMA review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to June 22, 2021.

This agreement made and entered by:

May 25 2021

Jeffrey M. Willis
Executive Director, CRMC

Date

South Fork Wind, LLC
By its agent, Ørsted Wind Power North America LLC

5/25/2021

Melanie Gearon
Ørsted Authorized Person

Date

And

May 25, 2021

Robert Mastria
Ørsted Authorized Person

Date

cc BOEM
NOAA OCM
CRMC Council members

State of Rhode Island
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
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(401) 783-3370
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June 17, 2021

Amanda Lefton, Director
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

James Bennett, Renewable Energy Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Re: South Fork Wind, LLC; Docket No. BOEM–2018–0010
CRMC File 2018-10-082

Dear Ms. Lefton and Mr. Bennett,

Pursuant to 15 CFR § 930.76, South Fork Wind, LLC, formerly known as Deepwater Wind South Fork, LLC, on October 22, 2018 filed with the Rhode Island Coastal Resources Management Council ("CRMC") a federal consistency certification and a copy of their Construction and Operation Plan ("COP") for the proposed construction and operation of the South Fork Wind energy project ("SFW"). The SFW project consists of up to fifteen (15) wind turbine generators, one (1) offshore substation and an export cable ("SFEC") that will make landfall on Long Island, NY. The SFW project will be located in federal offshore waters approximately 13 miles east-southeast of Block Island within BOEM Lease Area OCS-A 0517[1] (formerly part of OCS-A 0486) and within the CRMC's 2011 Geographic Location Description.

The proposed SFW project is subject to CRMC federal consistency review pursuant to the federal Coastal Zone Management Act ("CZMA"), 16 U.S.C. § 1451 *et seq*. and the CZMA's implementing regulations at 15 C.F.R. part 930, subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to Deepwater Wind South Fork, LLC. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

CRMC and South Fork are presently memorializing an agreement related to the mitigation pursuant to CRMC enforceable policy, which mitigation was agreed to by South Fork and approved by the CRMC. Therefore, additional time is warranted to complete this agreement. Accordingly, the CRMC and South Fork Wind, LLC have mutually agreed to further stay the CRMC six-month federal consistency review period pursuant to the attached amended stay agreement executed today, June 17, 2021. **The CRMC federal consistency decision date in this matter is now due no later than July 2, 2021**.

The purpose of this letter is to notify the Bureau of Ocean Energy Management (BOEM) of this agreement as required by 15 CFR § 930.60(b). In addition, the CRMC requests BOEM not to issue a license or permit to South Fork Wind, LLC until the requirements of 15 CFR part 930 subpart E have been satisfied. The CRMC will promptly notify BOEM when it issues a federal consistency decision in this matter.

Please contact me at 401-783-3370 or email jwillis@crmc.ri.gov should you have any questions.

Sincerely,

Jeffrey M. Willis

Jeffrey M. Willis, Executive Director
Coastal Resources Management Council

/lat

cc Melanie Gearon, South Fork Wind, LLC
David Kaiser. NOAA
Allison Castellan, NOAA
Jennifer Cervenka, CRMC Chair
CRMC Members
Anthony DeSisto, Esq., CRMC Legal Counsel

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AMENDED AGREEMENT TO STAY SIX-MONTH REVIEW PERIOD

Between

Rhode Island Coastal Resources Management Council

And

South Fork Wind, LLC

The Rhode Island Coastal Resources Management Council, hereinafter referred to as the "CRMC," and South Fork Wind, LLC, hereinafter referred to as "South Fork," hereby agree as follows.

Pursuant to 15 CFR § 930.76, South Fork filed a federal consistency certification with the CRMC on October 22, 2018 for the proposed construction and operation of a wind energy project, known as South Fork Wind, consisting of up to 15 wind turbine generators with one offshore substation, and an export cable that will make landfall on Long Island, NY, that will be located in offshore waters east-southeast of Block Island within BOEM Lease Area OCS-A 0517[1]. The proposed project is subject to CRMC review pursuant to the federal Coastal Zone Management Act (CZMA), 16 U.S.C. § 1451 *et seq*., and the CZMA's implementing regulations at 15 C.F.R. part 930 subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities.

The most recent stay agreement between South Fork and the CRMC was executed on May 25, 2021 and it provided for the State's CZMA consistency decision date on or before June 22, 2021. In the interim, the CRMC has approved a conditional concurrence for South Fork. CRMC and South Fork are now memorializing the agreement related to the mitigation, which

[1] In January 2020, Deepwater Wind New England, LLC requested that BOEM assign a portion of Lease Area OCS-A 0486 to DWSF. BOEM approved the assignment on March 23, 2020 with the new lease number OCS-A 0517 consisting of 13,700 acres.

mitigation was agreed to by South Fork and approved by the CRMC. Therefore, additional time is warranted to complete this work.

In accordance with 15 CFR § 930.60(b), and in consideration of the parties' mutual interest to have this additional time, the CRMC and South Fork mutually agree to the following dates and to stay the CRMC CZMA six-month review period as specified herein.

- Date the CRMC 6-month review period commenced: October 22, 2018
- Date the 6-month review period was to end: June 22, 2021
- Date during the 6-month review period that the stay begins: June 17, 2021
- Date that the stay ends: June 27, 2021
  (5 days remaining in the 6-month review period)
- Date the 6-month review period ends and
  the CRMC consistency decision is due: July 2, 2021

The CRMC will issue its consistency decision on or before **July 2, 2021** unless South Fork and CRMC mutually agree in writing to another later date. Furthermore, should the CRMC conclude its CZMA review earlier than anticipated by this agreement, then the CRMC will issue its consistency decision at the earliest possible time prior to July 2, 2021.

This agreement made and entered by:

Jeffrey M. Willis
Executive Director, CRMC

17 JUNE 2021
Date

South Fork Wind, LLC

Melanie Gearon

Melanie Gearon
Authorized Person

6/17/21
Date

And

Robert Mastria
Authorized Person

6/17/21
Date

cc BOEM
NOAA OCM
CRMC Council members

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

DIVISION OF MARINE FISHERIES
Three Fort Wetherill Road
Jamestown, Rhode Island 02835

TO:	Jim Boyd, Deputy Director of the Coastal Resources Management Council
FROM:	Dr. Conor McManus, Deputy Chief, Rhode Island Department of Environmental Management, Division of Marine Fisheries
DATE:	March 12, 2021
RE:	Southern New England Atlantic Cod Stock Structure

The following memo is intended to provide a brief description on Atlantic cod in southern New England and the cod spawning grounds of Cox Ledge. In doing so, we hope to bring to your attention the uniqueness of the region for Atlantic cod. While the Cox Ledge system supports a diversity of significant marine life and essential habitat for marine fauna, given recent regional undertakings on understanding Atlantic cod stock structure within the Northeast U.S. Shelf ecosystem, we aimed to provide brief insight on both historical and recent findings for Atlantic cod, which support the importance in further understanding the role of Cox Ledge in supporting Atlantic cod.

The full spatial and temporal extent of southern New England Atlantic cod (*Gadus morhua*) spawning is poorly understood, as many long-term scientific surveys do not provide the spatial and temporal resolution needed to properly characterize the distribution of cod spawning activity (DeCelles et al. 2017). However, the presence of spawning aggregations of cod in southern New England waters, including south of Rhode Island, has been documented through various sources (Zemeckis et al. 2014a). Cod have historically been managed as two units: the Gulf of Maine and the Georges Bank management units (Figure 1; McBride and Smedbol 2020), both of which are currently in a critically depleted state (NEFSC 2017a, NEFSC 2017b). Although managed as two broad stocks, the management units are believed to have finer scale structure within that support metapopulations. This metapopulation structure is likely critical in supporting the overall stock. Such metapopulation and heterogeneity characteristics are important to identify, as mismatches between management units and stock structure can reduce the effectiveness of management measures. Further, the connectivity between stocks and metapopulations is important to account for to better understand a stock's resiliency to various natural and fishing mortality pressures. For example, it has been suggested that cod spawning components in the Great South Cannel, Nantucket Shoals, southern New England and the Mid-Atlantic are more connected (genetically and in terms of larval dispersal) with spawning components in the Gulf of Maine than those on eastern Georges Bank, the unit with which they are currently managed with (Zemeckis et al. 2014a).

The Atlantic Cod Stock Structure Working Group (ACSSWG), a group of scientific experts convened by the Northeast Fisheries Science Center and the New England Fishery Management Council, recently conducted a peer-reviewed analysis of U.S. Atlantic cod to evaluate the scientific support for alternative biological stock structure scenarios, and identified a series of mismatches: 1) phenotypic and genetic heterogeneity suggesting that cod are not mixed within management units, 2) extensive movements between management units, and 3) dispersal of larvae around Cape Cod from the Gulf of Maine unit to the Georges Bank unit (McBride and Smedbol 2020). The ACSSWG concluded that there are likely more than two stocks of Atlantic cod, highlighting the need for improved science on a fine scale spatial structure for this species (Figure 2).

Of these newly proposed management units, a separate southern New England (SNE) stock (represented as NOAA Statistical Areas 537, 538 and 539) is included. Within this region is Cox Ledge, a known spawning site for Atlantic cod (e.g., Kovach et al. 2010; Zemeckis et al. 2014a). Spawning is known to occur within the Cox Ledge area between late fall/early winter (Nov-Jan) and late winter/early spring (Feb-Apr), which some suggest represents a single metapopulation unique to this area. As cod return to specific spawning grounds annually in the northwest Atlantic, Cox Ledge may be unique and important to the southern New England Atlantic cod metapopulation.

While the southern New England region has not sustained the cod biomass of other units within United States waters, Atlantic cod have supported significant recreational and commercial fisheries that are important to coastal communities, especially in Rhode Island (Serchuk and Wigley 1992; Oviatt et al., 2003). Climate change is anticipated to hinder Atlantic cod stock rebuilding, but recreational angler accounts suggest that abundance of cod south of Rhode Island has increased significantly over the past 15 years (Sheriff 2018). Therefore, Cox Ledge may be very important for effective stock rebuilding given the unique habitat of the area and potential significance in spawning. Early life history stages of Atlantic cod need complex benthic habitats, specifically boulder, cobble, and pebble substrates, like that of Cox Ledge (NOAA 1999). Moreover, cod exhibit site fidelity (Zemeckis et al. 2017) and spawning aggregations are sensitive to disturbance (Dean et al. 2012). Langan et al. (2019) suggest that eggs and larvae spawned near Cox Ledge may settle in Narragansett Bay based on larval cod observations in the Bay and their estimated hatching dates. Zemeckis et al. (2014b) suggest that spawning closures could be used as part of a multidisciplinary approach to fisheries management to prevent the disruption of spawning activity and the extirpation of semidiscrete spawning components.

Figures

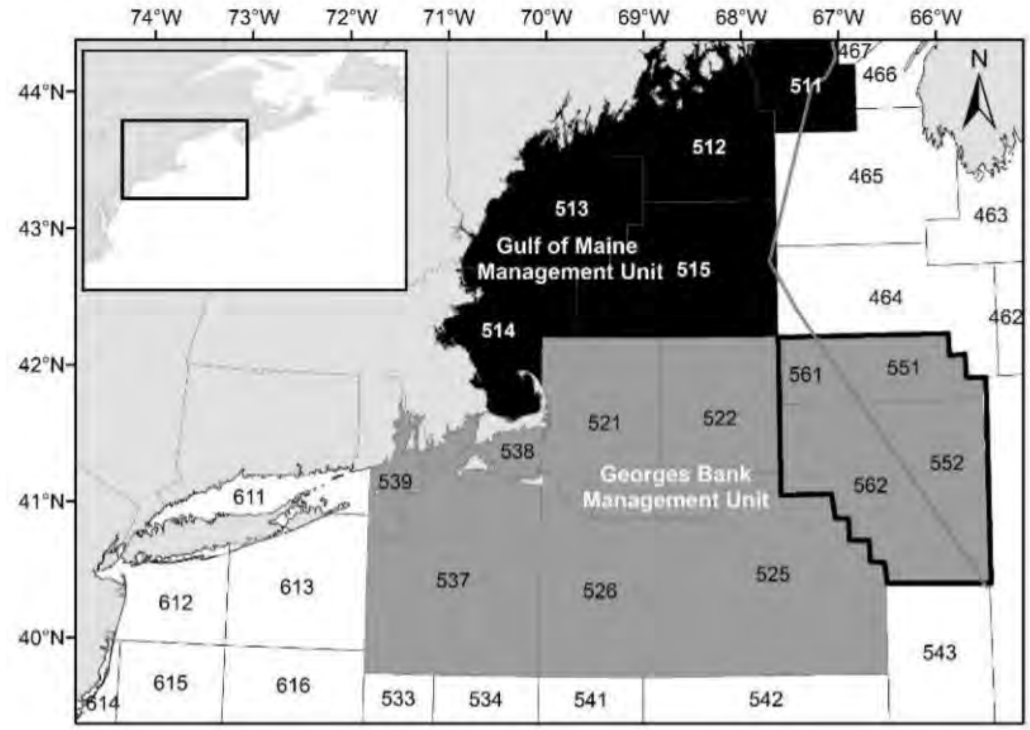

Figure 1. Current boundaries for the two US Atlantic cod management units (from McBride and Smedbol 2020)

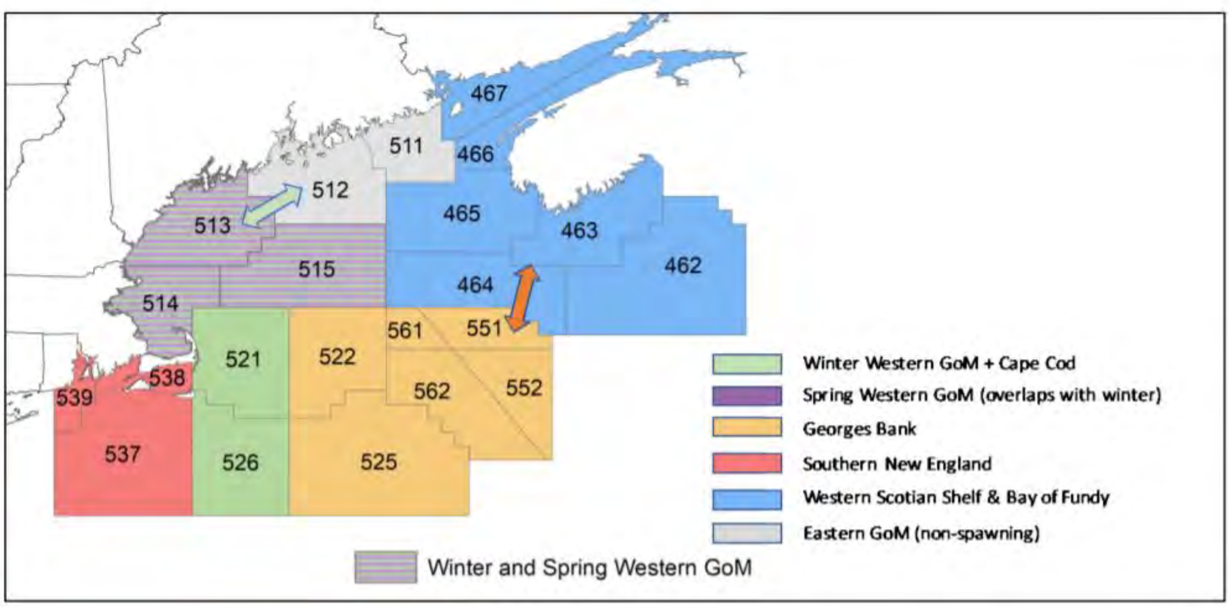

Figure 2. Model of cod population genetic structure in the US and adjacent Canadian waters (from McBride and Smedbol 2020)

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RHODE ISLAND
SALTWATER
ANGLERS
Association
P.O. Box 1465, Coventry, Rhode Island 02816 401-826-2121 FAX: 401-826-3546 www.RISAA.org

DRAFT

Angler Fishing Location Survey
March 2021
PRELIMINARY REPORT

DRAFT

In March 2021 the Rhode Island Saltwater Anglers Association (RISAA) sent out announcements for a survey of anglers designed to determine how and where anglers fished in Rhode Island during the 2019 and 2020 fishing seasons. Links to the survey were sent to the RISAA member email list of about 1,200 emails and links were posted on the RISAA Facebook page as well as sent to the SNESA email list of New England anglers.

Respondents were limited to one response each. Questions elicited how many times the angler had fished in 2019 and 2020. Location was first simply divided as from shore or from boat. Additional questions asked anglers to identify the location by general terms such as Upper Bay East or West side, Lower Bay East or West side, South Shore Beaches, Block Island, etc. A copy of the actual survey is attached.

196 anglers took the survey. 172 of them were considered complete.

The responses indicated that 172 anglers took a total of 6,966 fishing trips in 2019 and 7,593 fishing trips in 2020 for a total of 14,559 trips in those 2 years.
4,755 of those trips were fishing from shore and 9,804 of those trips were fishing from a boat.
This indicated a 9% increase in total fishing trips from 2019 to 2020.

1,321 of the **shore** fishing trips disclosed location; of those:

- 591 trips (44.7%) were in Narragansett Bay,
- 472 trips (35.7%) were in the ocean (beaches or rocks)
- 124 (9.4%) were on Block Island

2,389 of the **boat** fishing trips disclosed location; of those:

- 695 trips (29.1%) were in Narragansett Bay
- 510 trips (21.3%) were along the south shore – east or west
- 321 trips (13.4%) were within 3 miles of Block Island
- 550 trips (23.0%) were fishing greater than 3 miles offshore
- 147 trips were to Cox Ledge (6.2% of all boat trips)
- 137 trips were outside 3 miles, but less than 20 miles (5.7% of all boat trips)

The overall average trips reported per respondent is 14,559 trips for 172 respondents in 2 years or 42 trips per respondent per year. This is clearly a higher average number of trips than the average saltwater fisher. This makes sense considering that members of the RISAA are more active than the average fishers.

In addition, it is likely that those who are active on the RISAA email and who are willing to respond to a survey are more active than average fishers. The positive aspect of this is that active fishers are more likely to report more accurate trip information because many of them use logs to record when and where they fish and what they caught on each trip.

Based on 2016 data the NOAA report “*Fisheries Economics of the United States 2016"* (NOAA Technical Memorandum NMFS-F/SPO-187a) indicated that the average angler trip including both shore and boat fishing resulted in $313 total trip and durable goods expenditure. Using this average the 14,559 trips reported during this survey would result in an economic value to the State of RI of $4.5 million during 2019 and 2020.

The percentages of respondents fishing from shore, boat, in Narragansett Bay, near Block Island, and offshore were consistent with previous observations and estimates by the RISAA Board of Directors, but it is good to have updated information. This information will be used to plan educational programing for RISAA members and will be used to represent Rhode Island recreational anglers with RIDEM and other agencies involved in management of saltwater fishing in RI waters.

This brief summary is ***only a preliminary report*** and follow-up review of the responses will likely be conducted as necessary.

ACTUAL SURVEY ON FOLLOWING PAGES

RHODE ISLAND SALTWATER ANGLERS Association

The Voice of Southern New England Fishermen

Rhode Island Angler Survey

RISAA is conducting this survey so that we may better represent all saltwater anglers who fish in Rhode Island waters.

We are trying to better understand where anglers in Rhode Island go fishing and with what frequency.

Please take time to give your best estimate if you do not have an exact number of trips recorded in a log.

We do not want to know your fishing spots!

We will not use your personal information, but we may use the results of this survey to assess what informational and educational programs would serve recreational anglers. We may also use this information to better represent your fishing interests before RIDEM and other regulatory bodies who govern fishing in our area.

This information should be for **trips in and around the RI area**, including inshore and offshore, but not trips in other areas.

Please include charter and party boat trips that you have taken.

Please complete the survey only once per angler.

You do not need to be a RISAA member to answer, so you may forward this link to others who you know that also fish this areas.

You do NOT need to supply your name and email, but if you want to be contacted for future opinion surveys by RISAA, then leave your contact information here.

1. NAME (first and last)

____

2. EMAIL ADDRESS

____

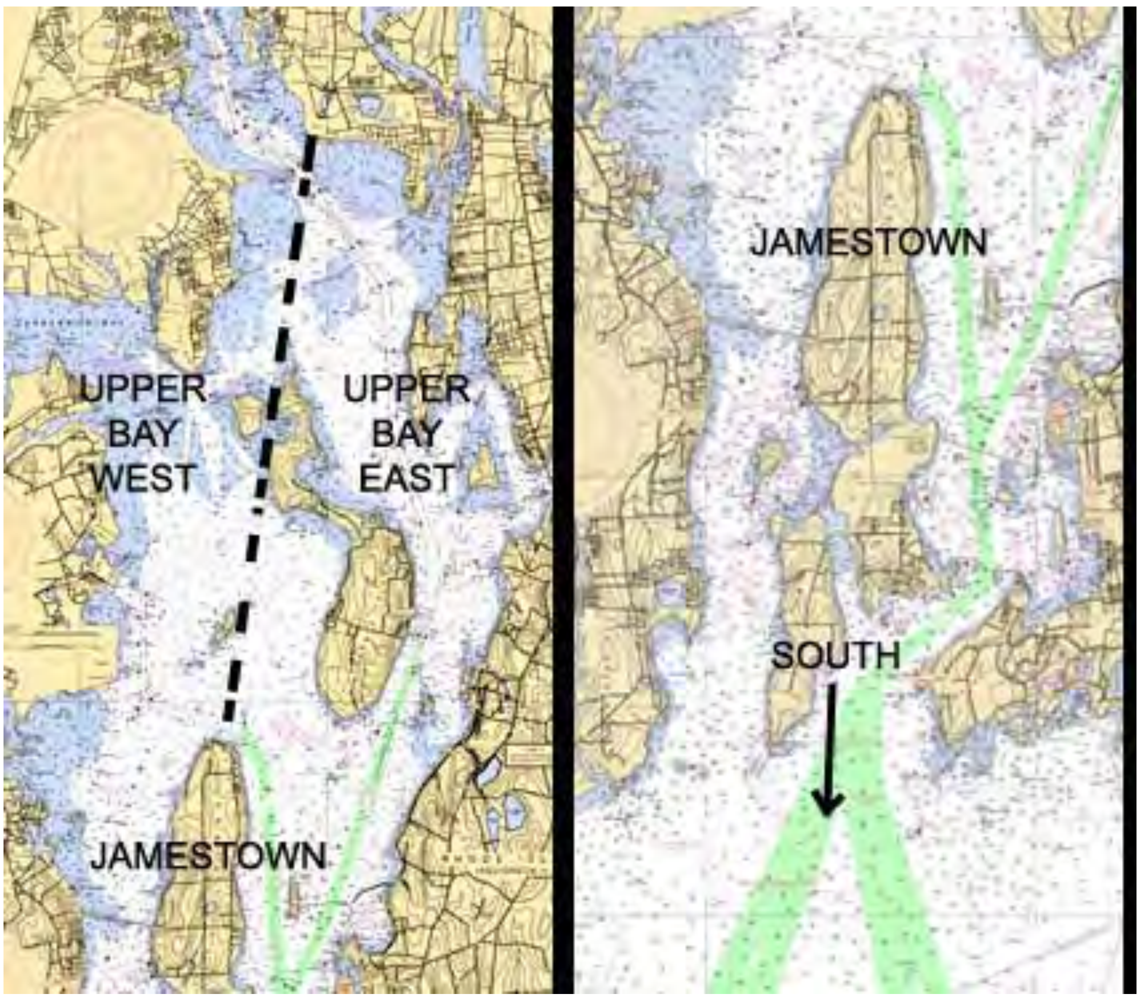
(end of page)

BEGIN SURVEY....

The follow questions compares your fishing in 2019 and 2020 in <u>Rhode Island waters</u>.

1. **IN 2019...** How many times did you fish in Rhode Island waters (if you did not fish enter a "0")
From a boat?
From shore?

2. **In 2020...** How many times did you fish in RI waters
From a boat?
From shore?
Narragansett Bay



3. **DURING 2019...**What were the primary areas were you fished (answer with number of above trips)
Upper Bay, West Passage, North of Jamestown from a BOAT?
Upper Bay, West Passage, North of Jamestown from SHORE?
Upper Bay, East Passage, North of Jamestown from a BOAT?
Upper Bay, East Passage, North of Jamestown from SHORE?
Lower Bay, West Passage, Jamestown & south from a BOAT?
Lower Bay, West Passage, Jamestown & south from SHORE?
Lower Bay, East Passage, Jamestown & south from a BOAT?
Lower Bay, East Passage, Jamestown & south from SHORE?
Other Bay: Sakonnet River, salt ponds from a BOAT?
Other Bay: Sakonnet River, salt ponds from SHORE?
Ocean Beaches (not Block I.) from a BOAT?
Ocean Beaches (not Block I.) from SHORE?
Block Island from a BOAT?
Block Island from SHORE?
Along the RI south coast (Beavertail and east) from a BOAT?
Along the RI south coast (Beavertail and east) from SHORE?
Along the south coast (west of Beavertail to CT border) from a BOAT?
Along the south coast (west of Beavertail to CT border) from SHORE?
Block Island - within 3 miles)?
Any other areas within 3 miles of shore?
Any other areas, greater than 3 miles, but less than 20 miles from shore?
At Cox Ledge?
Areas south and east of Cox Ledge (including canyons)?
Areas greater than 20 miles, west of Cox Ledge (including canyons)?

4. **DURING 2020...**What were the primary areas were you fished (answer with number of above trips)
Upper Bay, West Passage, North of Jamestown from a BOAT?
Upper Bay, West Passage, North of Jamestown from SHORE?
Upper Bay, East Passage, North of Jamestown from a BOAT?
Upper Bay, East Passage, North of Jamestown from SHORE?
Lower Bay, West Passage, Jamestown & south from a BOAT?
Lower Bay, West Passage, Jamestown & south from SHORE?
Lower Bay, East Passage, Jamestown & south from a BOAT?
Lower Bay, East Passage, Jamestown & south from SHORE?
Other Bay: Sakonnet River, salt ponds from a BOAT?
Other Bay: Sakonnet River, salt ponds from SHORE?
Ocean Beaches (not Block I.) from a BOAT?
Ocean Beaches (not Block I.) from SHORE?
Block Island from a BOAT?
Block Island from SHORE?
Along the RI south coast (Beavertail and east) from a BOAT?
Along the RI south coast (Beavertail and east) from SHORE?
Along the south coast (west of Beavertail to CT border) from a BOAT?
Along the south coast (west of Beavertail to CT border) from SHORE?
Block Island - within 3 miles)?
Any other areas within 3 miles of shore?
Any other areas, greater than 3 miles, but less than 20 miles from shore?
At Cox Ledge?
Areas south and east of Cox Ledge (including canyons)?
Areas greater than 20 miles, west of Cox Ledge (including canyons)?

5. Are there any comments that you would like to make to help us better understand where you fish so that we can provide better educational opportunities for you and better represent your fishing interests?

THIS CONCLUDES THE SURVEY QUESTIONS.
Thank you for taking the time to complete the survey.
We will use this information to better serve all Rhode Island saltwater anglers!

September 28, 2020

Jeffrey Willis
Executive Director
RI Coastal Resources Management Council
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879

James Boyd
Coastal Policy Analyst
RI Coastal Resources Management Council
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879

Dear Messrs. Willis and Boyd:

South Fork Wind, LLC ("SFW") respectfully submits this mitigation proposal to the Rhode Island Coastal Resources Management Council ("CRMC") and the Fishermen's Advisory Board ("FAB") for the federal consistency review of SFW's proposed offshore wind farm (the "Project" or "SFW Project"). SFW looks forward to working on a fair and transparent mitigation framework with CRMC with advice from the FAB. SFW asks that CRMC provide this mitigation proposal to the FAB for the FAB's review and assessment.

1. Description of SFW

SFW is a 50/50 partnership between Ørsted and Eversource.[1] The Project is the smallest of the Ørsted /Eversource proposed windfarms in the Rhode Island/Massachusetts Wind Energy Area. The Project will include up to 15 wind turbine generators ("WTG") with a capacity of 6 to 12 megawatts per turbine, submarine cables between the WTGs ("inter-array cables") and an offshore substation, all of which will be located in federal waters on the Outer Continental Shelf approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York. The SFW Project also will include one alternating current electric export cable that will connect the wind farm to an existing mainland grid in New York.

2. SFW Modified the Project to Avoid and/or Mitigate Impacts to Fisheries

Under CRMC's Ocean Special Area Management Plan ("OSAMP"), CRMC charted a careful course for the development of the waters over which it has federal consistency review. Where a proposed offshore project may have impacts on the fisheries, the developer is to evaluate, consider and mitigate those impacts. SFW has taken significant steps to modify its Project to avoid and/or mitigate impacts to fisheries. This is because SFW prioritizes co-existence with the

[1] Ørsted is a global leader in offshore wind and Eversource is New England's largest energy company. Ørsted was recently ranked the most sustainable company in the world and will be the world's first major energy company to become carbon-neutral by 2025. Eversource has committed to becoming carbon neutral by 2030, faster than any utility in the United States.

fishing community as an important step in developing a sustainable offshore wind industry. SFW believes that this focus on co-existence aligns with the spirit of the OSAMP – avoid impacts first, and if full avoidance cannot be achieved, then mitigate.

The modifications that SFW has made to the Project over time to avoid impacts are substantial – from an economic standpoint and on the overall layout of the Project. Over the course of many meetings, SFW assessed and responded to feedback from the FAB and other stakeholders about, among other things, the layout of SFW. Incorporating this input, SFW invested significantly in developing various WTG layouts that evolved over time:

- In the original Construction and Operations Plan ("COP")[2] in June 2018, SFW had 0.8 statute mile spacing between turbines arranged in a grid-like pattern. The intent of this spacing was to balance stakeholder input regarding the layout with a goal of maximizing the amount of clean, renewable energy SFW could bring to the area based on the number of WTGs that can fit within the finite wind lease area.

- After further input from stakeholders and particularly the fishing community that they needed more spacing between turbines to allow them to fish within the lease area, SFW updated the layout in June 2018 to space the turbines 1.0 statute miles apart.

- Over the subsequent year, however, numerous stakeholders reported that this 1.0 statute mile spacing did not fully address their needs. Hearing this feedback, SFW revised the layout again in May 2019 to adopt 1 nautical mile ("NM") spacing along the east-west corridor.

- Despite this significant change, members of the FAB and other stakeholders continued to express concern throughout mid-2019 that the proposed layout would impede fishermen's ability to navigate safely and fish within the SFW area. SFW listened to these concerns and, in concert with the larger offshore wind industry in New England, SFW committed to designing its layout in a 1 NM by 1 NM grid along both the east-west and north-south corridors that aligns across wind farms.

This 1 NM by 1 NM proposal came originally from stakeholder feedback. Now it is a key component of SFW's layout to facilitate long-term use of the wind farm area by the fishing community.

As reflected in the SFW February 2020 revised COP, SFW has committed to the uniform WTG layout grid. The grid points in SFW will align with adjacent WTG points so that all of the Ørsted /Eversource offshore wind installations in the Rhode Island/Massachusetts Wind Energy Area will be in a continuous east-west/north-south grid layout with 1 NM by 1 NM spacing. The grid layout and turbine spacing represent an important modification of the Project to avoid and/or mitigate potential impacts. This modification is also a significant concession by SFW and other

[2] COPs are submitted under federal regulations for Outer Continental Shelf renewable energy activities on a commercial lease.

Ørsted /Eversource Projects. The grid pattern constrains SFW's ability to design and install a layout that would otherwise optimize production from each WTG. The 1 NM by 1 NM spacing also limits the total number of wind turbines that can be constructed in the Ørsted /Eversource lease areas, and therefore, the total renewable energy and revenue that the wind farms can generate.

Recognizing that the OSAMP takes a multi-pronged approach to mitigation, SFW also has implemented additional programs to avoid and/or mitigate potential interactions between SFW and the fishing communities. SFW developed a robust fisheries communication plan that incorporates input from CRMC and the fishing community. The purpose of this communication plan is to give fishermen advance notice of where and when survey and construction activities will occur so as to minimize adverse interactions. SFW also employs fisheries liaisons to assist with these communication efforts. Every survey campaign uses fishing gear avoidance tactics such as onboard gear observers, avoidance training and/or the use of a scout vessel. Further, for those few instances in which gear loss occurs by accident, SFW has implemented a gear loss claim process. This first-in-the-industry gear loss claim process will compensate fishermen fairly in the event of lost or damaged gear.

3. SFW Recognizes the Need Under the OSAMP for Mitigation to Impacted Fishers

With its modifications, SFW has invested heavily in the Project to eliminate or minimize impacts to the fishing community. SFW recognizes, however, that the construction and decommissioning of SFW, in particular, will present some impacts that require mitigation under the OSAMP. The OSAMP establishes a process to ensure that the potential adverse impacts of offshore developments on commercial and recreational fisheries are evaluated, considered and mitigated. § 11.10.1(F). This process requires negotiations among CRMC staff, the FAB, and the Project developer, with final mitigation measures to be approved by the Council and included in CRMC's federal consistency certification.

The OSAMP identifies a broad array of measures constituting mitigation, including but not limited to "compensation, effort reduction, habitat preservation, restoration and construction, marketing, and infrastructure improvements." § 11.10.1(H).

a. Woods Hole Oceanographic Institution ("Woods Hole") Examined Economic Impacts to Fisheries from SFW Project

Because SFW recognized the need to evaluate fairly and on a quantitative basis the scope of financial mitigation, SFW engaged Woods Hole, which is one of the world's leading organizations dedicated to ocean research, to examine impacts to fisheries during the life of the Project and provide the economic value of such impacts.[3] Woods Hole's analysis brings a rigorous and data-driven focus to the question of impacts and economic value.

Woods Hole examined the level of existing fishing operations that intersect with SFW and two alternative export cable route areas to determine the landings and landed value attributable to the

[3] The Woods Hole report was prepared by Di Jin, Ph.D., and Hauke L. Kite-Powell, Ph.D.

area occupied by SFW. Woods Hole obtained and used data provided by NOAA's National Marine Fisheries Service ("NMFS") covering a period of ten years, 2008-2018. The data uses modeled representations of federal Vessel Trip Report ("VTR") and clam logbook fishing trip data overlaid with Vessel Monitoring System ("VMS") data to produce accurate spatial allocation of landings from each fishing trip. Further, because not everyone in the federally permitted lobster or Jonah crab fisheries provides VTR data, Woods Hole applied an upward adjustment on the reported VTR data for these fisheries to account for these additional landings. Accordingly, Woods Hole arrived at baseline fishery landings and values that intersect with the SFW wind farm area and export cable routes.

Woods Hole then applied an economic model using IMPLAN model software and data to estimate the average total economic impact from commercial fishing activity in the SFW and export cable areas to Rhode Island.[4] Based on this model, Woods Hole arrived at an output multiplier that reflects the linkages between economic activity in different sectors of the economy. For example, when landings increase in the commercial fishing sector, there is an associated increase in the seafood processing industry. Incorporating this multiplier allowed Woods Hole to capture indirect economic impacts attributable to commercial fishing activity.

Using these baseline values, Woods Hole then developed and analyzed two potential scenarios representing more extensive impacts and less extensive impacts to commercial fishing from the wind farm activities. These two scenarios considered five categories of possible impacts: (1) impacts due to constrained access areas during construction; (2) impacts on fish stocks due to construction activities; (3) impacts on fishing in the wind farm area and export cable area during operations; (4) impacts due to constrained access areas during decommissioning; and (5) impacts on fish stocks due to decommissioning activities. The two scenarios incorporated conservative assumptions based on anticipated construction schedules and methods and the current state of research regarding the effects of offshore wind construction on fish and other marine species. Woods Hole's report will serve as the basis for the compensatory framework that SFW has developed for mitigation. Please see Woods Hole's report attached in Exhibit A for the analysis described in this proposal.

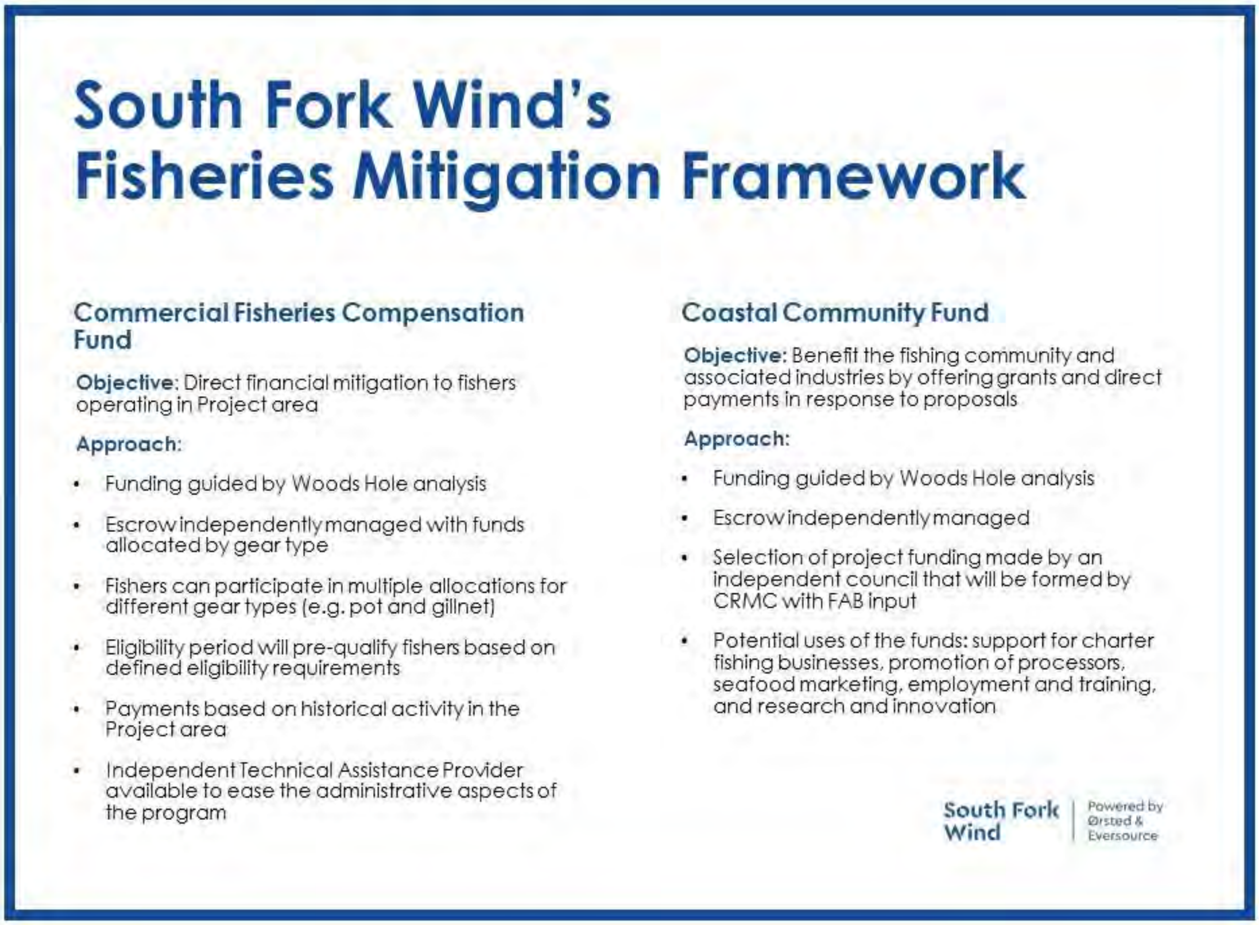
b. <u>SFW Invests in the Development of a Comprehensive Compensatory Framework for Fishers and Coastal Communities</u>

Based on Woods Hole's assessment, SFW engaged top experts to assist it in developing a fisheries mitigation framework that will compensate fishermen and support coastal communities. SFW wanted to present to CRMC and the FAB a comprehensive compensatory program to alleviate the uncertainty on how compensatory mitigation will work in practice. SFW hopes that this framework will advance the mitigation process and show its dedication to working with CRMC and the fishing community. SFW's mission was to achieve a fair and transparent process. SFW's proposed framework is divided into two components: a Commercial Fisheries Compensation Fund that will provide direct financial mitigation to Rhode Island fishers

[4] IMPLAN is a highly effective and often used economic modeling platform that is based on the input-output economic model. The input-output analysis is a form of economic analysis based on the interdependencies between economic sectors.

operating in the SFW and export cable areas; and a Coastal Community Fund that will benefit the fishing industry and its communities through grants.

The chart below provides an overview of these two programs. In addition, SFW has developed a draft term sheet for each of these programs that goes into further detail as to how each program will work. Those draft term sheets are attached for review in Exhibit B.



4. Conclusion

Using Woods Hole's assessment and the NOAA data upon which it is based, SFW is committed to providing a fair and equitable financial mitigation package that is comprised of two parts: 1) direct monetary mitigation in the Commercial Fisheries Compensation Fund; and 2) a Coastal Community Fund for coastal communities and related businesses. Implementation of this mitigation package is contingent on a successful negotiation process including:

- the FAB recommending to CRMC that CRMC concur with SFW's federal consistency certification under the Coastal Zone Management Act;
- concurrence from CRMC with SFW's federal consistency certification on or before January 31, 2021; and
- receipt of all final federal, state and local permits and approvals.

SFW looks forward to working with CRMC and the FAB to achieve a successful mitigation package. SFW would like to begin discussions on the mitigation framework with the FAB within approximately the next two weeks.

Sincerely,

Melanie Gearon

Robert Mastria
Project Development Director

Melanie Gearon
Permitting Manager

EXHIBIT A

Economic Impact of South Fork Wind on Rhode Island Commercial Fisheries

Di Jin and Hauke Kite-Powell
Marine Policy Center
Woods Hole Oceanographic Institution

28 September 2020

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List of Abbreviations

COP – Construction and Operations Plan

ECC – Export Cable Corridor

ECRA – Export Cable Route Area

NMFS – National Marine Fisheries Service

NOAA – National Oceanographic and Atmospheric Administration

RIDEM – Rhode Island Department of Environmental Management

SFW – South Fork Wind

VMS – Vessel Monitoring System

VTR – Vessel Trip Report

WLA – Wind Lease Area

Summary

Based on NOAA data from 2008 to 2018, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, we estimate the average annual value of landings from the South Fork Wind Lease Area to be $250,000 (2019$). Of this, $145,000 is landed in Rhode Island. Including indirect and induced effects, these landings generate average annual economic impacts of $233,000 in Rhode Island.

We estimate the average annual value of landings from the Beach Lane Export Cable Corridor to be $131,000. Of this, $54,000 is landed in Rhode Island. These landings generate estimated total annual economic impacts of $86,000 in Rhode Island.

For the Hither Hills Export Cable Corridor, we estimate average annual value of landings at $122,000. Of this, $54,000 is landed in Rhode Island. The estimated total annual economic impact of landings from the Hither Hills ECC is $87,000 in Rhode Island.

We estimate that a total (lump sum) of $159,000 to $435,000 (2019$) of fisheries value landed in Rhode Island is potentially exposed to the South Fork Wind Farm development. This accounts for about 52% of the total potentially exposed landed value from South Fork Wind. It includes about $26,000 to $78,000 from forgone fishing during construction activities, $109,000 to $180,000 from effects of construction activities on commercial stocks in and around the South Fork development area, up to $130,000 from forgone fishing during the wind farm's operation, and $24,000 to $47,000 in present value of landings from decommissioning. Including indirect and induced effects, the potentially affected landings result in about $255,000 to $700,000 in total (lump sum) present value economic impact in Rhode Island.

We report a range of potential impacts because there is variability in the baseline data of landings and landed value from the South Fork Wind areas, because baseline future landings are likely to vary with fluctuations in stocks potentially amplified by climate change effects, and because there is uncertainty about the impact of wind farm construction and operation on fish stocks and landings, and about the ways that fishers will adapt their fishing practices in response to wind farm development. We consider the low end of our estimates to be the most likely outcome, and the high end to be an upper bound.

Introduction

This report estimates the level of pre-development fishing operations intersecting with, and landings and landed value from, the South Fork Wind Lease Area (WLA) and two alternative export cable routes (Fig. 1), and the potential impact of South Fork Wind Farm construction, operations, and decommissioning on the commercial fishing industry of Rhode Island.

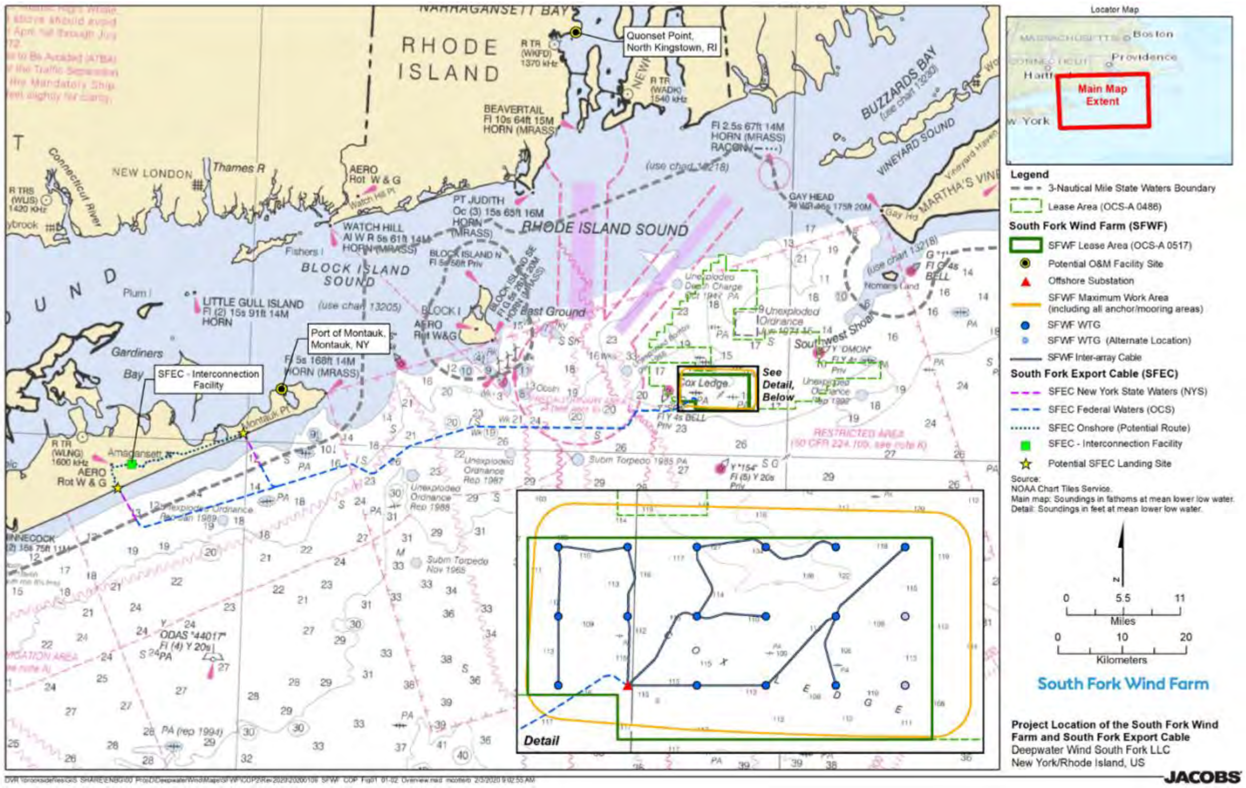

Figure 1. South Fork Wind Lease Area and export cable routes. Source: South Fork Wind Farm Construction and Operations Plan (Deepwater Wind South Fork 2020).

Two alternative export cable routes are under consideration: one that comes ashore at Beach Lane, and one that comes ashore at Hither Hills. To estimate commercial fish landings along the export cable routes, we define a 10km wide Export Cable Route Area (ECRA) extending 5km on either side of the cable route. The 10km wide ECRA has no physical significance in the context of the South Fork Wind Lease, and is defined only for the purpose of identifying fisheries landings data that reflect what may be landed from fishing along the export cable route. Only portions of a narrow, 180m wide strip (the Export Cable Corridor, ECC) immediately around the cable may be disturbed in the process of burying the export cable. A 1,600m wide Working Area around the cable route defines the area where access may be constrained during construction.

Table 1 shows the approximate length and area of these features for each of the two export cable routes. In the sections that follow, fishery landings and values for the export cable routes are estimated and reported for the 180 m Export Cable Corridor.

Table 1. Export Cable Route Area parameters

	Beach Lane	Hither Hills
Length (km)	99.53	80.42
Area of 10km Export Cable Route Area (ECRA) (km^2)	989	799
Area of 180m Export Cable Corridor (km^2)	18	15
180m Export Cable Corridor fraction of ECRA	0.0182	0.0188
Area of 1,600m Working Area (km^2)	159	129
1,600m Working Area fraction of ECRA	0.1610	0.1610

Methodology

Our approach to estimating the potential impact of the South Fork Wind Farm development on commercial fishing is to first estimate the annual landed weight and value of fish from the South Fork WLA and ECCs, and then to estimate the fraction of this annual value that may be exposed to wind farm construction, operation, and decommissioning. Our assessment method is consistent with the general framework described in the reports by BOEM (2017a and 2017b) on socio-economic impact of offshore wind energy development on commercial fisheries, and builds on the approach of Livermore (RIDEM 2017, 2018, and 2019), which develops high-end estimates of fishery impacts by including in baseline estimates the entire trip revenues from all trips that overlap with a wind lease area, regardless of how much fishing occurred inside or outside the area.

We estimate the annual landings and landed value of fish from the South Fork WLA and ECCs using a new dataset provided by NOAA's National Marine Fisheries Service. This dataset uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data to produce a more accurate spatial allocation of landings from each fishing trip (DePiper 2014; Benjamin *et al.* 2018). As we document below, there has been considerable variability in annual landings from these areas over the past decade; we use the average landings and landed value from 2008 to 2018 as indicative of what the areas may yield in the future.

We then estimate the fraction of this average annual value that may be at risk due to South Fork Wind Farm development, based on the nature and schedule of construction activities, operating plans, and decommissioning plans (Deepwater Wind South Fork 2020), and on information from the scientific literature on the effects of wind farm construction and operation on commercial fish stocks and landings.

The effect of offshore wind farm construction and operation on marine ecosystems, fish stocks and fish behavior, and fishery landings is an area of ongoing research. To date, almost all offshore wind farm development has taken place outside the US. The only wind farm off the coast of New England from which lessons might be drawn directly for South Fork is the Block Island Wind Farm, a five-turbine, 30 MW project about 4 miles from Block Island, RI.

Investigations of offshore wind farms outside the US have found both positive and negative impacts on marine biota, habitats, and ecological function. The impacts include the aggregation of finfish and other marine life via the creation of artificial reefs (Bergström *et al.* 2014; Langhamer 2012; Lindeboom *et al.*

2011; Wilhelmsson and Malm 2008) and disturbance of existing ecosystems (Bergström *et al.* 2014; Wilhelmsson *et al*. 2006). Bartley *et al.* (2019) have reported on monitoring of physical and chemical conditions in the benthic environment around Block Island Wind Farm turbine towers over the two years since the towers were installed; they found some changes in the benthos in the immediate tower foundation footprint at one out of three turbine towers they investigated, and found no changes beyond 30m from any of the towers studied.

In their 2018 study, ten Brink and Dalton interviewed commercial and recreational fishers active in the waters around the Block Island Wind Farm about the perceived effects of the farm on fish stocks and fishing activity. Respondents reported murky water, underwater noise, and vibration during construction, and a lower abundance of fish such as striped bass on the side of Block Island closest to the wind farm site during the construction time window. They also reported the presence of shellfish and finfish on and around the wind turbine towers, including an increase in the abundance of cod, within months of the conclusion of construction activities. The transient negative effect on mobile species within 5-10km of wind farm construction activities observed at Block Island is consistent with findings from Europe (Bergström *et al.* 2014; Vallejo *et al.* 2017).

Given the current state of knowledge about the effects of wind farm construction and operation on fish stocks and fishery landings, we consider five categories of possible impacts from the South Fork Wind Farm project on commercial fishing:

- Transient impacts due to constrained access to certain areas during construction
- Transient impacts on fish stocks in the vicinity of the WLA and ECRA due to construction activities
- Impacts to fishing in the WLA and ECRA during operations
- Transient impacts due to constrained access to certain areas during decommissioning
- Transient impacts on fish stocks in the vicinity of the WLA and ECRA due to decommissioning activities

In addition to historical fluctuations in baseline landings, and changes in future fishery landings as a result of climate change (Free *et al.* 2019; Oremus 2019), estimating landings in the future with wind farm development is complicated by two other sources of variability: the effect of wind farm construction and operation on commercial fish stocks in the vicinity of the wind farm, and the response of the commercial fishing industry to the altered “landscape” resulting from wind farm development. The current state of the science about wind farm effects on commercial fishing does not support a precise estimate of the former; and the latter is by its nature not precisely predictable, especially decades into the future, because it depends on personal assessments and decisions of individual fishers.

In light of these sources of variability, we construct two scenarios to estimate the expected future landings at risk from South Fork Wind Farm development: one scenario reflecting more extensive impacts, and one reflecting less extensive impacts. We make conservative assumptions about fishing industry response, assuming that landings from an area where access is constrained during construction, operations, or decommissioning are simply forgone, and not compensated by landings from fishing elsewhere instead. Further, we estimate impact as the landed value (gross revenue) at risk, not the net income or profit. Landed value is, by definition, larger than net income or profit from fishing. For these reasons, we consider our impacts estimate to represent an upper bound on the likely net effects of the wind farm on the fishing industry. In particular, we consider the “more extensive impacts” estimate in this report to be an upper bound on the effect from wind farm development that is likely to materialize, and the "less extensive impact" estimate to be our best estimate of likely actual effects.

Baseline fishery landings and values, 2008-2018

Data Description

The following data description is based on information provided by the National Marine Fisheries Service (NMFS) on March 20 and April 1, 2020.[1] All fishery landings and values analysis in this report is based on these NMFS data; and the data have not been amended, adjusted, or augmented in any way, with one exception: we make adjustments to the lobster and Jonah crab landed values to account for possible underreporting. This is described in detail in the section on Adjustment of Lobster and Jonah Crab Data below. The adjusted data appear only in Tables 10, 11, 12, and 13, and in our final estimates of impacts.

The data presented below summarize fisheries landings and values for fishing trips that intersected with the South Fork Wind Lease Area (WLA) and two alternative Export Cable Route Areas (ECRAs), Beach Lane and Hither Hills, from 2008 to 2018 (calendar years). Modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data were queried for spatial overlap with the wind lease and cable route areas, and linked to dealer data for value and landings information. VMS information has been integrated into the current version of the VTR data. Specifically, for an individual fishing trip, the vessel track was constructed using the VMS data, and the trip landings were distributed along the track based on the probability of whether the vessel was fishing or not fishing on each segment on the track. Details on the VTR model can be found in DePiper (2014) and Benjamin *et al.* (2018). Landings and value are summarized according to (1) species, (2) gear type, (3) port of landing, and (4) state of landing.

For each fishing trip that intersects with the wind lease and cable route areas, the percentage overlap is estimated as the fraction of total trip distance within the relevant areas. Landings and values within the wind lease and cable route areas are then estimated from full trip landings and values using that percentage, and resulting values for all relevant trips are summed. Use of the VTR raster model produces a more accurate estimate of the spatial distribution of landings than other approaches that rely entirely on the self-reported VTR/clam logbook locations, which associate all landings from the trip with a single point location.

Landings associated with the Export Cable Corridors and Export Cable Route Working Areas are calculated by applying the factors in Table 1 to the landings estimated for the respective Export Cable Route Areas. This assumes that landings are distributed uniformly across the fished sections of the ECRAs.

In order to maintain the legally required data confidentiality, summaries by species, gear type, and landing location are presented individually. In addition, for records that did not meet the "rule of three" (three or more unique dealers and three or more unique permits), values are summarized in a category labeled "ALL OTHERS." Note also:

[1] Our primary contact at NMFS was Benjamin Galuardi, a statistician at the NOAA Greater Atlantic Regional Fisheries Office. He has worked extensively on fishery data analyses in general and the VTR data in particular, and has authored or coauthored more than 30 publications on fisheries sciences and spatial statistics.

- All landed values have been converted to 2019 dollars using the Producer Price Index for "unprocessed and prepared seafood."
- Pounds are reported in Landed Pounds, unless otherwise noted.
- Data summarized here are from federal sources only.
- Because the South Fork WLA is in Federal waters, most lobsters caught in the area are included in the VTR data. However, federal lobster vessels that carry only lobster permits are not subject to the VTR requirement; and trips with no VTR are not reflected in the NMFS data summary. We make adjustments to reflect likely complete lobster landings in the assessment of fisheries values exposed to South Fork Wind Farm development. We describe these adjustments in the section on Adjustments to Lobster and Jonah Crab Data below.
- Other fisheries exist in state waters that may not be reflected in data from federal sources (e.g. whelk, bluefish).

We also obtained the average monthly number of trips intersecting with each area, for the period of 2014-2018.

Commercial Fishery Landings from Wind Energy and Export Cable Route Areas

Table 2 shows the average annual level and standard deviation of total values and landings associated with fishing in the South Fork Wind Lease Area and the Beach Lane and Hither Hills Export Cable Corridors from 2008 to 2018.

The average annual landings from the South Fork Wind Lease Area are about 362,000 lbs (standard deviation 146,000 lbs) with a value of about $203,000 (standard deviation $69,000). Average annual landings from the Beach Lane Export Cable Corridor are about 200,000 lbs (standard deviation 85,000 lbs) with a value of $124,000 (standard deviation $30,000). Average annual landings from the Hither Hills Export Cable Corridor are 118,000 lbs (standard deviation 78,000 lbs) with a value of $116,000 (standard deviation $29,000).

Table 2. Average annual value and quantity of commercial fisheries landings by area

	Mean		***Standard Deviation***	
Area	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
South Fork WLA	202,832	362,311	69,223	145,816
Beach Lane ECC	124,397	200,023	30,361	84,503
Hither Hills ECC	115,548	117,718	29,022	78,260

Table 3 shows the total landings and values, for each year from 2008 to 2018, associated with fishing in the South Fork Wind Lease Area and the two alternative Export Cable Corridors.

Table 4 summarizes the average annual landings and value of fisheries production from the South Fork Wind Lease Area and the two alternative Export Cable Corridors by the top five species or species groups. For example, Monkfish, scallops, and lobster are among the species generating the greatest value from the South Fork WLA during the 2008-2018 time period. Tables A1 through A3 in the Appendix provide the complete data on annual landings and value by species or species group for each of the three areas; and Table A4 shows the complete list of species, including those combined as ALL_OTHERS.

Table 3. Annual value and quantity of commercial fisheries landings by area.

Area	South Fork WLA		Beach Lane ECC		Hither Hills ECC	
Year	Value (2019 $)	Landings (lbs)	Value (2019 $)	Landings (lbs)	Value (2019 $)	Landings (lbs)
2008	278,374	187,155	116,815	179,969	110,700	136,273
2009	310,079	482,873	114,070	359,701	104,090	306,773
2010	196,359	283,468	113,644	201,353	103,171	173,314
2011	195,637	283,137	140,900	167,003	134,107	136,711
2012	142,740	256,147	123,168	188,836	114,405	142,488
2013	220,479	671,485	174,381	353,831	160,655	340,176
2014	291,907	494,736	167,890	194,053	159,666	194,273
2015	180,783	340,395	112,269	146,062	103,187	135,669
2016	196,378	425,941	142,421	197,432	131,522	185,062
2017	127,913	358,979	88,650	106,608	79,925	101,857
2018	90,502	201,108	74,153	105,403	69,599	102,304

Table 4. Average annual landings of major species by area, 2008-2018.

	Mean		***Standard Deviation***	
Area/Species	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
South Fork WLA				
Monkfish	34,977	20,692	23,762	14,032
Scallops	30,192	2,793	29,154	3,119
Lobster, American	28,355	5,240	13,191	2,366
ALL_OTHERS	18,855	187,018	13,083	120,799
Skate Wings	18,600	52,544	8,121	13,826
Beach Lane				
Scallops	37,859	3,258	20,822	1,433
Flounders	17,814	6,030	5,951	2,146
Monkfish	12,911	7,380	4,126	1,601
Squid/Loligo	8,071	6,084	6,916	5,437
Skate Wings	7,340	30,148	1,712	10,751
Hither Hills				
Scallops	34,549	2,964	18,922	1,286
Flounders	17,213	5,804	5,662	2,097
Monkfish	13,248	7,597	4,309	1,734
Skate Wings	7,477	30,867	1,793	10,779
ALL_OTHERS	6,705	72,040	6,807	70,494

Note that surf clam and ocean quahog landings are reported by NMFS in the underlying data set as pounds of live weight (including shells), while all other species are reported as landed weight. (This does not affect dollar values reported.) Quahogs are listed as a distinct species, while surf clams are included in the "all other" category. An approximate conversion to landed weight is given by NMFS as:

- landed pound of ocean quahog = ocean quahog pounds / 8.24
- landed pounds of surf clam = surf clam pounds / 5.27

Tables 5a through 5c break out annual landings for each area by gear type. Pot fisheries and gillnets dominate landings from the three areas. The "ALL_OTHERS" category includes landings using purse seines, other seines, and weirs/traps, and others that fall under the "rule of three" exclusion.

Table 5a. Average annual landings in South Fork WLA by gear type.

	Mean		***Standard Deviation***	
Gear	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Dredge	30,149	2,844	29,339	3,169
Gillnet – Other	0	0	0	0
Gillnet – Sink	53,363	53,002	29,681	23,626
Hand	771	185	1,205	273
Longline – Bottom	0	0	0	0
Pot	45,156	11,530	25,254	4,296
Trawl – Bottom	47,692	74,279	13,333	22,331
Trawl – Midwater	4,054	31,563	4,831	35,993
ALL_OTHERS	21,647	188,908	12,289	119,635

Table 5b. Average annual landings in Beach Lane ECC by gear type.

	Mean		***Standard Deviation***	
Gear	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Dredge	40,925	39,674	19,852	70,720
Gillnet – Other	12	4	30	8
Gillnet – Sink	18,857	15,885	3,774	1,590
Hand	1,773	587	448	132
Longline – Bottom	35	12	117	41
Pot	6,002	1,950	1,509	270
Trawl – Bottom	47,081	60,378	12,793	12,909
Trawl – Midwater	2,589	18,391	2,794	17,479
ALL_OTHERS	7,121	63,141	6,513	68,839

Table 5c. Average annual landings in Hither Hills ECC by gear type.

	Mean		***Standard Deviation***	
Gear	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Dredge	35,288	11,999	19,137	29,853
Gillnet – Other	1	1	2	3
Gillnet – Sink	18,150	15,818	4,474	1,736
Hand	1,901	620	477	129
Longline – Bottom	37	13	121	43
Pot	6,170	1,982	1,577	288
Trawl – Bottom	43,946	58,980	10,553	11,128
Trawl – Midwater	2,248	15,832	2,188	13,092
ALL_OTHERS	7,808	72,473	7,001	70,518

Table 6 summarizes annual landings and landed value for the major ports receiving landings from the three areas. Point Judith and Little Compton (both in Rhode Island) and New Bedford in Massachusetts are among the most significant ports for landings from the South Fork Wind areas. Tables A5 through A7 in the Appendix show the complete data on average annual landings and landed value by port for Rhode Island and Massachusetts.

Table 6. Average annual landings at major ports in Rhode Island and Massachusetts.

	Mean		***Standard Deviation***	
Area/Port	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
South Fork WLA				
Point Judith	64,725	52,038	24,334	16,965
New Bedford	45,567	209,868	16,031	140,394
Little Compton	28,868	29,251	18,743	17,442
Newport	18,775	29,359	12,570	15,028
Beach Lane ECC				
Point Judith	38,297	39,333	9,483	5,871
New Bedford	30,139	103,189	16,657	73,712
Newport	4,605	6,490	1,571	2,169
Hither Hills ECC				
Point Judith	38,325	39,966	9,073	5,605
New Bedford	25,662	83,521	16,479	70,818
Newport	4,655	6,671	1,510	2,234

Tables 7a through 7c show average annual landings and landed value from the three areas by state where the catch is landed. Table 7d shows the combined landings and landed value for the WLA and the Beach Lane ECC. Rhode Island and Massachusetts together account for more than 95% of landings and landed value from the WLA. The “others” category includes landings in Maine, New Hampshire, Connecticut, New York, New Jersey, North Carolina, and Virginia, as well as data flagged by the “rule of three” exclusion.

Table 7a. Average annual landings in South Fork WLA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Rhode Island	117,844	127,340	51,181	50,572
Massachusetts	75,348	227,172	35,425	143,320
Others	9,640	7,799	--	--

Table 7b. Average annual landings in Beach Lane ECC by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Rhode Island	51,031	63,602	11,905	15,594
Massachusetts	31,907	107,438	17,132	76,120
Others	41,459	28,983	--	--

Table 7c. Average annual landings in Hither Hills ECC by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
Rhode Island	51,300	64,859	11,730	16,195
Massachusetts	27,333	87,278	16,861	72,729
Others	36,915	25,581	--	--

Table 7d. Average annual landings in South Fork WLA and Beach Lane ECC by state.

	Mean	
State	**Value/year** (2019 $)	**Landings/year** (lbs)
Rhode Island	168,875	190,942
Massachusetts	107,255	334,610
Others	51,099	36,782

Landed value and trips by month

Table 8 and Figures 2 and 3 show the average monthly landings and values from the three areas. Table 9 reports the average monthly number of fishing trips that intersect each area.

Table 8. Average monthly value of landings, 2019$, 2014-2018.

Month	South Fork WLA	Beach Lane ECC	Hither Hills ECC
Jan	10,174	6,363	6,167
Feb	5,366	3,704	3,572
Mar	6,819	4,327	3,932
Apr	8,580	10,824	10,194
May	11,584	12,177	11,821
Jun	19,548	15,398	14,572
Jul	14,945	11,390	10,133
Aug	21,100	13,132	11,182
Sep	19,744	10,706	10,307
Oct	27,829	12,331	10,870
Nov	17,272	7,461	7,276
Dec	14,729	9,670	9,113

Figure 2. Average monthly value of landings, South Fork WLA, 2014-2018.

Figure 3. Average monthly value of landings, South Fork ECCs, 2014-2018.

Table 9. Average monthly number of fishing trips, 2014-2018.

Month	South Fork WLA	Beach Lane ECRA	Hither Hills ECRA
Jan	220	443	432
Feb	115	231	226
Mar	101	201	198
Apr	155	433	383
May	279	1,234	1,109
Jun	402	1,415	1,320
Jul	494	1,633	1,554
Aug	509	1,583	1,530
Sep	430	1,424	1,344
Oct	322	1,252	1,171
Nov	259	1,011	945
Dec	262	777	734

Adjustment of lobster and Jonah crab data

As noted above, lobster vessels that carry only lobster permits are not subject to a VTR requirement. Trips without VTR are not reflected in the numbers shown in Tables 2 through 9 (cf. King 2019). To account for potentially unreported lobster and Jonah crab landings, we make adjustments to the landed value data as shown in Table 10. Data in the first three rows are based on VTR data, and are taken from Table 2 and Tables A1 through A3 in the Appendix. An earlier study by Industrial Economics (2015) indicates that active lobster vessels not subject to trip report requirements in Lobster Management Area 2 may account for as much as 57% of the total lobster fishing activity in that area. We assume conservatively that landings from 60% of the lobster vessels in the South Fork Wind Lease and export cable route areas could therefore be unreported, and that the VTR data represent 40% of the true lobster and Jonah crab revenues. We use this as an adjustment factor, and estimate the adjusted lobster and Jonah crab revenues at 2.5 times of those in the VTR data (rows 5 and 6 in Table 10). The adjusted total annual landed values are shown in row 7. This adjustment results in a 23% increase in the estimated total annual landed value over VTR data for the WLA, and a 5-6% increase for the ECCs.

Table 10. Adjustment of landed value for lobster and Jonah crab landings not captured in VTR data.

Value (2019$)	**South Fork WLA**	**Beach Lane ECC**	**Hither Hills ECC**
Avg. VTR total $/year (Table 2)	202,832	124,397	115,548
Avg. VTR lobster $/year (Tables A1-A3)	28,335	3,862	3,990
Avg. VTR Jonah crab $/year (Tables A1-A3)	2,844	518	508
% of total captured by VTR	40%	40%	40%
Adjusted lobster $/year	70,838	9,654	9,975
Adjusted Jonah crab $/year	7,110	1,295	1,270
Adjusted total $/year	249,600	130,966	122,295
Adjusted increase over VTR total value	23.1%	5.3%	5.8%

Estimated indirect and induced economic impacts

We have developed regional economic models for Rhode Island and Massachusetts using the IMPLAN model software (IMPLAN 2004) and data for 2018. IMPLAN software and data are commercial products widely used by researchers and management agencies to perform economic impact analyses for a user specified study region (IMPLAN 2004; Hoagland *et al.* 2015). Based on these models, the output multiplier for the commercial fishing industry in Rhode Island is 1.606; and the output multiplier for the commercial fishing industry in Massachusetts is 1.775.

These multipliers reflect the linkages between economic activity in different sectors of the economy. For example, when landings increase in the commercial fishing sector, there is an associated increase in the purchases of ice and other supplies in the region, and an increase in onshore transportation and processing of seafood. The resulting increases in economic activity in the commercial fishing supply and transportation and processing sectors are indirect effects of increased landings. In addition, because fishermen and workers in the supply, transportation, and processing industries earn greater income as a result of this increased activity, and spend some of that extra income on local goods and services, there is also an induced effect of greater spending in other sectors. The multipliers capture the combined effect of indirect and induced spending that results from higher commercial landings.

Using these multipliers, and including the lobster and Jonah crab adjustment described in the previous section, we estimate the average annual total economic impact from commercial fishing activity in the South Fork Wind Lease Area to be about $233,000 in Rhode Island and $165,000 in Massachusetts (Table 11). We also estimate the average annual total economic impact from commercial fishing activity in the Export Cable Corridors to be $86,000 in Rhode Island and $60,000 in Massachusetts for the Beach Lane ECC, and $87,000 in Rhode Island and $51,000 in Massachusetts for the Hither Hills ECC. These estimates are based on average annual landings value from 2008 to 2018, with lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements.

Table 11. Estimated annual economic impact (2019$) in Rhode Island and Massachusetts.

Area	State	Average value of landings/year: VTR data only	Average value of landings/year: with lobster & Jonah crab adjustment	Multiplier	Total impact/year: with lobster & Jonah crab adjustment
South Fork WLA	RI	117,844	145,016	1.606	232,896
Beach Lane ECC	RI	51,031	53,726	1.606	86,283
Hither Hills ECC	RI	51,300	54,296	1.606	87,199
South Fork WLA	MA	75,348	92,722	1.775	164,581
Beach Lane ECC	MA	31,907	33,592	1.775	59,626
Hither Hills ECC	MA	27,333	28,929	1.775	51,349

Exposure of fishery resources and fishing to wind farm development

In the following sections, we consider five categories of possible impacts from the South Fork Wind Farm project on commercial fishing:

- Transient impacts due to constrained access to certain areas during construction
- Transient impacts on fish stocks due to construction activities
- Impacts to fishing in the WLA during operations
- Transient impacts due to constrained access to certain areas during decommissioning
- Transient impacts on fish stocks due to decommissioning activities

For each of these, we consider two scenarios: more extensive impacts (scenario 1) and less extensive impacts (scenario 2). The assumptions behind the two scenarios are summarized in Table 11, and discussed in more detail in the following sections. For each area and scenario, Table 12 shows the duration and fraction of the area affected (for constrained access), or the duration and fraction of landings affected (for stock effects). The assumptions are based in part on information from the South Fork Wind Farm Construction and Operations Plan (Deepwater Wind South Fork 2020).

Table 12. Scenarios for estimating exposure of fisheries to wind farm development.

<table>
<tr><th></th><th></th><th></th><th>Scenario 1</th><th>Scenario 2</th></tr>
<tr><td rowspan="3">Construction constrained access</td><td>WLA</td><td></td><td>8 months, 50%</td><td>8 months, 10%</td></tr>
<tr><td rowspan="2">ECRA</td><td>1.6km Working Area</td><td>7 months, 5%</td><td>7 months, 5%</td></tr>
<tr><td>180m Export Cable Corridor</td><td>2 months, 100%</td><td>included above</td></tr>
<tr><td rowspan="3">Stock effects due to construction</td><td>WLA</td><td></td><td>1 year, 75%</td><td>1 year, 50%</td></tr>
<tr><td rowspan="2">ECRA</td><td>1.6km Working Area</td><td>1 year, 10%</td><td>1 year, 5%</td></tr>
<tr><td>180m Export Cable Corridor</td><td>4 years, 10%</td><td>4 years, 5%</td></tr>
<tr><td rowspan="3">Effects during operations</td><td>WLA</td><td></td><td>5%</td><td>none</td></tr>
<tr><td rowspan="2">ECRA</td><td>1.6km Working Area</td><td>none</td><td>none</td></tr>
<tr><td>180m Export Cable Corridor</td><td>none</td><td>none</td></tr>
<tr><td rowspan="3">Decommissioning constrained access</td><td>WLA</td><td></td><td>8 months, 50%</td><td>8 months, 10%</td></tr>
<tr><td rowspan="2">ECRA</td><td>1.6km Working Area</td><td>3.5 months, 5%</td><td>3.5 months, 5%</td></tr>
<tr><td>180m Export Cable Corridor</td><td>1 month, 100%</td><td>included above</td></tr>
<tr><td rowspan="3">Stock effects due to decommissioning</td><td>WLA</td><td></td><td>1 year, 75%</td><td>1 year, 50%</td></tr>
<tr><td rowspan="2">ECRA</td><td>1.6km Working Area</td><td>1 year, 5%</td><td>1 year, 2.5%</td></tr>
<tr><td>180m Export Cable Corridor</td><td>2 years 10%</td><td>2 years, 5%</td></tr>
</table>

Transient impacts from constrained access during construction

During wind farm construction activities, fishing may be temporarily constrained in parts of the WLA and along the export cable routes. For example, South Fork Wind anticipates a 500-yard-radius construction safety zone around tower locations during construction activities, and around any vessel installing cables. In practice, during these construction and cable-laying activities, some fishing that would have taken place in those areas is likely to shift to other nearby locations, replacing some of the forgone landings. If fishers prefer to fish within the construction areas, that is likely because these are thought to be more productive than alternatives. As an upper bound on impacts due to these temporary constraints, we estimate the full average value of landings linked to the affected areas.

The construction schedule (Deepwater Wind South Fork 2020) envisions construction activity in the WLA taking place during the months of May through December (eight months). Work along the ECC is scheduled to take place from November to May over two years, concentrated in two months in the first year and five months in the second. We use as a basis for our calculations the average annual values for each area (Table 2), allocated to the months of the year according to the distribution of values in Table 8. The results are shown in Table 12.

In Scenario 1, we assume that fishing is constrained in half of the South Fork WLA and 5% of the 1.6km Working Area in the ECRA at any given time during the construction months outlined above. In addition, we assume that fishing is constrained within all of the 180m ECC immediately around the export cable for a period of two months as the cable is laid and then buried by a separate vessel.

In Scenario 2, we assume that fishing is affected in only 10% of the WLA at any time during the construction months, and in 5% of the 1.6km Working Area only during seven months of cable work. In this scenario, the cable is buried immediately as it is laid, so there is no constraint affecting the entire ECC itself. This scenario can also represent an alternative in which, as is likely, fishers respond to temporary constraints on fishing in more than 10% of the WLA by shifting their activity to other nearby locations.

The total value of landings associated with forgone fishing in those areas during construction using the Beach Lane ECC is estimated to be $171,000 in Scenario 1 and $42,000 in Scenario 2. Using the Hither Hills ECRA, the estimates are $167,000 in Scenario 1 and $41,000 in Scenario 2. Table 13 shows the contribution of different areas to these totals.

Table 13. Estimated value of landings associated with access constraints during construction.

Area	**Estimated Value Exposure** (2019$)	
	Scenario 1	***Scenario 2***
South Fork WLA	103,106	20,621
Beach Lane ECC – 1.6km Working Area	29,929	29,929
– 180m Export Cable Corridor	19,240	---
Hither Hills ECC – 1.6km Working Area	27,800	27,800
– 180m Export Cable Corridor	17,872	---

Transient impacts due to construction effects on stocks

Construction noise during drilling and pile driving, and disturbance of bottom sediments and rocks, is likely to have an impact on fish and shellfish stocks in and around the South Fork project areas. Mobile species may leave the area because of construction noise, and species that rely on seafloor habitat may be injured or displaced.

To estimate the potential scale of these effects, we assume that the effects of construction activity persist for a period of time, and reduce landings from the affected area by a fixed percentage of the historical baseline during that time. Construction work in the WLA is scheduled to extend over eight months (May to December) in one year, and in the ECC over a total of seven months during November to May in two consecutive years.

In the WLA, about half of landings are from water column fishing, and half from bottom gear. Up to 10% of the bottom within the WLA may be disturbed in some fashion in the course of turbine tower and cable installation. Mobile species are likely to move out of the WLA due to construction noise. The limited data from observations by fishers around the Block Island Wind Farm (ten Brink and Dalton 2018) suggest that the construction noise effect may extend 5-10km from its source, and that many finfish will return to the area within months of the end of construction. Fishing operations shifted to nearby waters to which mobile species relocate during construction may see increased landings. For the WLA, we conservatively model a 75% reduction in landings for one year in Scenario 1, and a 50% reduction for one year in Scenario 2, as indicative estimates.

Along the ECC, the most severe effects are likely to be due to habitat modification along the immediate cable route; cable laying does not involve the same disturbance from drilling or pile driving as turbine tower installation. We therefore consider significant displacement of mobile species from the ECC and Working Area to be unlikely. The habitat modifications that impact non-mobile benthic species are likely to extend on average no more than 5-10m on either side of the immediate cable route. In Scenario 1, we therefore model a 10% reduction in landings over four years from the 180m ECC, and a 10% reduction for one year in the 1.6km Working Area. In Scenario 2, we model a 5% reduction in landings for four years from the 180m ECC, and a 5% reduction for one year from the 1.6km Working Area.

We present the resulting estimates in Table 14. The results suggest that the total value of landings lost due to potential construction effects in the WLA and along the Beach Lane export cable route may be on the order of $356,000 in Scenario 1 and $209,000 in Scenario 2. The total value of landings lost due to potential construction effects in the WLA and along the Hither Hills export cable route may be on the order of $339,000 in Scenario 1 and $201,000 in Scenario 2.

Table 14. Estimated value of landings lost due to potential construction effects on stocks.

Area	**Estimated Value Exposure** (2019$)	
	Scenario 1	***Scenario 2***
South Fork WLA	187,265	124,843
Beach Lane ECRA – 1.6km Working Area	115,875	57,938
– 180m Export Cable Corridor	52,396	26,198
Hither Hills ECRA – 1.6km Working Area	104,692	52,346
– 180m Export Cable Corridor	47,339	23,670
WLA with Beach Lane ECC	355,536	208,979
WLA with Hither Hills ECC	339,296	200,859

Impacts due to fishing constraints during operations

If fishing activity is constrained at certain locations within the wind farm area during the operating life of the project, it may be appropriate to treat these areas as lost to fishing during that time. For example, areas in the immediate vicinity of turbine towers may not be accessible to bottom trawl fishing once the wind farm is built. Fishers are likely to adapt to such constraints by shifting fishing effort slightly from previous locations or tracks. This sort of adaptation by the fishing industry is made easier by the regular one-by-one nautical mile east-west/north-south grid spacing for wind turbine towers that has been adopted for South Fork and other wind development projects (Deepwater Wind South Fork 2020). Because it is not possible to know exactly how the fishing industry will respond to this change in future years, or what the implications of that adaptation will be for catch and landings, we assume here that the landings from affected areas are simply not realized. This is a conservative assumption that likely overstates the actual loss of landings due to wind farm development.

Fishing activity constraints during wind farm operations apply only to the WLA; we do not expect any constraints along the ECC during operations. A 100m radius area around each of the turbine towers on a 1nm grid spacing accounts for less than 2% of the total WLA. Conservatively, we assume that as much as 5% of the WLA footprint may be lost to fishing during operations.

Therefore, we estimate the affected landings as 5% of historical landings from the WLA in Scenario 1, and no net impact in Scenario 2, if the fishing industry shifts locations and tracks so as to maintain previous landing levels. Since the South Fork Wind project will be operating for 30 years, we estimate the potential loss associated with these constraints by calculating the value of landings associated with the restricted footprint within the wind farm area for a 30-year period. We estimate the present value of this reduction in landings using a 5% discount rate, which is the average of the rate usually applied in natural resource valuation (3%) and the rate usually applied by the US government for public investment and regulatory analyses (7%).

The resulting estimate of the total value of potential lost landings during project operations is between zero and $250,000.

Transient impacts from constrained access during decommissioning

After approximately 30 years of operations, South Fork Wind plans to decommission the project. This involves removing the turbine towers and foundations, and the cables including the export cable.

We estimate that the duration of decommissioning, and resulting access constraints in the WLA during decommissioning, will be similar to those experienced during construction of the wind farm. We expect that access constraints along the export cable route will be substantially less than during cable laying operations, and use a factor of 50% to scale the construction effects along the export cable route to reflect potential impacts from decommissioning. We then discount the value of affected landings from decommissioning to 2019$ by applying a 5% discount rate over 30 years.

The resulting present value estimate of potential lost landings due to access constraints during decommissioning is $30,000 in scenario 1 and $8,000 in scenario 2.

Transient impacts due to potential effects on stocks from decommissioning

We estimate that the potential stock effects in the WLA from decommissioning activities will be similar to those imposed from construction of the wind farm. We estimate that potential stock effects along the export cable route will be substantially less than during cable laying operations, and use a factor of 50% to scale the estimated construction stock effects along the export cable route to reflect potential stock effects from decommissioning. We then discount the value of affected landings from decommissioning to 2019$ by applying a 5% discount rate over 30 years.

The resulting present value estimate of potential lost landings due to access constraints during decommissioning is $62,000 in scenario 1 and $39,000 in scenario 2.

Conclusions

Based on NOAA data from 2008 to 2018, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, we estimate the average annual value of landings from the South Fork Wind Lease Area to be $250,000 (2019$). Of this, an average of $145,000 is landed in Rhode Island. Including indirect and induced effects, these landings generate average annual economic impacts of $233,000 in Rhode Island.

We estimate the average annual value of landings from the Beach Lane Export Cable Corridor to be $131,000. Of this, an average of $54,000 is landed in Rhode Island. These landings generate estimated total average annual economic impacts of $86,000 in Rhode Island.

For the Hither Hills Export Cable Corridor, we estimate average annual value of landings at $122,000. Of this, an average of $54,000 is landed in Rhode Island. The estimated total average annual economic impact of landings from the Hither Hills ECC is $87,000 in Rhode Island.

We estimate that a total (lump sum) of $159,000 to $435,000 (2019$) of fisheries value landed in Rhode Island is potentially exposed to the South Fork Wind Farm development. This accounts for about 52% of the total potentially exposed landed value from South Fork Wind. It includes about $26,000 to $78,000 from forgone fishing during construction activities, $109,000 to $180,000 from effects of construction activities on commercial stocks in and around the South Fork development area, up to $130,000 from forgone fishing during the wind farm's operation, and $24,000 to $47,000 in present value of landings from decommissioning.

In the context of overall commercial fishery landings in Rhode Island of more than $100 million per year (NMFS 2020), the landings potentially affected by South Fork Wind represents less than 0.1% of Rhode Island's total annual landings, with much of this impact concentrated in the early part of South Fork Wind's project life.

Including indirect and induced effects, the potentially affected landings result in about $255,000 to $700,000 in total (lump sum) present value economic impact in Rhode Island.

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Appendix

Table A1. Average annual landings by species from the South Fork WLA, 2008-2018.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

Species	*Mean* Value/year (2019 $)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2019 $)	*Standard Deviation* Landings/year (lbs)
ALL_OTHERS	18,855	187,018	13,083	120,799
AMBERJACK, SPECIES NOT SPECIFIED	0	0	0	0
BLACK SEA BASS	3,923	912	2,512	717
BLUE RUNNER	0	0	0	0
BLUEFISH	326	481	131	221
BONITO	88	24	238	61
BUTTERFISH	827	1,176	466	703
COBIA	0	0	0	0
COD, MILT	7,511	2,522	7,479	2,369
CRAB, BLUE/BUSHEL	2	2	5	6
CRAB, HORSESHOE	0	0	0	0
CRAB, JONAH	2,844	3,522	1,679	1,861
CRAB, ROCK/BUSHEL	309	486	210	319
CRAB, SPECIES NOT SPECIFIED	3	5	6	8
CREVALLE	0	0	0	0
CROAKER, ATLANTIC	8	18	13	28
CUNNER	83	30	117	45
CUSK	0	0	0	0
DOGFISH, SMOOTH	59	113	53	119
DOGFISH, SPINY	1,470	6,662	1,154	4,672
DOLPHIN FISH / MAHI-MAHI	0	0	0	0
DRUM, BLACK	0	0	0	0
EEL, AMERICAN	1	1	1	2
EEL, CONGER	18	31	16	30
EEL, SPECIES NOT SPECIFIED	3	3	3	2
FLOUNDERS	15,044	5,434	7,527	3,428
HADDOCK ROE	47	46	124	133
HAKES	6,917	12,073	3,094	6,709
HALIBUT, ATLANTIC	3	0	6	1
HARVEST FISH	0	0	0	0
HERRING, ATLANTIC	5,456	38,672	4,845	36,487
HERRING, BLUE BACK	0	0	0	0
HERRING/SARDINES, SPECIES NOT SPECIFIED	0	0	0	0
JOHN DORY	8	6	7	6
LOBSTER, AMERICAN	28,355	5,240	13,191	2,366
MACKEREL, ATLANTIC	1,226	6,435	2,801	17,681
MACKEREL, CHUB	1	1	3	3
MACKEREL, KING	0	0	0	0
MACKEREL, SPANISH	0	0	0	0
MENHADEN	1	2	2	7
MONKFISH	34,977	20,692	23,762	14,032
MULLETS	0	0	1	1
OCEAN POUT	3	2	6	6

OTHER FINFISH	0	0	0	0
PERCH, WHITE	0	0	0	0
POLLOCK	8	9	12	16
PUFFER, NORTHERN	0	0	0	0
QUAHOGS/BUSHEL	0	0	0	0
RED PORGY	0	0	0	0
REDFISH / OCEAN PERCH	0	0	0	0
RIBBONFISH	0	0	0	0
SCALLOPS, BAY/SHELLS	0	0	0	0
SCALLOPS/BUSHEL	30,192	2,793	29,154	3,119
SCORPIONFISH	0	0	1	1
SCUP	4,396	6,014	1,705	2,655
SEA RAVEN	14	9	16	10
SEA ROBINS	2	11	2	9
SEATROUT, SPECIES NOT SPECIFIED	1	1	1	2
SHAD, AMERICAN	0	0	0	0
SHAD, HICKORY	0	0	0	0
SHARK, THRESHER	1	1	3	2
SHRIMP (MANTIS)	0	0	0	0
SHRIMP (PANDALID)	0	0	0	0
SKATE WINGS	18,600	52,544	8,121	13,826
SKATE WINGS, CLEARNOSE	0	1	1	5
SPOT	0	0	0	1
SQUID / ILLEX	57	57	162	131
SQUID / LOLIGO	10,155	7,800	7,582	5,912
STARGAZER, NORTHERN	0	0	0	0
STRIPED BASS	351	74	427	80
SWORDFISH	0	0	0	0
TAUTOG	85	23	117	31
TILEFISH, BLUELINE	0	0	1	0
TILEFISH, GOLDEN	138	37	130	34
TOADFISH, OYSTER	0	0	0	0
TRIGGERFISH	1	1	2	2
TRIGGERFISH, GRAY	0	0	0	0
TUNA, ALBACORE	1	1	3	3
TUNA, LITTLE	17	32	47	91
TUNA, SKIPJACK	0	0	0	0
WEAKFISH	28	13	17	8
WHELK, CHANNELED/BUSHEL	10,310	1,212	26,250	3,075
WHELK, KNOBBED/BUSHEL	2	1	6	2
WHELK, LIGHTNING	0	0	0	0
WHITING, KING / KINGFISH	61	58	110	101
WOLFFISH / OCEAN CATFISH	0	0	0	0

Table A2. Average annual landings by species from the Beach Lane ECC, 2008-2018.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

	Mean		***Standard Deviation***	
Species	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
ALL_OTHERS	6,065	62,703	6,785	69,003
AMBERJACK, SPECIES NOT SPECIFIED	0	0	1	1
BLACK SEA BASS	2,360	514	721	203
BLUE RUNNER	0	0	0	0
BLUEFISH	966	1,164	500	575
BONITO	50	20	45	18
BUTTERFISH	604	730	214	288
COBIA	1	0	2	1
COD, MILT	3,445	1,242	1,750	663
CRAB, BLUE/BUSHEL	19	15	34	29
CRAB, HORSESHOE	0	0	1	1
CRAB, JONAH	518	641	224	239
CRAB, ROCK/BUSHEL	45	72	36	56
CRAB, SPECIES NOT SPECIFIED	1	2	1	2
CREVALLE	0	0	0	0
CROAKER, ATLANTIC	2	3	4	5
CUNNER	180	33	201	31
CUSK	-	-	-	-
DOGFISH, SMOOTH	264	348	87	107
DOGFISH, SPINY	398	1,867	281	1,096
DOLPHIN FISH / MAHI-MAHI	0	0	0	0
DRUM, BLACK	0	0	0	0
EEL, AMERICAN	67	28	103	30
EEL, CONGER	73	77	64	67
EEL, SPECIES NOT SPECIFIED	12	29	10	45
FLOUNDERS	17,814	6,030	5,951	2,146
HADDOCK ROE	26	24	80	76
HAKES	2,669	4,317	1,341	2,222
HALIBUT, ATLANTIC	2	0	3	0
HARVEST FISH	-	-	-	-
HERRING, ATLANTIC	3,448	23,692	2,484	17,960
HERRING, BLUE BACK	1	3	1	3
HERRING/SARDINES, SPECIES NOT SPECIFIED	0	0	1	1
JOHN DORY	4	3	3	2
LOBSTER, AMERICAN	3,862	682	1,663	269
MACKEREL, ATLANTIC	764	3,120	1,236	5,184
MACKEREL, CHUB	1	1	3	2
MACKEREL, KING	0	0	0	0
MACKEREL, SPANISH	5	2	4	1
MENHADEN	5	36	5	44
MONKFISH	12,911	7,380	4,126	1,601
MULLETS	1	2	2	3
OCEAN POUT	20	16	50	38
OTHER FINFISH	0	0	1	0
PERCH, WHITE	0	0	0	0
POLLOCK	3	3	3	3
PUFFER, NORTHERN	0	0	0	0
QUAHOGS/BUSHEL	3,278	36,378	6,453	71,190
RED PORGY	3	5	10	18
REDFISH / OCEAN PERCH	0	0	0	0
RIBBONFISH	-	-	-	-

SCALLOPS, BAY/SHELLS	1	0	2	0
SCALLOPS/BUSHEL	37,859	3,258	20,822	1,433
SCORPIONFISH	1	1	2	2
SCUP	6,482	7,960	1,912	3,112
SEA RAVEN	8	6	8	7
SEA ROBINS	10	42	6	26
SEATROUT, SPECIES NOT SPECIFIED	2	8	5	10
SHAD, AMERICAN	1	1	1	1
SHAD, HICKORY	0	0	0	0
SHARK, THRESHER	4	4	11	10
SHRIMP (MANTIS)	4	1	10	2
SHRIMP (PANDALID)	-	0	0	0
SKATE WINGS	7,340	30,148	1,712	10,751
SKATE WINGS, CLEARNOSE	2	4	4	9
SPOT	18	23	38	49
SQUID / ILLEX	5	6	10	9
SQUID / LOLIGO	8,071	6,084	6,916	5,437
STARGAZER, NORTHERN	-	0	0	0
STRIPED BASS	2,984	697	633	161
SWORDFISH	0	-	0	0
TAUTOG	234	54	81	16
TILEFISH, BLUELINE	0	0	1	0
TILEFISH, GOLDEN	788	211	1,006	274
TOADFISH, OYSTER	0	-	0	0
TRIGGERFISH	21	11	14	7
TRIGGERFISH, GRAY	1	0	3	1
TUNA, ALBACORE	7	7	7	6
TUNA, LITTLE	31	35	19	25
TUNA, SKIPJACK	0	0	1	0
WEAKFISH	344	177	699	385
WHELK, CHANNELED/BUSHEL	170	34	193	51
WHELK, KNOBBED/BUSHEL	5	4	4	5
WHELK, LIGHTNING	0	-	0	0
WHITING, KING / KINGFISH	51	46	104	91
WOLFFISH / OCEAN CATFISH	0	0	1	0

Table A3. Average annual landings by species from the Hither Hills ECC, 2008-2018.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

Species	*Mean* Value/year (2019 $)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2019 $)	*Standard Deviation* Landings/year (lbs)
ALL_OTHERS	6,705	72,040	6,807	70,494
AMBERJACK, SPECIES NOT SPECIFIED	0	0	1	1
BLACK SEA BASS	2,346	509	764	215
BLUE RUNNER	0	0	0	0
BLUEFISH	719	881	341	398
BONITO	18	7	12	6
BUTTERFISH	615	735	236	303
COBIA	0	0	0	0
COD, MILT	3,530	1,270	1,800	678
CRAB, BLUE/BUSHEL	18	13	34	28
CRAB, HORSESHOE	0	0	0	1
CRAB, JONAH	508	628	226	243
CRAB, ROCK/BUSHEL	47	75	44	69
CRAB, SPECIES NOT SPECIFIED	1	2	1	2
CREVALLE	0	0	0	1
CROAKER, ATLANTIC	2	3	3	4
CUNNER	181	33	205	32
CUSK	-	-	-	-
DOGFISH, SMOOTH	224	292	83	104
DOGFISH, SPINY	404	1,890	284	1,119
DOLPHIN FISH / MAHI-MAHI	0	0	0	0
DRUM, BLACK	0	0	0	0
EEL, AMERICAN	67	29	106	31
EEL, CONGER	76	81	66	70
EEL, SPECIES NOT SPECIFIED	12	30	10	47
FLOUNDERS	17,213	5,804	5,662	2,097
HADDOCK ROE	26	24	79	75
HAKES	2,698	4,376	1,336	2,217
HALIBUT, ATLANTIC	2	0	4	0
HARVEST FISH	-	-	-	-
HERRING, ATLANTIC	3,110	21,235	2,000	14,213
HERRING, BLUE BACK	1	1	1	2
HERRING/SARDINES, SPECIES NOT SPECIFIED	0	0	1	1
JOHN DORY	3	3	3	2
LOBSTER, AMERICAN	3,990	705	1,687	274
MACKEREL, ATLANTIC	753	3,106	1,226	5,182
MACKEREL, CHUB	2	1	4	3
MACKEREL, KING	0	0	0	0
MACKEREL, SPANISH	1	0	1	0
MENHADEN	3	22	3	25
MONKFISH	13,248	7,597	4,309	1,734
MULLETS	1	2	2	3
OCEAN POUT	21	16	51	39
OTHER FINFISH	0	0	0	0
PERCH, WHITE	0	0	0	0
POLLOCK	3	3	3	3
PUFFER, NORTHERN	0	0	0	0
QUAHOGS/BUSHEL	868	8,989	2,877	29,813
RED PORGY	-	-	-	-
REDFISH / OCEAN PERCH	0	0	0	0
RIBBONFISH	-	-	-	-

SCALLOPS,BAY/SHELLS	0	0	1	0
SCALLOPS/BUSHEL	34,549	2,964	18,922	1,286
SCORPIONFISH	1	1	2	2
SCUP	6,622	8,162	2,071	3,296
SEA RAVEN	8	6	8	7
SEA ROBINS	10	44	7	28
SEATROUT, SPECIES NOT SPECIFIED	3	7	6	7
SHAD, AMERICAN	1	1	1	1
SHAD, HICKORY	-	0	0	0
SHARK, THRESHER	0	0	0	1
SHRIMP (MANTIS)	5	1	10	2
SHRIMP (PANDALID)	-	0	0	0
SKATE WINGS	7,477	30,867	1,793	10,779
SKATE WINGS, CLEARNOSE	2	5	4	9
SPOT	20	26	43	54
SQUID / ILLEX	5	5	10	8
SQUID / LOLIGO	5,774	4,273	4,704	3,728
STARGAZER,NORTHERN	-	-	-	-
STRIPED BASS	2,117	483	767	161
SWORDFISH	-	-	-	-
TAUTOG	254	60	76	18
TILEFISH, BLUELINE	0	0	0	0
TILEFISH, GOLDEN	802	215	1,030	281
TOADFISH, OYSTER	0	-	0	0
TRIGGERFISH	28	13	20	10
TRIGGERFISH,GRAY	3	1	10	3
TUNA, ALBACORE	9	9	9	11
TUNA, LITTLE	10	12	10	12
TUNA, SKIPJACK	0	0	1	1
WEAKFISH	124	55	108	49
WHELK, CHANNELED/BUSHEL	169	34	198	52
WHELK, KNOBBED/BUSHEL	5	4	5	6
WHELK, LIGHTNING	0	0	0	0
WHITING, KING / KINGFISH	50	45	109	96
WOLFFISH / OCEAN CATFISH	0	0	1	0

Table A4. Complete species list (including those in ALL_OTHERS).

Species	Species
ALEWIFE	OTHER FINFISH
AMBERJACK, SPECIES NOT SPECIFIED	PERCH, SAND
AMBERJACK,GREATER	PERCH, WHITE
ANCHOVY,BAY	POLLOCK
ARGENTINES,SPECIES NOT SPECIFIED	POMPANO, COMMON
ATLANTIC SALMON	PORGY,JOLTHEAD
BLACK BELLIED ROSEFISH	PUFFER, NORTHERN
BLACK SEA BASS	QUAHOGS/BUSHEL
BLUE RUNNER	RED PORGY
BLUEFISH	REDFISH / OCEAN PERCH
BONITO	RIBBONFISH
BULLHEADS	ROUGH SCAD
BUTTERFISH	SCALLOPS,BAY/SHELLS
CLAM, ARCTIC SURF	SCALLOPS/BUSHEL
CLAM, RAZOR	SCORPIONFISH
CLAM, SPECIES NOT SPECIFIED	SCUP / PORGY
CLAM, SURF/BUSHEL	SEA RAVEN
COBIA	SEA ROBINS
COD,MILT	SEA URCHINS
CRAB, BLUE/BUSHEL	SEATROUT, SPECIES NOT SPECIFIED
CRAB, CANCER	SHAD, AMERICAN
CRAB, GREEN/BUSHEL	SHAD, GIZZARD
CRAB, HERMIT	SHAD, HICKORY
CRAB, HORSESHOE	SHARK, ANGEL
CRAB, JONAH	SHARK, BLACKTIP
CRAB, LADY	SHARK, BLUE
CRAB, RED/BUSHEL	SHARK, MAKO, LONGFIN
CRAB, ROCK/BUSHEL	SHARK, MAKO, SHORTFIN
CRAB, SPECIES NOT SPECIFIED	SHARK, MAKO, SPECIES NOT SPECIFIED
CRAB, SPIDER	SHARK, NOT SPECIFIED
CREVALLE	SHARK, NURSE
CROAKER, ATLANTIC	SHARK, PORBEAGLE
CRUSTACEANS,SPECIES NOT SPECIFIED	SHARK, SANDBAR
CUNNER	SHARK, THRESHER
CUSK	SHARK, THRESHER, BIGEYE
CUTLASSFISH, ATLANTIC	SHARK, TIGER
DOGFISH, CHAIN	SHARK, WHITE
DOGFISH, SMOOTH	SHARK, WHITETIP
DOGFISH, SPECIES NOT SPECIFIED	SHEEPSHEAD
DOGFISH, SPINY	SHRIMP (MANTIS)
DOLPHIN FISH / MAHI-MAHI	SHRIMP (PANAEID)
DRUM, BLACK	SHRIMP (PANDALID)
DRUM, SPECIES NOT SPECIFIED	SHRIMP, SPECIES NOT SPECIFIED
EEL, AMERICAN	SILVERSIDES, ATLANTIC
EEL, CONGER	SKATE WINGS
EEL, SPECIES NOT SPECIFIED	SKATE WINGS, CLEARNOSE
FLOUNDER, AMERICAN PLAICE /DAB	SNAIL,MOON
FLOUNDER, FOURSPOT	SNAPPER, OTHER
FLOUNDER, SAND-DAB / WINDOWPANE / BRILL	SNAPPER, RED
FLOUNDER, SOUTHERN	SPADEFISH

FLOUNDER, SUMMER / FLUKE
FLOUNDER, WINTER / BLACKBACK
FLOUNDER, WITCH / GRAY SOLE
FLOUNDER, YELLOWTAIL
FLOUNDER,NOT SPECIFIED
GROUPER, OTHER
GROUPER, SNOWY
HADDOCK ROE
HAKE, OFFSHORE
HAKE, RED / LING
HAKE, SILVER / WHITING
HAKE, WHITE
HAKE,SPOTTED
HALIBUT, ATLANTIC
HARD QUAHOG
HARVEST FISH
HERRING, ATLANTIC
HERRING, BLUE BACK
HERRING,ATLANTIC THREAD
HERRING/SARDINES,SPECIES NOT SPECIFIED
JACK,ALMACO
JOHN DORY
LADYFISH
LOBSTER, AMERICAN
LUMPFISH
MACKEREL, ATLANTIC
MACKEREL, CHUB
MACKEREL, FRIGATE
MACKEREL, KING
MACKEREL, SPANISH
MARLIN, BLUE
MENHADEN
MOLLUSKS,SPECIES NOT SPECIFIED
MONK LIVERS
MULLETS
NEEDLEFISH, ATLANTIC
OCEAN POUT
OCEAN SUNFISH / MOOLA
OCTOPUS, SPECIES NOT SPECIFIED
SPOT
SQUID / ILLEX
SQUID / LOLIGO
SQUID, SPECIES NOT SPECIFIED
SQUIRRELFISH
STARFISH
STARGAZER,NORTHERN
STING RAYS,SPECIES NOT SPECIFIED
STRIPED BASS
STURGEON, ATLANTIC
SWORDFISH
TAUTOG
TILEFISH
TILEFISH, BLUELINE
TILEFISH, GOLDEN
TILEFISH, SAND
TOADFISH, OYSTER
TRIGGERFISH
TRIGGERFISH,GRAY
TUNA, ALBACORE
TUNA, BIG EYE
TUNA, BLUEFIN
TUNA, LITTLE
TUNA, SKIPJACK
TUNA, SPECIES NOT SPECIFIED
TUNA, YELLOWFIN
TURTLE, LEATHERBACK
WAHOO
WEAKFISH / SQUETEAGUE / GRAY SEA TROUT
WEAKFISH, SPOTTED / SPOTTED SEA TROUT
WHELK, CHANNELED/BUSHEL
WHELK, KNOBBED/BUSHEL
WHELK, LIGHTNING
WHELK,WAVED
WHITING, KING / KINGFISH
WOLFFISH / OCEAN CATFISH

Table A5. Average annual landings from South Fork WLA by port (RI and MA).

	Mean		***Standard Deviation***	
Port	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
BARNSTABLE	5	2	15	7
BOSTON	19	16	64	54
CHATHAM	887	102	2,943	337
CHILMARK	817	148	1,283	224
DAVISVILLE	246	265	583	814
FAIRHAVEN	948	642	1,541	1,363
FALL RIVER	235	1,053	424	1,847
GLOUCESTER	107	637	217	1,458
LITTLE COMPTON	28,868	29,251	18,743	17,442
MENEMSHA	186	35	265	50
NEW BEDFORD	45,567	209,868	16,031	140,394
NEW SHOREHAM	46	19	48	30
NEWPORT	18,775	29,359	12,570	15,028
POINT JUDITH	64,725	52,038	24,334	16,965
SANDWICH	2	3	8	11
TIVERTON	2,430	2,510	2,855	2,741
WOODS HOLE	393	57	1,128	133

Table A6. Average annual landings from Beach Lane ECC by ports (RI and MA).

	Mean		***Standard Deviation***	
Port	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
BOSTON	10	31	19	88
CHATHAM	12	4	27	10
CHILMARK	9	2	15	3
DAVISVILLE	450	199	1,263	628
FAIRHAVEN	548	269	1,101	610
FALL RIVER	180	992	198	1,340
GLOUCESTER	312	1,994	630	4,073
LITTLE COMPTON	2,675	2,732	1,782	1,580
MENEMSHA	2	0	5	1
NEW BEDFORD	30,139	103,189	16,657	73,712
NEW SHOREHAM	440	279	491	424
NEWPORT	4,605	6,490	1,571	2,169
NORTH KINGSTOWN	81	185	270	613
POINT JUDITH	38,297	39,333	9,483	5,871
TIVERTON	2,606	2,676	514	619
WOODS HOLE	162	19	361	43

Table A7. Average annual landings from Hither Hills ECC by port (RI and MA).

	Mean		***Standard Deviation***	
Port	**Value/year** (2019 $)	**Landings/year** (lbs)	**Value/year** (2019 $)	**Landings/year** (lbs)
BOSTON	10	32	19	91
CHATHAM	12	4	28	10
CHILMARK	9	2	16	4
DAVISVILLE	451	185	1,270	585
FAIRHAVEN	516	287	1,046	672
FALL RIVER	178	967	189	1,259
GLOUCESTER	202	1,326	574	3,818
LITTLE COMPTON	2,763	2,822	1,841	1,632
MENEMSHA	2	0	5	1
NEW BEDFORD	25,662	83,521	16,479	70,818
NEW SHOREHAM	454	289	507	438
NEWPORT	4,655	6,671	1,510	2,234
NORTH KINGSTOWN	78	170	257	565
POINT JUDITH	38,325	39,966	9,073	5,605
TIVERTON	2,692	2,764	531	640
WOODS HOLE	167	20	373	44

EXHIBIT B

South Fork Wind (SFW) Commercial Fisheries Compensation Program
Proposed Term Sheet

I. Purpose and Brief Description

- The SFW Commercial Fisheries Compensation Program will provide financial compensation for mitigating impacts to commercial fishing from the construction, operation and decommissioning of SFW.
- The SFW Commercial Fisheries Compensation Program will pay eligible fishers within a reasonable period of time after their claim is approved from an escrow account to be funded in a lump sum according to the process defined below.
- The SFW Commercial Fisheries Compensation Program has two key parts:
  1) determining which fishers are eligible for compensation based on their historical fishing activity in SFW; and 2) calculating the amount of individual compensation based on an open and transparent predetermined payment framework that applies a tiered approach. In this tiered approach, every eligible fisher receives a payment but those with higher historical value landings within SFW receive more compensation than those with lesser value landings.

II. Creation, Use and Funding of SFW Escrow Account and Technical Assistance Provider

- SFW will fund an escrow account for the SFW Fisheries Compensation Program. The escrow will be managed by an independent third party selected by SFW with advice and input from CRMC and the FAB.
- SFW will fund the escrow account in an upfront lump sum payment within thirty days after the receipt of all final federal, state and local permits and approvals. Such payment will be informed by analyses performed by Woods Hole. The funds will be allocated into accounts for the various gear types based upon the Woods Hole analysis.
- SFW will pay for the cost of a Technical Assistance Provider (TAP). The TAP will ease the administrative aspects of the program on fishers. The TAP will be responsible for overseeing the administration of the fund as described below. SFW will select the TAP through a competitive process with advice and input from CRMC and the FAB.

III. Pre-Qualifying for Compensation During the Eligibility Period

- The purpose of the eligibility period is to provide sufficient time for fishers to prequalify for compensation to improve the efficiency of the claim and payment phase so that the payment of approved claims will be fast.

- During the eligibility phase, fishers will be asked to fill out a simple certification form stating that they have fished in the SFW area over a three-year period. Fishers will be required to list the approximate value of their landings from that area over the three years.

- SFW will seek advice from the FAB and CRMC on the documentation for eligibility.

- The TAP will be available to assist fishers with filing for eligibility. All information from fishers will be kept confidential by SFW and the TAP.

- The eligibility period will begin prior to the claims and payment period and will last for a reasonable period of time.

- The TAP will approve or reject eligibility submittals during the eligibility period. If eligibility is rejected, an appeal process to a neutral third party will be available.

- SFW will have no rights or role with respect to the TAP's approval or rejection of eligibility submittals.

IV. Claim and Payment Period for Eligible Fishers

- The claim and payment period for eligible fishers to obtain funds from the escrow will begin upon completion of SFW's commissioning and will last for a reasonable time period. Eligible fishers may submit claims for each gear type for which they have confirmed eligibility. For the avoidance of doubt, fishers may submit a claim for more than one gear type account so long they have confirmed eligibility.

- The claim form will require that the eligible fisher provide specific information and documentation on landings by gear type over the three-year period supporting the estimate provided during the eligibility period. Proof of eligibility may include VTR and log book data.

- SFW will seek advice from the FAB and CRMC on the documentation required to be produced for claims.

- Each payment form will include a release of liability by the certifying fisher releasing SFW from any future claim for additional compensation or other relief under that gear type upon receipt of compensation.

- The amount of the payment will be based on the eligible fishers' historical activity in the SFW area. Payments will be established in tiers by fishery.

    - Once the eligibility period ends, tiered payment levels will be established for allocating funds. Fishers with a higher value of historical landings in the SFW area will receive higher payment than those that have a lower value of historical landings. A minimum payment will be incorporated to ensure all fishers with any level of historical landings from the SFW area will receive a payment. The predetermined funding framework will provide full transparency of how much compensation each eligible claimant will receive.

  - The full amount of funds in each fishery account will be paid to the eligible fishers.

- Payments will be made within a reasonable time frame.

- The TAP will approve claims consistent with the predetermined funding framework. SFW will have no role with the claim and payment period. Upon approval from the TAP, the escrow agent will pay funds directly to the eligible fisher.

South Fork Wind (SFW) Coastal Community Fund Proposed Term Sheet

I. Purpose

- SFW will establish the SFW Coastal Community Fund to provide grants for initiatives supporting the general betterment of coastal communities in Rhode Island.

- By way of example, the SFW Coastal Community Fund may be used for the following objectives:

  - Supporting the recreational and charter boat industry;

  - Providing marketing and promotional support for processors, manufacturers of local seafood products, party or charter boat services;

  - Enhancing opportunities for training, apprenticeship, and employment in the commercial fishing industry, offshore wind industry, and other sectors of the coastal economy;

  - Improving infrastructure that supports the commercial fishing industry including but not limited to processors, wholesalers, and recreational fishers;

  - Supporting the enhancement and productivity of the commercial fishing industry; and

  - Supporting technology development to reduce potential conflicts between commercial fishing and offshore wind operations.

II. Creation, Use and Funding of the Coastal Community Fund

- SFW will establish an escrow account that will be overseen by an independent third-party escrow agent selected by SFW with input from CRMC and the FAB.

- SFW will fund the escrow account with five consecutive annual payments beginning immediately upon the conclusion of SFW commissioning activities. Such payment will be informed by analyses performed by Woods Hole on the indirect economic impacts from SFW.

- These funds will only be used to fund projects that satisfy the SFW Coastal Community Fund‘s objectives and as approved by the SFW Coastal Community Advisory Council (“Advisory Council”). The composition and number of the Advisory Council will be decided by CRMC with advice from the FAB.

- SFW will have no rights or role with respect to the Advisory Council’s approval of project funding requests.

III. Distribution of Escrow Account Funds

- Each request for project funding must be submitted to the Advisory Council and affirm that funds will be used to support projects that meet the objectives of the fund.

- The Advisory Council will review all submitted proposals. The Advisory Council will either approve, reject with an explanation, or request additional documentation necessary to complete its evaluation of a proposal.

- The process and form of such proposals will be determined by the Advisory Council.

- Upon notification of project approval from the Advisory Council, the escrow agent will disburse funds directly to the project applicant.

- In the event the fund is oversubscribed, the Advisory Council may, in its sole discretion, approve partial payment of a proposal.

Update to "Economic Impact of South Fork Wind to Rhode Island Commercial Fisheries"

Di Jin and Hauke Kite-Powell, Woods Hole Oceanographic Institution
15 December 2020

We have made the following adjustments to the September 2020 report titled "Economic Impact of South Fork Wind to Rhode Island Commercial Fisheries" (hereafter referred to as "the report"):

- Adjusted lobster and Jonah crab landed value to account for dockside sales
- Modified the stock effects assumptions from construction activities on the WLA
- Adjusted the application of multipliers to capture downstream impacts
- Added impacts to the charter fishing industry

<u>Dockside sales of lobster and Jonah crab</u>

The average annual value of lobster and Jonah crab landed from the WLA and 180m ECC, respectively, are reported as $77,948 and $10,949 in the report. Those values include an adjustment of the underlying NOAA data to account for the assumption that the NOAA data capture only 40% (by weight) of actual lobster and Jonah crab landings. We have now applied in addition the 15% premium suggested by the FAB (p. 2 of T. Sproul's Nov. 24, 2020 "Calculations for RI FAB Mitigation Summary Slides and Proposal," hereafter referred to as "the Sproul memo.")

The net effect of this adjustment is an increase in baseline landed value per year of $11,692 in the WLA and $1,644 in the ECC, or an average annual value of lobster and Jonah crab landings of $89,640 from the WLA and $12,593 from the ECC.

<u>Stock effect from construction activities on the WLA</u>

The report assumes (scenario 1, p. 18) that construction activities result in a 75% reduction in landings from the WLA over 1 year because of the effect of construction activity on stocks. (This is in addition to the assumption that fishing activity is curtailed by 50% in the WLA during 8 months of construction work.) Our updated assessment retains the assumption regarding fishing activity (effectively, no fishing in 50% of the WLA during 8 months of construction activities) and replaces the 75%/1year stock effect assumption with the following assessment as a result of discussions during mitigation. This assessment is based on the most likely pile driving scenario for the South Fork Wind project: 11 m monopiles, each installed within 24 hours, using a 4,000 kJ hammer, and 10 dB of noise attenuation.

- We assume conservatively that 10% of the lobster and scallop populations within the WLA are adversely affected by pile driving noise during construction time only, and thus lost to fishing. This is based on the "mortality and potential mortal injury" 24-hour exposure threshold of 219 dB for "fish without swim bladders," the closest approximation to lobster/scallops (Popper *et al.* 2014; Denes *et al.* (JASCO) 2018, p. F-39). This level of exposure will extend no more than 120 m from tower locations, a radius that covers about 1% of the WLA footprint. To be conservative, we increase the estimate of the effect by a factor of ten, to 10%.

- We further assume conservatively that mobile species (finfish) will leave all areas where pile driving noise exceeds 160 dB. There is no scientific evidence that the 150 dB threshold sometimes cited for "temporary behavioral changes" (Cal Trans 2015) leads to substantive relocation of finfish; and even 160 bB is far below any documented injury threshold. The maximum range for pile driving noise in the South Fork setting is 4,840 m for 160 dB (Denes *et al.* (JASCO) 2020, p. G-52). We therefore assume conservatively that all finfish leave the WLA and a 5 km buffer zone around the WLA for the duration of pile driving (two months) and return after a further two months (total of four months). To estimate the value associated with this effect, we obtained data from NOAA on average annual landings from a region enclosed by a 5 km buffer around the South Fork WLA. (The value of landings reported by NOAA for this buffer area is similar, in per-unit-area terms, to that of the WLA itself.)
- We also account for some double-counting between these stock effects and the assumption of no fishing in 50% of the WLA during construction activities. In the areas of the WLA where no fishing takes place during construction, the temporary dislocation of finfish is not relevant to landings. To be conservative, we do not account for double-counting of effects in the overlap between the 5km buffer around the WLA and the ECC.

The net effect of this adjustment is an increase in the exposed present value of landings due to construction effects, including direct and indirect impacts, by about $75,000.

<u>Multiplier for downstream impacts</u>

We adopt the FAB's suggestion (pp. 3-4 of the Sproul memo) that the multiplier on RI landings should be 0.985 to account for both upstream effects and downstream effects to seafood processors. We apply this to all landings except lobster and Jonah crab, which are subject to dockside sales and, in most cases, minimal processing. For lobster and Jonah crab landings, we continue to apply the RI IMPLAN multiplier of 0.606.

The net effect of this adjustment is an increase of about $21,800 in RI total exposed value.

<u>Impacts to RI charter fishing</u>

We have added impacts associated with RI-based charter fishing trips that may be exposed to construction and decommissioning activities at the South Fork WLA. According to the Kirkpatrick *et al.* (BOEM, 2017b) study (vol. 2, p. 138, Table III-xii), the average annual gross revenue from for-hire (charter) fishing boats based in RI from 2007 to 2012 was $15,606,829, of which $1,039,999 is considered exposed to general wind energy area development, that is, associated charter boat trips go within 1nm of a wind energy area. We assume no net adverse impact on charter fishing during the operations phase of the project.

We assume conservatively that all RI charter fishing exposed to wind energy areas is exposed to those referred to in the BOEM (2017) report as the MA/RI WEA; in fact, some RI charter fishing may be exposed to other wind energy areas to the southeast of the MA/RI area. The South Fork WLA accounts for about 6.75% of the MA/RI wind energy area modeled by the BOEM study; so we estimate the 2010 exposed value as approximately $70,246. We allow for 3% annual growth in this industry and apply a CPI inflator to estimate $112,341 (2019$) in RI charter boat revenue exposed to the South Fork Wind area.

We assume that this value is foregone in the construction and decommissioning years of the project. Although construction and decommissioning activities are expected to extend for only eight months, we use the full annual value in this case. We also apply a multiplier of 0.6 to estimate onshore effects of charter boat activity, based on a study by Steinback (1999).

The net effect of this adjustment is a $221,335 (2019$) increase in RI exposed value.

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January 16, 2019

Ms. Aileen Kenny
Senior Vice President, Development
Deepwater Wind, LLC
56 Exchange Terrace
Providence, RI 02903

Re: CZMA federal consistency review status for proposed South Fork Wind Farm 90MW offshore wind project.

Reference CRMC File No.: 2018-10-082

Dear Ms. Kenney,

The purpose of this letter is to provide a status update on the Rhode Island Coastal Resources Management Council's (CRMC) federal consistency review of the proposed South Fork Wind Farm (SFWF) project in accordance with 15 CFR § 930.78(a). Accordingly, this letter details some additional information necessary for the CRMC to make a consistency certification determination by April 22, 2019[1] concerning the enforceable policies of the State's federally approved coastal management program, specifically 650-RICR-20-05-11 (CRMC's Ocean Special Area Management Plan (Ocean SAMP))

On October 22, 2018 Deepwater Wind, LLC[2] filed with the CRMC a Construction and Operations Plan (COP) dated September 2018 for the proposed South Fork Wind Farm. The SFWF project consists of up to 15 wind turbine generators (WTGs) with a capacity of 6 to 12 megawatts per turbine, submarine cables between the WTGs (inter-array cables), and an offshore electric substation. These project components will be located within federal waters on the outer continental shelf (OCS) within Bureau of Ocean Energy Management (BOEM) renewable energy lease area OCS-A 0486, approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York. The SFWF is also located within the CRMC's Ocean SAMP boundary that is coincident with Rhode Island's 2011 geographic location description (GLD), including the associated listed federal actions, as approved by NOAA Office of Coastal Management. The SFWF project also includes an alternating current electric submarine export cable, known as the South Fork Export Cable (SFEC) that will connect the SFWF to an existing mainland electric grid at East Hampton, New York. The SFEC will be buried beneath the seabed within federal waters on the OCS from the SFWF to the boundary of New York State territorial waters (3 miles offshore). The intended purpose of the project is to supply 90 megawatts (MW) of electricity to the State of New York.

[1] Unless Deepwater Wind and the CRMC mutually agree to stay the CRMC's six-month review period pursuant to 15 CFR § 930.60.

[2] On October 8, 2018 Ørsted announced that it entered into an agreement with the D.E. Shaw Group to acquire a 100% equity interest in Rhode Island-based Deepwater Wind. In November 2018 federal regulators approved the merger of the two companies as a single organization named Ørsted US Offshore Wind.

The proposed SFWF project is subject to CRMC federal consistency review authority pursuant to the federal Coastal Zone Management Act (CZMA) at 16 USC § 1456(c)(3)(A) and the CZMA's implementing regulations at 15 CFR Part 930, Subpart D - Consistency for Activities Requiring a Federal License or Permit and Subpart E - Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities. The SFWF project meets the definition of a "large-scale offshore development" as specified in § 11.3(H)(1)[3].

Included within Section 1.3.4 of the COP was a general statement of Coastal Zone Management Act consistency with the State's enforceable policies. See COP at 1-34. As you know, I indicated to you via email dated October 24, 2018 that the consistency certification included within the COP was not in compliance with 15 CFR § 930.57. Additionally, the COP statement concerning Deepwater Wind's voluntary filing of the consistency certification with the state of Rhode Island was also incorrect. As stated in my October 24 email, Deepwater Wind is subject to CRMC federal consistency review and is required to file a consistency certification with Rhode Island, pursuant to 15 CFR Part 930 Subpart D, because the proposed project is a listed activity on the State's approved federal consistency list, and the project is located within Rhode Island's GLD. In addition to the proper consistency certification statement, my email of October 24 also requested a draft fisheries monitoring plan that outlines the specifics as to what species will be monitored and what methods will be used and when the surveying will be conducted to demonstrate compliance with enforceable policy § 11.10.9(C)(1). I had requested that the information be provided to the CRMC prior by Tuesday, November 13, 2018 to avoid the CRMC having to issue an incomplete submission notice pursuant to 15 CFR § 930.60, which would stop the agency's six-month CZMA review period.

Deepwater Wind submitted the requested information to the CRMC on November 13, 2018 via email and a hardcopy package via FedEx the following day. In review of the package filed by Deepwater Wind, we have determined that it satisfactorily addresses the consistency certification statement. See revised Appendix A at A-2 dated November 10, 2018. The fisheries monitoring plan titled "Demersal Fisheries Resources Survey Protocol" was stamped "*DRAFT*" and it outlines the minimum information necessary to proceed with review. However, the fisheries monitoring plan lacks specificity and is insufficient to develop a pre-construction baseline data set necessary to assess targeted commercial fisheries species that are typically harvested from the project area. A more robust monitoring plan as detailed below in Section A will be required for the CRMC review.

A. Supplemental information required to address Rhode Island's enforceable policies

The regulatory standards contained within 650-RICR-20-05-11 are the enforceable policies for purposes of the CZMA federal consistency provisions, specifically Part 11.10. These standards in addition to other applicable federally approved Rhode Island Coastal Resources Management

[3] The enforceable policies of the Rhode Island coastal management program applicable to the SFWF project are contained in the CRMC's Ocean Special Area Management Plan, which is codified in the Rhode Island Code of Regulations as 650-RICR-20-05-11. For purposes of federal consistency, enforceable policies are defined at 15 CFR § 930.11(h).

Program (CRMP) enforceable policies are the basis for the CRMC's CZMA federal consistency certification concurrence or objection.

§ 11.10.1(C): *Offshore Developments shall not have a significant adverse impact on the natural resources or existing human uses of the Rhode Island coastal zone, as described in the Ocean SAMP. In making the evaluation of the effect on human uses, the Council will determine, for example, if there is an overall net benefit to the Rhode Island marine economic sector from the development of the project or if there is an overall net loss. Where the Council determines that impacts on the natural resources or human uses of the Rhode Island coastal zone through the pre-construction, construction, operation, or decommissioning phases of a project constitute significant adverse effects not previously evaluated, the Council shall, through its permitting and enforcement authorities in state waters and through any subsequent CZMA federal consistency reviews, require that the applicant modify the proposal to avoid and/or mitigate the impacts or the Council shall deny the proposal.*

Deepwater Wind's response to this enforceable policy states that "The SFWF [SFEC] is consistent with this policy. The SFWF [SFEC] will not have significant adverse impact on the natural resources or human uses of the RI Ocean SAMP study area. It is expected that current activities will be able to continue post construction." See Appendix A-2 at A-2-1. While current activities may well continue post construction, it is still is not clear whether there may need to be modifications to the proposed project to avoid potential significant impacts to Rhode Island-based commercial fishery operations. Therefore, the CRMC cannot at this time conclude that the project is consistent with this enforceable policy.

Figure 1.1-2 of the SFWF COP shows a grid layout with north-south and east-west orientation of the WTGs within a "maximum work area" in context with Deepwater Wind's lease area OCS-A 0486. Inset details show both 0.8 mile and 1.0 mile spacing of the WTGs within a maximum work area boundary. It appears that Deepwater Wind has committed to an east-west layout of the project based on representations by Deepwater Wind staff at the August 27, 2018 CRMC Fishermen's Advisory Board meeting and the BOEM public scoping meeting for the SFWF project held on November 8, 2018 in Narragansett, RI. Deepwater Wind to date has confirmed that the maximum spacing between WTGs will be 1.0 (statute) mile. As you know, the alternative wind farm layout proposal developed by the Commercial Fisheries Center of Rhode Island (CFCRI), and included in the CRMC's 3-month letter to Vineyard Wind for their proposed 800MW project, consists of a grid of east-west lanes with 1 **nautical** mile (1 nm) spacing between the WTGs. The alternative wind farm layout proposal was developed by CFCRI so that if adopted by the offshore wind energy industry for southern New England waters, then a majority of Rhode Island-based commercial fishing operations would be able to continue harvesting activities with some exceptions and adjustments, and coexist with the offshore wind energy industry. I would encourage Deepwater Wind to consider increasing the spacing between WTGs to 1 nautical mile to achieve the spacing necessary for consistency with the CFCRI proposal in an attempt to accommodate the commercial fishing industry and avoid potential adverse impacts. Furthermore, from a risk management perspective it is imperative that wind turbines be installed by all renewable energy developers throughout southern New England waters in a consistent grid pattern of east-west orientation with a minimum 1 nm spacing between turbines to enhance safe navigation and operations of all recreational and commercial vessels.

Based on the experience of the Block Island wind farm construction it became evident that burial depth of the export cable was insufficient in some locations, which necessitated the installation of concrete mats to protect the cable. Considering that the SFEC will be installed in an area of high mobile gear activity it will be important to achieve proper cable burial depth to avoid unnecessary use of cable protection that has a potential to snag mobile gear (trawling nets). It appears that Deepwater Wind is considering the use of self-propelled mechanical and hydraulic trenchers based on discussion in the COP in section 4.1.2.2 and the submarine cable installation drawing contained in Appendix G2 to achieve the targeted cable burial depth of 1.2 to 1.8 meters. However, the SFWF COP indicates that articulated concrete mattresses or rock placement will be used to protect cables where sea bed conditions may not allow burial to the desired depth within the inter-array cable route or the SFEC route. See COP at 3-31 and 3-45. Deepwater should confirm that the described equipment will be used to the maximum extent practicable and limit the use of hydro-jet plow trenching equipment to sea bed areas that are suitable for such equipment (e.g., predominantly sands). Achieving proper cable burial depth and minimizing the use of cable protection will aid in avoiding impacts to the commercial fishing sector.

Given a positive outcome with the issues detailed above, the CRMC could then likely conclude that the SFWF project has been modified to avoid unnecessary impacts and meets its burden of proof under enforceable policy § 11.10.1(C).

§ 11.10.1(I): *The Council recognizes that moraine edges, as illustrated in Figures 3 and 4 in § 11.10.2 of this Part, are important to commercial and recreational fishermen. In addition to these mapped areas, the FAB may identify other edge areas that are important to fisheries within a proposed project location. The Council shall consider the potential adverse impacts of future activities or projects on these areas to Rhode Island's commercial and recreational fisheries. Where it is determined that there is a significant adverse impact, the Council will modify or deny activities that would impact these areas. In addition, the Council will require assent holders for offshore developments to employ micro-siting techniques in order to minimize the potential impacts of such projects on these edge areas.*

§ 11.10.1(J): *The finfish, shellfish, and crustacean species that are targeted by commercial and recreational fishermen rely on appropriate habitat at all stages of their life cycles. While all fish habitat is important, spawning and nursery areas are especially important in providing shelter for these species during the most vulnerable stages of their life cycles. The Council shall protect sensitive habitat areas where they have been identified through the Site Assessment Plan or Construction and Operation Plan review processes for offshore developments as described in § 11.10.5(C) of this Part.*

§ 11.10.2(A): *Areas of Particular Concern (APCs) have been designated in state waters through the Ocean SAMP process with the goal of protecting areas that have high conservation value, cultural and historic value, or human use value from large-scale offshore development. These* *areas may be limited in their use by a particular regulatory agency (e.g., shipping lanes), or have inherent risk associated with them (e.g., unexploded ordnance locations), or have inherent natural value or value assigned by human interest (e.g., glacial moraines, historic shipwreck sites). Areas of Particular Concern have been designated by reviewing habitat data, cultural and historic features data, and human use data that has been developed and analyzed through the Ocean SAMP process. Currently designated Areas of Particular Concern are based on current knowledge and available datasets; additional Areas of Particular Concern may be identified by the Council in the future as new datasets are made available. Areas of Particular Concern may be elevated to Areas Designated for Preservation in the future if future studies show that Areas of Particular Concern cannot risk even low levels of large-scale offshore development within these areas. Areas of Particular Concern include:*

1. *Areas with unique or fragile physical features, or important natural habitats;*
2. *Areas of high natural productivity;*
3. *Areas with features of historical significance or cultural value;*
4. *Areas of substantial recreational value;*
5. *Areas important for navigation, transportation, military and other human uses; and*
6. *Areas of high fishing activity.*

Glacial moraines of the cobble and boulder nature represent areas of high biodiversity and important fish habitat. Impacts to these areas could result in long-term or permanent impacts to fish populations that are dependent on these habitat types and thus impact the Rhode Island fishery in the area. Additionally, the CRMC is obligated through § 11.10.1(J) to protect sensitive habitat areas where they have been identified through the Site Assessment Plan or Construction and Operation Plan review processes. The Ocean SAMP has identified specific glacial moraines as areas of particular concern (APC) as shown in §§ 11.10.2(F) and (G), Figures 3 and 4, respectively. Deepwater Wind's COP indicates that the project is consistent with the enforceable policy and that the project has been sited to avoid any areas of particular concern, including moraine edges. See COP Appendix A-2 at A-2-2. While the project may not be located within a glacial moraine, there is no graphic or other evidence within the COP that clearly shows that the project is not located within a glacial moraine as depicted within §§ 11.10.2(F) and (G) of the Ocean SAMP. Even if shown that the project is not sited within an existing identified moraine or moraine edge, "the FAB may identify other edge areas that are important to fisheries within a proposed project location" pursuant to § 11.10.1(I) as part of the CRMC review process. An appropriate graphic is requested showing the project in relation to existing glacial moraines mapped within the Ocean SAMP as indicated above. Some of the Ocean SAMP geological mapping and data are available at the www.narrbay.org website here: http://www.narrbay.org/d_projects/oceansamp/.

The CRMC may identify additional Areas of Particular Concern as new datasets are made available, as provided by § 11.10.2(A). The more detailed geotechnical survey data collected by Deepwater Wind for the SFWF/SFEC project would likely be helpful in establishing whether either project element is located within a moraine or APC, or whether the project is located within sensitive habitat areas as may be identified by the CRMC. Accordingly, absent additional information and consideration by the FAB and the CRMC pursuant to §§ 11.10.1(I), 11.10.1(J) and 11.10.2(A), the CRMC at this time cannot conclude that the SFWF/SFEC project is not located within a moraine, an APC or sensitive habitat areas. Therefore, the CRMC presently does not agree that the SFWF and SFEC are consistent with the enforceable policies of §§ 11.10.1(I) and 11.10.2(A) as stated within Deepwater Wind's Appendix A-2.

§ 11.10.9(C): *The items listed below shall be required for all offshore developments:*

1. A biological assessment of commercially and recreationally targeted species shall be required within the project area for all offshore developments. This assessment shall assess the relative abundance, distribution, and different life stages of these species at all four seasons of the year. This assessment shall comprise a series of surveys, employing survey equipment and methods that are appropriate for sampling finfish, shellfish, and crustacean species at the project's proposed location. Such an assessment shall be performed at least four times: pre-construction (to assess baseline conditions); during construction; and at two different intervals during operation (i.e. one (1) year after construction and then post-construction). At each time this assessment must capture all four seasons of the year. This assessment may include evaluation of survey data collected through an existing survey program, if data are available for the proposed site. The Council will not require this assessment for proposed projects within the renewable energy zone that are proposed within two (2) years of the adoption of the Ocean SAMP.

As you know, I had advised you in my October 24, 2018 email that the COP filed with the CRMC on October 22, 2018 indicated that Deepwater Wind was developing a fisheries monitoring plan to further assess targeted species for pre-construction, during construction and under operational conditions. Thus, a fisheries monitoring plan was not yet completed for CRMC review. Deepwater Wind provided to the CRMC on November 13, 2018 a fisheries monitoring plan titled "Demersal Fisheries Resources Survey Protocol" that was stamped "*DRAFT*". The submitted fisheries monitoring plan essentially details a gillnet survey for demersal fish species, but it lacks specificity to develop a comprehensive pre-construction baseline data set necessary to assess targeted commercial fisheries species that are typically harvested from the area. Moreover, the gillnet survey design is insufficient to establish a baseline assessment of demersal finfish. In addition, an assessment and monitoring plan for commercially harvested crustacean species must be included as part of the biological assessment. Pelagic fish and molluscan shellfish are known to be present in the project area and should be included in the assessment and monitoring plan. In conclusion, a more robust monitoring plan will be required for the CRMC review that outlines the specifics as to what species will be monitored and what methods will be used and when the surveying will be conducted to demonstrate compliance with enforceable policy § 11.10.9(C)(1).

B. Conclusion

Pursuant to the enforceable policies of the Ocean SAMP, offshore developments shall not have a significant adverse impact on the natural resources or existing human uses of the Rhode Island coastal zone. Where the CRMC determines that there are significant adverse effects on Rhode Island coastal resources or uses, it can require that the applicant modify the proposal to avoid and/or mitigate the impacts or the CRMC shall deny the proposal. See Ocean SAMP § 11.10.1(C). As detailed above, there is further information necessary for Deepwater Wind to file with the CRMC to properly evaluate potential coastal effects to the Rhode Island-based commercial fishing operations.

I am requesting that Deepwater Wind provide the following data and information **within thirty (30) days from the date of this letter** to demonstrate that the SFWF/SFEC project is consistent with the enforceable policies of the Ocean SAMP at § 11.10. Absent this information within the CRMC's review period, presently scheduled to end on April 22, 2019, the CRMC would be unable to conclude that the SFWF/SFEC project is consistent with the Rhode Island coastal management program. Thus, the CRMC would then have to object to Deepwater Wind's consistency certification pursuant to 15 CFR §§ 930.63(c) and 930.78.

Additional data and information necessary for CRMC review

1. Alternative layout showing an increase in spacing between WTGs to 1 nautical mile.
2. Confirmation as to what specific trenching equipment, hydraulic or mechanical, will be used and under what conditions, and to limit the use of hydro-jet plow trenching only to sea bed areas that are suitable for such equipment (e.g., predominantly sands) to ensure achievement of proper cable burial depth and minimize the use of cable protection (concrete mats or rock) to avoid adverse impacts to the commercial fishing sector. Deepwater should identify specific areas of sea bed where specific trenching techniques will likely be used.
3. Supply a graphic(s) showing the proposed SFWF and SFEC project elements in relation to the currently existing CRMC identified glacial moraines as depicted within §§ 11.10.2(F) and (G) of the Ocean SAMP. Additional non-confidential geotechnical data should be filed with the CRMC to aid in determining whether the SFWF/SFEC is located within a glacial moraine a moraine edge or an area of particular concern.
4. A more robust fisheries monitoring plan that details the specifics as to what commercial and recreational species will be monitored, what survey methods will be used and when the surveying will be conducted to meet the requirement of a biological assessment of the relative abundance, distribution, and different life stages of these species at all four seasons of the year. The assessment must comprise a series of surveys, using survey equipment and methods appropriate for sampling finfish, shellfish, and crustacean species at the project's proposed location. The assessment must be performed at least four times: pre-construction (to assess baseline conditions); during construction; and at two different intervals during operation (i.e. one (1) year after construction and then post-construction) and must capture all four seasons of the year.

A final decision by the CRMC for concurrence or objection to Deepwater Wind's SFWF consistency certification must be issued by April 22, 2019 pursuant to 15 CFR §§ 930.62, 930.63 and 930.78. Should Deepwater Wind require additional time to prepare and file the requested information or determine that additional time for the CRMC to review the SFWF/SFEC project would be in Deepwater Wind's best interests given the current federal government shutdown and other factors, the CRMC would be amenable to a stay agreement with Deepwater Wind as provided for under 15 CFR § 930.60(b) to stay the CRMC federal consistency review period for a reasonable period of time and extend the deadline for a final determination on Deepwater Wind's consistency certification filing.

The CRMC will file a copy of this consistency review status with the Acting Director of the Bureau of Ocean Energy Management as required pursuant to 15 CFR §§ 930.62(b) and 930.78.

Please contact me at 401-783-3370 or email gfugate@crmc.ri.gov should you have any questions.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

cc Walter Cruickshank, Ph.D., Acting Director, BOEM
James Bennett, Chief, BOEM, Office of Renewable Energy Programs
David Kaiser, NOAA
Allison Castellan, NOAA
Jennifer R. Cervenka, CRMC Chair
CRMC Council members
Anthony DeSisto, Esq., CRMC legal counsel
Jeffrey Willis, CRMC Deputy Director
James Boyd, CRMC Coastal Policy Analyst

November 1, 2019

RE: Proposal for a uniform 1 X 1 nm wind turbine layout for New England Offshore Wind

Mr. Michael Emerson, Director
Marine Transportation Systems (CG-5PW)
US Coast Guard, Stop 7501
Washington DC 20593-751

By email: Michael.D.Emerson@uscg.mil

Dear Mr. Emerson:

We, the five New England offshore wind leaseholders, propose a collaborative regional layout for wind turbines across our respective BOEM leases, and urge the Coast Guard, BOEM, and other regulators and stakeholders to support adoption of this 1 x 1 nautical mile (nm) uniform turbine layout with no additional designated transit corridors. For the purpose of this letter, the combined area encompassed by the seven leases is referred to as the New England Wind Energy Area (NE WEA). Under this proposal each turbine would be spaced 1 nautical mile (nm) apart in fixed east-to-west rows and north-to-south columns to create the 1 nm by 1 nm grid arrangement preferred by many stakeholders, including fishermen operating in the region. This 1x1 nm layout has also been confirmed through expert analysis to allow for safe navigation without the need for additional designated transit lanes. This proposed layout will provide a uniform, wide spacing among structures to facilitate search and rescue operations.

Enclosed please find a report prepared by W.F. Baird & Associates Ltd., a leading vessel and port safety consultant, which describes historic vessel transit patterns in the region and analyzes the 1x1nm layout using international vessel safety guidelines. Baird's analysis is based on AIS data between 2017 and 2018. The key findings include:

- Most traffic in the general region is transiting around, or along the outside edges, of the NE WEA;
- Most of the transiting vessels are fishing vessels, and they follow a wide range of transit paths through the NE WEA as they are coming from several different ports and heading to a variety of fishing grounds;
- Vessels up to 400' length can safely operate within the proposed 1x1 nm layout, and historic transit data shows vessels over this length tend to follow existing Traffic Separation Schemes already outside the NE WEA;
- Given the 1x1nm layout, there does not appear to be a need for designated transit corridors through the WEA.

We respectfully invite the Coast Guard to incorporate this proposal and the enclosed study in the ongoing Massachusetts and Rhode Island Port Access Route Study. Given the many advantages of the proposed 1x1 nm regional layout, the New England Leaseholders are proud to be working together to present a collaborative solution that we believe accommodates all ocean users in the region.

Advantages of a 1 x 1 nm uniform layout

There are four main advantages of the proposed 1x1nm uniform turbine layout:

- Navigation safety
- Responsive to fishermen's request for 1 nm turbine spacing and east-west rows
- Creates 231 transit corridors, in four cardinal directions
- Facilitates search and rescue operations

Navigation Safety

The Coast Guard has consistently expressed its desire that the potential wind energy facilities in then NE WEA preserve mariners' ability to transit from one end of the NE WEA to the other while maintaining a relatively steady course and speed. The Coast Guard was concerned that dissimilar array layouts may present a veritable obstacle course through which mariners must navigate. The solution jointly proposed here would address both Coast Guard issues and preserve navigation safety.

Responsive to requests from fishermen

Commercial fishermen working in the region have consistently advocated for turbines to be oriented in E-W rows, to accommodate long-standing practices designed to minimize conflict between fixed and mobile fishing gear. Considerable written and oral public comments have urged adoption of 1 nm spacing between turbines so as to better facilitate fishing operations among the turbines. Fishermen have also asked that turbine layouts be consistent across lease areas so as to avoid changing their operations as they pass from one lease area into the next.

Members of the Rhode Island Fisheries Advisories Board, the Massachusetts Fisheries Working Group, fisheries groups that serve as representatives to the Leaseholders, fishing fleet operators, and fish processing companies, as well as the National Marine Fisheries Service, have all expressed support for one or all of the following design elements: a uniform layout across the entire NE WEA, E-W rows, and at least 1 nm spacing being turbines. The 1x1nm turbine layout proposed here would provide each of these requested design elements, precisely as requested by the fishing industry.

Creates 231 transit corridors serving four cardinal directions

The proposed 1x1 nm turbine layout accommodates safe transiting through the region by creating 231 transit corridors in four cardinal directions. The existence of numerous corridors, in multiple directions, consistently across all lease areas, would be preferable to having a restricted number of designated transit lanes.

Because most of the vessel traffic in the NE WEA are fishing vessels, as noted in the Baird report, and fishing vessels utilize a wide variety of transit paths, having the ability to safely transit in any of four cardinal directions from any point within the NE WEA best accommodates the largest number of vessels operating in the area.

As shown in Figure 1, the uniform turbine layout would create 231 corridors of uniform width that cross from east-west (E-W), north-south (N-S), NW-SE, and SW-NE. These 231 corridors will be available for mariners no matter where they cross into the NE WEA. The corridor width in the E-W and N-S direction would be 1 nm. In the NW-SE and SW-NE directions the corridors would be 0.7 nm wide for the purpose of maintaining a constant heading, however the closest distance between any two turbines on either side of a vessel using a NW-SE or SW-NE corridor would be 1.4 nm

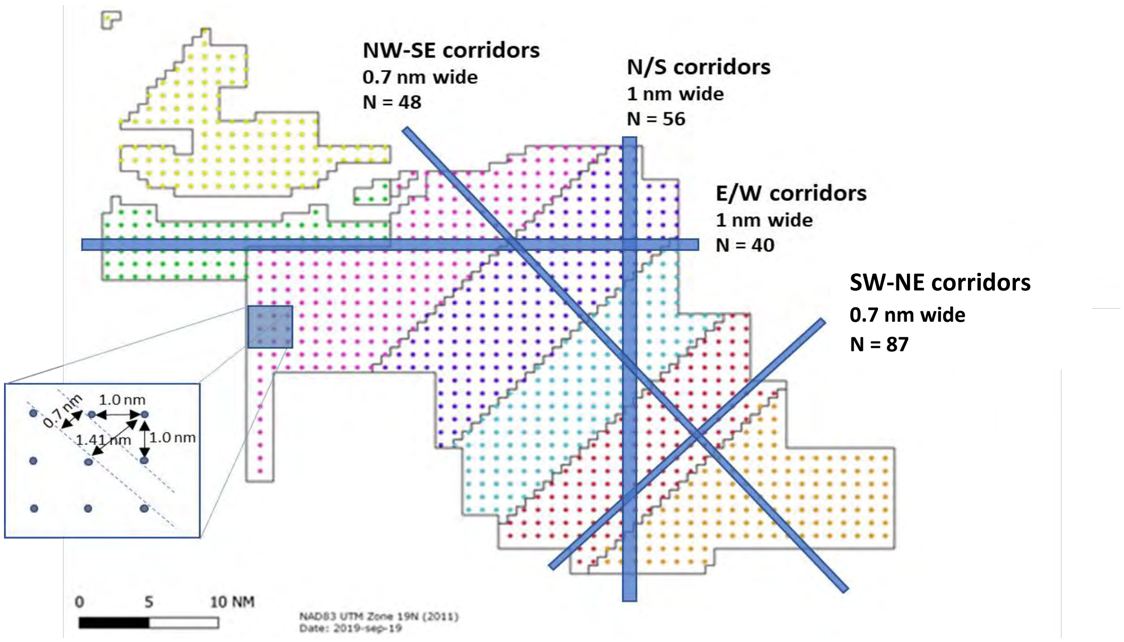

Figure 1: A full 1 X 1 nm E-W, N-S grid creates the equivalent of 231 transit lanes in four different key directions: E-W, NW-SE, N-S and SW-NE.

The AIS data that Baird analyzed, indicates that most of the vessels transiting the region currently choose to navigate outside of the NE WEA even when no turbine structures are present. And of those vessels transiting the NE WEA, many are just inside the edge of the NE WEA.

Of the vessels transiting the NE WEA, most are commercial fishing vessels. These vessels originate from several ports that are generally to the north and northwest of the NE WEA, heading to fishing grounds located generally to the southeast and south of the NE WEA. Consequently, a single transit corridor would still require many vessels to modify their traffic patterns, given the wide variety of origins and destinations to accommodate the wide variety of fishing vessel homeports and practices.

Baird's analysis demonstrates that for all but the very largest vessels transiting in the region — and for fishing vessels of all sizes— the wide spacing of 1 nm between turbines would allow for safe navigation among the turbines. This conclusion applies to vessels that might be passing or overtaking each other, and considers the need to make emergency turns, even with fishing gear deployed.

Facilitates search and rescue operations

Our proposal of a uniform grid turbine layout, with turbines no closer than 1 nm, would afford an even greater level of flexibility and safety for SAR operations, by both vessel and aircraft.

1 x 1 nm layout best accommodates all maritime stakeholders, allowing offshore wind to deliver its benefits to the U.S.

Given the many advantages of the proposed 1x1 nm turbine layout, the New England Leaseholders are proud to be working together to propose a collaborative solution to concerns that have been raised by stakeholders about the full-build out scenario of the NE WEA. We respectfully invite the Coast Guard to incorporate this proposal and the enclosed study in the Massachusetts and Rhode Island Port Access Routing Study. As detailed above, this proposed layout responds to input and requests from many stakeholders and creates an opportunity that we believe accommodates all ocean users. We appreciate your continued consideration for how to safely ensure continued coexistence of all ocean users in the region, including offshore wind.

Christer af Geijerstam, President
Equinor Wind US

Leon Olivier, Executive Vice President Enterprise Energy Strategy
Eversource Energy

John Hartnett, President
Mayflower Wind

Thomas Brostrøm, President
Orsted North America

Lars Thaaning Pedersen, CEO
Vineyard Wind LLC

CC: Walter Cruickshank, Director, Bureau of Ocean Energy Management

Enclosure: Baird Study “Vessel Navigation Through the Proposed Rhode Island/Massachusetts and Massachusetts Wind Energy Areas”, October 31, 2019

Vessel Navigation Through the Proposed Rhode Island/Massachusetts and Massachusetts Wind Energy Areas

October 31 2019 | 13057.301.R1.RevD

Baird.

Innovation Engineered.

baird.com

Vessel Navigation Through the Proposed Rhode Island/Massachusetts and Massachusetts Wind Energy Areas

Prepared for: Prepared by:

Epsilon Associates Inc.
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W.F. Baird & Associates Ltd.

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Douglas Scott at +1 608 273 0592
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13057.301.R1.RevD

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Revision	Date	Status	Comments	Prepared	Reviewed	Approved
A	06 Sep 2019	Draft	For client review	RDS	DT	RDS
B	24 Sep 2019	Draft		RDS	DT	RDS
C	07 Oct 2019	Draft		RDS	DT	RDS
D	31 Oct 2019	Draft		RDS	DT	RDS

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Acronyms

AIS	Automatic Identification System
AtoN	Aids to Navigation
BOEM	Bureau of Ocean Energy Management
COLREGS	International Regulations for Preventing Collisions at Sea
COP	Construction and Operations Plan
DWT	Deadweight Tonnage
EMF	Electromagnetic Field
ESP	Electrical Service Platform
Ft	feet
GPS	Global Positioning System
Hz	Hertz
IALA	International Association of Lighthouse Authorities
IPS	Intermediate Peripheral Structures
kts	Knots - vessel speed in nautical miles per hour
LOA	length overall
m	meter
MHHW	Mean Higher High Water
MLLW	Mean Lower Low Water
MSL	Mean Sea Level
NM	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NTM	Notice to Mariners
PAtoN	Private Aids to Navigation
RACON	Radar Transponder
Ro-Ro	Roll-on roll-off vessel
SAR	Search and Rescue
SPS	Significant Peripheral Structure

TSS	Traffic separation scheme
USCG	US Coast Guard
VHF	Very High Frequency Radio
WEA	Wind Energy Area
WTG	Wind Turbine Generator

1. Introduction

In January 2019, Baird completed a Supplementary Analysis for Navigational Risk Assessment of the Vineyard Wind project. That study, documented in Baird (2019), focused on analysis of an Automated Identification System (AIS) data set of vessel traffic in the vicinity of the Vineyard Wind project covering the period from 2017 to 2018. The analyses and risk assessment completed by Baird were focused on the navigation risk during the operational phase of the Vineyard Wind project.

Since that time, guidance has been provided that a uniform wind turbine layout with an East-West orientation should be assumed over the entire Rhode Island/Massachusetts and Massachusetts Wind Energy Area (referred to herein as the WEA) as shown in Figure 1.1. The proposed layout has a 1 nautical mile (nm) wind turbine generator (WTG) spacing in both the East-West (E-W) and North-South (N-S) directions, providing corridors 1 nm wide in both the N-S and E-W orientations. This uniform layout also inherently creates 0.7 nm wide corridors on the diagonal in the Northwest-Southeast (NW-SE) and Southwest-Northeast (SW-NE) directions. As may be seen in Figure 1.1, these corridors exist across the entire WEA, not just through selected designated fairways.

This uniform WTG layout will allow vessels to transit through the turbines on a constant heading track along N-S, E-W, NW-SE and SW-NE corridors at all locations in the WEA.

This study has examined the potential impact of the proposed WTG layout on vessel navigation through the WEA. A first step was to conduct an analysis of historical vessel traffic using Automatic Identification System (AIS) data and the methods presented in Baird (2019). Subsequently an assessment of the influence of the WTG arrangement and transit corridors on vessel navigation was conducted using international design guidance.

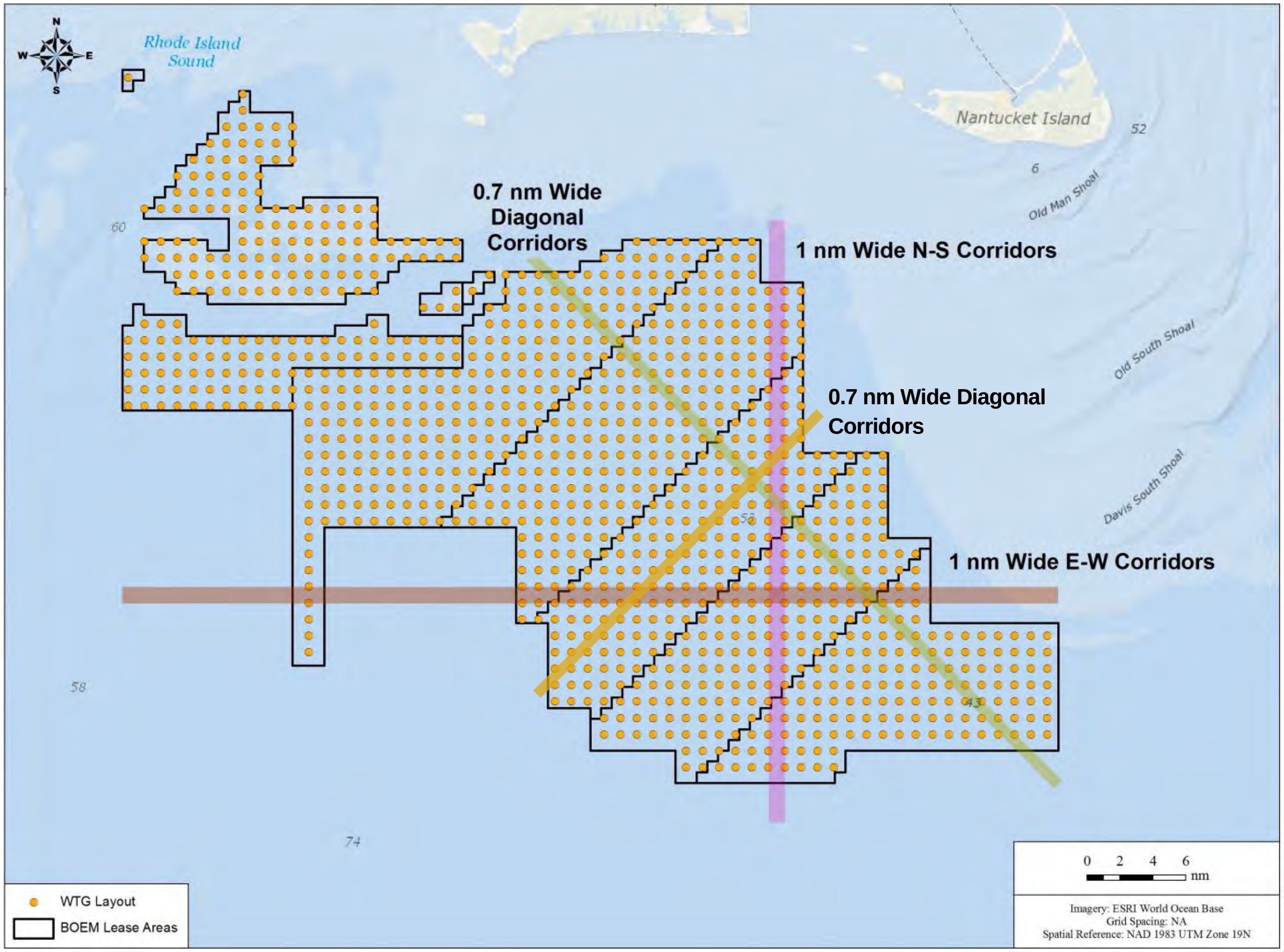

Figure 1.1: RI/MA and MA Wind Energy Areas (WEA) – Uniform Turbine Layout (1 nm E-W; 1 nm N-S; 0.7 nm NW-SE; 0.7 nm SW-NE spacing)

2. Summary of Historical Vessel Traffic

Historical vessel traffic patterns for the years 2017 and 2018 were examined using AIS data. All tracks for vessels transiting within the perimeter of the WEA were extracted from the AIS dataset. The analysis focused on the following vessel types as identified by their AIS reporting codes:

- Cargo;
- Tankers;
- Passenger;
- Military;
- Sailing and Pleasure vessels; and
- Fishing.

Table 2.1 presents a summary of the AIS vessel traffic through the WEA by vessel type. Fishing vessels are the dominant vessel type based on number of AIS data points (pings), unique transits identified in Baird's analysis, and unique vessels. Fishing vessels represent over 70% of the AIS data. The size of fishing vessels is typically 70 ft length overall (LOA) up to a maximum of 195 ft, while vessel beam is typically 25 ft, up to a maximum of 49 ft. Cargo and tanker vessels represent approximately 11% of vessel position data and those vessels typically exceed 600 ft LOA, with the largest vessels between 900 and 1000 ft. There are very few military vessels that transit the WEA (0.3% of total traffic) with only seven unique vessels per year on average. Note the "Other" category has been excluded from the statistics as it is comprised of survey vessels that were operating in the WEA (thus, not normal traffic) as well as vessels that were missing the AIS category data.

Table 2.1: Summary of AIS Vessel Traffic through WEA: 2017 and 2018.

Vessel Type	LOA (ft)		Beam (ft)		% AIS data points – All Data	Unique Vessels (per year)*		Unique Tracks (per year)*	
	Mode^	Max	Mode^	Max		Count	%	Count	%
Fishing	70	195	25	49	71.2%	348	38.7%	3,259	69.4%
Military	105	465	20	55	0.3%	7	0.8%	19	0.4%
Passenger	570	960	105	145	0.7%	16	1.8%	41	0.9%
Cargo	660	990	105	155	7.0%	94	10.4%	252	5.4%
Tanker	600	900	105	155	4.3%	59	6.6%	185	3.9%
Sailing and Recreational	45	300	15	80	16.5%	376	41.8%	941	20.0%
Not Included in Normal Vessel Traffic									
Other#	225	600	35	95	-	48	N/A	453	N/A

* Average of 2017 and 2018 data

Includes survey vessels which operated in the WEA in 2017 and 2018 as well as uncategorized vessels (incomplete AIS data)

^ Mode is the most common LOA or beam of the specified vessel type

2.1 Consideration of Vessels Without AIS

It is important to recognize that AIS is only required on vessels 65 feet and longer and, as a result, not all vessels, particularly fishing vessels, are equipped with AIS equipment. In Baird (2019), a comparison was made between the permitted fishing vessels and those equipped with AIS equipment for two of the larger fishing ports (New Bedford and Point Judith). It was concluded that AIS-equipped fishing vessels appear to represent a relatively large percentage (estimated at about 40% to 60%) of the fishing vessels operating in the area. And while the AIS data does not capture all the fishing vessel traffic which transits the WEA, the AIS data represents the largest fishing vessels by length and beam. Length and beam are two of the more important vessel characteristics considered in the assessment of navigational safety, given the more limited maneuverability of larger vessels and the tendency of larger vessels to travel faster than smaller vessels.

2.2 Summary of Vessel Traffic Through the WEA

Figure 2.1 presents vessel track density plot for all AIS vessels (excluding research and survey vessels) which transited near and through the WEA between 2017 and 2018. The highest density of vessel traffic (shown in grey contours) transits outside the WEA. There are three designated Traffic Separation Schemes (TSS) adjacent to the WEA that can be readily identified by traffic density in the figure (using numbers shown on Figure 2.1):

1. The Narragansett Bay Traffic Lanes that run north-south to the west of the WEA.
2. The Buzzard Bay Traffic Lanes that run in a northeast-southwest orientation and are located northwest of the WEA.
3. The Nantucket-Ambrose Traffic Lanes located to the south of the WEA.

The following report sections (2.3 to 2.5) focus on the three groups of vessels that comprise much of the traffic in the area:

- Cargo, tanker and passenger vessels (grouped together due to size and vessel characteristics)
- Pleasure and sailing vessels
- Fishing vessels

The majority of the AIS vessel traffic through the WEA are fishing vessels (see Table 2.1, 69% of the vessel transits through WEA are fishing vessels) and it is therefore appropriate to focus on the characteristics of the fishing vessel traffic through the WEA and the potential navigation impacts to that group of vessels.

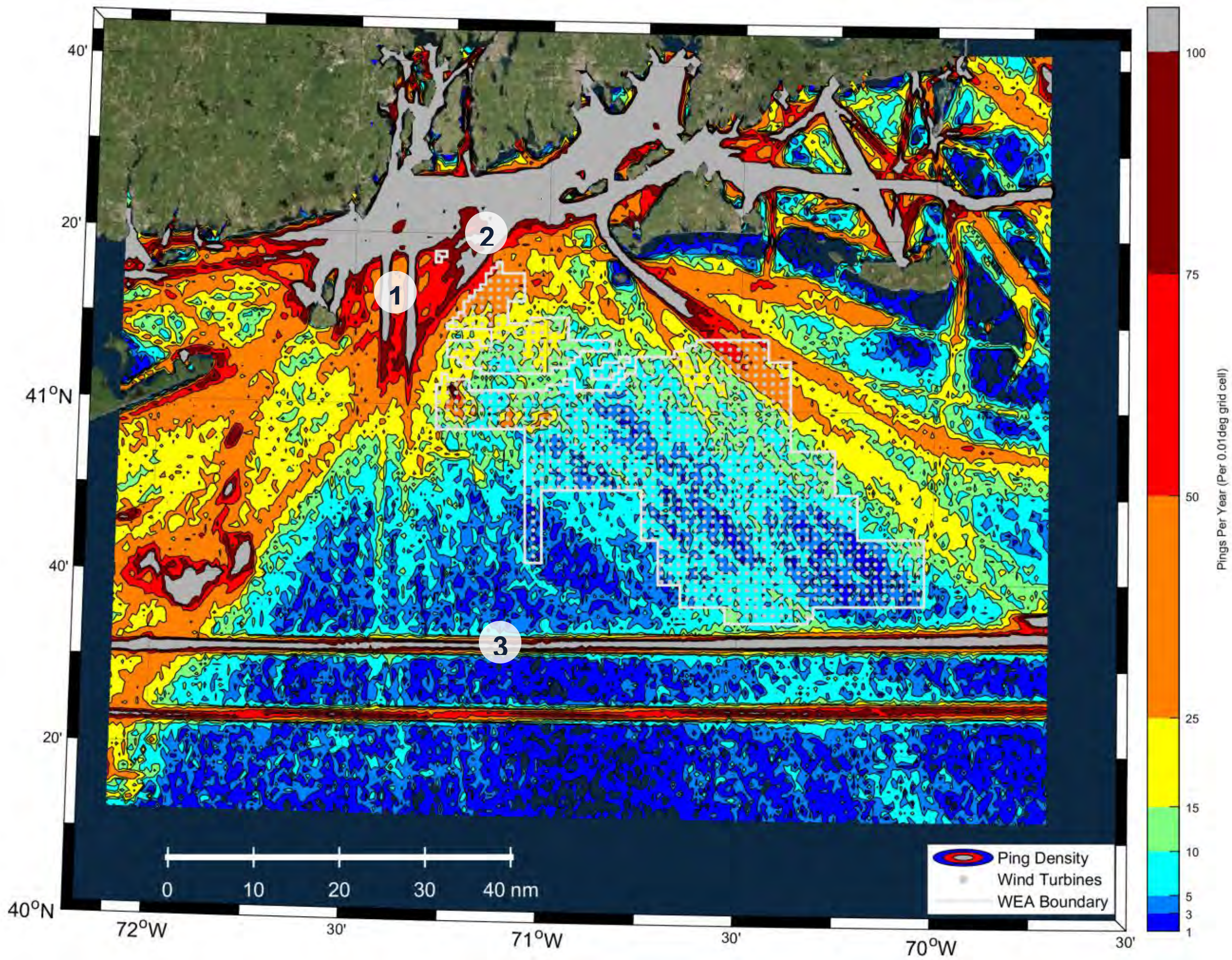

Figure 2.1: All AIS Vessel Traffic Through WEA Vessel Traffic Density: 2017 and 2018 (excluding survey and research vessels).
Note: Numbers indicate designated traffic lanes (TSS).

2.3 Cargo, Tanker and Passenger Vessel Traffic through the WEA

Figure 2.2 presents unique vessel tracks for passenger, cargo and tanker vessels. Based on Table 2.1, most of these vessels are 550 ft or longer (LOA) and they are typically transiting through the NW-SE axis of the WEA, or along the southwestern margins of the WEA. Vessel speeds through the WEA are relatively high, ranging from 8 to 16 knots. Many of these vessels are travelling to and from the Narragansett Bay Traffic Lanes and the Nantucket-Ambrose Traffic Lanes . The feasibility of those ships navigating through the WEA with a uniform turbine layout is discussed later in this report.

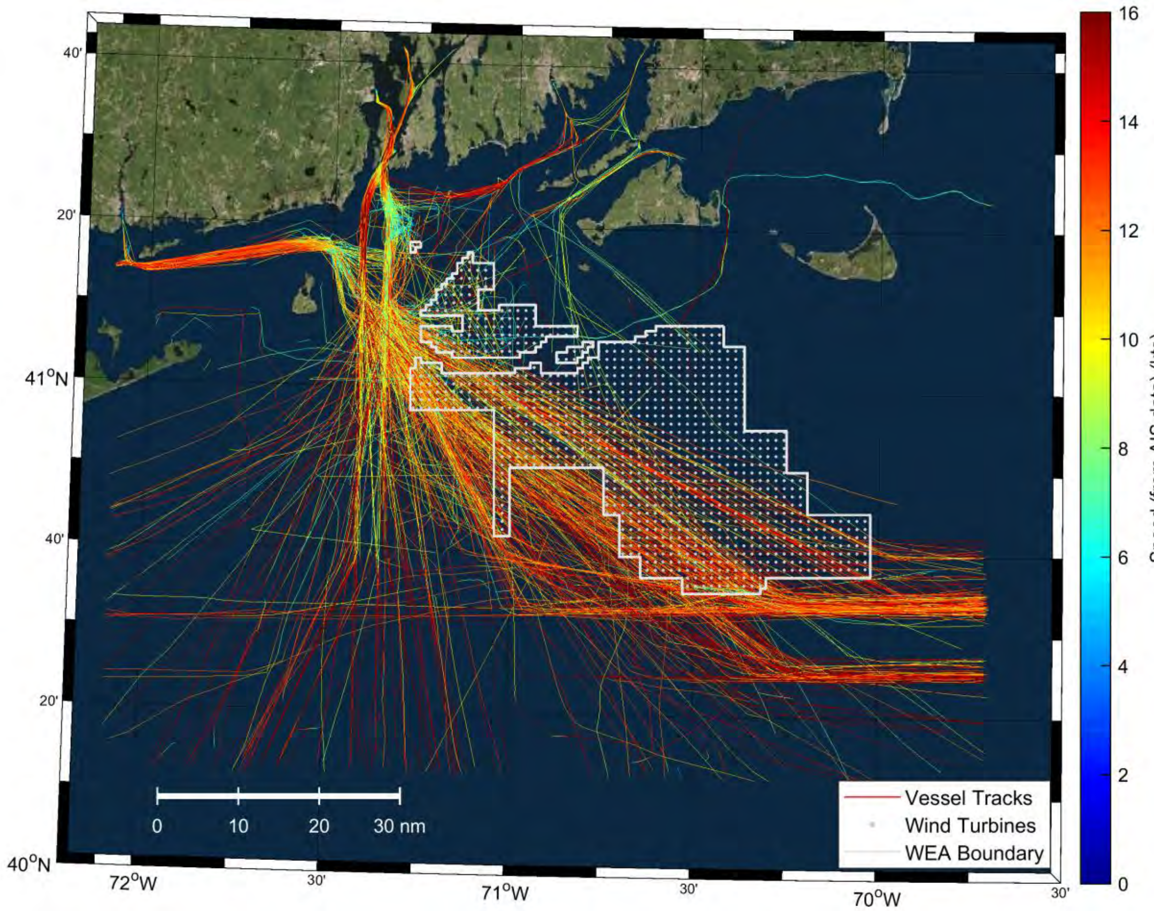

Figure 2.2: Cargo, Tanker and Passenger Vessel Tracks: 2017 and 2018

While a track plot, such as Figure 2.2, provides an indication of the range of historical vessel transits, it is difficult to evaluate the relative volume of vessel traffic as the tracks tend to overlie each other on the busier transit routes. To better understand the traffic volume, "vessel track density plots" were prepared that give an indication of the number of AIS data points ("pings") per specified area (0.01 degrees) annually. The greater the number of data points, the greater the traffic volume. Figure 2.3 presents such a vessel track density plot for cargo, tanker and passenger vessels which transit near and through the WEA. It may be noted in Figure 2.3 that many vessels transit around the WEA. For the vessels that do transit through the WEA the most common transit route is between points 1 and 2 indicated on Figure 2.2.

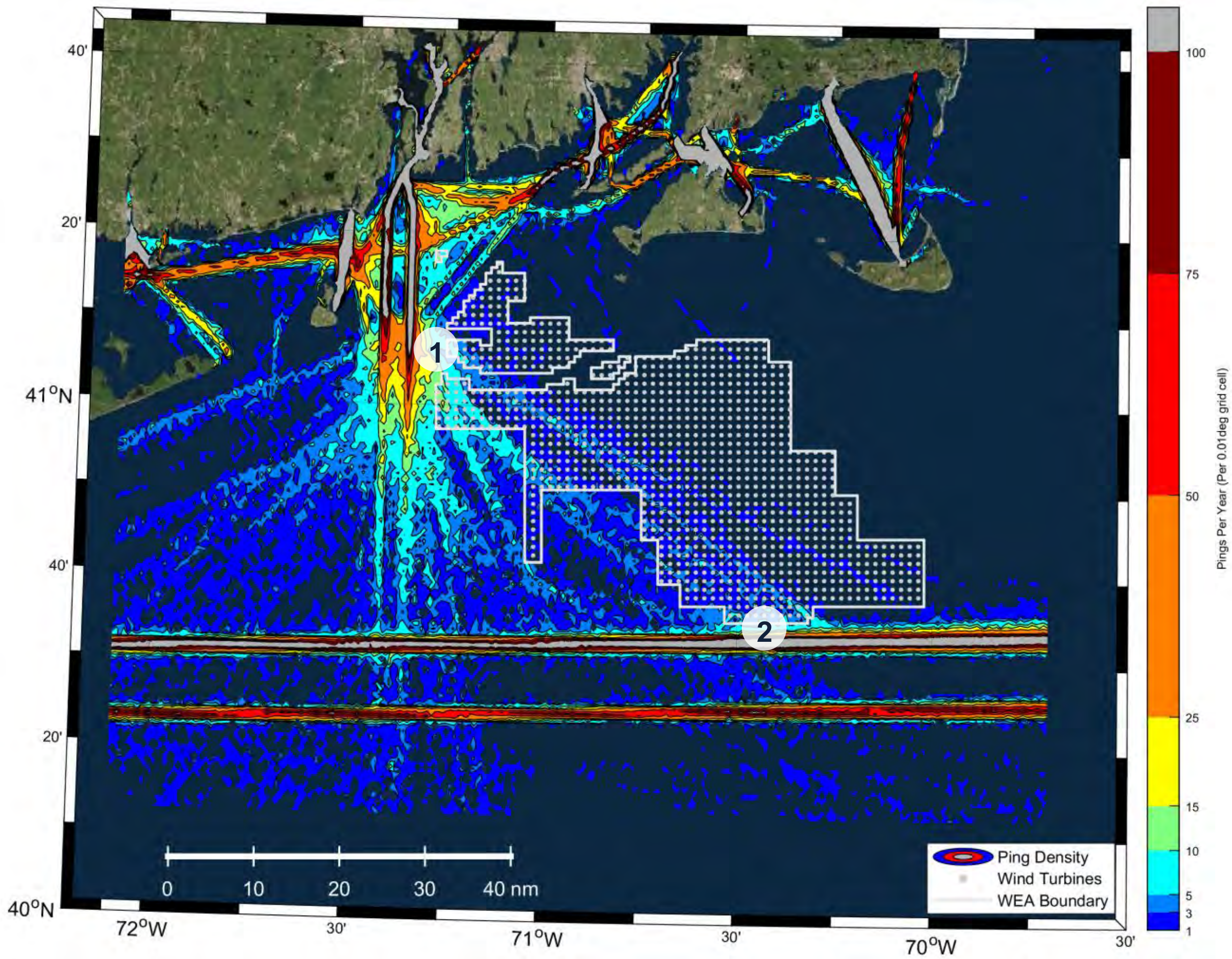

Figure 2.3: Cargo, Tanker and Passenger Vessel Traffic Density: 2017 and 2018

2.4 Pleasure and Sail Vessels

Pleasure and sail vessels represented 16% of the AIS vessel traffic navigation through and near the WEA. Figure 2.4 presents a plot of pleasure and sail vessel traffic for 2017 and 2018 which indicates a reasonable density of traffic through the WEA across a series of NW-SE transit routes. Vessel speeds through the WEA show considerable variability, typically ranging from 8 to 10 knots, but can be as slow as 6 knots or fast as 14 knots. Figure 2.5 presents a traffic density plot which highlights some of the preferred sailing routes. Based on vessel length, all of the vessels transiting through the WEA in 2017 and 2018 could also maneuver through the uniform turbine layout. However, certain very large sail craft do have mast heights that exceed the air draft limits of the turbines due to their blades, and operators of these vessels would need to aware of this limitation. Such vessels would need to be in close proximity to the turbine base for a turbine blade strike to be possible.

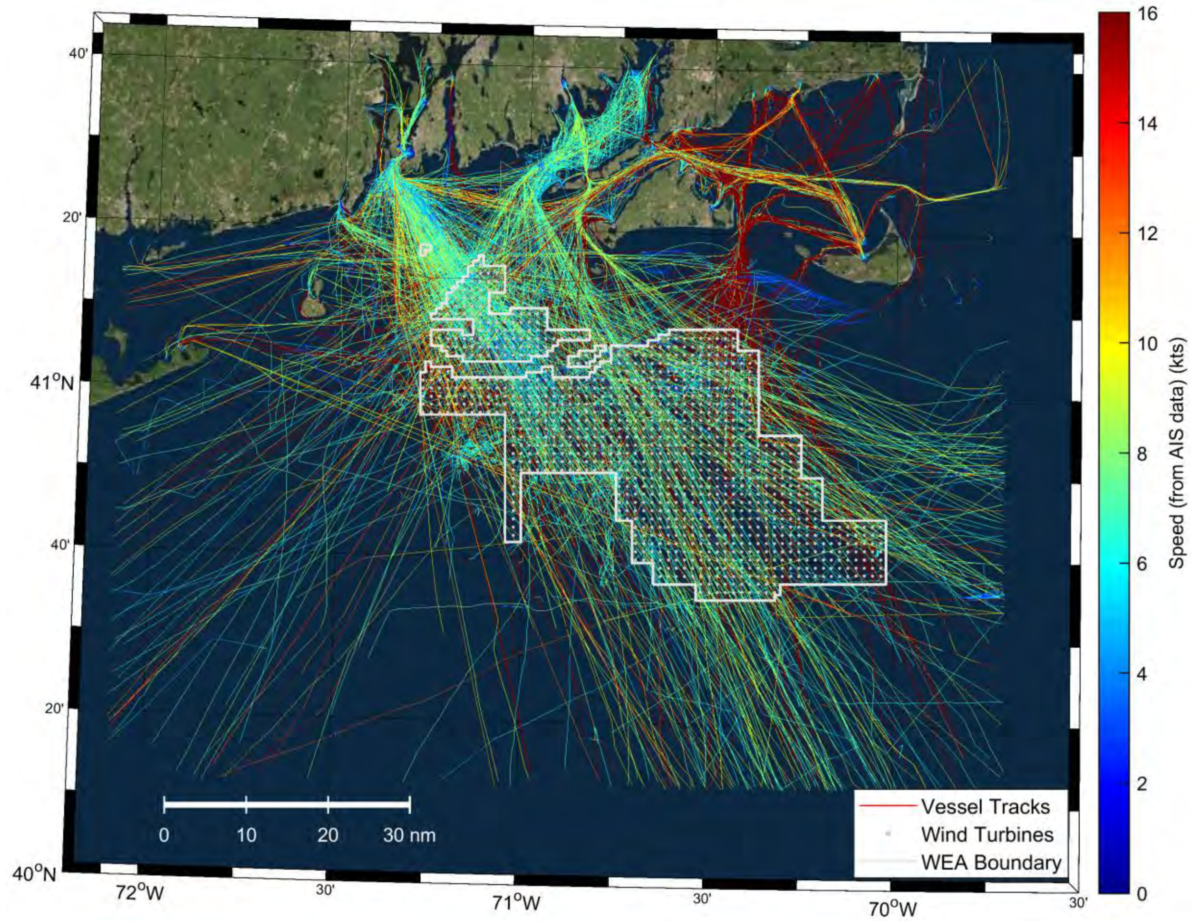

Figure 2.4: Pleasure and Sail Vessel Tracks: 2017 and 2018

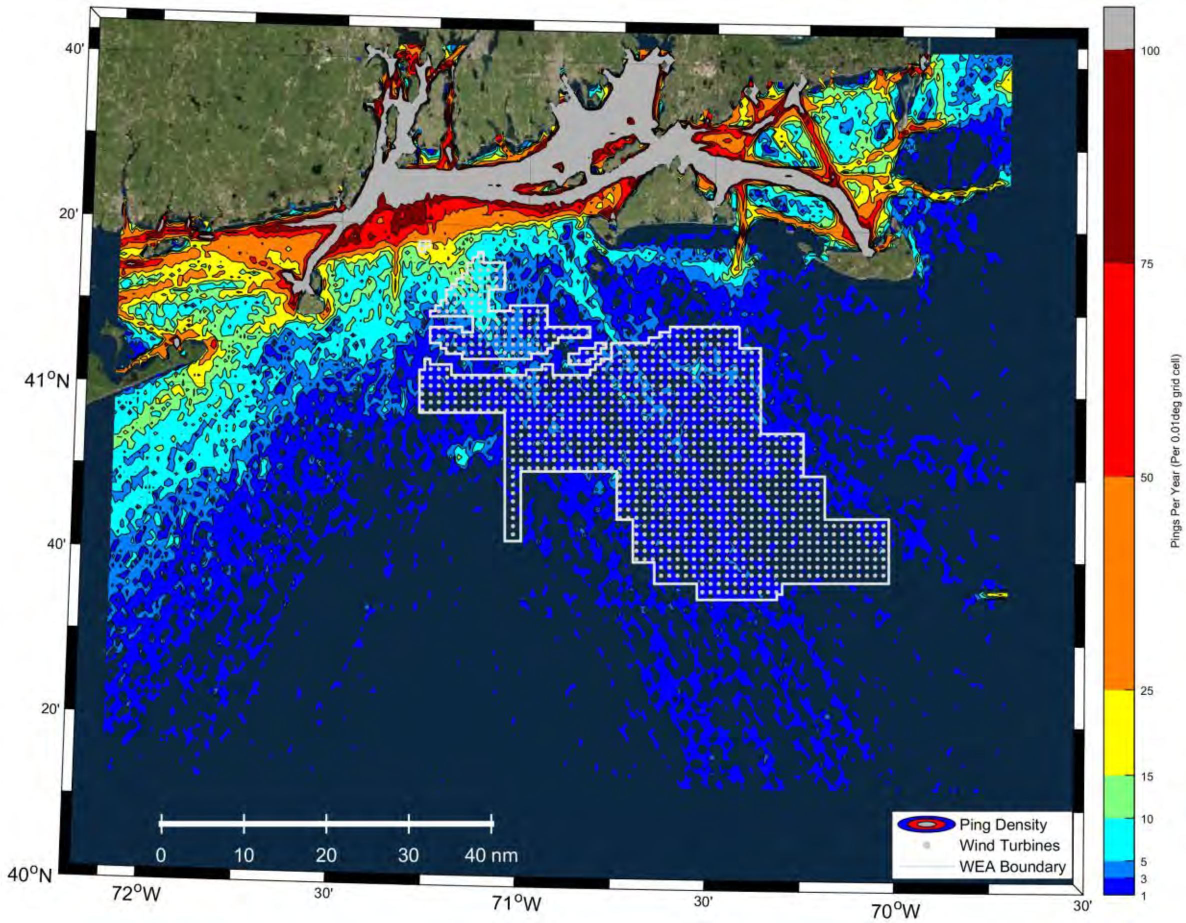

Figure 2.5: Pleasure and Sail Vessel Traffic Density: 2017 and 2018

2.5 Fishing Vessel Traffic through the WEA

The fishing vessel traffic was specifically analyzed based on unique track plots and track density through and around the WEA for the 2017 and 2018 data set, as shown in Figure 2.6 and Figure 2.7. Note that only fishing vessels travelling faster than 4 knots were considered; it was assumed that slower vessels were fishing (trawling) and not transiting. It may be seen in the figures that fishing vessels transit through the WEA with a wide range of track orientations depending on the port of origin and the intended fishing grounds. The typical transit speed of fishing vessels through the WEA is in the order of 6 to 8 knots.

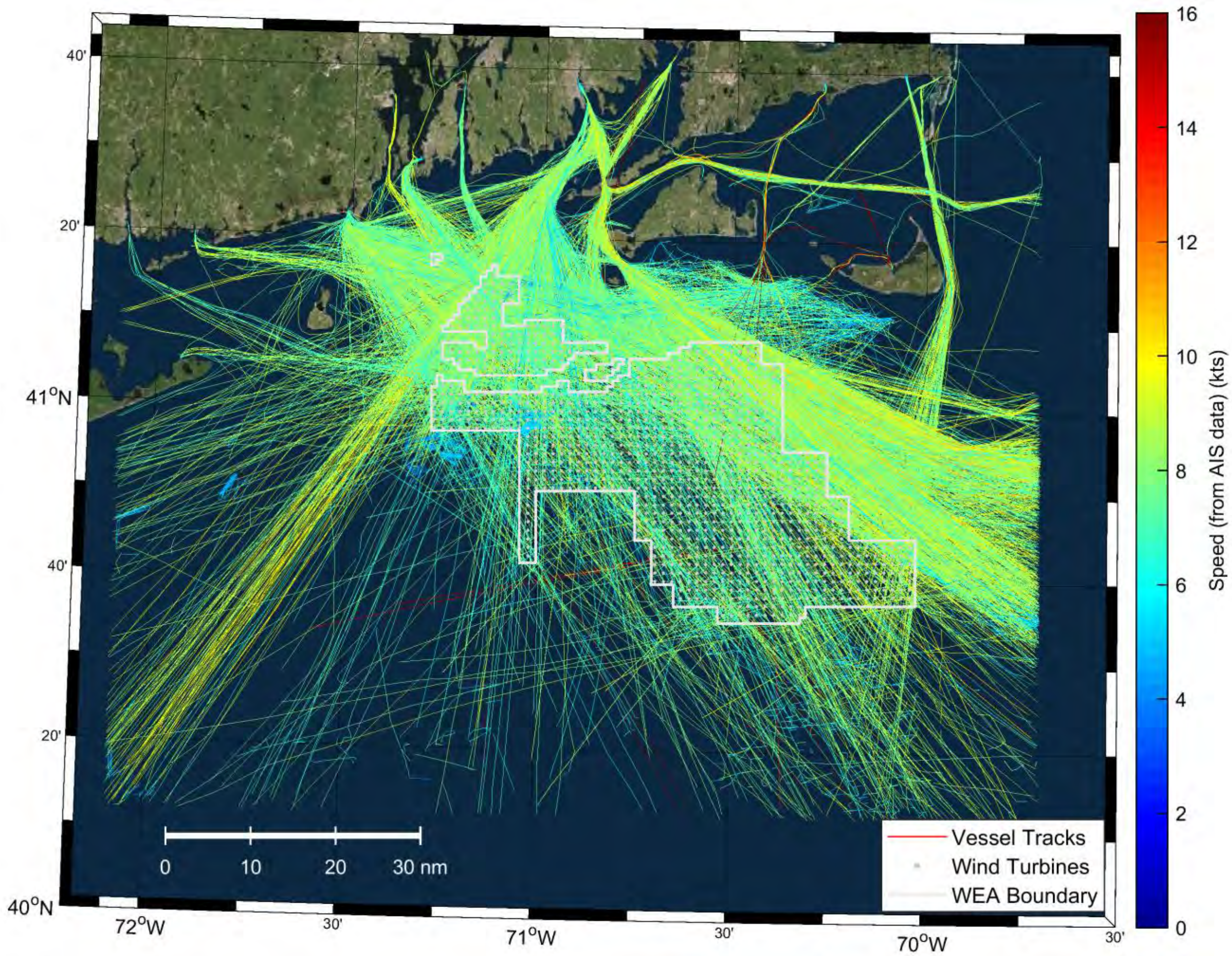

Figure 2.6: Fishing Vessel Traffic Tracks (>4 kts): 2017 and 2018

Figure 2.7 presents the fishing vessel traffic density through and surrounding the WEA. Overall, much of the fishing vessel traffic either skirts the WEA or intersects with perimeter areas of the WEA. The volume of traffic transiting through the middle of the WEA is limited.

Of the vessel traffic that did enter the WEA, the following observations were noted (using the numbers shown on Figure 2.7):

1. There is a concentration of fishing vessel traffic along a SW-NE corridor near the northwestern edge of the WEA.
2. Along the northeastern boundary of the WEA, there are two notable traffic corridors along a NW-SE corridor that intersects the northeastern boundary of the WEA.
3. Through the center of the WEA, there is a moderate density of traffic along a NNW-SSE corridor.

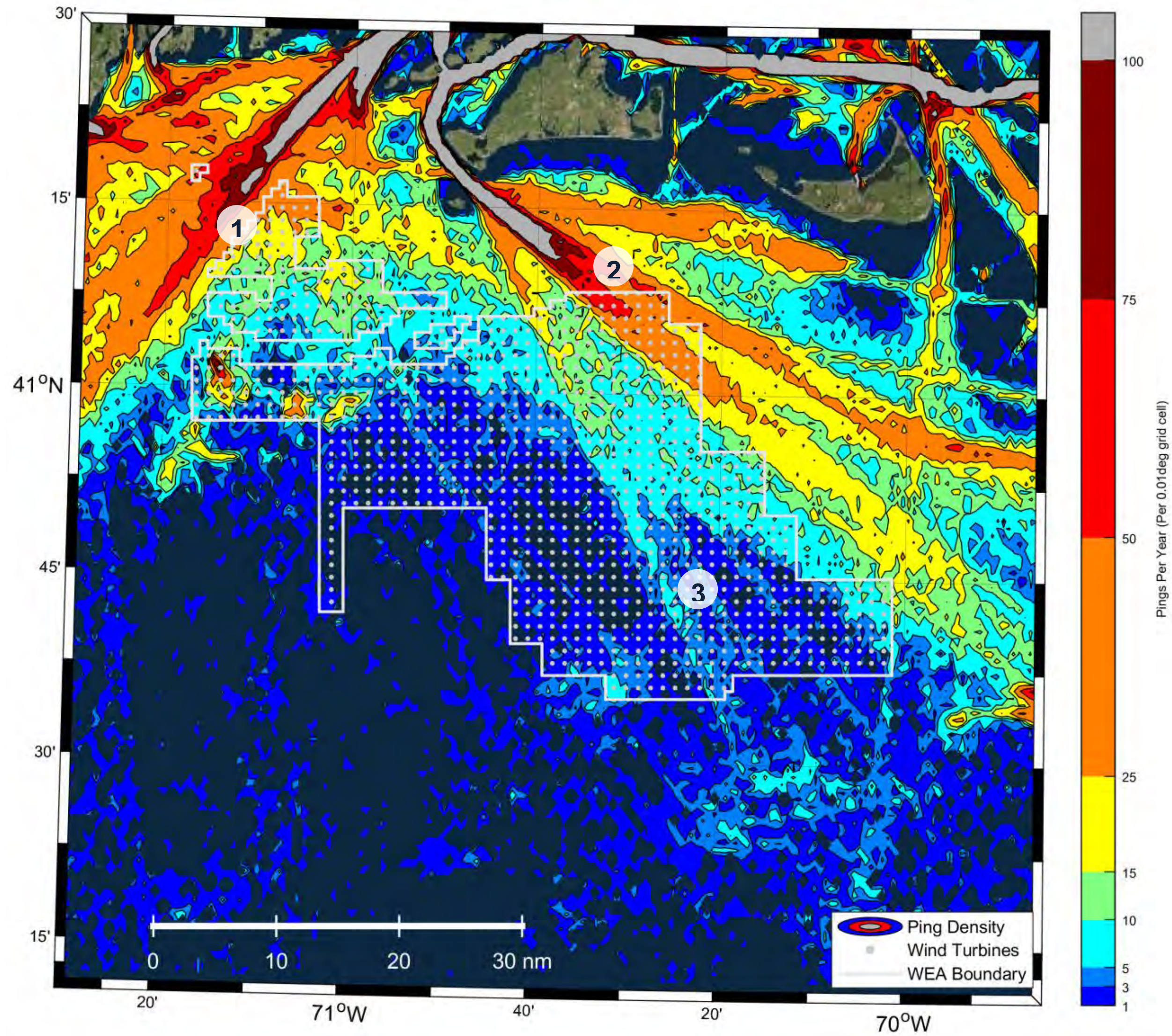

Figure 2.7: Fishing Vessel Traffic Density (> 4 kts): 2017 and 2018

Vineyard Wind has provided Baird with anecdotal information collected by the Vineyard Wind's fisheries liaison that links the Port of Origin and the fishing ground locations frequented by vessels from that port. Table 2.2 indicates the Port of Origin, Fishing Destination and Target Species that were provided to Baird. Based on the 2017 and 2018 AIS vessel traffic data, it has been noted whether the AIS data showed transits between the identified port and fishing destination.

Figure 2.8 is a conceptual schematic indicating the linkages between the destination fishing grounds for the fishing fleets at various ports of origin in the region based on Table 2.2. The lines linking the ports and fishing grounds in the figure do not indicate the relative volume or specific routes of vessel traffic but simply show that a particular fishing practice is being undertaken by certain vessels of a particular port. It is also important to recognize that the fishing grounds do not represent a specific location but rather a general fishing area.

Table 2.2: Fishing Vessel Transits – Ports of Origin and Approximate Destinations

Port of Origin	Fishing Destination	Visible in AIS Data	Type of Catch
Chatham	Veatch Canyon, Atlantis Canyon	Yes	Monkfish
	The Dump	No	Monkfish
New Bedford	South of Nantucket / Martha's Vineyard	Yes	Squid
	Nantucket Lightship Closed Area	Yes	Scallop,
	Great South Channel / Georges	Yes	Scallop, groundfish
	Block Canyon	Yes	Monkfish
	The Dump	No	Monkfish, Lobster
	Munson Canyon	Yes	Whiting, squid
Westport	East side of Atlantis Canyon to the west	No	Lobster, monkfish
Sakonnet	West Atlantis Canyon	Yes	Monkfish
	Mid-way between Atlantis and Block Canyons	No	Monkfish, Lobster
Newport	Atlantis to Hydrographer Canyons	Yes	Lobster
Point Judith	South of Nantucket / Martha's Vineyard	Yes	Squid
	Nantucket Lightship Closed Area	Yes	Scallop
	Lydonia, Munson, Nygren Canyons	Yes	Squid, whiting
	South of the dump	No	Jonah crab (fall)
Montauk	South of Nantucket / Martha's Vineyard	Yes	Squid
	Nantucket Lightship Closed Area	No	Scallop
	Lydonia Canyon	No	Squid, whiting, butterfish
Stonington	South of Nantucket / Martha's Vineyard then to areas further south	Yes	Squid, whiting, butterfish

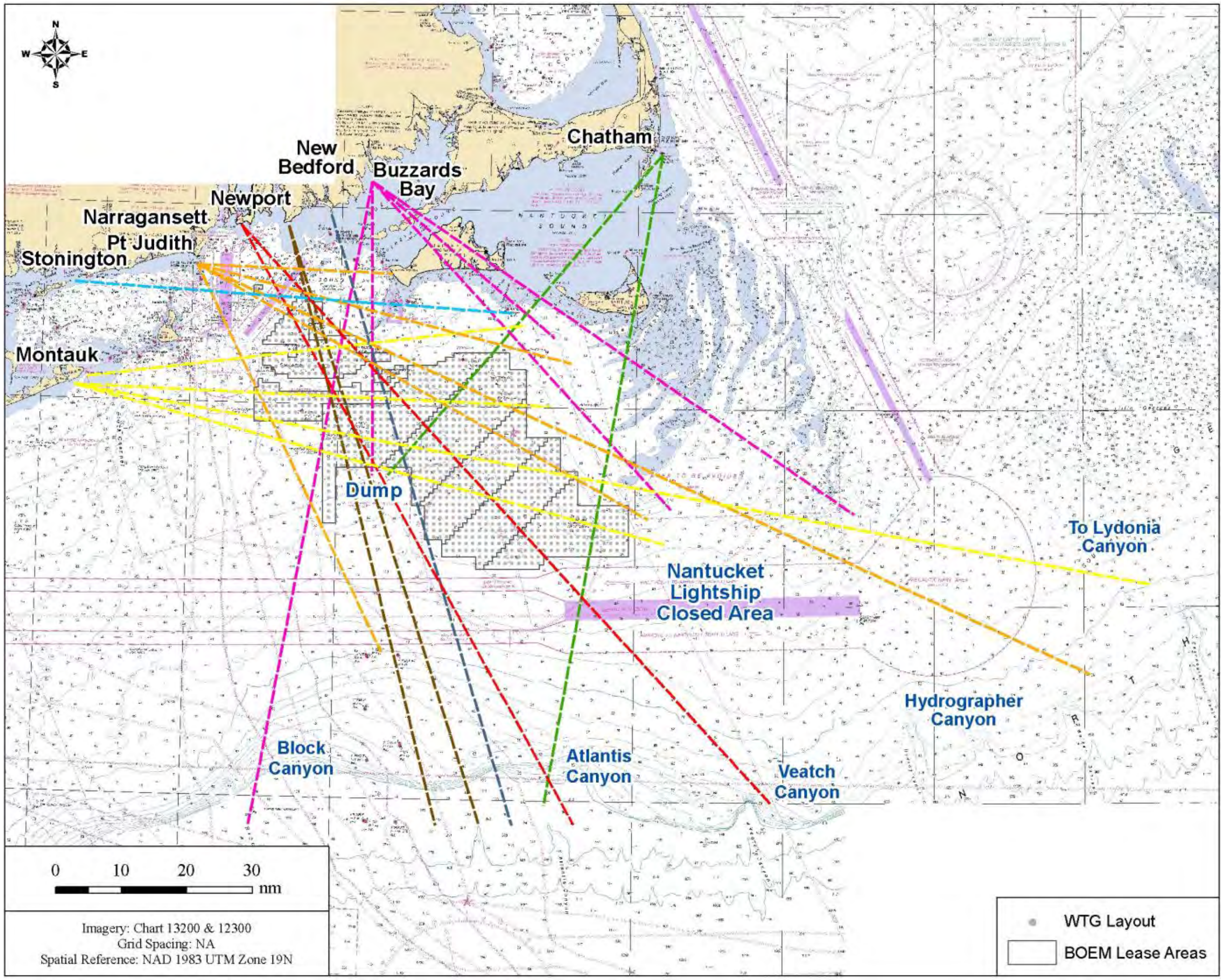

Figure 2.8: Key Fishing Ports Relative to Fishing Ground Locations

Many of the fishing grounds are located south of the WEA at the various canyons where there is a steep drop off in water depths. Other vessels target fishing within the Nantucket Lightship Closed Area, which is located east of, and overlapping with, the most easterly lease area (OCS-A 0522). Vessels from a variety of ports (New Bedford, Point Judith, Montauk, and Stonington) travel to squid trawling grounds located between Nantucket and Martha's Vineyard Islands and the WEA. Vessels from certain ports (Chatham, New Bedford) fish in an area called the "Dump", where unexploded ordnance is identified on hydrographic charts (no wind energy development is planned for this area).

A comparison of Figure 2.6, Figure 2.7 and Figure 2.8 indicates that:

- Vessels transiting to the canyons south of the leases have a wide range of destinations in the general fishing area and are coming from a number of different origination ports, and therefore are transiting over a wide range of tracks and do not follow any specific path.
- Fishing vessels from New Bedford and Buzzards Bay heading to the more easterly fishing grounds travel around the southern end of Martha's Vineyard then follow a southeasterly track along the northern edge of the WEA. Some of the vessels out of Point Judith follow similar tracks. A number of these vessel tracks cross the northeastern edge of the WEA.
- Figure 2.7 shows that a number of fishing vessels travel through the WEA along a NNW-SSE path, starting from the vicinity of Nomans Land Island, and headed towards Veatch Canyon region (Location 3).
- There are fishing grounds, such as the Dump and the Nantucket Lightship Closed Area, where no transits are evident in the AIS plots suggesting that those areas are fished by vessels that are not AIS-equipped.

3. Vessel Navigation Through the WEA

3.1 Navigation Calculations

The Supplementary Analysis for Navigational Risk Assessment of the Vineyard Wind project (Baird, 2019), reported on various analyses of vessel navigation conducted using the international design guidance given in PIANC (2014, 2018). These calculations have been repeated in this study for the WEA vessel traffic. The PIANC analyses are based on the maximum vessel lengths and beams given in Table 2.1.

For the purposes of the analyses, it was been assumed that a navigational lighting and marking plan similar to that proposed by Vineyard Wind (2019) for its current project proposal located in the northern portion of lease area OCS-A 0501 would be implemented over the entire WEA.

In terms of navigational safety when operating vessels within the WEA, there are three important considerations:

1. Sufficient width for two-way traffic (both directions) within a turbine field corridor when transiting or trawling in a straight line.
2. Ability to turn safely to avoid a vessel collision.
3. Ability to turn a trawler within a 1.0 nm corridor (it has been assumed that the trawlers will generally operate on an E-W alignment).

To address item 1 with respect to required channel width, calculations were carried out using the guidance provided by PIANC (2014). This document provides calculation procedures and recommendations for the design of vertical and horizontal dimensions of harbor approach channels of all types. The channel width calculation takes into consideration a range of factors, such as maneuverability of the vessel, the prevailing winds, the magnitude and direction of currents and waves, water depth and the bottom surface characteristics. The channel width is defined relative to the maximum vessel beam width, B.

Table 3.1 summarizes the results of the PIANC (2014) calculations. It was assumed that the transiting vessels (such as cargo or fishing) were of moderate maneuverability while a trawler with gear fully deployed is of poor maneuverability, which is the reason the beam factor differs for the two fishing vessel categories. A fishing trawler (also potentially transiting) of beam 35 feet with two outriggers each having a length of 70 feet was assumed as in Baird (2019). This gave an effective beam of 175 ft. For the purposes of this analysis, this effective beam was also assumed for transiting vessels (giving a conservative result).

Table 3.1: Minimum Two-Traffic Requirements for Vessels in a Straight Channel

	Transiting Cargo / Tanker Vessel	Transiting Fishing Vessels	Trawling
Required Channel Width, Beam Factor	10.8B	11.4B	11.0B
Assumed Maximum Vessel Beam	155 ft	175 ft*	175 ft*
Required Minimum Channel Width	1,674 ft (0.28 NM)	1,995 ft (0.33 NM)	1,925 ft (0.32 NM)

* Note: Effective vessel beam as described in the text above.

Table 3.1 provides the minimum required width for two-traffic in a straight channel for safe operations. As may be noted, the required widths are significantly less than the 0.7 nm width of the NW-SE and SW-NE corridors created by the 1 x 1 nm layout, as described in the introduction. Thus, it is safe for vessels to move within the turbine corridors without restrictions on speed and/or direction provided they are not larger than the assumed vessels. This would apply equally to both overtaking and passing vessels, and to fishing vessels with and without gear deployed. Moreover, these corridors widths are notional (not actual corridors with physical limits at the 0.7nm width), and the actual distance between any two turbines when navigating in these directions is 1.4 nm, see Figure 3.1.

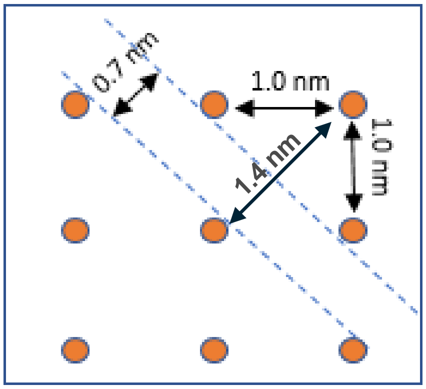

Figure 3.1: Distances Between Turbines When Considering a 0.7 nm Corridor

With respect to item 2 above, in an emergency situation such as an imminent collision, vessels may be required to execute a very rapid turn. Merchant vessels are designed to turn within a tactical turn diameter of 5 times the length of the vessel, while an allowance of 6 times vessel length (LOA) is often used for design purposes (PIANC, 2018). Based on this criterion and assuming a vessel travelling down the center of the minimum corridor width (0.7 nm), a vessel up to 350 to 400 feet LOA (length overall) can safely enter the WEA. Such a vessel executing a rapid turn in the 1 nm corridors would have additional buffer room on either side of the corridor.

The spacing required to turn a trawler between the turbine rows was examined in Baird (2019). It was estimated that a large trawler in this area can change headings by 180° within a lateral distance of 0.7 nm with gear fully deployed, well within the 1.0 nm spacing between turbines in the E-W rows. The required lateral distance would be much smaller if the gear were retrieved before turning then redeployed.

Overall, it was concluded that:

- The limiting constraint for vessel movements through the WEA based on PIANC (2018) will be vessel length. Based on collision avoidance criteria, it is recommended that vessels greater than 400 ft in length should transit around the WEA. In 2017 and 2018, there were no fishing vessels and approximately 27% of the non-fishing vessels with a length exceeding 400 ft.
- The minimum 0.7 nm nominal corridor width is sufficient for two-way transit of fishing or other vessels (up to 400 ft LOA) based on PIANC (2014, 2018) guidelines, allowing vessels to safely pass and overtake in opposite directions.
- The minimum 1.0 nm turbine separation is sufficient for all fishing activities including trawling, as even trawling vessels with gear fully deployed were estimated can change headings by 180° within a lateral distance of 0.7 nm.

It is important to recognize that the above analyses make the inherent assumption that the turbine corridors have a “hard” channel limit. That is, it is assumed that the vessel cannot cross the turbine row alignments that separate the corridors. In reality, the turbines are spaced 1 nm apart and there is room for the vessel to maneuver between the turbines.

3.2 Available Transit Corridors

As noted in Section 1, the proposed uniform layout across the WEA has a 1 nm WTG spacing in both the E-W and N-S directions. This uniform layout also inherently creates 0.7 nm wide corridors on the diagonal in the NW-SE and SW-NE directions. In the case of the diagonal corridors (NW-SE, SW-NE), the turbines are offset from each other in the direction of travel, such that the closest distance between two opposite turbines when navigating in the direction of the corridor is 1.4 nm. Figure 3.2 provides an illustration of the E-W, N-S and diagonal SE-NW transit corridors provided by the uniform 1 nm x 1 nm turbine layout. Illustrations of the available transit corridors are provided in detail in the following:

- Figure 3.3: 40 E-W transit corridors;
- Figure 3.4: 56 N-S transit corridors; and
- Figure 3.5: 48 NW-SE transit corridors.

There are also 87 transit corridors in the SW-NE orientation although the AIS data showed that there is little vessel traffic that transits in this direction.

As may be noted in the AIS data plots shown in Section 2, much of the existing vessel traffic transits the WEA in a NW-SE orientation.

3.3 Designated Transit Corridors

The results of this analysis indicate that sufficient corridor width for vessel maneuvering can be maintained within the WEA without the need for dedicated transit lanes assuming the application of a uniform spacing across the entire WEA and a suggested limit of 400 ft vessel length. The proposed turbine arrangement would accommodate the wide range of ports, destinations, and routes and headings observed by fishing vessels. Additionally, there is a high degree of flexibility available to the US Coast Guard (USCG) to configure the transit corridors outlined in Figure 3.2 to Figure 3.5, should designated or specially corridors be deemed desirable. For example, in each direction, it would be possible to designate marked one-way transit corridors, with a potential separation corridor between opposite directions of transit. Designating specific transit corridors will tend to concentrate the vessel traffic, potentially increasing the number of vessel interactions.

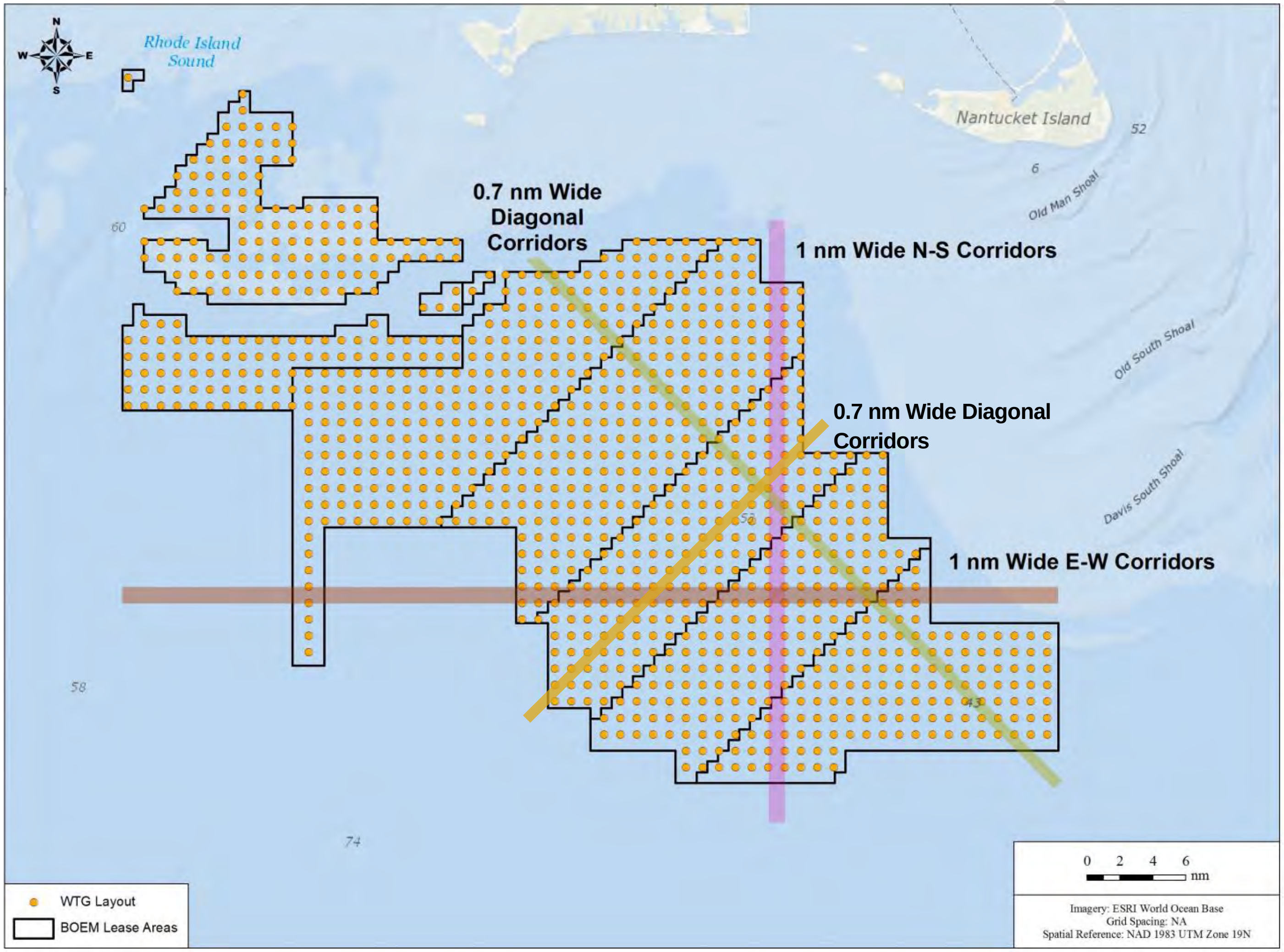

Figure 3.2: Overview of E-W, N-S, NW-SE and SW-NE Transit Corridors provided by 1 nm turbine layout.

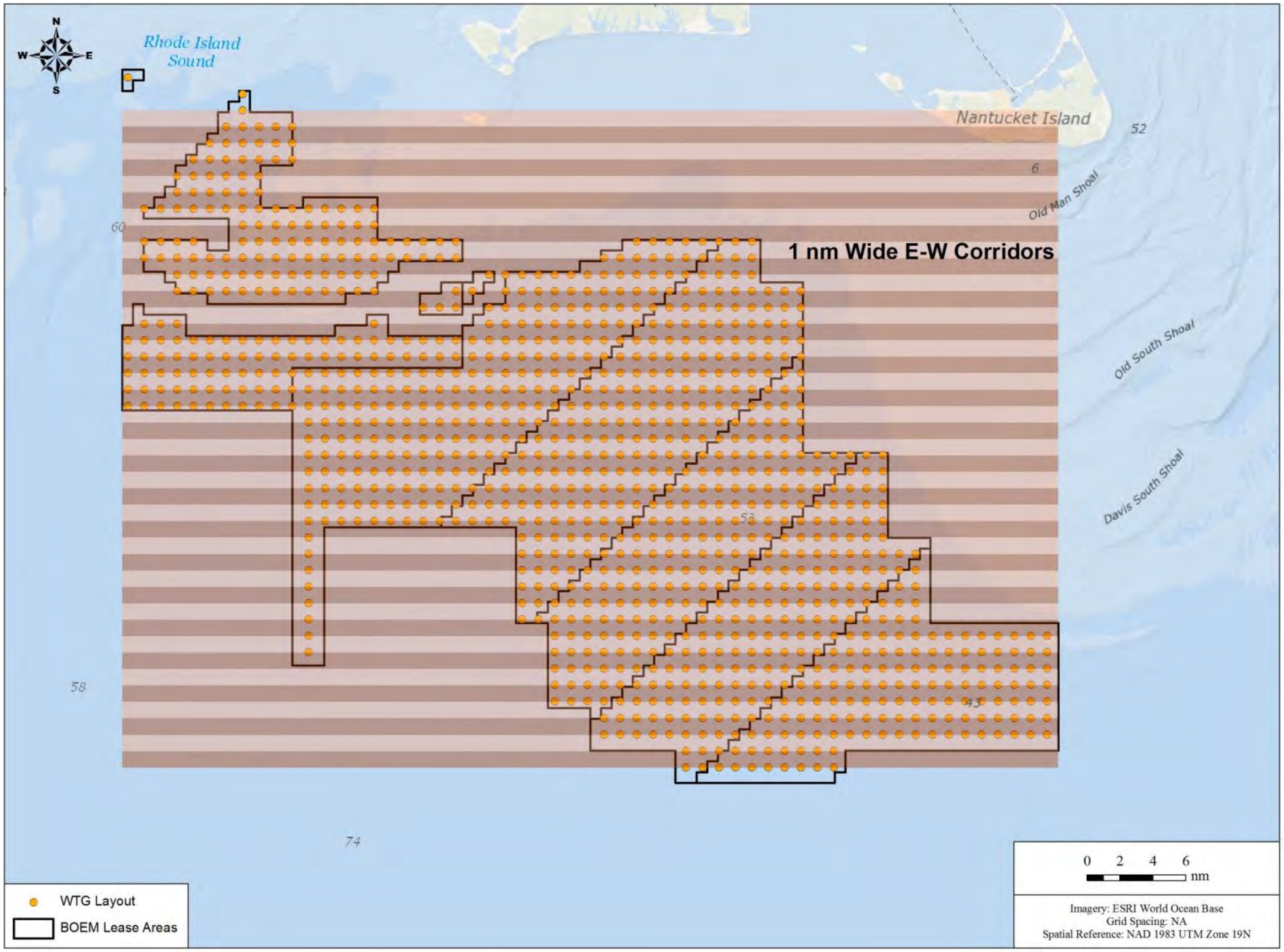

Figure 3.3: 40, 1 nm wide E-W Transit Corridors provided by 1x1 nm turbine layout.

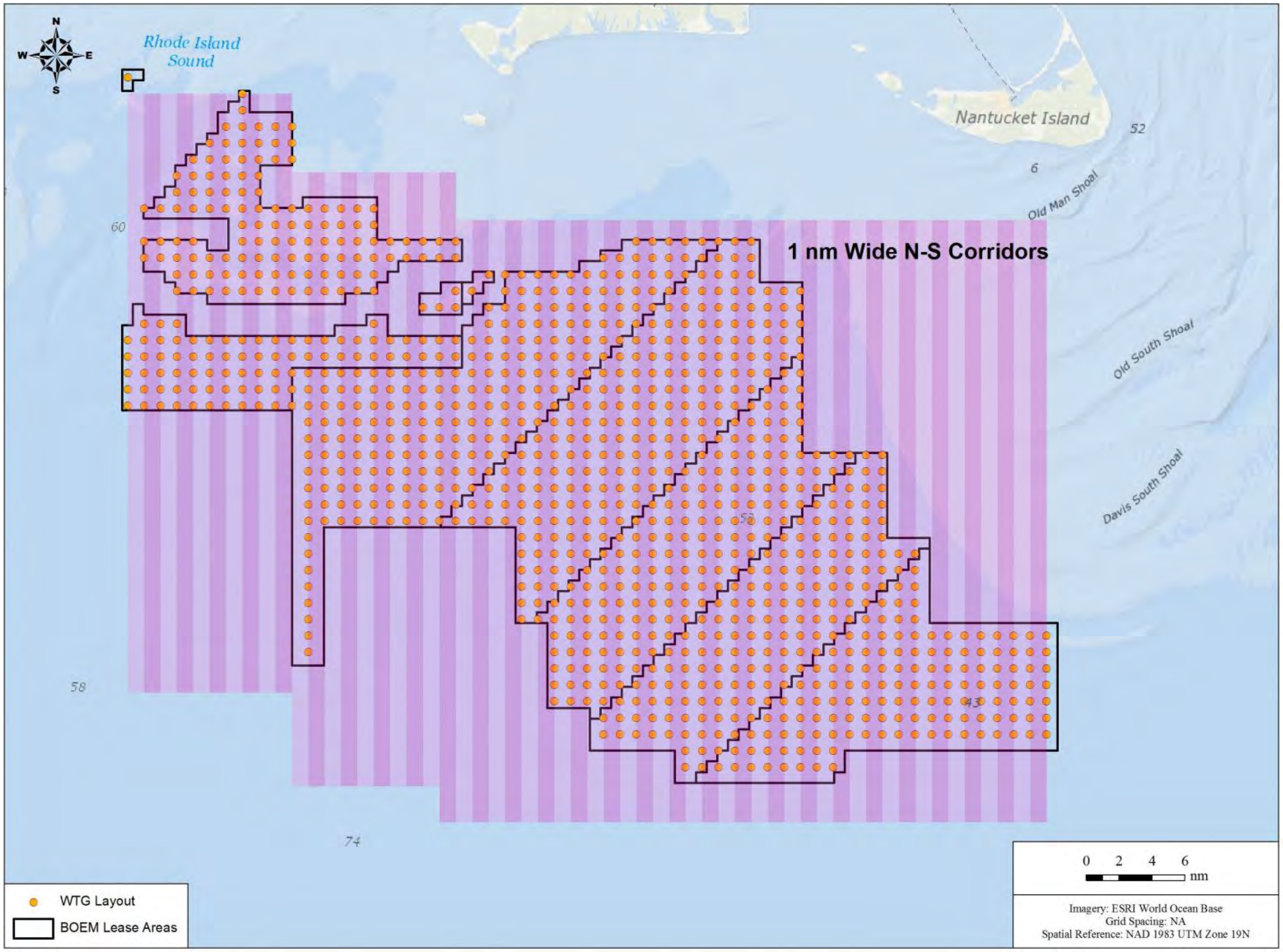

Figure 3.4: 56, 1 nm wide N-S Transit Corridors provided by 1x1 nm turbine layout.

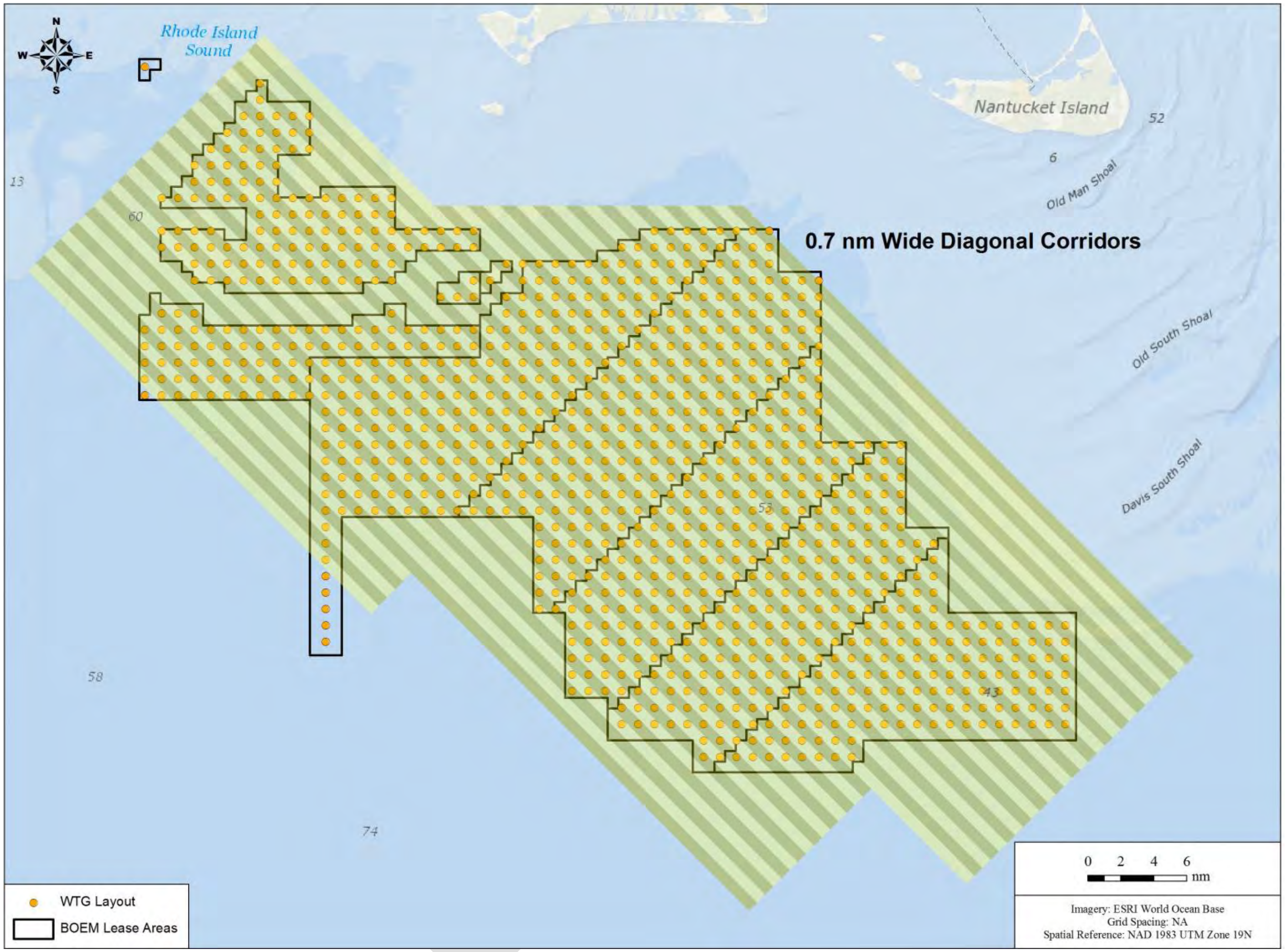

Figure 3.5: 48, 0.7 nm wide SE-NW Diagonal Transit Corridors provided by 1x1 nm turbine layout.

4. Vessel Traffic Around the WEA

Given the turbine layout assumed for this analysis, it is expected that vessels greater than 400 ft LOA or that exceed the air draft limits of the turbine blades will transit around the WEA. This would include many of cargo, tanker, and larger passenger vessels but not fishing vessels (as all observed had a length of less than 400 ft). For the cargo, tanker and passenger vessels identified in Figure 2.2 and Figure 2.3, which presently transit the southwestern margin of the WEA (see between Points 1 and 2 on Figure 2.3), it is expected that to skirt the western edge of the WEA will add approximately 10 nm to the transit distance. Based on average speed through the WEA, the additional transit time for vessels is estimated as the following:

- Passenger vessels: 40 minutes;
- Tanker vessels: 60 minutes; and
- Cargo vessels: 70 minutes.

Given the size, purpose, and transit track of these vessels, many of these larger commercial vessels may be making lengthy trips to or from points well beyond the general region of the WEA. For these vessels, the additional transit time to go around the WEA may be a small part of the overall trip duration. Passenger, tanker and cargo vessels represent approximately 10.2% of the vessel traffic transiting the WEA. As noted in Section 2.2, there are existing TSS that could accommodate the transit of those vessels around the WEA. Much of this traffic is transiting to/from the Narragansett Bay and Nantucket-Ambrose TSS.

Fishing vessels will be able to transit through the WEA (see Section 3.0) and also have the option to transit around the WEA. Figure 2.6 indicates that a significant portion of the AIS fishing vessels are transiting to the west of the WEA, and to the north or near the northern-eastern boundary of the WEA. Those fishing vessels that choose to transit around the WEA are expected to have no or small impacts, of 30 minutes at most, in transit times by avoiding the WEA.

5. Conclusions and Recommendations

A summary of the conclusions and recommendations with respect to vessel navigation through the WEA is as follows:

- There does not appear to be a need for designated transit corridors through the WEA if a uniform turbine layout with 1 nm corridors E-W and N-S and 0.7 nm corridors NW-SE and SW-NE is adopted. This layout would accommodate the wide range of ports, destinations, and routes observed by fishing vessels, which makes up most of the traffic going through the WEA, as well as the majority of observed vessel tracks through the WEA, thereby by accommodating the wide range of reported fishing practices in the region. This arrangement would effectively create 40 corridors in the E-W direction; 56, N-S; 48, NW-SE; and 87 SW-NE.
- If the USCG identifies the need to have designated transit corridors, then certain of the available corridors within the uniform turbine layout could be designated as one-way transit corridors. For example, in each direction, it would be possible to designate one-way transit corridors, with a potential separation corridor between opposite directions of transit.
- Based on considerations of collision avoidance, it is recommended that vessels exceeding 400 feet should transit around the WEA. Vessels of this size were observed to be tanker, cargo, passenger or military vessels. Transiting around the WEA may also provide a suitable option for much of the existing fishing vessel traffic, since the majority of fishing vessel traffic skirts the northwest and northeast boundaries of the WEA and results in little (less than 30 minutes) or no increase in transit times for these vessels.
- It was assumed in the analysis that the navigational lighting and marking plan for the entire WEA will be similar to that proposed by Vineyard Wind for its current project proposal (Vineyard Wind, 2019).

6. References

Baird (2019). Vineyard Wind - Supplementary Analysis for Navigational Risk Assessment. Prepared for Epsilon Associates Inc. Ref: 13057.201.R2.Rev0. January 23, 2019.

PIANC (2014). Harbour Approach Channels Design Guidelines. Report No. 121 – 2014.

PIANC (2018). Interaction Between Offshore Wind Farms and Maritime Navigation. MarCom WG Report No. 161 – 2018. March.

Vineyard Wind (2019). Vineyard Wind LLC - Lighting and Marking Requirements. Rev 4, 8 May 2019.

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CRMC & FAB
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Stedman Government Center
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4808 Tower Hill Road
Wakefield, RI 02879-1900

October 2, 2019

Dear Grover and Lanny,

Commercial Fisheries Center of RI is submitting comments on the South Fork Wind Farm project to address, turbine layout design, environmental impacts and baseline research survey.

From the beginning of the Fishing Industry and OSW Developers meetings, there has been a consistent consensus from the industry of 1 nautical mile spacing in all directions between the turbines. The SFW proposes 1nm spacing in a N & S pattern, with only .6 to .7 nm in an E & W pattern, posing navigation, fishing and transiting concerns that will lead to unsafe measures. Commercial fishing is by far the most dangerous industry in the Nation and with proposed limited spacing of less than 1nm in the course of limited visibility, high winds and heavy sea conditions vessel navigation is in peril. USCG will present their final determination on appropriate turbine spacing in order to conduct safe and effective search and rescue missions. To reflect back, originally, there was a sea floor topographical chart identifying the hard-glacial terrain that engineers utilized to map the placement of the 15 turbines using .7 nm spacing. We were able to place the turbines with 1nm spacing using the identical chart avoiding the rocky terrain acknowledging it was doable.

We have grave concerns pertaining to the limited gear types proposed to use for the Baseline Survey. Gillnetting is effective for harvesting Monkfish and Skates and at times more so than a trawl. However, this gear type is not effective to sample species assemblage, very selective.

Due to the historical presence of Codfish on Cox's Ledge, we would suggest that half of the 6 – 300ft panels (strings) use 12" and 6" mesh for Codfish retention.

Especially since research conducted in the North Sea has determined that Codfish and similar species have been driven from the grounds due to noise acoustics. This research will provide a more accurate stock assessment during and post construction of Codfish, Monkfish and Skates.

The use of a 10' wide beam trawl will provide extremely limited demersal species composition due to the narrow width and low height (3'-6'). The swept area in coverage with this Beam Trawl is approximately 15% of a conventional trawl net, which is the traditionally ideal gear type for a baseline survey. The Beam Trawl survey would need 6-7 times more replicates to compare and calibrate using the NEAMAP survey. There will be negligible representation of scup, whiting, ling, cod, butterfish, squid, etc. attributable to the low headrope height. Again, we question the viability of determining accurate species assemblage for stock assessment with only a 10' wide Beam Trawl and Gillnet.

We encourage the use of additional gear types to conduct an accurate baseline survey. Cox's Ledge has been the principal spawning and migratory grounds in Southern New England for decades and is declared an essential fish habitat for as many as 36 specie. We have suggested a Trawler that has tows in the experimental and control areas and recommend adding this Trawler to your baseline survey. The continuation of a ventless trap survey should augment the baseline survey. We request that a scoping meeting and workshop be held to determine additional gear types to be applied to the SWF Wind baseline research study.

It is understood and expected that Inspire will forward and initiate an RFP to conduct all of the Baseline Research Surveys to institute a fair, balanced and transparent process. To maintain the vein of transparency, we would advocate for Inspire to establish a science review board (scientist, academia, stakeholders) to approve proposals and peer review of the research.

Thank you for the opportunity to comment on the South Fork Wind Farm Project.

Respectfully,

Fred Mattera

Frederick J Mattera

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF MARINE FISHERIES
3 Fort Wetherill Road
Jamestown, RI 02835

October 10, 2019

Lanny Dellinger
Fishermen's Advisory Board Chair

Re: Comments on the Revised South Fork Wind Farm Fisheries Research and Monitoring Plan

Dear Mr. Dellinger:

The Rhode Island Department of Environmental Management Division of Marine Fisheries (DMF) has received and reviewed the revised South Fork Wind Farm Fisheries Research and Monitoring Plan as of the September 30, 2019 Fishermen's Advisory Board (FAB) meeting and offers the following comments:

- Reference site selection
    - Careful selection of reference sites is essential to being able to detect potential impacts. If the reference sites are of different habitat types or are within an area where they may be affected by construction activities or operation, they are not true reference areas.
        - The selected locations must be suitable for the type of surveying to be done (beam trawling, gillnetting).
        - Acceptable locations may not be the same for all BACI survey designs (i.e., reference areas for a gillnet survey may differ from a beam trawling survey).
    - It is not clear how the area of influence was determined.
        - Is the distance required from the area of primary effect specific to certain sources of disruption (physical disturbance, suspended sediments, noise/vibration) or all sources?
        - This should be discussed in detail, as the distance away from the area of primary effect has influence on potential findings.
            - If the site is too far away, it may have different species utilization. If the site is too close, it may not be independent of construction effects.
    - It should be demonstrated that the reference areas are of the same habitat type as that of the impact areas. Refer to Appendix A for an example of how different types of habitat may differ in abundance of target species.
    - Reference Area East falls within the overall lease area. This portion of the lease is slated for development of the Revolution Wind Farm. It will not be an effective reference site for post-construction monitoring if development occurs there or nearby in the future.

        - This may limit any long-term monitoring using these survey approaches.
- Additional detail regarding potential statistical tests to be performed on the data is necessary for both the gillnet and beam trawl surveys. This same recommendation was provided in June 2019 by DMF to INSPIRE Environmental, but has not been addressed in the revised protocol.
    - Regarding the beam trawl survey design, further discussion of quantification of any substantial changes in species presence, absence, or abundance associated with proposed operations is necessary. A power analysis would be the first step.
        - Beam trawl data may not exist for this particular area but can be acquired for other nearby areas. A power analysis may be conducted using beam trawl data collected for the OceanSAMP by Anna Malek-Mercer. These data may be available through the University of Rhode Island by speaking with Jeremy Collie.
    - For the gillnet survey design, assessment of confidence intervals alone without use of more rigorous statistical tests that may determine effect through p-values may not be sufficient to describe whether the wind farm resulted in impacts to target species' (e.g., monkfish and winter skate) abundances.
        - While there are no local gillnet surveys that will be representative of the area there are other survey datasets available (NC gillnet survey). These data could at least be useful to analyze some representative species groups (e.g., roundfish or flatfish) for refinement of the sample size.
        - Please also note that the gillnet survey will not provide an ability to assess potential changes in monkfish or winter skate size distributions due to the single mesh size.
    - DMF suggests that the FAB develop a clear list of primary species of concern and the types of questions they would like answered (e.g., will Atlantic cod abundance change in response to wind farm development?) as the basis for a series of hypothesis testing approaches.
        - This should also include a recommendation about what level of effect should be detectible (effect size). The DMF offers a reasonable statistical power in the section below for your consideration.
            - Refer to Appendix B for an example of how effect size can be tested using an existing dataset.
        - These questions from the FAB can then be used to test the survey design's ability to detect certain changes and modify the design if necessary.
    - Study designs should have *at minimum* 80% statistical power, or more simply, each test of significance should have at least an 80% probability of detecting an effect that is present (avoiding a type II statistical error).
        - 80% is an acceptable power level within the scientific community (Cohen 1988). However, a power of 80% means that there is a 20% chance that a present effect may go undetected. Nonetheless, given the high variance in fisheries data, creating sampling designs with higher power can be unachievable given time and monetary constraints.
        - A higher (90%) statistical power should be tested, in particular for research questions of primary focus, so that the tradeoff between statistical power and logistical considerations can be considered.

- Ventless lobster survey
    - Ørsted should fund a ventless lobster pot survey in and around the SFWF area given the importance of the Cox Ledge habitat to lobster and Jonah crab.
    - Three general survey design approaches are possible. There are benefits and challenges associated with each approach as outlined below.
        - Model the survey after the BIWF ventless lobster pot survey.
            - This approach will provide data regarding potential impacts of the wind farm on lobster abundance, size distribution, condition, etc. through BACI analyses.
            - This sampling design does not allow for analysis to determine the area of effect (how far do impacts extend spatially?).
            - Results of this survey will be comparable to those of the BIWF survey.
            - These data could not be used to supplement fisheries independent sampling for use in stock assessment due to the nature of the survey design (fixed monitoring sites).
        - Model the survey after state ventless lobster pot surveys or the survey conducted for the OceanSAMP using a random stratified design.
            - This approach will provide data regarding potential impacts of the wind farm on lobster abundance, size distribution, condition, etc. though a gradient analysis.
            - This random stratified sampling design may allow for analysis to determine the area of effect (how far do impacts extend spatially?) through gradient analysis.
            - Other offshore wind developments have or are slated to have ventless pot survey designs similar to MA and/or RI state surveys (e.g., SMAST survey within the Vineyard Wind area). Taking a similar or analogous approach may provide an ability to assess impacts across wind farms and potentially test for differing impacts based on project design components (e.g., different turbine sizes, foundation types).
            - If all developers utilize the same sampling approach in Southern New England wind lease areas, the overall area sampled will expand substantially and the time series could extend for a longer period of time.
            - Consequently, these data may be suitable to supplement fisheries independent sampling for use in stock assessment due to a random stratified sampling design. Usefulness will depend on the spatial stratification and length of the time series.
        - Merge the two previous approaches.
            - It may be possible to designate larger "effect/impact" areas and "reference" areas and then randomly stratify sampling within them to meet a variety of needs.
- There should be a data release plan; it should be clearly stated who will have access to the raw data.

- Some of these data may be of value to stock assessment, and more generally, fisheries management, by way of supplementing existing sampling. DFM would support the implementation of standard data delivery dates to fishery management agencies.
- Fishing industry groups should also have access to the data to ensure for complete transparency.

References:

Cohen, J (1988). Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Lawrence Erlbaum Associates. https://doi.org/10.1016/C2013-0-10517-X

Appendix A

An analysis of the proposed sampling areas for the lobster ventless trap survey plan

Hypothesis: use the existing RI DFW ventless trap survey data to test for significant differences in lobster abundance between hard and soft bottom habitat.

Methods: An existing set of ventless trap data from the RIDEM ventless trap survey which ran from 2006 through 2012 was used to test whether significant differences existed between hard and soft bottom habitats. The dataset chosen was ventless lobster pot data only (meaning vented pot data from the same survey was removed from the analysis), and the data used was from lobster pots that had been set in the vicinity of the nearfield and farfield areas being considered for the Block Island wind farm survey protocol. The data used from these areas were total lobsters per sampling day per station which originated from 3 pots in each case. The number of data points used in the analysis was n=132.

A new data field was created by taking the existing bottom type classification and re-classifying each bottom type as either hard or soft bottom. Bottom originally classified as mud was re-classified as soft, while bottom originally classified as any combination of rock, sand or gravel was re-classified as hard.

A histogram of total lobster abundance data was used to check the distribution of the data. A general Linear Model (GLM) with the appropriate link function was then used to test for significant differences between the two bottom types, hard and soft.

H_0: $\mu_s = \mu_h$

Ha: $\mu_s \neq \mu_h$

μ_s is the mean lobster abundance of soft bottom

μ_h is the mean lobster abundance of hard bottom

To investigate whether bottom type differed spatially, sampling events were plotted with ArcMap 10. Total lobster abundance was binned and sampling events were color coded by the binned abundance.

Results: A histogram of total lobster abundance data indicated a Poisson distribution (Figure 1). A GLM with a Poisson link function resulted in a significant difference between hard and soft bottom habitat (Table 1).

A GIS map showing the location of each sampling event and the corresponding abundance showed that the majority of the hard bottom sites fell around the vicinity of Block Island while the soft bottom sites were in the vicinity of the mouth of Narragansett Bay (Figure 2). Additionally, the map demonstrated that the sites around Block Island had a relatively low abundance while the sites at the mouth of the Bay were quite variable in abundance.

Conclusion: Significant differences in total lobster abundance were seen between sites with a soft bottom and sites with a hard bottom. This demonstrates the importance of having a consistent bottom type between sampling areas being considered for the BIWF lobster survey protocol. This data also suggests that notable differences in abundance occur with increasing distance from Block Island. Based on this finding, sampling areas should be far enough apart so project impacts will not be detected at the control site, but close enough together to minimize the amount of natural variance that exists between areas.

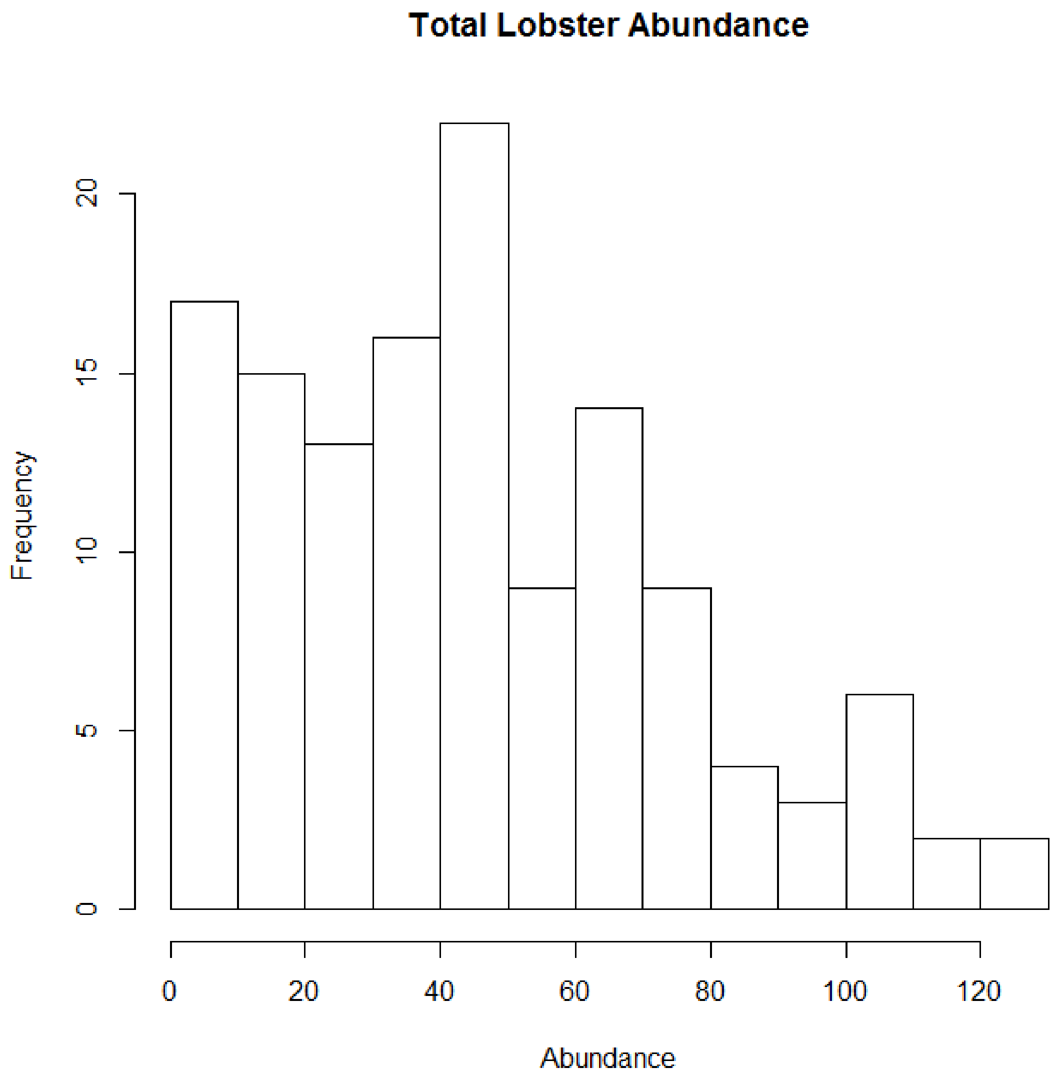

Figure 1. Histogram of lobster abundance data showing a Poisson distribution.

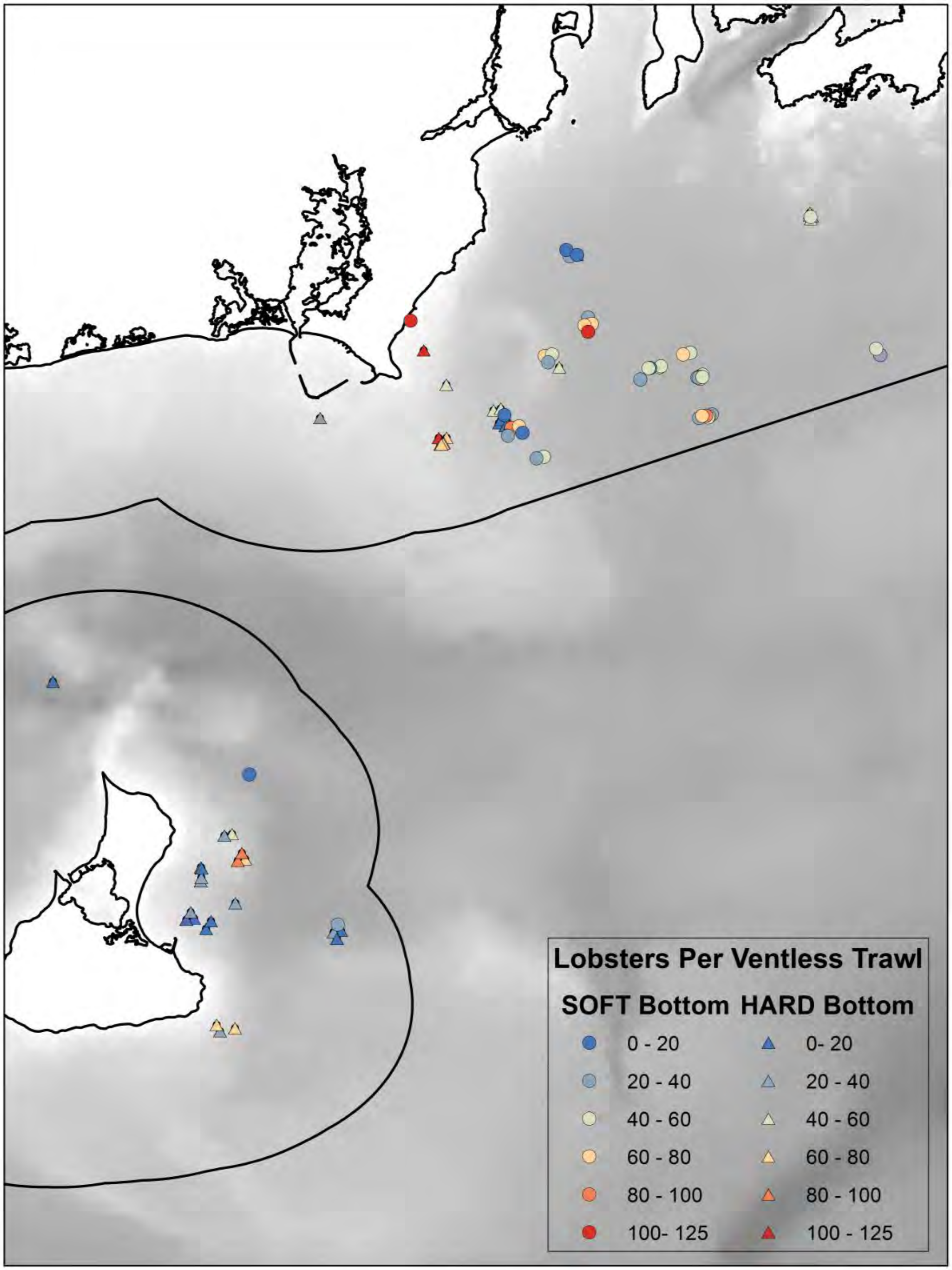

Figure 2. Map showing the location of soft and hard bottom sites and the corresponding abundance of lobsters.

Table 1. Output from GLM

	Estimate	Std. Error	Z value	Pr(>|z|)	
Hard (intercept)	3.72192	0.01944	191.453	<2.00E-16	***
Soft	0.18272	0.02597	7.037	1.96E-12	***

Appendix B

An analysis of the proposed sample size for the lobster ventless trap impact area monitoring program

Hypothesis: To test for an appropriate sample size at which differences can be detected between two separate sampling locations given variances from an existing ventless lobster trap dataset.

Methods: An existing set of ventless trap data from the RIDEM ventless trap survey which ran from 2006 through 2012 was used to test whether differences can be detected at various levels of abundance using different sample sizes. The dataset chosen was ventless lobster pot data only (meaning vented pot data from the same survey was removed from the analysis), and the data used was from lobster pots that had been set in the vicinity of the area being considered for the wind farm impact area experiment. The data used from these stations were total lobsters from each station, which originated from 3 pots in each case. The number of stations, and therefore data points, used in the analysis was n=120.

Two new fields were created as the simulated population of data. The first was to take the total lobsters and increase this column of data by 10%, and the second used the original data but increased each data point by 20%.

The data were then tested by taking a random sample of various sizes (10, 50, 100, up to the final size needed to achieve difference detection) from the existing dataset and subtracting from it the same sized random sample from the increased datasets. So in each case two analyses were made, one comparison between the original data and the data increased by 10%, and a second comparison between the original data and the data increased by 20%. A bootstrap of 1000 repetitions was then performed for each randomized sample size and analyzed. The sample size was increased until the confidence limits indicated a difference from 0, which indicates that the difference in means was not equal to 0 and therefore the populations of data had detectable differences in them.

H_0: $\mu_0 - \mu_{alt} = 0$

Ha: $\mu_0 - \mu_{alt} \neq 0$ and because $\mu_{alt} > \mu_0$, the difference should be negative

Results: The bootstrap of the random samples distributed normally relative to the mean in each case (Figures 1 – 4). The comparisons versus the 10% increased data population had a relatively high needed sample size to detect a difference in means, with the final sample size needed being n=426 per dataset (Figures 1a, 2a, 3a, 4a, and Table 1). The comparisons versus the 20% increased data population had a much lower needed sample size to detect a difference in means, with the final sample size needed being n=116 per dataset (Figures 1b, 2b, 3b, 4b, and Table 1).

Conclusion: The bootstrap resampling did a fair job of approximating a normal distribution in all cases. This made the comparisons of the 95% confidence intervals relative to each data population a valid comparison. The sample size needed to detect a difference of 10% between sampling populations was high given the existing variability in the ventless lobster pots. A sample size of 426 per area would be needed to detect a difference of 10% in lobster abundance between sites. This is most likely a reasonable number of stations given the time and budget that are designated for this project. It appears as if the protocol per the February 13th version of the monitoring program would more than adequately cover this sampling intensity. The sample size decreases significantly when only trying to detect a difference of 20%. This sample size was 116 needed per area. This number of stations can produce estimates that could detect differences at the reasonable level of precision of 20%. Conversely though, this does mean that impacts could be occurring to the lobster population between the impact area and the control area, but if the impact is less than 20%, i.e. if the population in the impact area decreases by 17% relative to the control area, the monitoring program runs the risk of not being able to detect this difference with statistical certainty, making the monitoring program susceptible to a type 2 statistical error. Given that the existing proposed protocol meets and exceeds the sample size needed to determine differences at a precision of 10%, no modifications to the existing protocol will be needed with regard to the appropriate sample size.

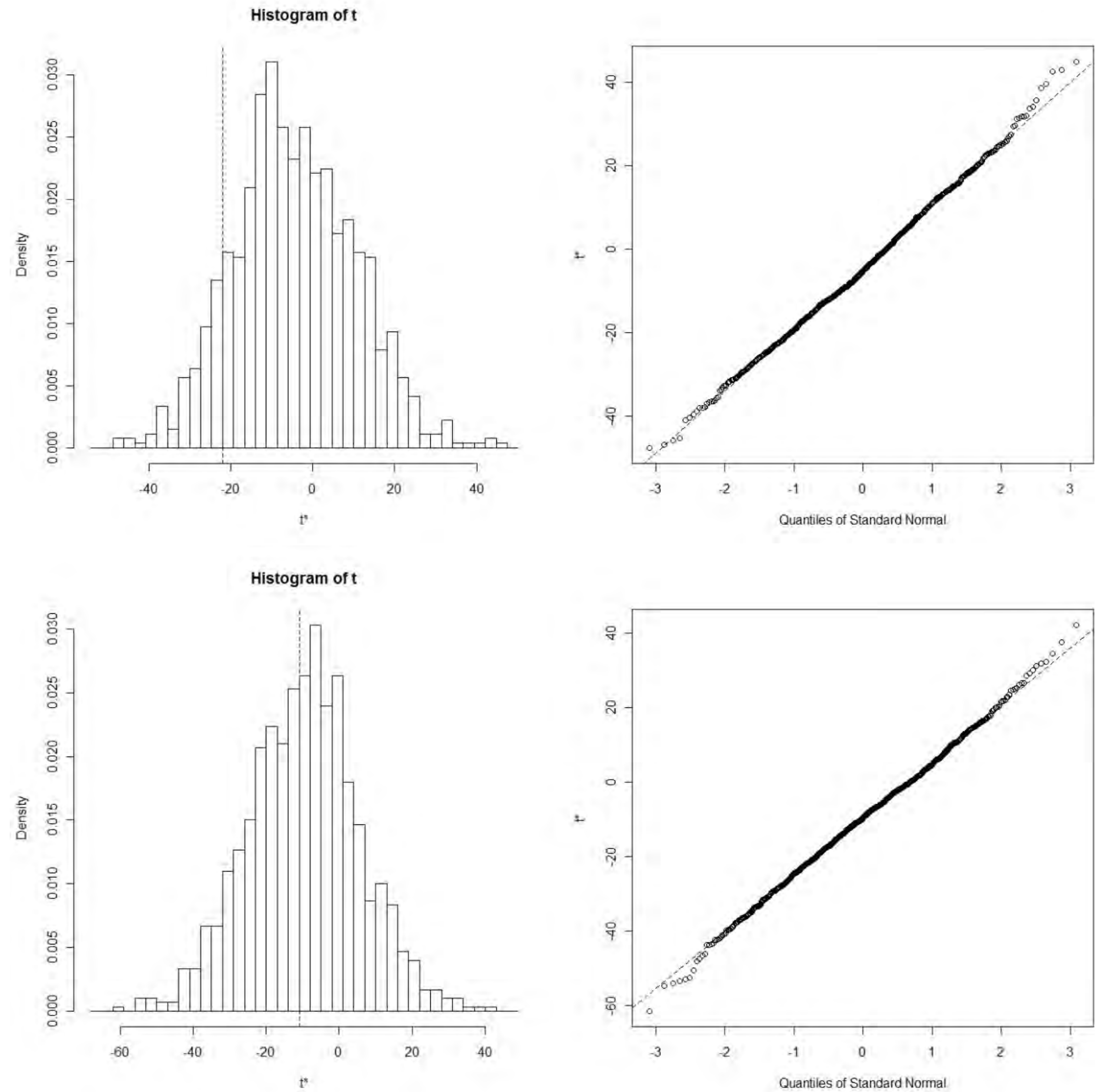

Figure 1 a (top dataset increased by 10%) and b (bottom dataset increased by 20%) – Output from a randomized sample size of 10 with 1000 bootstrap runs.

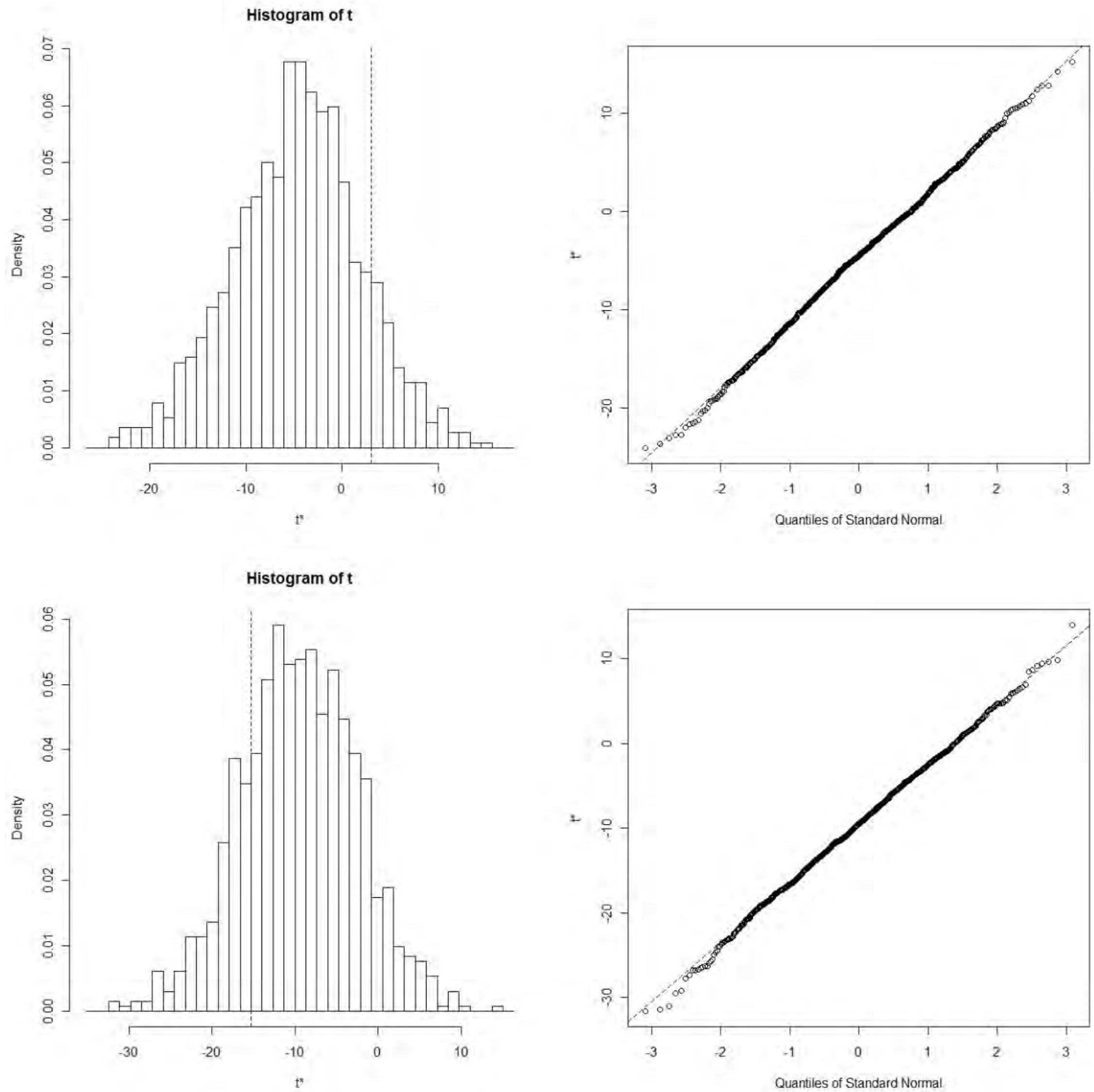

Figure 2 a (top dataset increased by 10%) and b (bottom dataset increased by 20%) – Output from a randomized sample size of 50 with 1000 bootstrap runs.

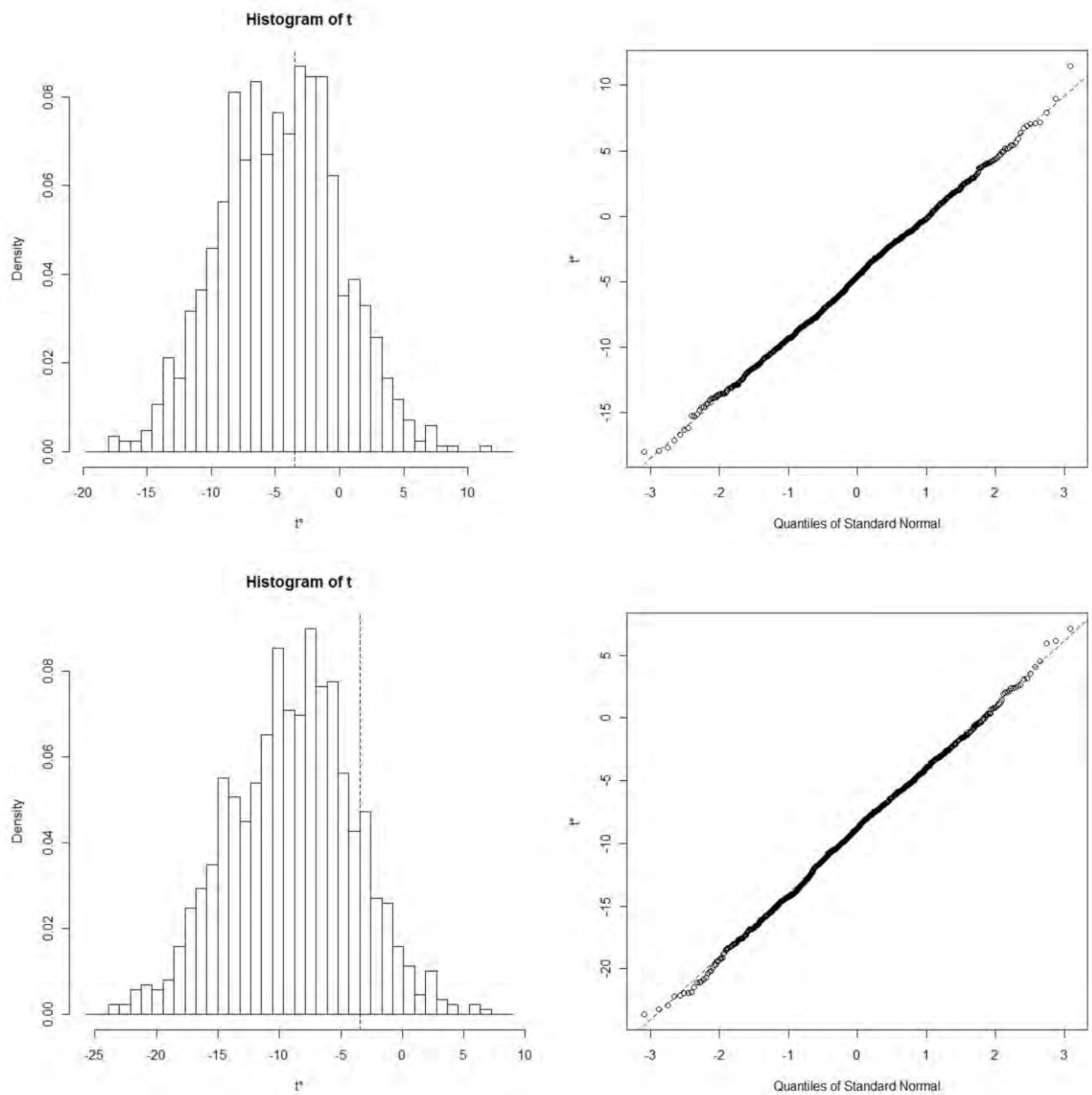

Figure 3 a (top dataset increased by 10%) and b (bottom dataset increased by 20%) – Output from a randomized sample size of 100 with 1000 bootstrap runs.

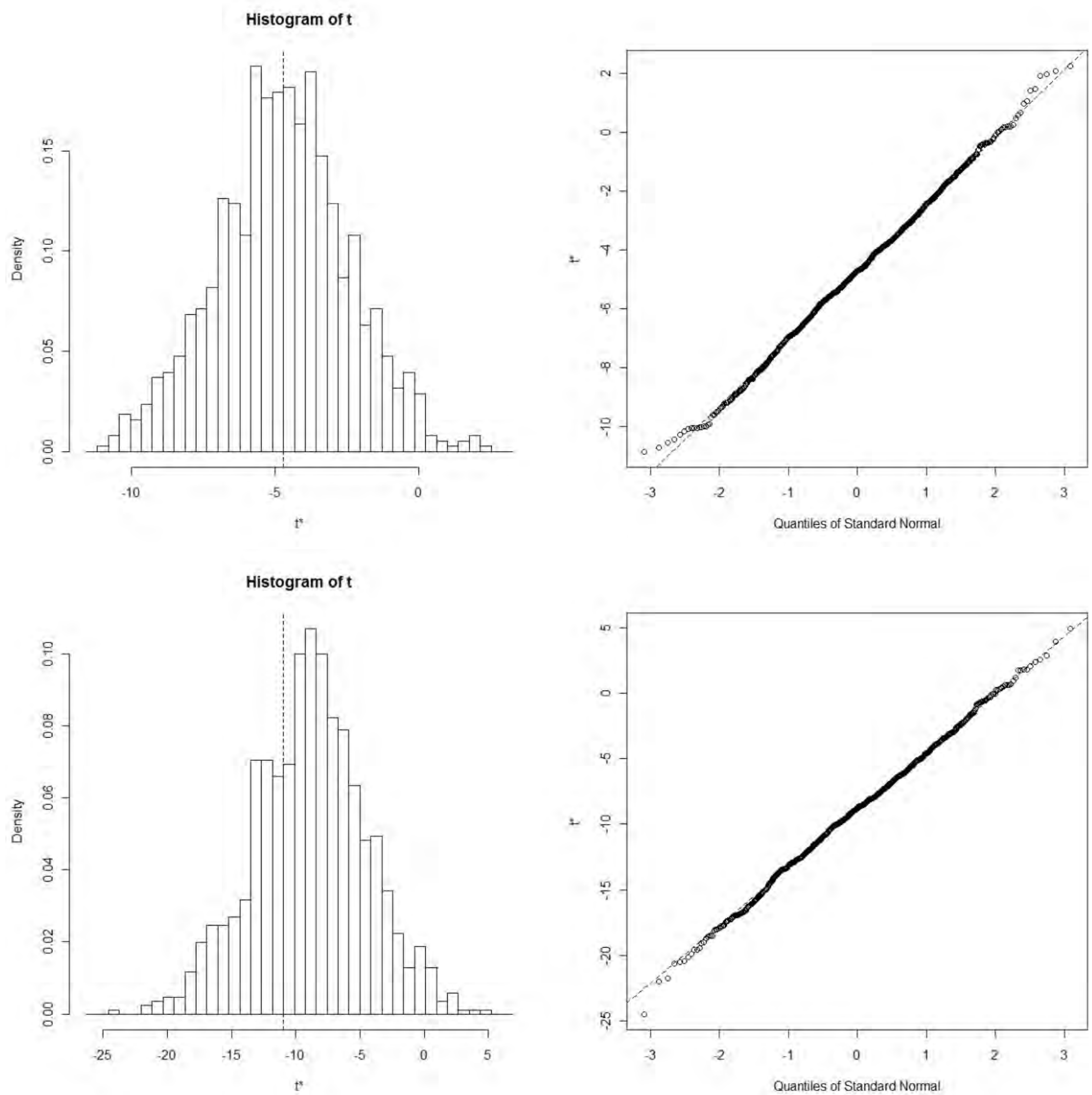

Figure 4 a (top dataset increased by 10%) and b (bottom dataset increased by 20%) – Output from a randomized sample size of 426 for the comparison of the dataset increased by 10% with 1000 bootstrap runs and output from a randomized sample size of 116 for the comparison of the dataset increased by 20% with 1000 bootstrap runs.

Table 1 – Randomized samples of various sizes including 95% confidence intervals.

Sample size	Sample increased by 10%		Sample increased by 20%	
	Lower 95%	Upper 95%	Lower 95%	Upper 95%
10	-31.94	24.66	-41.64	20.64
50	-18.33	8.38	-23.02	3.99
100	-13.54	4.20	-18.24	0.16
116	X	X	-18.43	-0.236
426	-9.20	-0.06	X	X

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF MARINE FISHERIES
3 Fort Wetherill Road
Jamestown, RI 02835

January 3, 2020

Lanny Dellinger
Fishermen's Advisory Board Chair

Re: Comments on the South Fork Wind Farm Fisheries Monitoring Plan and Power Analyses for the Beam Trawl Survey

Dear Mr. Dellinger:

The Rhode Island Department of Environmental Management Division of Marine Fisheries (DMF) has received and reviewed the Power Analyses for the Beam Trawl Survey at South Fork Wind Farm, as well as the letter to Marisa Desautel, Esq. from Orsted dated December 12, 2019. The DMF offers the following comments:

- The DMF stands by all comments provided in the memo provided to the Fishermen's Advisory Board (FAB) on October 10, 2019.
    - These comments included discussion of reference site selection, power analyses, ventless lobster survey design, and the need for a data release plan.
- DMF agreed to meet with INSPIRE Environmental staff on October 29, 2019 and November 21, 2019 to discuss potential reference site options.
    - Staff felt that the sites referenced within the Orsted letter to Marisa Desautel were a substantial improvement from their initial sites.
    - The two new reference areas are equidistant from the area of potential effect, have similar substrate types and depths as the impact area, and are likely beyond the distance where development may affect them.
        - However, DMF did request an explanation, and or literature review, from Orsted regarding what the distance of effect is for various disturbances (i.e., pile driving noise, sedimentation, EMF). A discussion of the spread of disturbance would strengthen the argument for use of any potential reference areas.
    - DMF also stressed that staff have not done any trawling or offshore sampling in the areas proposed for reference sites. It is recommended that Orsted/ INSPIRE Environmental continue to engage with the FAB and any other commercial or recreational fishermen that are familiar with these areas to discuss feasibility of both gillnetting and beam trawling in these sites.
- After careful review of the power analyses provided by Lorraine Read, of Exa Data and Mapping, DMF finds the statistical power analysis approach logical.
    - If the beam trawl data collected through South Fork Wind Farm monitoring has similar variance in total abundance to those in the otter trawl BIWF data, a ≥90%

power can be achieved with a sampling design featuring 3 replicate tows per site (1 impact and 2 control) per month, resulting in 9 tows per month.
    - 4 replicate tows had ≥90% power under all variance scenarios.
    - 3-4 replicate tows will achieve a reasonable level of statistical power (Cohen 1988) if implemented by Orsted as part of SFWF biological monitoring.
- One additional challenge is that these analyses evaluate only total abundance of all species.
  - Many of the statistical tests that will be performed using the beam trawl data to be collected at the SFWF will assess changes in abundance or biomass, as well as size distributions, of individual species.
  - Additional analyses on species of concern (e.g., Atlantic cod, scallops, monkfish) would improve the approach.
- DMF staff agree with the approach of revisiting this power analysis after a year or two of data have been collected at the SFWF impact and control sites. Survey refinement is possible prior to construction beginning.
  - This is the approach that is being taken with the gillnet survey.
  - After a single year of data are collected, an assessment of the variance in the SFWF data should be conducted. DMF recommends that power analyses with smaller effect sizes be conducted at this time.
- At present, there is no discussion of how community species composition will be assessed. Methods exist for conducting power analyses to design surveys that will be evaluated via analysis of variance based on an analysis of distance (ADONIS), as well as principal component analysis (PCA) and canonical correspondence analysis (CCA). Refer to Skalski et al. (2018) for additional details.

References:

Skalski JR, Richins SM, Townsend RL (2018) A statistical test and sample size recommendations for comparing community composition following PCA. PLoS ONE 13(10): e0206033. https://doi.org/10.1371/journal.pone.0206033

Cohen J (1988) Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Lawrence Erlbaum Associates. https://doi.org/10.1016/C2013-0-10517-X

South Fork Wind
Fisheries Research and Monitoring Plan

September 2020

Prepared by:

South Fork Wind | Powered by Ørsted & Eversource

South Fork Wind, LLC

and

INSPIRE Environmental

INSPIRE Environmental
513 Broadway, Suite 314
Newport, Rhode Island 02840

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LIST OF ACRONYMS

ACCOL	Anderson Cabot Center for Ocean Life
ASMFC	Atlantic States Marine Fisheries Commission
BACI	Before-After-Control-Impact
BAG	Before-After-Gradient
BIWF	Block Island Wind Farm
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operation Plan
CPUE	Catch per unit effort
DSLR	Digital single-lens reflex
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
ESA	Endangered Species Act
FGDC	Federal Geographic Data Committee
GPS	Global Positioning System
HMS	Highly migratory species
INSPIRE	INSPIRE Environmental, LLC
LOA	Letter of Acknowledgement
LPIL	Lowest possible identification level
MADMF	Massachusetts Division of Marine Fisheries
MARACOOS	Mid-Atlantic Regional Association Coastal Ocean Observing System
MMPA	Marine Mammal Protection Act
NERACOOS	Northeastern Regional Association of Coastal Ocean Observing Systems
NEAMAP	Northeast Area Monitoring and Assessment Program
NEFSC	Northeast Fisheries Science Center
NOAA	National Oceanic and Atmospheric Administration
NYSERDA	The New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
PV	Plan View
RICRM	Rhode Island Coastal Resources Management
RIDEM	Rhode Island Department of Environmental Management
SFEC	South Fork Export Cable

SFW	South Fork Wind
SFWF	South Fork Wind Farm
SMAST	School for Marine Science & Technology
SNECVTS	Southern New England Cooperative Ventless Trap Survey
SPI	Sediment Profile Imaging
WEA	Wind Energy Areas

1.0 Introduction

This Fisheries Research and Monitoring Plan (the plan) has been developed for the South Fork Wind Farm (SFWF or Project), which is proposed to be located in Bureau of Ocean Energy Management (BOEM) Lease Area OCS A-0517, which is within the Rhode Island – Massachusetts Wind Energy Area (RI-MA WEA) (Figure 1). [1] SFWF includes up to 15 wind turbine generators (WTGs or turbines) with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the WTGs (Inter-array Cables), and an offshore substation (OSS), all of which will be located approximately 19 miles (30.6 kilometers [km], 16.6 nautical miles [nm]) southeast of Block Island, Rhode Island, and 35 miles (56.3 km, 30.4 nm) east of Montauk Point, New York.

1.1 Monitoring Plan Development

This monitoring plan has been developed in accordance with recommendations made by BOEM's "Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM, 2013; BOEM, 2019) and by state agencies (RICRMC, 2018; NYSERDA, 2017; MADMF, 2018). In addition, as described in detail below and in Appendix A attached hereto, this plan was refined and expanded through an iterative process that considered feedback from agencies and stakeholder groups.

By way of background, in 2017, the South Fork Wind (SFW) team began meeting with regional fishing organizations, working groups, and individual fisherman to gather information on the fisheries in the SFWF area. Through the permitting and development process, the SFW team also consulted with several states (e.g., NY, CT, RI, and MA) and federal fisheries resource management agencies (BOEM, NOAA) about the fisheries in the SFWF area. With the information collected during these interactions, the SFW team prepared an initial version of the fisheries monitoring plan that contained a gillnet survey because gillnet gear was identified as the primary gear used by commercial fisheries in and around the proposed SFWF area, and because sampling in SFWF with an otter trawl was not a viable monitoring option. *See* Section 2.0 for details on the gillnet survey.[2]

The initial version of the plan was widely circulated for comment in November 2018 to state and federal agencies, regional working groups, advisory boards, research institutions, fishing groups, and other stakeholders. These entities and groups provided the SFW team with numerous comments that it took under consideration as it developed the next draft of the plan. *See* Appendix A.[3] While set forth in more detail in Appendix A, some of the key comments during this time period were: need for a power analysis to determine level of sampling; seasonal sampling intensity needed to increase; more specific information was needed on the sampling gear to be

[1] South Fork Wind, LLC, now a wholly-owned indirect subsidiary of North East Offshore, LLC, a joint venture between Ørsted and Eversource , submitted the major federal permit application, The South Fork Wind Farm Construction and Operations Plan (COP), to BOEM in June, 2018 and submitted a revised COP to BOEM in May, 2019.
The full revised COP document can be found online at: https://www.boem.gov/South-Fork/

[2] References to sections contained herein are to show that additions to the plan were made based on comments that the SFW team received.

[3] Please *see* Appendix A, which presents a summary of key comments received in writing and verbally on the various drafts of the plan. In addition, all written comments received are attached as exhibits to Appendix A.

used; and that a gillnet survey alone was not enough to effectively sample the area. *See* Appendix A for more details.

The SWF team then sought additional feedback on the plan during two webinars in March 2019 with state and federal agencies. Comments from those webinars informed the team about additional gear types that could be used for fisheries monitoring. *See* Appendix A. As a result of the feedback from the webinars and previous comments, a second draft of the fisheries monitoring plan was circulated to agencies and stakeholders for review in June 2019. This draft included the addition of a beam trawl survey protocol. *See* Section 3.0 herein. Also, modifications to the gillnet protocol were made based on comments received previously and additional feedback from industry members. *See* Appendix A. These modifications included adjustments to the sampling schedule and soak time of the survey and the decision to use a single mesh size and tie-downs to address questions about potential interactions with protected species. These changes to the sampling gear also mimic the practices of the commercial fishery and will allow comparability with commercial catch data. *See* Section 2.3 herein. More specific details regarding the sampling gear were also added to the plan. *See* Sections 2.1 and 2.2 herein.

Development of the plan continued through the summer of 2019 incorporating more comments and feedback on the second version of the plan. These comments included the necessity of sharing monitoring data with scientists in the region, feedback that additional gear types should be used for monitoring beyond the gillnet and beam trawl, and the location of the Reference Areas. *See* Appendix A. In September 2019, the SFW team attended two meetings of the Rhode Island Coastal Management Council's (RICRMC) Fishermen's Advisory Board (FAB) to discuss the fisheries monitoring plan. The FAB commented on the proximity of proposed Reference Areas to the SFWF development area as well as the Reference Areas being within areas identified for future development. The FAB also reiterated previously received comments on the need to conduct a power analysis to determine the level of sampling for each survey type. *See* Appendix A.

During the fall of 2019, the SFW team undertook extensive efforts to determine different Reference Area locations that were situated away from any potential impacts from development but were still of comparable depth and habitat as the impact area. *See* Section 2.2 herein. In addition, a power analysis was conducted for the beam trawl survey. *See* Appendix B herein. A power analysis was attempted for the gillnet survey. Comparable fishery-independent datasets for the region, however, are lacking for gillnet gear and the little data that were available did not adequately inform the power analysis to determine a proper level of sampling.

Continuing with the solicitation of feedback, SFW had productive in-person meetings in October and November of 2019 with scientists at Rhode Island Department of Environmental Management (RIDEM) and the Massachusetts Division of Marine Fisheries (MADMF) to review the new Reference Areas and the beam trawl power analysis. The comments received during these meetings are in Appendix A, and both agencies responded positively to the power analysis and new Reference Areas. *See* Appendix A. Meetings with individual fishermen also were conducted to gather additional feedback on the adequacy of the Reference Areas. Through these meetings, a consensus emerged that the new Reference Areas had similar bathymetry, benthic habitats, and species assemblages as the SFWF area. *See* Appendix A. Given the lack of data for a gillnet power analysis, discussions led to the decision to use an adaptive sampling approach whereby a power analysis would be performed after the first year of the survey to determine if the level of sampling would need to be adjusted in subsequent years. *See* Section 2.7 herein. These decisions on the Reference Areas and power analysis were provided to the FAB in late 2019 and added to the evolving plan. *See* Appendix A.

In February 2020, the SFW team attended another FAB meeting to discuss the amendments to the second version of the plan made in late 2019. The FAB stated that the two survey designs contained in the plan (gillnet and beam trawl) would not adequately sample the entire species assemblage at the SFWF site and suggested a one day workshop with the SFW team, state and federal agency scientists, area researchers, and industry members to outline a complete monitoring plan and discuss additional sampling gears. The Commercial Fisheries Research Foundation (CFRF) hosted the workshop and facilitated its development. *See* Appendix A. The workshop was conducted in March 2020 with the SFW team, individuals from the RI CRMC, FAB, RIDEM, NOAA, and several local industry members. *See* Appendix A. Species to be monitored and additional gear types were reviewed and discussed for potential addition to the plan. As a result of this meeting, ventless lobster trap, ventless fish pot, and benthic survey protocols were all added to the new version of the plan, which was distributed in May 2020. *See* Sections 4.0, 5,0 and 7.0 herein. Additionally, the SFW team has pledged to provide financial support for two projects being conducted by area researchers that use acoustic telemetry to monitor Atlantic cod and Highly Migratory Species (HMS) in and around SFWF and surrounding wind energy areas (WEAs). *See* Section 6.0 herein.

Following the release of the revised plan in May 2020, the SFW team hosted an inter-agency webinar on May 22nd. Following the webinar, NOAA, MADMF, NYDEC, and RIDEM provided additional feedback on the monitoring plan. The major feedback received included the need for a power analysis for the ventless trap monitoring plan, the need for a data sharing plan, consideration of spatial and temporal overlap between high-resolution geophysical surveys and fisheries monitoring, and the desire to see more details regarding the adaptive sampling strategy that was proposed. In response to these comments, substantial revisions were made to the monitoring plan. Appendix C was added to the plan, which describes the High-Resolution Geophysical survey equipment that may be used at SFWF, and describes how the operational frequency of that equipment compares to the auditory abilities of fish in the region. A data sharing plan was also added to the Plan (*see* Section 8.0), and a power analysis was completed for the ventless trap survey (*see* Appendix D). Finally, the plan was revised to better describe the specifics associated with the adaptive sampling approach (*see* Sections 2.7, 3.7 and 5.7). Further details are also provided in Appendix A.[4]

[4] As stated above, for more detailed information on the timeline and development of this plan, please also refer to Appendix A.

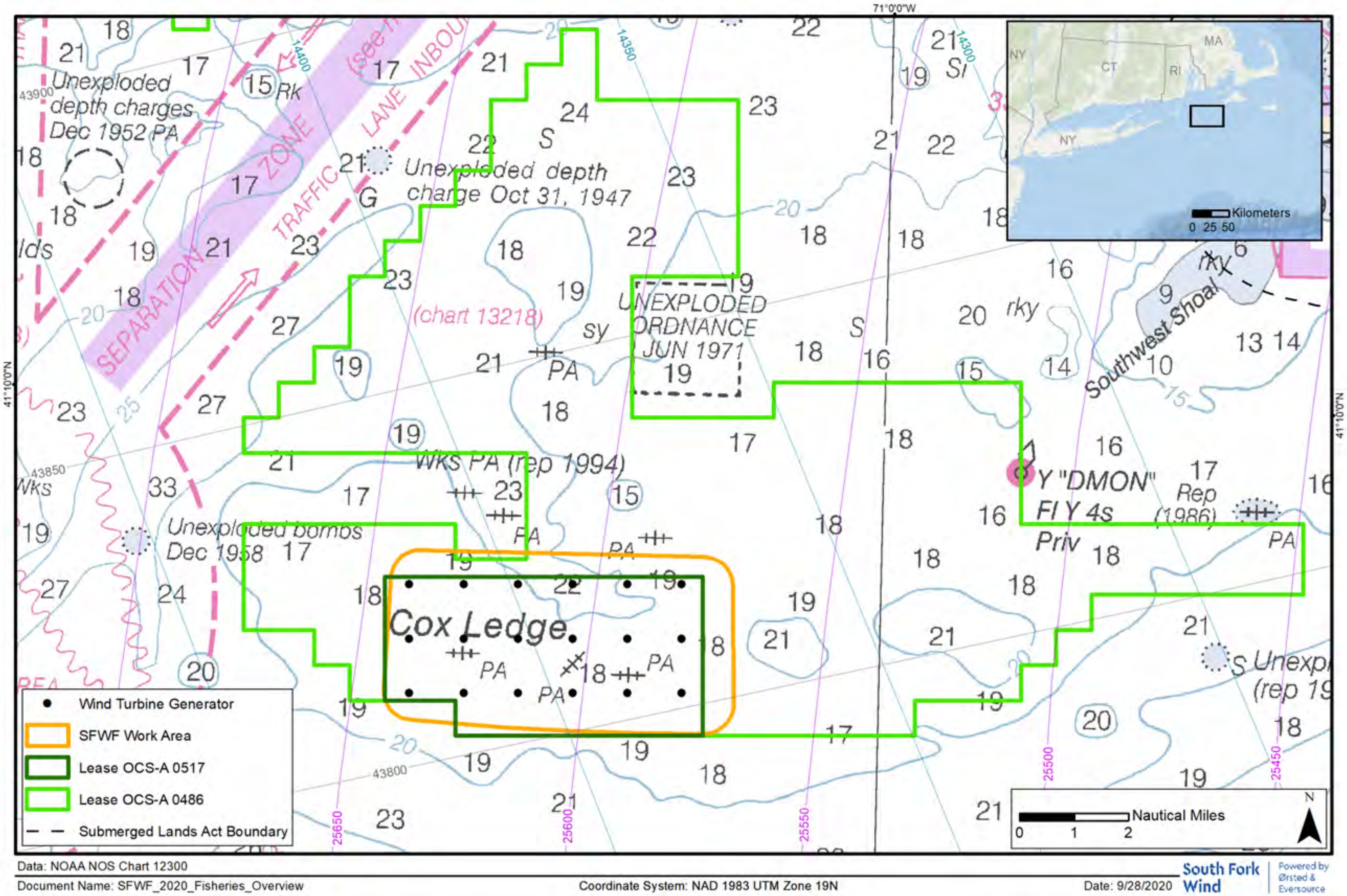

Figure 1. Location of South Fork Wind Farm

1.2 Overview of Fisheries Monitoring for South Fork Wind

SFW is committed to conducting sound, credible science. Biological surveys, developed in coordination with the commercial fishing fleet and state agencies, were conducted at the Block Island Wind Farm (BIWF) from 2012 through 2019. The guiding scientific principles implemented beginning with the BIWF and continuing into the future include:

- Producing transparent, unbiased, and clear results from all research;
- Working with commercial and recreational fishermen to identify areas important to them;
- Collecting long-term data sets to determine trends and develop knowledge;
- Promoting the smart growth of the American offshore wind industry;
- Focusing on maintaining access and navigation in, and around, our wind farms for all ocean users;
- Completing scientific research collaboratively with the fishing community;
- Being accessible and available to the fishing industry;
- Utilizing standardized monitoring protocols when possible and building on and supporting existing fisheries research;
- Sharing data with all stakeholder groups; and
- Maintaining data confidentiality for sensitive fisheries dependent monitoring data

The SFWF site is situated atop Cox Ledge, an area with complex bathymetry including extensive areas of boulders and mobile gear "hangs", making it difficult to safely operate large mobile gear (e.g., bottom trawl) in this area. Therefore, the SFWF site is not sampled routinely by the Northeast Fisheries Science Center (NEFSC) bottom trawl survey. Feedback from commercial fishermen, and an analysis of vessel Monitoring System (VMS) data indicate there is little commercial trawl effort in the area. Details of the SFWF fisheries data assessment and early stakeholder feedback can be found in the SFWF COP Appendix Y - *Commercial and Recreational Fisheries Technical Report* (Jacobs, 2018).[5]

The BOEM fishery guidelines recommend that trawl surveys be executed using a stratified random design. However, because of the complex bathymetry throughout the area, it is unlikely that a trawl survey can be safely conducted within the SFWF site using a scientific design with random site selection. Therefore, SFW has evaluated alternative survey designs and monitoring tools that can be used to collect pre-construction data for a wide range of taxa in the SFWF site. With this consideration in mind, the monitoring plan began with an emphasis on using gillnets as a monitoring tool. Over time, the plan evolved to incorporate additional survey techniques that could be executed safely within the SFWF area including a beam trawl, fish pots, ventless traps, and optical approaches to benthic monitoring. Through extensive outreach efforts with the fishing community, feedback from state and federal agencies (outlined in Section 1.1), and exploration of existing datasets (Jacobs, 2018), the SFW team has developed survey designs using multiple sampling gears to acquire pre-construction data on the abundance, biomass, demographics (e.g., length, fish condition, shell disease status), and species composition that occur in and around the SFWF site. In particular, the surveys have been designed to utilize sampling gear that can be fished safely and effectively, and with limited impact, on the complex, rocky habitat within the SFWF site (Thomsen et al., 2010; Malek, 2015).

[5] Appendix Y can be found online at: https://www.boem.gov/Appendix-Y/

Different gear types select for different fish and macro-invertebrate species, therefore, using multiple gear types to sample distinct species assemblages is needed for assessing potential impacts from SFWF (Walsh and Guida, 2017). Consistent survey methods and approaches will allow for data comparisons across studies, collaboration among developers and institutions, and an ability to address questions at appropriate spatial and temporal scales. Several gear types will be used to monitor a large portion of the species assemblage present in and around SFWF. However, it is acknowledged that the monitoring tools proposed herein may not sample for all of the species present within SFWF, particularly some of the smaller pelagic fauna (e.g., Atlantic herring, squid, and butterfish) that are too small to be retained in the gillnet gear, and are unlikely to be captured in substantial quantities by the beam trawls or fish pots. Some sampling will occur seasonally, while other sampling efforts will occur throughout the year (Figure 2). The proposed survey designs in this plan are not exhaustive but will form a basis for fisheries monitoring in the SFWF site. In particular, it is noted that additional fisheries monitoring will be performed along the route of the South Fork Export Cable (SFEC). Those studies are currently being planned in collaboration with local academic researchers and Subject Matter Experts. However, the details and methodologies associated with that monitoring effort are not included in this Plan.

For the gillnet survey, beam trawl survey, ventless trap survey and the fish pot survey, the overarching objective is to determine whether the construction and operation of the wind farm leads to changes in the relative abundance of fish and invertebrate species in the Project Area. The potential impacts associated with the construction and operation of an offshore wind farm have been described in various papers (e.g., Petersen and Malm, 2009; Gill et al., 2012), and it is recognized that several impacts may occur simultaneously (Bergstrom et al., (2013). Therefore, we will evaluate the relative abundance and distribution of fish and invertebrate resources around a wind farm after construction, as compared to abundance and distribution in Reference Areas, and in the Project Area prior to construction (Bergstrom et al., 2013). Our monitoring will be executed with an emphasis on detecting changes in relative abundance, rather than attempting to assess the ecological response to a single impact associated with the construction of an offshore wind farm.

Figure 2. Generic survey timeline for SFWF monitoring

These surveys will provide data that can be used to evaluate:

- Commercially and recreationally important species that utilize the area in and around the SFWF site.
- The seasonal timing of the occurrence of these species.
- Whether the taxonomic composition or relative abundance of fish and invertebrate assemblages change between the pre-construction and post-construction time periods.

The survey protocols have been designed to address requirements and guidelines outlined in the Federal Register (30 CFR 585.626), BOEM fishery guidelines, and RICRMC policies (11.10.9 C).

SFW issued a 'Request for Proposals' on May 5th, 2020 to local Universities and research institutions to execute fisheries monitoring elements of the monitoring plan. The proposals were reviewed in late May and early June, and our scientific research partners were selected in late June 2020. Commercial Fisheries Research Foundation (CFRF) was awarded the contract and will be responsible for executing the gillnet, beam trawl, fish pot, and ventless trap surveys. CFRF will partner with the University of Rhode Island (Dr. Jeremy Collie) to carry out the beam trawl and ventless trap surveys. These scientific researchers have worked collaboratively with SFW to make additional amendments and improvements to the methodologies in the fisheries monitoring plan. It was initially envisioned that field work for these components of the pre-construction monitoring would begin by early fall 2020. However, the start dates for the surveys have been delayed by several factors, including logistical difficulties associated with Covid-19 and delays in the receipt of the scientific research permits that are needed to conduct the monitoring. It is anticipated that the beam trawl monitoring will begin in October, 2020, while the other fisheries surveys (gillnets, ventless traps, and fish pots) will not commence until the Spring of 2021.

Similar to the principles and practices executed for the Block Island Wind Farm, SFW is committed to conducting scientific surveys and assessments that are collaborative with the fishing industry. The scientific contractors selected to perform the monitoring have identified eight local fishing vessels from which these monitoring surveys will be conducted.

2.0 Demersal Fisheries Resources Survey - Gillnet

Gillnet selectivity depends mainly on fish size and shape and mesh size, but is also affected by the thickness, material, and color of net twine, hanging of net, and method of fishing (Hamley, 1975). Using specific gear placements and prescribed mesh sizes, gillnets may be designed to target specific species, or subgroupings of species, and life stages. Southern New England waters are host to an active gillnet fishery that primarily targets monkfish and winter skate. The proposed gillnet survey will focus on monitoring these two species, pre- and post-construction of SFWF, using large-mesh gillnet gear that is designed to effectively target these species.

The objective of the pre-construction monitoring survey is to collect data on the distribution, abundance and composition of demersal fish species in the area of potential affect and in the Reference Areas. The objective of post-construction monitoring is to identify any changes in the fish community in the Project Area between pre- and post- construction that did not also occur at the Reference Areas that could be attributed to either construction or operation of the wind turbines.

At least two years of sampling (*see* Section 2.2. for details) will be conducted prior to the commencement of offshore construction. Similarly, a minimum of two years of monitoring will be completed following offshore construction, but the duration of post-construction monitoring will also be informed by ongoing guidance for offshore wind monitoring that is being developed cooperatively through the Responsible Offshore Science Alliance (ROSA).

2.1 Survey Methods

The survey will be conducted from commercial fishing vessels with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor has applied for an Exempted Fishing Permit (EFP) from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) in order to use the hired fishing vessels as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Marine mammal deterrent devices will be used on all gillnet gear as required under regulation. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

The requirements described in the Atlantic Large Whale Take Reduction Plan (NOAA, 2018a) for the Northeast gillnet fishery will be followed. At a minimum, the following measures will be used to avoid interactions between the gillnet survey and marine mammals, but additional modifications to the survey gear can be made at the discretion of NOAA:

- No buoy line will be floating at the surface.
- There will not be wet storage of the gear. All sampling gear will be hauled at least once every 30 days, and all gear will be removed from the water at the end of each sampling season.
- All groundlines will be constructed of sinking line.
- Fishermen contracted to perform the field work will be encouraged to use knot-free buoy lines.
- All buoy line will use weak links that are chosen from the list of NMFS approved gear.
- All gillnet strings will be anchored with a Danforth-style anchor with a minimum holding strength of 22 pounds.
- All buoys will be labeled as research gear, and the scientific permit number will be written on the buoy. All markings on the buoys and buoy lines will be compliant with the regulations, and instructions received from staff at the Protected Resources Division.
- Further modifications to the sampling gear can be made at the discretion of the Greater Atlantic Regional Fisheries Office.

2.2 Proposed Sampling Stations

An asymmetrical Before-After-Control-Impact (BACI) design is proposed with three sampling areas: a Project Area within the SFWF "Work Area" and two Reference Areas. The SFWF "Project Area" is defined as the maximum work area required to install the SFWF (yellow outline in Figure 3 below). This includes the maximum spatial extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Data will be collected in the Project Area (the blue square in Figure 3) and two Reference Areas with similar habitat characteristics as the Project Area. The Reference Areas will serve as an index of demersal fish abundance in Rhode Island Sound in an area outside of the direct influence of SFWF and other planned offshore wind farm development sites in the region. Concurrent sampling in the Project Area and the two Reference Areas will identify whether changes in the relative abundance and demographics of monkfish, winter skate, and other species observed within the Project Area are consistent with regional trends rather than representing a localized impact in the vicinity of SFWF. Several sources of information were used to determine the initial location of the Reference Areas. Bathymetry data was obtained from the Northwest Marine Ecoregional Assessment and the NOAA online bathymetric data viewer (https://maps.ngdc.noaa.gov/viewers/bathymetry/). Spatial information on fishing activity, including VTR data for the gillnet fishery and VMS data for the monkfish fishery was from the Northeast Ocean Data Portal was utilized, along with personal communication with local fishermen. Beam trawl data from Malek (2015) was also considered, and the SFW team sought feedback on the reference locations from staff at Rhode Island Department of Environmental Management and Massachusetts Division of Marine Fisheries.

Following feedback received in July 2020 from gillnet fishermen that are participating in the SFWF fisheries monitoring, the eastern Reference Area that was initially selected was moved to the south (Figure 3). The participating fishermen explained that moving the eastern Reference Area to the south would improve sampling of monkfish during their fall migration. The fishermen also expressed concerned that the eastern Reference Area that was initially selected would provide operational challenges, because of the large amount of macroalgae that is flushed out of Vineyard Sound every fall. The fishermen were concerned that this macroalgae would consistently foul the gillnets and prevent the gear from sampling in a representative manner.

The study design consists of sampling each of the treatment areas with gillnet strings. The proposed sampling areas were selected in consultation with regional stakeholders to ensure that:

1. There is comparability among all sampling areas with respect to current, habitat and depth conditions;
2. The Reference Areas are outside the area of influence from SFWF and other projects that may be constructed during the survey, but are still utilized by the same/similar fish populations;
3. Areas allow optimal operational execution of the survey (e.g., safe operation of the sampling gear, minimal travel times between sampling locations, habitats are suitable for the sampling gear); and
4. Space conflicts are minimized with other active uses to the extent practicable.

As mentioned above, several factors were taken in account when considering the location of the Reference Areas. One important consideration is that the Reference Areas must be located in an area that will not be developed in the future, which is especially pertinent in this case given that SFWF is adjacent to the larger Revolution Wind lease area. The submarine power cables (inter-array and export cables) will emit electric and magnetic fields (EMF) while the wind farm is operational. These impacts will persist over a relatively long temporal scale while the wind farm is operational, but the EMF decays very quickly with distance from the cable and is anticipated to have a negligible impact on fish species (Snyder et al., 2019). Therefore, EMF from the project will not affect the Reference Areas. Conversely, noise from offshore construction and High-Resolution Geophysical (HRG) surveys are a transient impact that occurs across a relatively large spatial scale. While the hearing capabilities of fish depend upon their physiology (Popper et al., 2014; Appendix C), the current guidelines are applied to all species of fish equally and use 150 dβ re 1 μPa as the behavioral threshold (Stadler and Woodbury, 2009). A paucity of experimental data has precluded the establishment of behavioral thresholds for invertebrates (Stadler and Woodbury, 2009). The sound levels associated with foundation installation will depend on several factors; including but not limited to the diameter of the pile, the type of hammer used, the hammer energy, the temperature of the water, and the noise attenuation techniques that are used. Therefore, the Reference Areas are well outside of the direct influence of the proposed activities, with the possible exception of pile-driving noise, which may have the potential to affect fish behavior at the Reference Areas during a brief time period when the foundations are being installed.

Within each area, fishable gillnet lines will be determined through consultation with the participating fishermen and an examination of geophysical survey data. Five gillnet lines per area will be randomly selected for each sampling event, resulting in 15 gillnet strings conducted per sampling event. The five gillnet strings per area are subsamples and catches will be averaged to estimate the CPUE per area per sampling event, which will be used in analyses. This sample size was chosen to minimize sampling error for the mean within each area, while considering practical constraints, such as the need to reduce the potential for interactions with protected species, and also avoid gear conflicts with active fisheries that occur in the Project Area and the Reference Areas. The location of gillnets may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for setting gillnets it may be moved based on the captain’s professional judgement. Sample sizes and sampling strategies may be subsequently modified following data evaluation from the data collected through 2021, including the results of a mid-study power analysis using observed estimates of variance (Section 2.7), however the overall survey design will remain unchanged.

Gillnet sampling will occur each spring and fall, as the gillnets will be sampled twice per month from April-June and again from October-December, which coincides with the majority of commercial gillnet activity as monkfish and skates migrate through the area in spring and fall. The pre-construction monitoring is expected to begin in April 2021 and will continue through December 2022. Sampling in July-September will not occur in order to minimize interactions with protected species (e.g., large whales, sea turtles) and to reduce the likelihood of gear damage that can occur during the seasonal migration of spiny dogfish and larger shark species through the area. Based on feedback from local fishermen, efforts will be made to maintain spatial separation between the gillnet and ventless trap survey gears. Fishermen have expressed concern that dead fish in the gillnets may attract lobster away from the survey traps. Therefore, efforts will be made to avoid setting the survey gillnets near the survey lobster traps, during the months that those surveys are both occurring (May, June, October, and November).

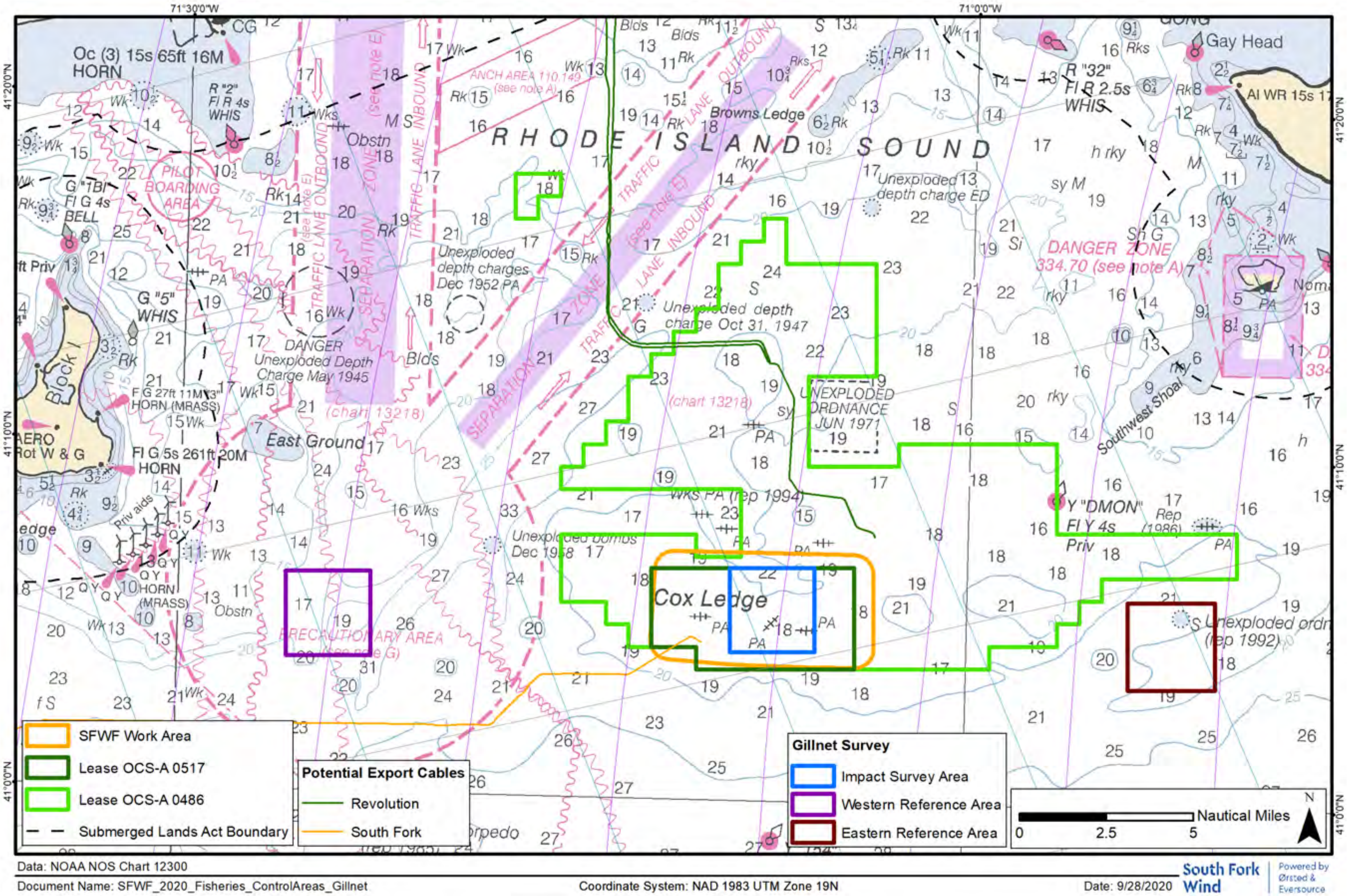

Figure 3. **Northeast lease areas including the South Fork Wind Farm with Gillnet Survey Areas.**

2.3 Gillnet Methods

A gillnet is a wall of netting that hangs in the water column and is typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. Factors that can influence the catch rate of gillnets for target species include: fish density in the vicinity of gears, the behavior of the target species, the ability of fish to detect and locate the gillnet, and environmental factors such as water temperature, visibility, current direction, and velocity. This survey will use standardized fishing gear and sampling strategies across time and space to standardize catch rates to the extent possible. However, comparison of this gillnet survey data to other pre-construction fishery independent sampling efforts (e.g., nearby federal Northeast Area Monitoring and Assessment Program [NEAMAP]and NEFSC bottom trawl survey stations) may be limited due to the differences in the selectivity and catch rates of the disparate gear types.

The gillnet survey may be conducted using gillnets that are typical of the commercial fishery in Rhode Island and Massachusetts. Each gillnet string will consist of six, 300-ft net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs. After much deliberation and discussion with stakeholders, a decision was made to limit the gillnet survey to a single mesh size of 12-inches to target monkfish and skates of commercial sizes. While it was recognized that deploying experimental gillnets with multiple mesh sizes could potentially sample a wider range of species and size classes, this would also necessitate deploying more strings of gillnets, which may have increased the potential for protected species interactions. Further, given the small spatial extent of the Project Area, we were concerned that deploying additional gillnet strings would lead to increases in gear interactions with other user groups in the area. Therefore, the decision was made to utilize a single mesh size of 12-inches, with the primary objective to monitor changes in the relative abundance of monkfish and winter skate in the Project Area and the Reference Areas.

The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), to minimize depredation of catch, and to improve the logistics of the survey. Soak time will remain consistent throughout the duration of the survey, to the extent practicable. Each sampling event will be managed by a team of qualified scientists including a lead scientist with experience performing fisheries research. The catch will be removed from the gillnets by the boat crew for processing. The lead scientist will be responsible for collection of data and data recording.

Fish collected in each gillnet will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. 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 that may be employed are adapted from 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 will be dependent upon the volume and species diversity of the catch. Scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species. Taxonomic guides include *NOAA's Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), *Bigelow and Schroeder's Fishes of the Gulf of Maine* (Collette and Klein-MacPhee, 2002), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas*, and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The catch will be sorted by species, and size categories (if appropriate) until the lead scientist verifies that the sorting areas are clear of all specimens. The following information will be collected for each gillnet string that is sampled; abundance and biomass for each species that is captured and length and weight measurements for individual fish belonging to the dominant species and vulnerable (e.g., Atlantic sturgeon) species present in the catch. Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size class will be measured (+/- 0.5 cm) from each gillnet string that is sampled, and the rest counted. A subsample of these individuals will also be weighed (+/- 0.5 g) on a motion compensating marine scale, to evaluate individual fish condition. Individual lengths and weights are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes with the exceptions of the following measurements for particular species: rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), and squids (mantle length). The catch from the gillnet survey will not be retained for sale by the participating vessels, and all animals will be returned to the water as quickly as possible once the sampling is completed.

Stomach content analysis will be performed for commercially important focal species (monkfish, winter skate, gadids, black sea bass) to determine the composition of their prey, and evaluate whether prey composition changes prior to and after construction. Up to 10 animals will be sacrificed for stomach content analyses from each string that is sampled, with no more than 5 individuals of any one species sampled from each string. Each fish sampled for stomach content analysis will be measured (+/- 0.5 cm) and weighed (+/- 0.5 g) individually before the stomach is removed to permit assessment of relative condition. All prey items will be identified to the lowest possible identification level (LPIL), counted, and weighed.

Atlantic cod are known to spawn on or near Cox Ledge (Zemeckis et al., 2014; Cadrin et al., 2020). Sex and reproductive stage will be assessed for the cod sacrificed for stomach sampling according to the protocols used for the 2018 and 2019 SFWF Atlantic Cod Spawning Survey (adapted from Burnett et al. [1989] and O'Brien et al. [1993]). Up to five cod may be sampled per string for sex and maturity and stomach contents. Maturity data from this sampling may be shared with local researchers to better understand the timing and distribution of cod spawning activity in Southern New England.

Should any interactions with protected species (e.g., marine mammals, sea birds, sea turtles) occur, the contracted scientists will follow the sampling protocols described for At-Sea Monitors (ASM) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016). Protected species interactions will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office (incidental.take@noaa.gov) within 24 hours that includes the following information; date, time, area, gear, species, and animal condition and activity. The following protocol will also be followed:

- If a marine mammal take occurs, the entire animal will be retained as time and space allow. However, if there is insufficient space on board the vessel, the minimum sampling requirements described for at-sea monitors will be met.

- If any interactions with Atlantic sturgeon or shortnose sturgeon occur, the contracted scientists will follow the sampling protocols described for the Northeast Fisheries Observer Program (NEFOP) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016), which includes collecting a genetic sample and scanning the animal for a PIT tag. Interactions with sturgeon will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 24 hours.

- If an Atlantic sturgeon or shortnose sturgeon carcass is retained, we will contact Fred Wenzel at the Northeast Fisheries Science Center. Any biological data collected during sampling of protected species will be shared as part of the written report that is submitted to the NMFS Greater Atlantic Regional Fisheries Office.
- Sightings of right whales, and observations of dead marine mammals and sea turtles in the water will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 48 hours.
- Sea birds will be sampled following the protocols outlined by the Northeast Fisheries Science Center (2016) and if a dead seabird is encountered, any 'dead, fresh' animals will be retained and provided to the US Fish and Wildlife Service for additional sampling.
- Due to the potential for communicable diseases all physical sampling and handling of marine mammals and seabirds will be limited to the extent Ørsted health and safety assessments and plans allow.

2.4 Environmental Data

Hydrographic data will be collected at each gillnet sampling location. A Conductivity Temperature Depth (CTD) sensor will be used to sample a vertical profile of the water column at each gillnet sampling location, following the methods used by the CFRF/WHOI Shelf Research Fleet (Gawarkiewicz and Malek Mercer, 2019). The CTD profile may be collected prior to the string being hauled, or after the string has been hauled, at the discretion of the chief scientist. Bottom water temperature (degrees C) will be recorded at regular intervals (e.g., every 30 seconds) throughout the duration of each gillnet set using a temperature logger mounted on the first panel in each string. Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

2.5 Gillnet Station Data

The following data will be collected during each sampling effort:

- Station number;
- Latitude and longitude;
- Soak start and end time and date;
- Water depth;
- Wind speed;
- Wind direction;
- Wave height;
- Air temperature ; and
- Vertical CTD profile, and continuous observations of bottom temperature while the gear is fishing (*See* Section 2.4).

2.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) will be verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

2.7 Data Analysis

The study will use an asymmetrical BACI experimental design, with statistical evaluation of the differences between reference and Project Areas contrasted in the before and after construction time periods (Underwood, 1994; Smith, 2002). A BACI design will allow for assessment of shifts in fish presence/absence, or relative abundance that correlate with proposed construction and operations at the SFWF site.

Results presented in annual reports will focus on comparing the fish communities in the Project and the Reference Areas to describe spatial and seasonal differences in relative abundance, species composition, and size distribution. For the dominant species in the catch, seasonal catch per unit effort (CPUE) will be compared among the three areas using graphics and descriptive statistics (e.g., mean and variance) and length frequency data by species will be compared among areas using descriptive statistics, graphical techniques (empirical cumulative distribution function [ECDF] plots), and appropriate statistical tests (e.g., the Kolmogorov-Smirnoff test). Species composition will be compared amongst the Project and Reference Areas using a Bray-Curtis Index and multivariate techniques (e.g., nMDS and ANOSIM).

Analysis presented in the final synthesis report will focus on identifying changes in the fish community in the Project Area between pre- and post- construction that did not also occur at the Reference Areas that could be attributed to either construction or operation of the wind turbines (Table 1). With regard to measuring for changes in relative abundance, the research question is to estimate the magnitude of the difference in the temporal changes in relative abundance for winter skate and monkfish observed between the Project and Reference Areas. The null hypothesis is that changes in CPUE (relative abundance) for monkfish and winter skate in both the Reference and Impact Areas will be statistically indistinguishable over time. The alternative hypothesis is that changes in CPUE will not be the same at the Reference and Impact Areas over time (two-tailed). Generalized Linear Models (GLMs) will be used to describe the data and estimate the 90% Confidence Interval (CI) on the BACI contrast. The interaction contrast that will be tested is the difference between the temporal change (i.e., average over the post-construction period minus the average over the pre-operation period) at the windfarm and the average temporal change at the Reference Areas. A statistically significant impact would be indicated by a 90% CI for the estimated interaction contrast that excludes zero. Using a 90% CI allows 95% confidence statements for the lower or upper bound (e.g., if the lower bound of the 90% CI for the mean is greater than 0, this indicates 95% confidence that the mean exceeds 0).

For diet data, the primary question that will be asked is whether the prey composition of monkfish, winter skate, and other focal species changes following the construction of the wind farm. The null hypothesis is that changes in diet between the Impact and Reference Areas are statistically indistinguishable over time. Monthly diet data for focal species will be obtained from stomach contents, and prey composition will be calculated separately for each species as the mean proportional contribution (W_k) of each prey item (Buckel et al. 1999a; Bonzek et al. 2008) by month and area, where:

$$\%W_k = \frac{\sum_{i=1}^{n} M_i q_{ik}}{\sum_{i=1}^{n} M_i} * 100$$

$$q_{ik} = \frac{w_{ik}}{w_i},$$

and where

n is the total number of gillnet strings that collected the fish species of interest,

M_i is the sample size (counts) of that predator species in the gillnet string i,

w_i is the total weight of all prey items in the stomachs of all fish analyzed from gillnet string i, and

w_{ik} is the total weight of prey type k in these stomachs.

Potential seasonal differences in prey composition will be explored for each focal species using multivariate techniques (e.g., nMDS, ANOSIM, and SIMPER). A stomach fullness index (FI) will be calculated for each fish analyzed. The difference between full and empty stomach weights will be determined to obtain the total weight of food (FW). The ingested food weight (FW) is expressed as a percentage of the total fish weight according to a formula defined by Hureau (1969) as cited by Ouakka et al. 2017.

$$FI = FW / \text{fish weight} \times 100$$

More detailed or appropriate analyses may be included as the Project progresses. Data analysis will be executed in accordance with the BOEM fishery guidelines.

Table 1. Summary of planned data analysis for the gillnet survey.

Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
1 Impact, 2 Reference areas; 2 years Before Construction and ≥2 years After Operation; April-June and October-December (2x per month); 48-hour soak time.	**Sampling frame** = SFW and Reference areas of similar habitat and size. **Observational unit** = day-area (gillnet strings randomized each sampling event; individual strings are subsamples of day-area estimate) **Response variable** = mean catch per day-area. **Error variance** = temporal	**Catch of key species (monkfish, and winter skate)**	What is the magnitude of the difference in the temporal changes in the observed metric between SFW and reference areas?	Fit the GLM or GAM that best describes the data; estimate the 90% CI on the BACI contrast.
	Observational unit = individual fish **Response variables** = % contribution (by weight) of each species contributing to total diet/stomach contents. **Error variance** = among individual fish	**Diet (prey) composition** for key species (e.g., monkfish, winter skate, gadids, black sea bass)	How does diet composition change over time (B/A), or between areas (C/I)?	Bray-Curtis similarity between individual fish; ANOSIM to identify whether significant differences exist between fish from different seasons, years, or locations. Relationships graphically depicted with nMDS.
	Observational unit = individual fish/invertebrate **Response variable** = length **Error variance** = among individual fish/invertebrates	**Length frequency**	How does size structure change over time (B/A)? How does size structure compare between areas (C/I)?	1. descriptive (range, mean) 2. graphical and statistical comparison (between times and locations) of ECDFs using distributional comparison test (e.g., Kolmogorov-Smirnoff).
	Observational unit = individual fish **Response variable** = condition index **Error variance** = among individual fish	**Fish condition index** (i.e., deviations from log-length vs log-weight relationship) by species	What is the magnitude of change in fish condition over time (B/A), or between areas (C/I)?	Find the best fitting model to the condition values by species, and calculate 90% CI of the relevant contrasts.

Definitions:

BAG = before after gradient

90% CI = 90% confidence interval

ECDF = empirical cumulative distribution function

The SFW project team is not aware of any existing fishery-independent gillnet data sets from the region that could be used to perform a power analysis. Therefore, an adaptive sampling strategy is proposed. Upon completion of sampling in 2021, and again following sampling in 2022, a power analysis will be conducted to evaluate the power of the sampling design. The power analysis will be conducted using an approach similar to what was performed for the ventless trap survey (*see* Appendix D). The variance (e.g., RSE) associated with the relative abundance estimates for winter skates and monkfish will be calculated. Power curves will be used to demonstrate how statistical power varies as a function of effect size and sample size (i.e., number of gillnet samples per area). When analyzing changes in the relative abundance of monkfish and winter skate, we will aim to achieve a statistical power of at least 0.8, which is generally considered to be the standard for scientific monitoring (Cohen, 1992). This ensures that the monitoring will have a probability of at least 80% of detecting an effect that is present. A single two-tailed alpha (0.10) will be evaluated during the power analysis. There is a direct relationship between the magnitude of the effect size and the statistical power of the analysis, with greater power associated with larger effect sizes.

The results of the power analysis will be considered and can be used to modify the monitoring protocols in subsequent years. The decision to modify sampling will be made after evaluating several criteria including the amount of variability in the data, the statistical power associated with the study design, and the practical implications of modifying the monitoring protocols. For example, if the analysis demonstrates that the proposed sampling will not achieve the desired level of statistical power, sampling intensity may need to be increased, which could be achieved throughout the duration of the study by adding random sampling stations to the Reference and Impact Areas, by sampling the existing stations more often each month (e.g., three monthly samples, rather than two), or by increasing the duration of the post-construction monitoring.

3.0 Demersal Fisheries Resources Survey – Beam Trawl

Experienced local fishermen report that sections of the Project Area allow for data collection via beam trawl, as beam trawls are smaller and more maneuverable than otter trawls (R. Sykes, pers. comm.). Previous studies have used beam trawls to sample in the vicinity of the Project Area and beam trawls have proven to be an effective gear for sampling demersal species, including juveniles (Malek, 2015; Walsh and Guida, 2017). Based on the data collected by Malek (2015), the beam trawl survey is expected to capture a range of demersal fish and benthic invertebrates that are common to the waters of New England and the mid-Atlantic including sea scallops, summer flounder, windowpane flounder, winter flounder, fourspot flounder, winter skate, little skate, lobster, Jonah crabs, rock crabs, and silver hake.

The beam trawl survey will collect pre- and post-construction data on distribution, abundance and community composition, with a focus on demersal fish and macroinvertebrates species. The primary objective of the beam trawl survey is to evaluate whether the construction and operational activities associated with the Project lead to a significant change in the relative abundance of demersal fish and invertebrates within the Project Area relative to the Reference Areas.

At least two years of sampling (i.e., 24 monthly sampling trips) will be conducted prior to the commencement of offshore construction. The pre-construction monitoring is scheduled to begin in October, 2020. Similarly, a minimum of two years of monitoring will be completed following offshore construction, but the duration of post-construction monitoring will also be informed by ongoing guidance for offshore wind monitoring that is being developed cooperatively through the Responsible Offshore Science Alliance (ROSA).

3.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. Two commercial vessels were selected based on criteria such as experience using a beam trawl, safety record, knowledge of the area, and cost. One vessel will serve as the primary survey vessel, and the other will be used as an alternate. The scientific contractor has applied for an Exempted Fishing Permit (EFP) from NOAA Fisheries in order to use the hired fishing vessel as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

3.2 Proposed Sampling Stations

As described for the gillnet survey (Section 2.2), an asymmetrical BACI design is proposed for the beam trawl survey to sample within three areas: one survey area within the SFWF Project Area (Figure 4) and two Reference Areas. The Reference Areas were initially identified in 2019, using the same data and process that was described for the gillnet survey (Section 2.2). Due to the complex bathymetry (e.g., hangs and boulders) present in the Project Area and the Reference Areas, a beam trawl survey would be difficult to execute safely using a simple random design. Conversations with fishermen indicate that there is a limited amount of benthic habitat that can be sampled safely and effectively within each area using a beam trawl. Therefore, in lieu of a simple random design, the input of commercial fishermen with experience fishing in these area, and detailed geophysical seafloor survey data, will be used to generate a map of tow tracks that can be safely sampled within the Project Area, and the two Reference Areas. From this map of potential tow tracks, random sampling locations will be selected during each sampling event.

Sampling will occur once per month within the Project and Reference Areas. During each sampling event, three beam trawl lines will be randomly selected from the universe of possible sampling locations in each area, resulting in nine beam trawls conducted per monthly sampling event (*see* Appendix B). This sample size was chosen to provide adequate replication within each area, while considering practical constraints, such as the need to avoid gear conflicts with active fisheries that occur in the Project and Reference Areas, and practical consideration of the amount of sampling that can be accomplished in a day at sea. Sample sizes and sampling strategies may be subsequently modified following the results of a mid-study power analysis (Section 3.7), however the overall sampling design will remain unchanged. During any given sampling event, the location of beam trawl sampling stations may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for beam trawling it may be moved based on the captain's professional judgement. In this instance an alternate trawling location will be chosen at random from the universe of potential sampling locations within that area.

The fishermen participating in the beam trawl survey provided feedback on the Reference Areas in July 2020. Their feedback indicated that fixed gear and 'broken bottom' is prevalent in portions of the eastern Reference Area that was initially identified in 2019. Based on this feedback, the eastern Reference Area was moved slightly to the north, in order to minimize interactions with fixed gear and broken bottom that may cause operational constraints and safety issues during the beam trawl survey (Figure 4).

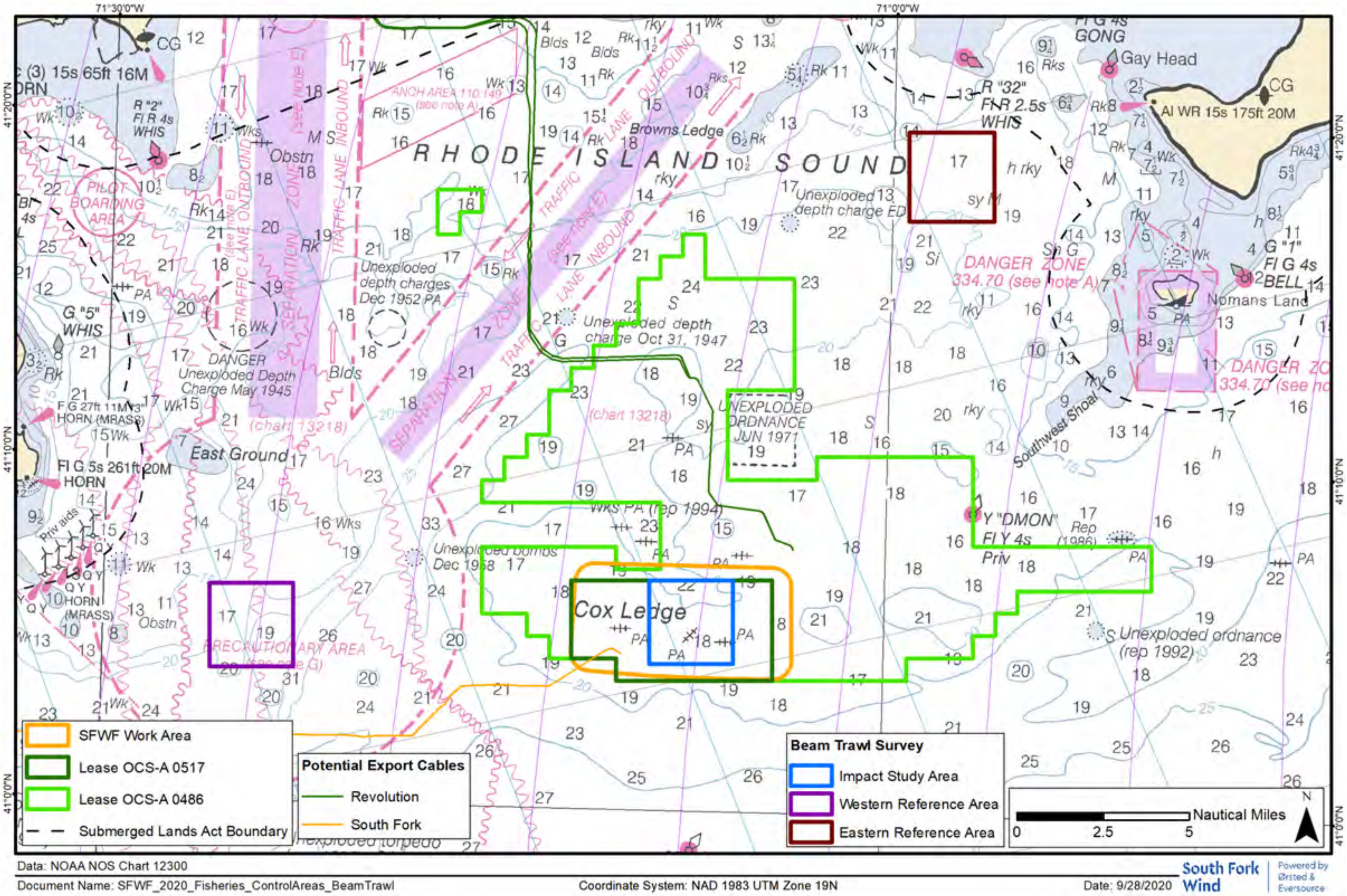

Figure 4. **Northeast lease areas including the South Fork Wind Farm with Beam Trawl Survey Areas.**

3.3 Beam Trawl Methods

Beam trawling will be conducted monthly by a commercial fishing vessel using a 3-m beam trawl, with a cod-end of double 4.75 inch mesh and a 1-inch (2.54-cm) knotless cod end liner (or similar; equivalent to NEAMAP cod end) to ensure retention of the smaller fish (Malek, 2015). A single vessel has been selected as the primary sampling vessel for the survey, and it is planned that this vessel will complete all of the sampling trips. However, an additional vessel has been identified as an alternate, and will be used if problems with the primary vessel preclude it from sampling in a given month. Rock chains will be fitted across the mouth of the beam trawl to prevent larger rocks from entering and damaging the catch or net. Once on station, the crew of the vessel lowers the net into the water fully and allows it to drag behind the boat. When the gear is fully deployed and the winch brakes are set, and the start coordinates, start time, date, tow direction, water depth, and tow speed are recorded. Upon completion of the tow, the end time and coordinates are recorded. At the outset of the survey a target towing speed of 4.0 knots and tow duration of 20 minutes will be used, based on the protocols described by Malek (2015). However, the tow speed and duration may be modified based on feedback received from the captain and scientific crew after initial sampling trips have been completed. The catch from the beam trawl survey will not be retained for sale by the participating vessels, and all animals will be returned to the water as quickly as possible once the sampling is completed.

Fish collected in each tow will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. In the case of larger catches, one or multiple subsampling procedures may be used. Subsampling protocols for the beam trawl are adapted from the subsampling procedures of the NEAMAP survey 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 will be dependent upon the volume and species diversity of the catch and will be determined at the discretion of the chief scientist. The scientists will sort and identify fish, and weigh each species according to the following protocol:

All organisms will be identified to species including fish and mega-invertebrates such as sea scallops, squid, lobsters, *Cancer* spp. crabs, sand dollars, and urchins. Taxonomic guides include NOAA's *Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), *Bigelow and Schroeder's Fishes of the Gulf of Maine* (Collette and Klein-MacPhee, 2002), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas* and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The catch will be sorted by species. In the case of large catches with a range of size classes, the catch may be sorted by relative size categories within each species. The use of size categories is to ensure that all sizes are equally represented in the data if subsampling is used. The chief biologist will determine the categories and approximate length ranges to be used for each species.

The following data elements will be recorded for each tow: total biomass and total number of organisms caught, number and biomass caught for each species, species diversity, and length for dominant species and vulnerable species (e.g., Atlantic sturgeon, thorny skate). Notwithstanding sub-sampling procedures, up to 50 individuals of each species (and size category) are measured and the rest counted. Individual lengths (+/- 0.5 cm) are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), sea scallops (shell height), and squids (mantle length). Miscellaneous invertebrates (e.g., worms, hermit crabs, snails) will be counted but not measured.

Stomach content analysis will be performed for commercially important species (monkfish, winter skate, winter flounder, gadids) to determine the prey composition for these species during the pre-construction period. Up to 10 animals will be sacrificed for stomach content analyses from each tow that is sampled, with no more than 5 individuals of any one species sampled from each tow. Each fish sampled for stomach content analysis will be measured (+/- 0.5 cm) and weighed (+/- 0.5 g) individually before the stomach is removed to permit assessment of relative condition. All prey items will be identified to the LPIL, counted, and weighed. Atlantic cod are known to spawn on or near Cox Ledge (Zemeckis et al., 2014, Cadrin et al., 2020; Inspire Environmental, 2020). Sex and reproductive stage will be assessed for the cod sacrificed for stomach sampling according to the protocols used for the 2018 and 2019 SFWF Atlantic Cod Spawning Survey (adapted from Burnett et al. [1989] and O'Brien et al. [1993]). Up to five cod may be sampled per tow for sex and maturity and stomach contents. Maturity data from this sampling may be shared with local researchers to better understand the timing and distribution of cod spawning activity in Southern New England.

Should any interactions with protected species (e.g., marine mammals, sea birds, sea turtles) occur, the contracted scientists will follow the sampling protocols described for At-Sea Monitors (ASM) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016). Protected species interactions will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office (incidental.take@noaa.gov) within 24 hours that includes the following information; date, time, area, gear, species, and animal condition and activity. The following protocol will also be followed:

- If a marine mammal take occurs, the entire animal will be retained as time and space allow. However, if there is insufficient space on board the vessel, the minimum sampling requirements described for at-sea monitors will be met.

- If any interactions with Atlantic sturgeon or shortnose sturgeon occur, the contracted scientists will follow the sampling protocols described for the Northeast Fisheries Observer Program (NEFOP) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016), which includes collecting a genetic sample and scanning the animal for a PIT tag.

- Interactions with sturgeon will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 24 hours.

- If an Atlantic sturgeon or shortnose sturgeon carcass is retained, we will contact Fred Wenzel at the Northeast Fisheries Science Center. Any biological data collected during sampling of protected species will be shared as part of the written report that is submitted to the NMFS Greater Atlantic Regional Fisheries Office.

- Sightings of right whales, and observations of dead marine mammals and sea turtles in the water will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 48 hours.

- Sea birds will be sampled following the protocols outlined by the Northeast Fisheries Science Center (2016) and if a dead seabird is encountered, any 'dead, fresh' animals will be retained and provided to the US Fish and Wildlife Service for additional sampling.

- Due to the potential for communicable diseases all physical sampling and handling of marine mammals and seabirds will be limited to the extent Ørsted health and safety assessments and plans allow.

3.4 Environmental Data Collection

Hydrographic data will be collected at each beam trawl sampling location. A Conductivity Temperature Depth (CTD) sensor will be used to sample a vertical profile of the water column at each beam trawl sampling location. The chief scientist will have discretion to decide whether the CTD profile is collected prior to the start of the tow, or at the conclusion of the tow. Bottom water temperature (degrees C) will be recorded at regular intervals (e.g., every 30 seconds) throughout the duration of each beam trawl tow using a temperature logger mounted to the frame of the beam trawl. Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

3.5 Station Data

The following data will be collected during each sampling effort:

- Station number;
- Start latitude and longitude;
- Start time and date;
- Start water depth;
- Tow direction;
- Tow speed;
- Tow duration;
- End latitude and longitude;
- End time and date;
- Wind speed;
- Wind direction;
- Wave height; and
- Air temperature

Vertical CTD profile, and continuous observations of bottom temperature while the gear is fishing (*see* Section 3.4)

3.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

3.7 Data Analysis

The study will use an asymmetrical BACI experimental design, with statistical evaluation of the differences between reference and Project Areas contrasted in the before and after construction time periods (Underwood, 1994; Smith, 2002). A BACI design will allow for assessment of changes in relative abundance that correlate with proposed construction and operations at the SFWF site.

Results presented in annual reports will focus on comparing the fish and invertebrate communities in the Project Area and the Reference Areas to describe spatial and seasonal differences in relative abundance, species composition, and size distribution. For the dominant species in the catch, seasonal catch per unit effort (CPUE) will be compared among the three areas using graphics and descriptive statistics (e.g., mean and variance). Length frequency data by species will be compared among areas using descriptive statistics, graphical techniques (empirical cumulative distribution function [ECDF] plots), and appropriate statistical tests (e.g., the Kolmogorov-Smirnoff test). Species composition will be compared amongst the Project and Reference Areas using a Bray-Curtis Index and multivariate techniques (e.g., nMDS and ANOSIM).

Analysis presented in the final synthesis report will focus on identifying changes in the fish community in the Project Area between pre- and post- construction that did not also occur at the Reference Areas that could be attributed to either construction or operation of the wind turbines (Table 2). With regard to measuring for changes in relative abundance, the primary research question is to estimate the magnitude of the difference in the temporal changes in relative abundance for the dominant species in the catch observed between the Project and Reference Areas. The null hypothesis is that changes in CPUE (relative abundance) for the dominant species in both the Impact and Reference Areas will be statistically indistinguishable over time. The alternative hypothesis is that changes in CPUE will not be the same at the Impact and Reference Areas over time (two-tailed). Generalized Linear Models (GLMs) will be used to describe the data and estimate the 90% Confidence Interval (CI) on the BACI contrast. The interaction contrast that will be tested is the difference between the temporal change (i.e., average over the post-construction period minus the average over the pre-operation period) at the windfarm and the average temporal change at the Reference Areas. A statistically significant impact would be indicated by a 90% CI for the estimated interaction contrast that excludes zero. Using a 90% CI allows 95% confidence statements for the lower or upper bound (e.g., if the lower bound of the 90% CI for the mean is greater than 0, this indicates 95% confidence that the mean exceeds 0).

For the diet data, the primary question to be asked is whether the construction of the wind farm leads to changes in the diet composition of focal species. The null hypothesis is that changes in diet between the Reference and Impact Areas are statistically indistinguishable over time for the species that are sampled. Monthly diet data for focal species will be obtained from stomach contents, and prey composition will be calculated separately for each species as the mean proportional contribution (W_k) of each prey item (Buckel et al. 1999a; Bonzek et al. 2008) by month and area, where:

$$\%W_k = \frac{\sum_{i=1}^{n} M_i q_{ik}}{\sum_{i=1}^{n} M_i} * 100$$

$$q_{ik} = \frac{w_{ik}}{w_i},$$

and where

n is the total number of beam trawls that collected the fish species of interest,

M_i is the sample size (counts) of that predator species in beam trawl *i*,

w_i is the total weight of all prey items in the stomachs of all fish analyzed from beam trawl *i*, and

w_{ik} is the total weight of prey type *k* in these stomachs.

Potential seasonal differences in prey composition may also be explored for each focal species using multivariate techniques (e.g., nMDS, ANOSIM, and SIMPER). A stomach fullness index (FI) will be calculated for each fish analyzed. The difference between full and empty stomach weights will be determined to obtain the total weight of food (FW). The ingested food weight (FW) is expressed as a percentage of the total fish weight according to a formula defined by Hureau (1969) as cited by Ouakka et al. 2017.

FI = FW / fish weight x 100

Species composition will also be compared between the Before and After periods to determine if the construction and operation of the wind farm had any impacts on the species that are present in the area. Species composition will be compared before and after construction using a Bray-Curtis Index and multivariate techniques (e.g., ANOSIM). Additional data analyses will be performed as appropriate based on the nature of the data that are collected (i.e., normality).

Table 2. Summary of planned analyses for the beam trawl survey.

Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
1 Impact, 2 Reference areas; 2 years Before Construction and ≥2 years After Operation; January-December (1x per month)	**Sampling frame** = SFW and Reference areas of similar habitat and size. **Observational unit** = day-area (trawl lines randomized each sampling event; individual trawls are subsamples of day-area estimate). **Response variable** = mean catch per day-area. **Error variance** = temporal	**Catch of dominant and commercially important species**	What is the magnitude of the difference in the temporal changes in the observed metric between SFW and reference areas?	Fit the GLM or GAM that best describes the data; estimate the 90% CI on the BACI contrast.
	Observational unit = sampling event. **Response variables** = average abundance of each species. **Error variance** = among sampling events	**Species assemblage composition**	How does species composition change over time (B/A), or between areas (C/I)?	Bray-Curtis similarity between sampling events; ANOSIM to identify whether significant differences exist between events from different seasons, years, or locations. Relationships graphically depicted with nMDS.
	Observational unit = individual fish. **Response variables** = % contribution (by weight) of each species contributing to total diet/stomach contents. **Error variance** = among individual	**Diet (prey) composition** for key species (e.g., monkfish, winter skate, gadids, black sea bass)	How does diet composition change over time (B/A), or between areas (C/I)?	Bray-Curtis similarity between individual fish; ANOSIM to identify whether significant differences exist between fish from different seasons, years, or locations. Relationships graphically depicted with nMDS.
	Observational unit = individual fish/invertebrate. **Response variable** = length. **Error variance** = among individual fish/invertebrates	**Length frequency**	How does size structure change over time (B/A)? How does size structure compare between areas (C/I)?	1. descriptive (range, mean) 2. graphical and statistical comparison (between times and locations) of ECDFs using distributional comparison test (e.g., Kolmogorov-Smirnoff).
	Observational unit = individual fish. **Response variable** = condition index. **Error variance** = among individual fish	**Fish condition index** (i.e., deviations from log-length vs log-weight relationship) by species	What is the magnitude of change in fish condition over time (B/A), or between areas (C/I)?	Find the best fitting model to the condition values by species, and calculate 90% CI of the relevant contrasts.

Definitions:
90% CI = 90% confidence interval
ECDF = empirical cumulative distribution function
nMDS = non-parametric Multidimensional Scaling
ANOSIM = Analysis of Similarities

A power analysis was conducted using data from Malek (2015). These data provided approximate estimates of spatial variability in total abundance among independent tows, but the level of replication over time was insufficient to estimate temporal variability at the scale needed for the power analysis (Appendix B). Therefore, an adaptive sampling strategy will be employed. Upon completion of sampling in 2021, and again following sampling in 2022, a power analysis will be conducted to evaluate the power of the sampling design. The power analysis will be conducted using an approach similar to what was performed for the ventless trap survey (Appendix D). The variance (e.g., RSE) associated with the relative abundance estimates for dominant species in the catch will be calculated. Power curves will be used to demonstrate how statistical power varies as a function of effect size and sample size (i.e., number of beam trawl samples per area). When analyzing changes in the relative abundance of dominant species in the catch, we will aim to attain a statistical power of at least 0.8 to ensure that the monitoring will have a probability of at least 80% of detecting an effect that is present. A single two-tailed alpha (0.10) will be evaluated during the power analysis. There is a direct relationship between the magnitude of the effect size and the statistical power of the analysis, with greater power associated with larger effect sizes.

The results of the power analysis will be considered and can be used to modify the monitoring protocols in subsequent years. The decision to modify sampling will be made after evaluating several criteria including the amount of variability in the data, the statistical power associated with the study design, and the practical implications of modifying the monitoring protocols. For example, if the analysis demonstrates that the proposed sampling will not achieve the desired level of statistical power, sampling intensity may need to be increased, which could be achieved throughout the duration of the study by adding random sampling stations to the Reference and Impact areas, by sampling the existing stations more often each month (e.g., two monthly sampling events, rather than one), or by increasing the duration of the post-construction monitoring.

4.0 Demersal Fisheries Resources Survey – Ventless Trap, Lobster

Lobster and Jonah crab are targeted by fishermen in New England and the Mid-Atlantic and are managed by the Atlantic States Marine Fisheries Commission (ASMFC). Based on recommendations from BOEM's renewable energy fishery guidelines (BOEM, 2013) and stakeholders, this survey will quantify pre-construction data for lobster in the SFWF site (McCann, 2012; Petruny-Parker et al., 2015, MADMF, 2018) such that changes in the resource due to construction and operation of the wind farm can be evaluated. A BACI ventless trap survey will be conducted to collect pre- and post-construction data on lobster and crab resources in the proposed Project Area. The objective of the pre-construction monitoring is to evaluate the spatial and seasonal patterns of relative abundance of lobster, Jonah crab and rock crab in the Project Area and in the Reference Areas. In addition, the proposed study will classify the demographics of lobsters, Jonah crabs, and rock crabs, including size structure, sex ratios, reproductive status, and shell disease. Monitoring will continue after construction to quantify the magnitude of potential changes that may occur to the relative abundance and demographics of lobsters and crabs before and after construction.

At least two years of sampling (i.e., 14 semi-monthly sampling events) will be conducted prior to the commencement of offshore construction. The pre-construction monitoring is expected to commence in May, 2021. Similarly, a minimum of two years of monitoring will be completed following offshore construction, but the duration of post-construction monitoring will also be informed by ongoing guidance for offshore wind monitoring that is being developed cooperatively through the Responsible Offshore Science Alliance (ROSA).

4.1 Survey Design/Procedures

The sampling protocol proposed here is informed by the methods used by the Atlantic States Marine Fisheries Commission (ASMFC) and other regional groups to monitor lobster and crab resources in the region (Wahle et al., 2004; O'Donnell et al., 2007; Geraldi et al., 2009; Collie and King, 2016). While the current survey is focused upon SFWF, we also plan to conduct similar ventless trap monitoring at the adjacent Revolution lease area. Further, as part of an effort to standardize monitoring amongst offshore wind developers, the sampling methodologies proposed here are similar to sampling methods being used at the Vineyard Wind development site. All sampling will occur on commercial lobster vessels that are chartered by Commercial Fisheries Research Foundation and the University of Rhode Island for the survey.

The scientific contractors have applied for an EFP from NOAA Fisheries in order to use the commercial lobster vessels as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Take Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

The requirements described in the Atlantic Large Whale Take Reduction Plan (NOAA, 2018b) for the trap and pot fisheries will be followed. At a minimum, the following measures will be used to avoid interactions between the ventless trap survey and marine mammals, although additional gear modifications can be made at the discretion of NOAA:

- No buoy line will be floating at the surface.
- There will not be wet storage of the gear. All sampling gear will be hauled at least once every 30 days, and all gear will be removed from the water at the end of each sampling season.
- All groundlines will be constructed of sinking line.
- Fishermen contracted to perform the field work will be encouraged to use knot-free buoy lines.
- All buoy line will use weak links that are chosen from the list of NMFS approved gear.
- All buoys will be labeled as research gear, and the scientific permit number will be written on the buoy. All markings on the buoys and buoy lines will be compliant with the regulations. Gear will be marked according to instructions received from the Greater Atlantic Regional Fisheries Office.
- Missing line or trawls will be reported to the NOAA Protected Resources Division as quickly as possible.
- Further modifications to the sampling gear can be made at the discretion of the Greater Atlantic Regional Fisheries Office.

4.2 Sampling Stations

The ventless trap lobster survey will be conducted using an asymmetrical BACI experimental design, with quantitative comparisons made before and after construction and between reference and Project Areas (Underwood, 1994). We collaborated with the scientific contractors and participating fishermen that have been selected to perform the fisheries monitoring to select two Reference Areas for this survey (Figure 5), following the considerations described in Section 2.2. The two Reference Areas that were selected have similar bottom types, benthic habitat, and areal extent as the SFWF site. Data collected at the Reference Areas will serve as a regional index of lobster, rock crab, and Jonah crab abundance in locations outside of the direct influence of the Project.

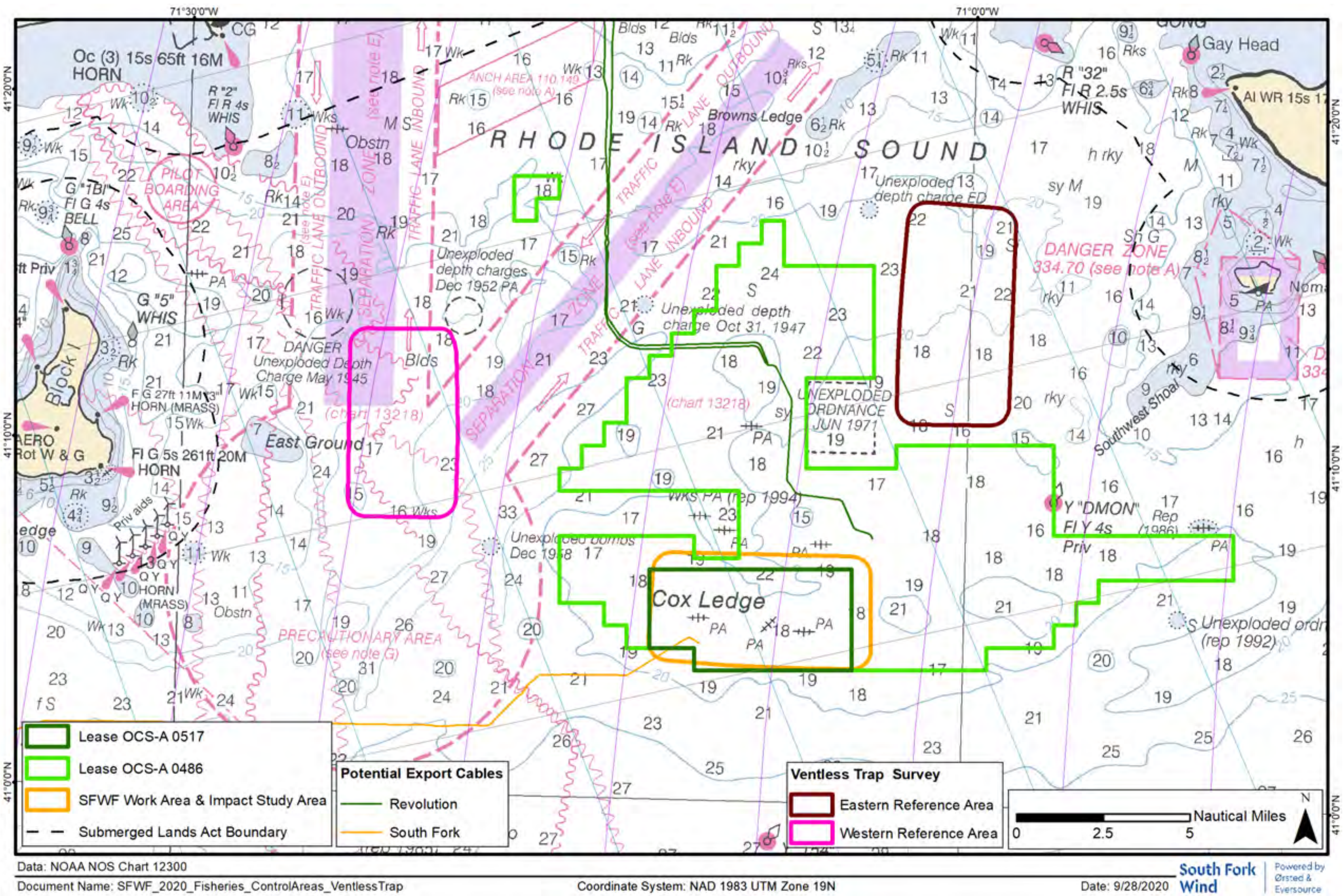

Figure 5. **Northeast lease areas including the South Fork Wind Farm with Ventless Trap Survey Areas.**

Sampling stations in the Project and Reference Areas will be allocated using a spatially balanced random design, with ten trawls (10 traps per trawl) deployed in each of the thee areas during each sampling event. The protocols proposed for the survey as consistent with those used during the Southern New England Cooperative Ventless Trap Survey (SNECVTS; Collie and King, 2016). The Project Area and Reference Areas will each be divided into a series of ten grid cells. Each grid cell will be further divided into aliquots (Figure 6). Through consultation with local industry members, a subset of the aliquots within each grid cell will be identified as suitable sampling sites based on the desire to minimize gear conflicts amongst fishermen in the area. At the beginning of each sampling season, an aliquot will be randomly selected for sampling within each grid cell. An alternative aliquot will also be selected within each grid cell, and the alternative aliquot will be sampled if needed based on local conditions (e.g., to avoid gear conflicts).

To achieve consistency with the ASMFC and SNECVTS protocols, the stations will be selected randomly at the start of each year of sampling, and the sampling locations will remain fixed for the remainder of the year. This sampling approach keeps the station occupied, reduces time spent moving traps between locations, and is generally similar to the routine operations of lobstermen in the region. To minimize gear interactions with other user groups in these areas, the lead scientist will work with the captain to ensure that the gear is set in accordance with local fishing practices.

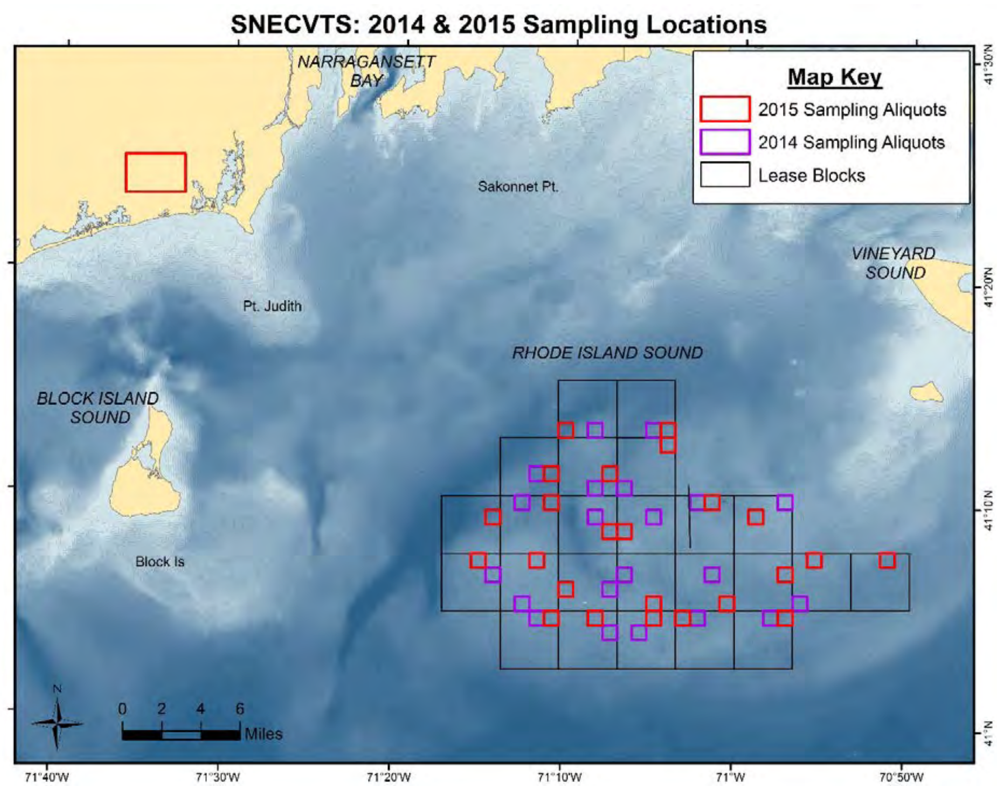

Figure 6. Example of the station selection method employed during the Southern New England Cooperative Ventless Trap Survey. The study area was stratified into 24 sampling grid cells, and each grid cell was further divided into aliquots. One aliquot from each grid was randomly selected for sampling in each year. Figure from Collie and King (2016).

4.3 Ventless Trap Methods

Lobster and crab resources in SFWF and the Reference Areas will be surveyed using commercial lobster vessels with scientists onboard to process the catch. Local lobster vessels have been contracted to conduct the sampling using a trap that is consistent with that used in the ASMFC and SNECVTS ventless trap surveys. This trap is a single parlor trap, 16 inches high, 40 inches long, and 21 inches wide with 5-inch entrance hoops and is constructed with 1-inch square rubber coated 12-gauge wire. The trap is constructed with a disabling door that can close off the entrance during periods between samples when the trap is on the bottom but not sampling. Local fishermen provided input that fishing longer trawls (i.e., 10 pot vs., 6 pot) should reduce the likelihood of gear losses during the study. Trawls will be configured with 10 traps on each trawl – six ventless (v) and four vented (or standard, S) in the following pattern: V-S-V-S-V-V-S-V-S-V; this is consistent with the gear configuration used in the SNECVTS (Collie and King, 2016). One trawl will be set in each of the 10 grid cells within the Project Area and two Reference Areas, for a total sampling intensity of 30 trawls (300 traps) per bimonthly sampling event. A power analysis based the data collected during the SNECVTS in 2014 and 2015 was completed to estimate the statistical power associated with this sampling design (*see* Appendix D for details). The results of the power analysis suggested that given a small to moderate effect size (0.25) the proposed BACI sampling design should have a statistical power of >0.8 to detect changes in the relative abundance of lobster, rock crabs, and Jonah crabs.

A temperature logger (Onset TidBit or similar) will be attached to the first trap in each trawl to record water temperature continuously throughout the monitoring period. A Conductivity Temperature Depth (CTD) sensor will be used to sample a vertical profile of the water column at each station.

Pre-construction sampling will occur twice per month from May through November. The sampling period of May through November was derived from a combination of feedback from commercial fishermen and to establish consistency with existing regional surveys (Rhode Island Department of Environmental Management [RIDEM], Massachusetts Division of Marine Fisheries [MADMF], SNECTVS). The standard soak time will be five nights, which is consistent with local fishing practices to maximize catch, and congruent with the protocols used on the SNECVTS survey. Soak time will remain consistent throughout the duration of the survey, to the extent practicable. Traps will be baited with locally available bait. At the start of each monthly sampling event, the lobsterman will retrieve and bait the traps. After the five-day soak period, the traps will be hauled and the catch will be processed for sampling, and the traps will be rebaited for another five-night soak. Each survey event will be managed by a team of qualified scientists including a lead scientist with experience performing lobster research. The catch will be removed from the traps by the vessel crew for processing. The lead scientist will be responsible for collection and recording of all data. The catch from the ventless trap survey will not be retained for sale by the participating vessels, and all animals will be returned to the water as quickly as possible once the sampling is completed.

The catch will be processed in a manner consistent with the ASMFC and SNECVTS ventless trap surveys. The following data elements will be collected for each trawl sampled during the survey; total number and biomass of individuals sampled, number and biomass for each species, and length of dominant invertebrate species (lobster, Jonah crab, and rock crab) and fish (+/- 0.5cm) that are captured in the traps. Data collected for individual lobsters will include:

- Carapace length: Measured to the nearest mm using calipers.
- Sex: Determined by examining the first pair of swimmerets.

- Eggs: Examine the underside of the carapace for the presence or absence of eggs.
- V-notch status: present or absent
- Cull status: Examine the claws for condition (claws missing, buds, or regenerated)
- Incidence of shell disease: absent, moderate, or severe
- Mortality: alive or dead

Biological information will also be collected for Jonah crabs and rock crabs. One ventless trap will be randomly selected in each string, and biological data will be recorded for all of the Jonah crabs and rock crabs that are captured in that randomly selected ventless trap. Counts and weights will be recorded for Jonah crabs and rock crabs from the other nine traps in each string. The following data elements will be recorded for each rock crab and Jonah crab that are sampled in the one randomly selected ventless trap in the trawl:

- Carapace width: Measured to the nearest mm using calipers.
- Sex: Determined by examining the width of the abdomen (apron). For female crabs, it is noted that there will be small differences in the width of the abdomen between mature and immature animals.
- Ovigery status: Presence/absence of eggs. Egg color recorded for females with eggs present.
- Incidence of shell disease: absent or present (3 categories: 1-10%, 11-50%, >50%)
- Cull status: Examine the claws for condition (claws missing, buds, or regenerated)
- Mortality: alive or dead

Should any interactions with protected species (e.g., marine mammals, sea birds, sea turtles) occur, the contracted scientists will follow the sampling protocols described for At-Sea Monitors (ASM) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016). Protected species interactions will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office (incidental.take@noaa.gov) within 24 hours that includes the following information; date, time, area, gear, species, and animal condition and activity. The following protocols will also be followed:

- If a marine mammal take occurs, the entire animal will be retained as time and space allow. However, if there is insufficient space on board the vessel, the minimum sampling requirements described for at-sea monitors will be met.
- If any interactions with Atlantic sturgeon or shortnose sturgeon occur, the contracted scientists will follow the sampling protocols described for the Northeast Fisheries Observer Program (NEFOP) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016), which includes collecting a genetic sample and scanning the animal for a PIT tag.
- Interactions with sturgeon will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 24 hours.

- If an Atlantic sturgeon or shortnose sturgeon carcass is retained, we will contact Fred Wenzel at the Northeast Fisheries Science Center. Any biological data collected during sampling of protected species will be shared as part of the written report that is submitted to the NMFS Greater Atlantic Regional Fisheries Office.

- Sightings of right whales, and observations of dead marine mammals and sea turtles in the water will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 48 hours.

- Sea birds will be sampled following the protocols outlined by the Northeast Fisheries Science Center (2016) and if a dead seabird is encountered, any 'dead, fresh' animals will be retained and provided to the US Fish and Wildlife Service for additional sampling.

- Due to the potential for communicable diseases all physical sampling and handling of marine mammals and seabirds will be limited to the extent Ørsted health and safety assessments and plans allow.

4.4 Environmental Data

Hydrographic data will be collected at each trawl that is sampled. A Conductivity Temperature Depth (CTD) sensor will be used to sample a vertical profile of the water column at each ventless trap sampling location, following the methods used by the CFRF/WHOI Shelf Research Fleet (Gawarkiewicz and Malek Mercer, 2019). The CTD profile may be collected either before the first trap in each trawl is hauled, or after the last trap in the trawl is hauled, at the discretion of the chief scientist. Bottom water temperature (degrees C) will be recorded at regular intervals (e.g., every 30 seconds) throughout the duration of each trawl deployment set using a temperature logger mounted on the first trap in each trawl.

4.5 Ventless Trap Station Data

The following data will be collected during each sampling effort:

- Station number;
- Start latitude and longitude;
- Start time and date;
- Start water depth;
- End latitude and longitude;
- End time and date;
- Wind speed;
- Wind direction;
- Wave height;
- Air temperature;
- Type of bait that was used; and

- Vertical CTD profile, and continuous observations of bottom temperature while the gear is fishing (Section 4.4).

4.6 Data Management and Analysis

The ventless trap survey will supplement the available pre-construction data on lobster and crab resources in the proposed SFWF site (i.e., SNECVTS survey dataset). The pre-construction monitoring data will be analyzed to evaluate the spatial and seasonal patterns of relative abundance of lobster, Jonah crab and rock crabs in the Project and Reference Areas. Results reported in annual reports will focus on comparing relative abundance, size frequencies, and demographic parameters between the Project and Reference Areas. For lobster, Jonah crab, and rock crab, CPUE (average annualized catch per trawl) will be compared amongst the Project and Reference Areas using descriptive statistics (e.g., mean, variance and range); and length frequency data by species will be compared among areas using descriptive statistics, graphical techniques (eCDF plots), and appropriate statistical tests (e.g., Kolmogorov-Smirnoff tests). Sex ratios will be reported for each sampling event for each area and compared amongst areas. The abundance and distribution of lobster, Jonah crab, and rock crab will be mapped each month, and descriptive statistics will be used to report on monthly trends in biological information such as shell disease or egg status.

Sampling after construction will allow for quantification of changes in the relative abundance and demographics of the lobster and crab resources due to construction activities as well as operation of the windfarm. For lobster, Jonah crab, and rock crab, the primary research question is the magnitude of difference in the temporal changes in relative abundance that are observed between the Project and Reference Areas. The null hypothesis for this design is that the changes in relative abundance in both the Project and Reference Areas will be statistically indistinguishable over time for lobster, Jonah crabs, and rock crabs. The alternative hypothesis is that changes in CPUE will not be the same at the Impact and Reference Areas over time (two-tailed). GLMs or GAMs will be used to describe the data and estimate the 90% Confidence Interval (CI) on the interaction contrast (Table 3). The interaction contrast that will be tested is the difference between the temporal change (i.e., average over the post-operation period minus the average over the pre-operation period) at the windfarm and the average temporal change at the Reference Areas. A statistically significant impact would be indicated by a 90% confidence interval for the estimated interaction contrast that excludes zero.

Spatial and temporal patterns in the biological data for lobsters and crabs (shell disease, sex ratios, reproductive status) will be summarized and reported. Similar to the methods described for relative abundance, GLMs or GAMs may also be used to test for the magnitude of the difference in the temporal change between the Project and Reference Areas for the biological parameters that will be collected (e.g., shell disease, cull status). The null hypothesis is that changes in demographic parameters (e.g., shell disease) for lobsters and crabs in both the Reference and Impact Areas will be statistically indistinguishable over time. The alternative hypothesis is that changes in demographic parameters will not be the same at the Reference and Impact Areas over time (two-tailed). GLMs or GAMs will be used to describe the data and estimate the 90% Confidence Interval (CI) on the interaction contrast. The interaction contrast that will be tested is the difference between the temporal change (i.e., average over the post-operation period minus the average over the pre-operation period) at the windfarm and the average temporal change at the References Areas. A statistically significant impact would be indicated by a 90% confidence interval for the estimated interaction contrast that excludes zero.

Table 3. Summary of the planned analyses for the ventless trap survey.

Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
1 Impact, 2 Reference areas; 2 years Before Construction and ≥2 years After Operation; May-November (2x per month); 5-day soak time.	**Sampling frame** = SFW and Reference areas of similar habitat and size. **Observational unit** = Trawl (trawl locations randomized for first sampling event of each year, then fixed for remainder of year). **Response variable** = annual mean CPUE per trawl. **Error variance** = among replicate trawls within year and area.	**Lobster**: catch, ovigery rates, ovigery status, shell disease, cull status; **Jonah crab**: catch, ovigery status (color code eggs), shell disease; **Rock crab**: catch, ovigery status (color code eggs), shell disease	What is the magnitude of the difference in the temporal changes in the observed metric between SFW and reference areas?	Fit the GLM or GAM that best describes the data; estimate the 90% CI on the BACI contrast.
	Observational unit = individual fish/invertebrates **Response variable** = length **Error variance** = among individual fish/invertebrates	**Length frequency**	How does size structure change over time (B/A)? How does size structure compare between areas (C/I)?	1. descriptive (range, mean) 2. graphical and statistical comparison (between times and locations) of ECDFs using distributional comparison test (e.g., Kolmogorov-Smirnoff).

Definitions:
90% CI = 90% confidence interval
ECDF = empirical cumulative distribution function

5.0 Demersal Fisheries Resource Survey – Ventless Fish Pot

Black sea bass, scup, and tautog are important target species in both the commercial and recreational fisheries in southern New England and the Mid-Atlantic. Black sea bass and scup are jointly managed by the Mid-Atlantic Fisheries Management Council (MAFMC) and the Atlantic States Marine Fisheries Commission (ASMFC), while tautog are managed by the ASMFC. Black sea bass and tautog are typically associated with complex bottom habitats and not often well represented in trawl survey catches. There is also a significant pot fishery for these species in the region. Therefore, a fish pot survey will be a suitable gear type for monitoring these species at SFWF. The emphasis on sampling for black sea bass is justified given that this species has Essential Fish Habitat (EFH) throughout the Project Area and is considered to be vulnerable to potential habitat disturbance from offshore wind construction and operation activities (Guida et al., 2017).

Fish pots are a transportable, cage-like, stationary fishing gear, which typically use bait as an attractant for target species, along with retention devices to prevent the escape of captured individuals (Suuronen et al., 2012). Fish pots possess many characteristics that are desirable in a sampling gear: they can be highly selective for targeted species, and fish can generally be returned after sampling in healthy condition and with low rates of post-capture mortality (Bjordal, 2002; Pol and Walsh, 2005; ICES, 2006; Rotabakk et al., 2011). Fish pots also provide an alternative survey and harvest method for areas inaccessible to otter-trawling, such as reefs and other hard bottom habitats (ICES, 2009; Petruny-Parker et al., 2015). As static gears, pots exhibit low impact to habitats (Thomsen et al., 2010).

Fish pots are often designed to target specific species, or subgroupings of species. This is accomplished through the structural design of the pot openings, the pot holding areas, and the bait selected to attract species. Due to these characteristics, pots do not provide a comprehensive assessment of fish and invertebrates in a study area. However, they do provide important additional sampling data in areas where bottom trawling is not an option. In addition, as a static gear, fish pots are well-suited for sampling along a spatial gradient, particularly in close proximity to the turbine foundations.

The SFWF fish pot survey will be conducted to determine the spatial scale of potential impacts on the abundance and distribution of juvenile and adult fish, particularly black sea bass, scup, and tautog, within the proposed SFWF site. The main question to be addressed is whether the relative abundance and distribution of these three species changes before and after construction. In particular, we are interested in determining whether the areas closest to the turbine foundations demonstrate increased relative abundance of these structure-oriented species following construction. An increase in abundance would be suggestive of a 'reef effect', whereby the addition of offshore wind foundations and scour protection creates new habitat for fish, which leads to subsequent increases in abundance in the Project Area (Anderson and Ohman, 2010; Bergstrom et al., 2013). This 'reef effect' has been documented in roughly half of the offshore wind farm monitoring studies that have tested for this impact (Glarou et al., 2020).

In particular, black sea bass are a suitable focal species to assess questions related to introduced habitat. Black sea bass may be associated with relatively shallow, complex habitats that are characterized by placed materials (i.e., artificial reefs; Fabrizio et al., 2013b). Black sea bass off the coast of New Jersey appeared to use artificial reefs primarily for shelter, rather than for feeding (Steimle and Figley, 1996). Previous research has shown that black sea bass (especially adult males) on complex habitats generally exhibit relatively small home ranges, and typically exhibit limited movements during the summer months (<0.1km/day; Moser and Shepherd, 2009; Fabrizio et al., 2013a).

At least two years of sampling (i.e., 14 monthly sampling events) will be conducted prior to the commencement of offshore construction. It is anticipated that the fish pot survey will commence in April, 2021. Similarly, a minimum of two years of monitoring will be completed following offshore construction, but the duration of post-construction monitoring will also be informed by ongoing guidance for offshore wind monitoring that is being developed cooperatively through the Responsible Offshore Science Alliance (ROSA).

5.1 Survey Design/Procedures

A Before-After-Gradient (BAG) survey will be conducted at SFWF using fish pots to assess the spatial scale and extent of wind farm effects on habitat preferred by structure associated species like black sea bass, scup, and tautog. The survey will be conducted from commercial fishing vessels with scientists onboard to process the catch. Local commercial fishing vessels were selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor has applied for an EFP from NOAA Fisheries in order to use the hired fishing vessels as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

The requirements described in the Atlantic Large Whale Take Reduction Plan (NOAA, 2018b) for the trap and pot fisheries will be followed. At a minimum, the following measures will be used to avoid interactions between the fish pot survey and marine mammals, although additional modifications to the sampling gear can be made at the discretion of NOAA:

- No buoy line will be floating at the surface.
- There will not be wet storage of the gear. All sampling gear will be hauled at least once every 30 days, and all gear will be removed from the water at the end of each sampling season.
- All groundlines will be constructed of sinking line.
- Fishermen contracted to perform the field work will be encouraged to use knot-free buoy lines.
- All buoy line will use weak links that are chosen from the list of NMFS approved gear.
- All buoys will be labeled as research gear, and the scientific permit number will be written on the buoy. All markings on the buoys and buoy lines will be compliant with the regulations. Gear will be marked according to instructions received from the Greater Atlantic Regional Fisheries Office.
- Further modifications to the sampling gear can be made at the discretion of the Greater Atlantic Regional Fisheries Office.

5.2 Sampling Stations

To accomplish the goals of this survey, data will be collected before and after installation and operation of SFWF using a BAG survey design. The study design will sample at increasing distances from turbine locations to examine the spatial scale of effects from construction and operation of a turbine on the surrounding habitat and associated fish species (Ellis and Schneider, 1997). The proposed survey design eliminates the need for a Reference Area as is typical in a BACI design. Sampling effort is focused on sampling sites along a spatial gradient within the work area, rather than using a control location that may not be wholly representative of the conditions within the work area (Methratta, 2020). This design also allows for the examination of spatial variation and does not assume homogeneity across sampling sites within the Project Area (Methratta, 2020).

The methodologies and sampling distances employed in previous offshore wind studies were considered in the design of the fish pot survey. Transect studies using visual observations of SCUBA divers have been able to compare fish densities immediately adjacent to the turbine with nearby locations (e.g., 0m vs. 20m; Wilhelmson et al., 2006; Anderson and Ohman, 2010). Bergstrom et al (2013) used fyke nets to sample along transects that spanned a distance range of 20 to 1350m from a turbine foundation and observed that four of the seven fish species examined demonstrated increased densities near the turbine. Griffin et al., (2016) used Baited Remote Underwater Video (BRUVs) to compare fish abundance and species assemblage at locations adjacent to the turbine foundation with locations 100m from turbine foundations in the Irish Sea. Lefaible et al (2019) used grab sampling to classify macrobenthic communities and sampled at two distance categories from the foundations (‘very close’ = 37.5m and ‘far’ = 350-500m). Using gillnets, Stenberg et al (2015) sampled at three increasing distance categories from the turbine foundations (‘near’ = 0-100m, ‘middle’ = 120-200m, and ‘far’ = 230-330m) and demonstrated that fish with an affinity to rocky habitats were most abundant close to the turbine foundations, while the opposite effect was observed for whiting. In a review paper based on European case studies, Methratta (2020) noted that the majority of direct effects associated with turbine foundations (e.g., habitat provision, attraction, food provision) are expected to occur on a local scale (i.e., 10 - 100s of meters from the turbine foundation). Artificial reef studies also offer some information to inform the sampling strategy. For example, Rosemond et al. (2018) compared fish biomass and species richness using SCUBA between artificial reefs and adjacent sandy habitats and found that the abundance and species richness of fish was highest on the reefs and gradually declined across adjacent sand habitats from 30m to 120m away from the reef. It is important to note that many of the studies referenced above investigated wind farms that were built on relatively homogenous habitats (e.g., sand). Given the availability of naturally occurring complex habitat (e.g., boulders and ledge) within SFWF, it is uncertain whether the introduction of novel habitat associated with the turbine foundation and scour protection will cause a detectable change in abundance or distribution for these structure-oriented species.

Eight turbine locations will be randomly selected for sampling prior to the first year of the survey. Those turbines and trawl positions will remain fixed for the duration of the survey (preconstruction and post-construction). Each trawl will be 900 meters in length. The length of the trawl was chosen to cover approximately half of the distance between adjacent turbines. The turbines will be positioned in a grid pattern, with one nautical mile of spacing between adjacent turbines. The intent of choosing this trawl length was to ensure that there was adequate sampling of both the habitat in the close proximity of a turbine foundation, while also sampling areas within the wind farm where the habitat will not be altered for comparison. During the pre-construction monitoring, the first trap of the trawl will be placed within the buffer zone around the planned location of turbine, and the trawl will be set in a straight line extending away from the turbine. During the post-construction monitoring, the first pot of the string will be placed as close to the turbine foundation as possible (given safety considerations) to sample the habitat immediately adjacent to the turbine.

Each trawl will have 18 pots. The spacing between pots along the length of each trawl will not be identical; and the pot spacing intervals were selected based on information about the home range of black sea bass and consideration was also given to the results of prior offshore wind monitoring studies discussed above which often showed that the greatest effects on abundance and distribution occurred in close proximity to the turbine foundation. Using acoustic telemetry, Fabrizio et al (2013) reported a median home range for black sea bass (of unknown sex) of 137 hectares (436,085m^2), at an artificial reef off New Jersey. If it is assumed that the foundation of the turbine serves as the focal point for the home range of a sea bass (post-construction), then the home range can be represented by a circle with a radius of 660m. The first five fish pots will sample within 50m of the turbine foundation at 10m intervals (e.g., 10, 20, 30, 40, and 50m from the turbine). The intention is to intensely sample the locations directly adjacent to the turbine foundation, where the greatest effects on fish abundance and distribution would be anticipated. The remaining thirteen fish pots will be spaced 65m apart and will sample at distances of approximately 115m to 900m from the turbine foundation. The intent is to sample in areas of the wind farm that are both within and beyond the assumed median home range of black sea bass (Fabrizio et al., 2013), and also sample at distances that are outside of any habitat alteration associated with the installation of the turbine foundation and the addition of the scour protection. To minimize gear interactions with other user groups in these areas, the lead scientist will work with the captain to ensure that the gear is set in accordance with local fishing practices.

5.3 Fish Pot Methods

The fish pot survey will be conducted using typical rectangular fish pots commonly used in Rhode Island and Massachusetts fisheries and these fish pots are also used in other regional pot surveys (R. Balouskus, RIDEM, pers comm.). The ventless fish pots measure 43.5 inches long, 23 inches wide, and 16 inches high and are made from 1.5-inch coated wire mesh. Each pot will be baited with whole clam bellies and the entire trawl allowed to soak for 24 hours. Sampling will take place once per month from April through October. The Contractor selected to carry out the survey will take efforts to ensure that the timing of sampling is approximately consistent within each month, to the extent practicable. Soak time will remain consistent throughout the duration of the survey. Each survey event will be managed by a team of qualified scientists including a lead Scientist with experience performing fisheries research. The catch will be removed from the pots by the boat crew for processing. The Lead scientist will be responsible for collection of data and data recording. The catch from the fish pot survey will not be retained for sale by the participating vessels, and all animals will be returned to the water as quickly as possible once the sampling is completed.

Fish collected in each pot will be identified to species, weighed, and enumerated. The following data elements will be recorded for each fish pot; total biomass and total number of organisms caught, number and biomass caught for each species, number of species, and length for species caught. Subsampling for length may occur, at the discretion of the chief scientist, if there is a large number of fish captured in a given pot.

The catch from each pot will be sorted by species and size (if appropriate) into baskets or fish totes as needed. This process continues until all animals are sorted, and the chief biologist verifies that the sorting areas are clear of all animals. Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured (+/- 0.5 cm) and the rest counted. A subset of the individual fish that are measured will also be weighed (+/- 5.0g) to evaluate individual fish condition. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Dominant invertebrate species will be measured as follows: crabs (carapace width) and lobsters (carapace length). Miscellaneous invertebrates (e.g., worms, hermit crabs, snails) will be counted but not measured.

Should any interactions with protected species (e.g., marine mammals, sea birds, sea turtles) occur, the contracted scientists will follow the sampling protocols described for At-Sea Monitors (ASM) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016). Protected species interactions will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office (incidental.take@noaa.gov) within 24 hours that includes the following information; date, time, area, gear, species, and animal condition and activity. The following protocols will also be followed:

- If a marine mammal take occurs, the entire animal will be retained as time and space allow. However, if there is insufficient space on board the vessel, the minimum sampling requirements described for at-sea monitors will be met.
- If any interactions with Atlantic sturgeon or shortnose sturgeon occur, the contracted scientists will follow the sampling protocols described for the Northeast Fisheries Observer Program (NEFOP) in the Observer On-Deck Reference Guide (Northeast Fisheries Science Center, 2016), which includes collecting a genetic sample and scanning the animal for a PIT tag.
- Interactions with sturgeon will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP, and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 24 hours.
- If an Atlantic sturgeon or shortnose sturgeon carcass is retained, we will contact Fred Wenzel at the Northeast Fisheries Science Center. Any biological data collected during sampling of protected species will be shared as part of the written report that is submitted to the NMFS Greater Atlantic Regional Fisheries Office.

- Sightings of right whales, and observations of dead marine mammals and sea turtles in the water will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) or via the Whale Alert APP and a follow up detailed written report will be provided to NMFS Greater Atlantic Regional Fisheries Office within 48 hours.
- Sea birds will be sampled following the protocols outlined by the Northeast Fisheries Science Center (2016) and if a dead seabird is encountered, any 'dead, fresh' animals will be retained and provided to the US Fish and Wildlife Service for additional sampling.
- Due to the potential for communicable diseases all physical sampling and handling of marine mammals and seabirds will be limited to the extent Ørsted health and safety assessments and plans allow.

5.4 Environmental Data

Hydrographic data will be collected at sampling location. A Conductivity Temperature Depth (CTD) sensor will be used to sample a vertical profile of the water column at each fish pot sampling location. The CTD may be collected either before the first fish pot in each trawl is hauled, or after the last pot in the trawl is hauled, at the discretion of the chief scientist. A temperature logger (Onset TidBit or similar) will be attached to the first fish pot on each trawl to record water temperature continuously throughout the monitoring period. Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

5.5 Fish Pot Station Data

The following data will be collected during each sampling effort:

- Station number;
- Start latitude and longitude;
- Start time and date;
- Start water depth;
- End latitude and longitude;
- End time and date;
- Wind speed;
- Wind direction;
- Wave height;
- Air temperature; and
- Vertical CTD profile, and continuous observations of bottom temperature while the gear is fishing (*see* Section 5.4).

5.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

5.7 Data Analysis

The BAG survey design will allow for characterization of pre-construction community structure of fish species associated with complex bottom habitats and will continue sampling after construction to allow for quantification of any changes in relative abundance associated with installation and operation of wind turbines in the SFWF site. The primary question to be asked is, what is the pattern of temporal change in relative abundance, relative to distance from a turbine foundation? The null hypothesis associated with this design is that relative abundance will remain the same over time and remain consistent with respect to the distance from a turbine (i.e., the coefficient describing the influence of distance from a turbine on catch is not different from zero). Several statistical models will be compared (e.g., GLM, GLMM, or GAM) with distance treated as a main effect (continuous variable), and the best fitting model for each species will be used to estimate the 90% CI on the before-after change in the distance coefficient. Further, information on depth and bottom temperature collected at sea may be considered as covariates in the model to evaluate their influence on CPUE. Habitat data collected during the benthic SPI/PV surveys (Section 7.0), from Orsted geophysical surveys, or at sea (using the sounder to broadly classify habitat) can also be considered as covariates in the model to evaluate the influence of habitat on CPUE. Graphical methods and descriptive statistics will be used to assess changes in CPUE over time, as a function of distance from the turbine foundations. These graphical techniques may help to elucidate the spatial scale at which relative abundance changes the most with distance from the turbine foundation. Data analysis will be performed in accordance with the BOEM fishery guidelines.

This study design assumes that each fish pot along a trawl will sample independently from the other pots on the trawl. However, given the desire to sample intensively at locations adjacent to the turbine foundations, the density of fish pots (and thus density of bait) will not be homogenous along the length of each trawl. Therefore, this assumption should be evaluated. Graphical comparisons of CPUE at each pot along a string, particularly during the pre-construction period (before the habitat associated with turbines and scour protection are introduced) will help to elucidate whether the density of pots along a string influences CPUE. In particular, given that the five pots that will be deployed closest to the turbine will only be spaced 10m apart, the CPUE in these five pots should be compared to the other pots along the string to determine the potential influence of fish pot density and spacing on catch rates.

Table 4. Summary of the planned analyses for the fish pot survey.

Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
Impact only (no reference sites); pots at distances ranging from ~10m to ~900m from turbine; April - October (1x per month); 24 hour soak time	**Sampling frame** = single direction from turbines in SFW **Observational unit** = individual pot (turbines and string locations fixed throughout study). **Response variable** = annual mean CPUE per distance **Error variance** = among replicate pots at the same distance (turbines provide replication).	**Catch** of key species (black sea bass, scup, tautog)	What is the pattern of temporal change (B/A) in catch as a function of distance from turbine?	Fit the GLM (or GLMM or GAM) that best describes the data; estimate the 90% CI on the B/A contrast for the distance effect. Biological and physical covariates (from Benthic SPI/PV Survey) will be considered, along with other covariates (T, depth). Graphical assessment of changes (B/A) in catch over distance and time.
	Observational unit = individual fish/invertebrate **Response variable** = length **Error variance** = among individual fish/invertebrates	**Length frequency**	How does size structure change over time (B/A)? How does size structure compare between areas (C/I)?	1. descriptive (range, mean) 2. graphical and statistical comparison (between times and locations) of ECDFs using distributional comparison test (e.g., Kolmogorov-Smirnoff).
	Observational unit = individual fish **Response variable** = condition index **Error variance** = among individual fish	**Fish condition index** (i.e., deviations from log-length vs log-weight relationship) by species	What is the magnitude of change in fish condition over time (B/A), or between areas (C/I)?	Find the best fitting model to the condition values by species, and calculate 90% CI of the relevant contrasts.

Definitions:
BAG = before after gradient
90% CI = 90% confidence interval
ECDF = empirical cumulative distribution function

An adaptive sampling strategy is being proposed as part of this monitoring plan. Upon completion of sampling in 2021, and again following sampling in 2022, an evaluation will be conducted of the statistical power associated with this sampling design. This analysis will use an approach similar to what was performed for the ventless trap lobster survey (Appendix D) but made relevant to the study design and model used for this survey. Potential impacts on relative abundance from windfarm operation may include: an overall change in the mean CPUE over time, a step change in the mean at some distance from the turbine foundations during the operation period, or a gradual change in abundance expressed as a function of distance from the foundations (e.g., a slope in a regression equation). The variance (e.g., RSE) associated with the relative abundance estimates for black sea bass and scup will be calculated for the data from years 1 and 2. Using the observed variance estimates, power curves will be used to demonstrate how expected statistical power varies as a function of effect size (i.e., the magnitude of change) and sample size (i.e., number of turbines sampled). For this assessment of the potential impact on the relative abundance of black sea bass and scup, 90% confidence (two-tailed $\alpha = 0.10$) and at least 80% power ($\beta = 0.20$) will be used to ensure that the monitoring will have a probability of at least 80% of detecting a targeted effect size, if it is present.

The results of the power analysis may be used to modify the monitoring protocols in subsequent years. The decision to modify sampling will be made after evaluating several criteria including the amount of variability in the data, the statistical power associated with the study design to detect a targeted effect size, and the practical implications of modifying the monitoring protocols. For example, if the power analysis demonstrates that the proposed sampling will not achieve the desired level of statistical power, sampling intensity may need to be increased, which could be achieved throughout the remainder of the study by sampling additional turbines, by sampling the existing stations more often each month (e.g., two monthly sampling events, rather than one), or by increasing the duration of the post-construction monitoring.

6.0 Acoustic Telemetry

Passive acoustic telemetry can monitor animal presence and movements across a range of spatial and temporal scales. For instance, each acoustic receiver provides information on the fine-scale (tens to hundreds of meters) residence and movement of marine organisms. Acoustic receivers also offer continuous monitoring, allowing for behavior, movements, and residence to be investigated at a fine temporal scale (e.g., diel, tidal, etc.). By leveraging observations collected across individual receivers, and receiver arrays, telemetry can also monitor animal presence and movement over a broad spatial and temporal extent. Therefore, passive acoustic telemetry is an ideal technology to not only collect pre-construction data on species presence within WEAs, but also to monitor and evaluate short and long-term impacts of wind energy projects on species presence, distribution, and persistence.

The use of passive acoustic telemetry has grown dramatically over the past decade and continues to grow each year (Hussey et al. 2015). As a result of this rapid growth, hundreds to thousands of acoustic receivers are deployed each year in the northwest Atlantic from the Gulf of St Lawrence to the Gulf of Mexico, each of which is capable of detecting the thousands of active transmitters that are currently deployed on at least 40 species including, among many others, sturgeon, striped bass, sea turtles, sharks, bluefin tuna, and black sea bass.

In particular, acoustic telemetry has proven to be a valuable research tool to understand the seasonal movements, spawning behavior, and spawning site fidelity of Atlantic cod in the Gulf of Maine (e.g., Dean et al., 2014, Zemeckis et al., 2014; Zemeckis et al., 2019). Cod have been observed to spawn in the waters of southern New England, primarily between December and March, with evidence of spawning on Cox Ledge and also in the surrounding areas to the south and west of Cox Ledge (Dean et al., 2020; Cadrin et al., 2020; Langan et al., 2020; Inspire Environmental, 2020). In addition, the Atlantic Cod Stock Structure Working Group concluded that cod in southern New England likely comprise a unique biological stock, that is distinct from the adjacent Georges Bank and Gulf of Maine stocks (McBride et al., 2020). Therefore, monitoring for the impacts of offshore wind development for cod in SFWF has been recognized as a priority.

Inspire Environmental recently completed a rod and reel survey of cod in the SFWF project Area and nearby locations over two winters, to identify spawning aggregations and examine the spatial distribution of cod during the spawning season (Inspire Environmental, 2020). While the rod and reel study provided valuable information, inferences were generally limited by the low sample sizes (e.g., mean daily catch rates of <1 cod per angler) obtained using this method. Given our inability to conduct a trawl survey within SFWF, and the sample size limitations that would likely be associated with an additional rod and reel survey, SFW considered acoustic telemetry to be the most suitable tool to collect high-resolution information on the seasonal distribution of Atlantic cod in SFWF and surrounding areas.

6.1 Ongoing Telemetry Research

SFW will coordinate with, and provide contributions to, ongoing acoustic telemetry projects in and around the SFWF site. There is an ongoing BOEM-funded study that is using passive acoustic telemetry to monitor the seasonal distribution and spawning activity of Atlantic cod on and around Cox Ledge, including within the SFWF work area (Figure 7). This Project includes scientists from the Massachusetts Division of Marine Fisheries, the UMass Dartmouth School for Marine Science and Technology, Rutgers University, the Nature Conservancy, Woods Hole Oceanographic Institute, and the NEFSC. To date, approximately 40 adult cod have been tagged with Vemco V16-4H acoustic transmitters, and additional tagging trips are planned for the fall and winter of 2020 to deploy the remaining transmitters. All tagging trips have been conducted on local for-hire recreational fishing vessels.

The movements and residency patterns of tagged cod are being monitored using fixed-station passive acoustic receivers, as well as a receiver that is attached to an autonomous glider. Ten acoustic receivers were deployed from a commercial gillnet vessel in November 2019, and the receiver array will remain in the water until at least May 2021. The autonomous glider allows for tagged fish to be detected over a wider area than is possible using the fixed-station receivers. In addition, the glider also collects environmental data including temperature, dissolved oxygen, and turbidity. In addition to the acoustic receiver and environmental sensors, the glider is also equipped with a Passive Acoustic Monitoring device, which is used to record and document the vocalizations of whale species in the study area, and the glider data is available in near real-time on the web (http://dcs.whoi.edu/cox1219/cox1219_we16.shtml). The glider deployments were scheduled to coincide with the presumed peak spawning season for Atlantic cod in southern New England. The autonomous glider was deployed in December 2019 and remained in the water until March 20th, 2020. The glider will be deployed again during the next two winters (December 2020-March 2021, and December 2021-March 2022).

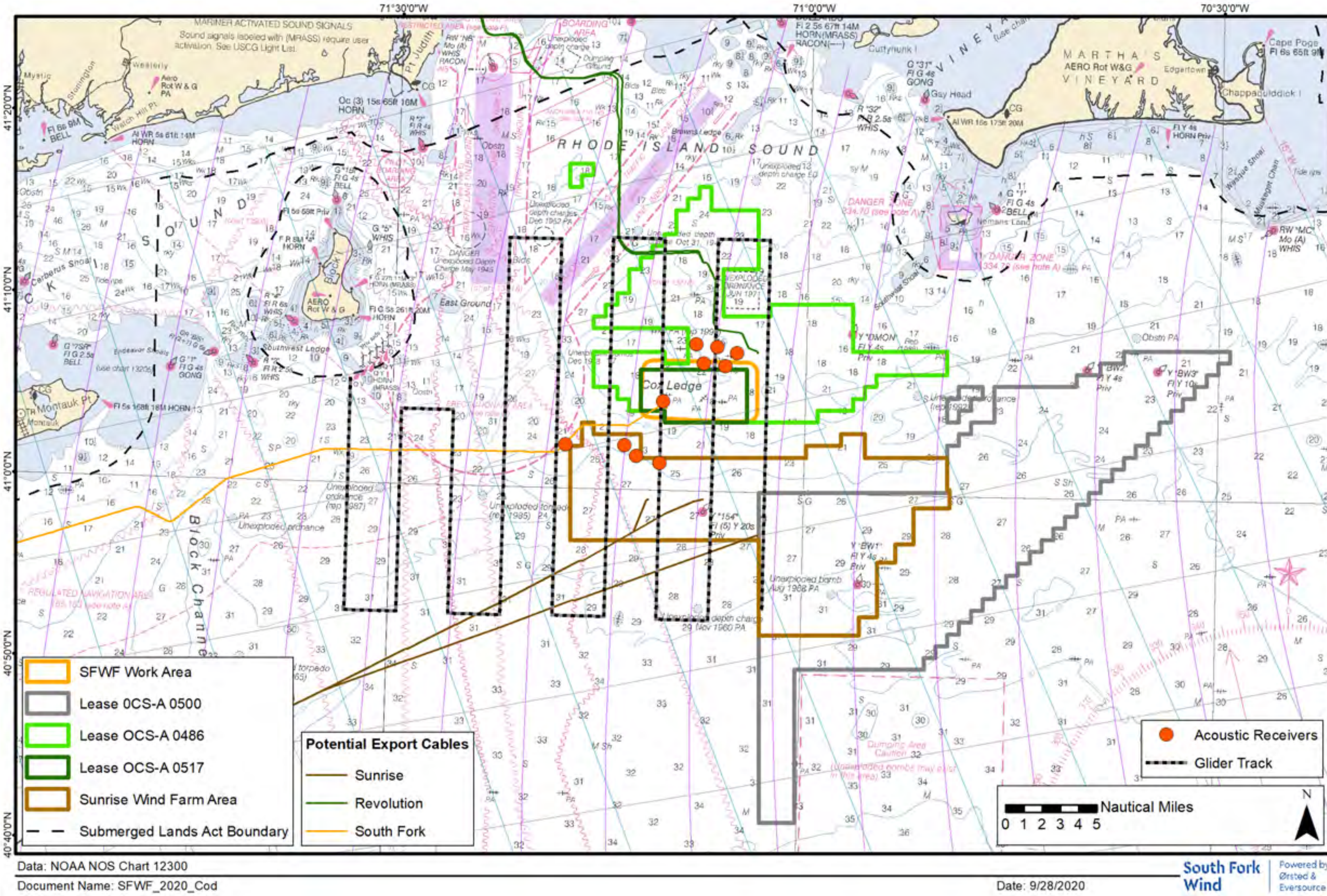

Figure 7. Study site for the Atlantic cod acoustic telemetry study, including the location of the fixed-station acoustic receivers. The general track of the autonomous glider is also shown.

A second acoustic telemetry study, which began in the summer of 2020 and is scheduled to continue through 2021, will examine the presence and persistence of Highly Migratory Species (HMS) at popular recreational fishing grounds in the southern New England WEAs. INSPIRE Environmental has partnered with the Anderson Cabot Center for Ocean Life (ACCOL) at the New England Aquarium to use passive acoustic telemetry to monitor the pre-construction presence and persistence of bluefin tuna, blue sharks, and shortfin Mako sharks in the southern New England WEAs. These species have been identified as three of the most commonly captured and targeted species by the offshore recreational community in southern New England (NOAA, 2019). Fifteen acoustic receivers were deployed in July 2020 at three popular recreational fishing sites within the WEAs identified through a previous recreational fishing survey carried out by the ACCOL (Kneebone and Capizzano, 2020). The receivers were deployed strategically in conjunction with the Atlantic cod receiver array, to maximize spatial coverage for both projects. Tagging trips have been conducted collaboratively with the recreational fishing community to target and tag 20 individuals of each of the three HMS species listed above.

As part of the pre-construction monitoring, SFW will provide financial support to strengthen these ongoing telemetry projects and contribute more broadly to regional telemetry research in the northwest Atlantic.

6.2 Acoustic Telemetry Methods

SFW will contribute to these ongoing acoustic telemetry efforts by providing additional funding to support these projects. SFW will provide support to the cod telemetry project team to purchase additional VR2W receivers that can be used to replace receivers that are lost during the course of the project, allowing the project team to maintain the scope of the receiver array. Further, SFW will also provide funds to the cod telemetry project to purchase the mooring equipment (e.g., line, buoys, anchors, etc.) that is needed to retrofit the receiver moorings that are currently being used. The purpose of retrofitting the receiver moorings is to minimize the loss of receivers, which will increase the spatial and temporal extent of coverage, help maintain data integrity, and allow the project to meet its' monitoring objectives. As part of the ECO-PAM project, an acoustic receiver has also been deployed near SFWF (41.06N 70.83W).

Additionally, SFW will provide financial support to the HMS telemetry project. This support will be used to purchase an additional two VR2-AR receivers, as well as additional replacement receivers needed to maintain the array if receivers are lost. These two receivers will be placed strategically within the SFWF site in November 2020 to enhance the spatial coverage of the receiver array prior to the cod spawning season. These receivers will remain in the water until March or April of 2022 in order to detect tagged HMS species, and to bolster the resolution of the telemetry array in SFWF during the cod spawning season. In addition, SFW will provide the funds needed to keep some (e.g., n = 3 to 5) of the HMS project's receivers deployed year-round, rather than having the receivers removed from the water each November, as was initially planned. The purpose of keeping the receivers in the water year-round is to increase the spatial scope of the receiver array during the winter months when cod spawning occurs on Cox Ledge and in the surrounding areas (Dean et al., 2020; Langan et al., 2020). Receivers will be rigged using standard procedures outlined by Vemco for benthic deployment (https://www.vemco.com/wp-content/uploads/2015/01/vr2ar-deploy-tips.pdf). Further, SFW will provide salary support for the PI's from the HMS telemetry study (Dr. Kneebone and Mr. Gervelis) to compensate them for their time associated with the year-round maintenance of the receiver array, and analysis of the detection data.

These financial investments will bolster both ongoing telemetry projects and increase the spatial and temporal resolution of information that is collected, particularly during the cod spawning season (December through March). The high-resolution data collected using acoustic telemetry will provide a valuable supplement to the monitoring plan and improve our understanding of cod habitat use within the SFWF area, particularly during the spawning season, which is a time period that is not well sampled by the regional fishery independent surveys, and a time period for which there is limited fishery-dependent data collected for the recreational fishery.

6.3 Data Analysis and Data Sharing

The resulting detection data downloaded from acoustic receivers will be analyzed with the overall goal of establishing pre-construction information on species presence and persistence in SFWF. Short- and long-term presence, site fidelity (i.e., residency/persistence), fine- and broad-scale movement patterns, and inter-annual presence at SFWF (i.e., whether individuals return to the receiver array each year) will be examined. Any detection data obtained through our participation in regional telemetry data sharing networks will be incorporated into this analysis, particularly to examine the distribution and movements of species beyond the confines of SFWF. Deliverables include detailed detection history plots for each tagged individual that depict all detections logged for an animal over the course of a year. Summary tables and figures will be generated that describe: the number of times each fish was detected by receivers in SFWF, the detection history for each fish, the total number of receivers it was detected on, movements, and monthly patterns in presence and persistence. In addition to the local-scale acoustic monitoring achieved by the proposed receiver array, broad-scale movement data will be accomplished through participation in regional telemetry data sharing programs, in an attempt to obtain detection data from our tagged animals wherever else they are detected in the greater Atlantic region.

All detection data recorded by the acoustic receivers in this Project will be distributed to researchers through participation in regional telemetry networks such as the Ocean Tracking Network or the Mid-Atlantic Acoustic Telemetry Network (MATOS). We will compile any detection data that we collect for transmitters that are not deployed as part of the proposed Project and disseminate that information to the tag owners (it is the policy of regional data sharing programs that the ‘owner’ of the data is the entity that purchased and deployed the transmitter, not the entity that detected it on their receiver). We will also approach each transmitter’s owner to request the inclusion of their data (i.e., metadata on the species detected, number of detections, amount of time the animal was detected in our receiver array, etc.) in any analyses performed. Ultimately, participation in these large data sharing networks will increase both the spatial and temporal extent of monitoring for species tagged as part of this research effort and permit the collection of data on the presence and persistence of other marine species tagged with acoustic transmitters (e.g., Atlantic sturgeon, striped bass, white sharks) in and around SFWF at no additional cost.

7.0 Benthic Survey – Sediment Profile Imaging – Plan View and Video

Installation and operation of OSW projects can disturb existing benthic habitats and introduce new habitats, with the level of impact and recovery from disturbance observed to vary depending on existing habitats at the site (HDR 2017, Wilhelmsson and Malm 2008). Habitat alteration during construction may include boulder relocation; mechanical or hydraulic disturbance of sediments; and placement of scour protection layers (Dannheim et al. 2020). After installation, the WTG structure introduces supratidal to subtidal hard habitat to the project site: hard vertical substrates and, depending on the type of foundation and the degree of scour protection used, a range of horizontal habitat complexity (Langhamer, 2012).

Over time (3-6 years), the introduction of the hard substrata (novel WTG surfaces, scour protection layers, cable protection layers, and natural boulders) can lead to extensive biological growth over the unoccupied surfaces with a complex pattern analogous to shoreline intertidal to subtidal zonation (artificial reef effect, Petersen and Malm 2006, Ruebens et al. 2013). This biological growth has led to dense accumulations of filter feeding mussels in the intertidal (i.e., on the turbines at the water surface) followed by amphipods, tunicates, sponges and sea anemones in the subtidal in Europe (De Mesel et al., 2015) and at the Block Island Wind Farm (BIWF, HDR 2020). The high-volume filter feeders (mussels) capture phytoplankton and marine snow and discharge large volumes of pseudofeces (organic mineral aggregates with high carbon content) that settle to the seafloor (Lefaible et al., 2019). Three to six years after installation, seafloor locations <50 m from the foundation showed evidence of finer sediments and increased organic matter compared to locations 350-500 m away (Lefaible et al., 2019).

The epifaunal species colonizing the new hard bottom substrata are also of direct interest. In New England waters, non-native species have been identified as potential competitors for space with native species and commercial harvests of shellfish (Lengyel et al. 2009, Valentine et al. 2007).There is evidence at BIWF that the introduction of mussels led to mussel colonization of adjacent subtidal hard and soft bottom habitats (HDR 2020, Wilber et al. 2020). At BIWF and European projects, native and non-native species (e.g., at BIWF colonial tunicates, *Didemnum vexillum*) have been observed to colonize new hard bottom substrate within six months to two years (HDR 2020, Guarinello and Carey, 2020). *D. vexillum* has been observed within the SFWF project area, but there is limited information available to understand the current abundance and distribution of *D. vexillum* on hard bottom habitats (Deepwater Wind South Fork 2020).

These observations from existing OSW projects lead to two prevailing hypotheses of likely effects:

1. Enrichment of seafloor conditions from WTG artificial reef effect within 3-6 years (1-100 m from WTG) leading to fining and higher organic content of soft bottom habitats.
2. Introduction of attached organisms (both native and non-native) to existing natural hard bottom habitats with potential for rapid colonization of relocated boulders.

The consequences of these predicted effects are to potentially affect the function of soft and hard bottom habitats to provide food resources, refuge, and spawning habitat for commercial fish and shellfish species (Reubens et al., 2014, Krone et al. 2017).

For this operational monitoring plan, monitoring of soft bottom habitats will focus on measuring physical changes and indicators of benthic function (bioturbation and utilization of organic deposits, Simone and Grant 2020) as a proxy for measuring changes in the community composition. Monitoring of hard bottom habitats will focus on measuring changes in macrofaunal attached communities (native vs. non-native species groups), percent cover, and physical characteristics (rugosity, boulder density) as a proxy for measuring changes in the complex food web. The schedule for monitoring these two benthic habitats is outlined in Table X and discussed in more detail in the following sections. These indicators of the function of soft and hard bottom habitats provide quantitative data, can support rapid data collection and analysis, and lead to effective management actions (mitigation). They are not designed to answer research questions.

Table 5. Schedule of soft bottom and hard bottom benthic surveys

Survey	Soft bottom WTG	Soft bottom SFEC	Hard bottom Turbine surface	Hard bottom IAC
Season	Late summer	Late summer	Late summer	Late summer
Pre seabed preparation	SPI/PV – within 6 months prior		SPI/PV – within 6 months prior	MBES, SSS, ROV – within 12 months (timed to avoid gear conflicts)
Post seabed preparation				MBES, SSS, ROV - within 1 month
Post construction Year 0	SPI/PV – earliest Late summer after construction	SPI/PV – earliest Late summer after construction	ROV – earliest Late summer after construction	ROV – earliest Late summer after construction
Post construction Year 1	SPI/PV	SPI/PV	ROV	ROV
Post construction Year 2			ROV	ROV
Post construction Year 3	SPI/PV	SPI/PV	TBD	TBD
Post construction Year 4				
Post construction Year 5	SPI/PV	SPI/PV		
Post construction Year 6	TBD	TBD		

TBD is adaptive monitoring if evidence that location is still changing from previous sampling period

7.1 Soft Bottom Monitoring

Soft bottom monitoring will be conducted within the project area and along the SFEC with a Sediment Profile and Plan View Imaging (SPI/PV) system. SPI/PV provides an integrated, multi-dimensional view of the benthic and geological condition of seafloor sediments and will support characterization of the function of the benthic habitat and physical changes that result from construction and operation of SFWF.

A SPI/PV survey will characterize the geological (sediment size and type) and benthic (animal habitat) characteristics of the soft-sediment areas with consideration of potential effects from wind farm operation. A PV survey will characterize surficial geological and biotic (epifaunal) features of hard-bottom areas within the sample area but will not replace a dedicated hard bottom survey (Section 7.2).

Existing benthic data from the SFWF area and the SFEC were primarily collected in late summer or fall (August to November), when biomass and diversity of benthic organisms is greatest (Deepwater Wind South Fork 2020, HDR 2017, 2019, NYSERDA, 2017, Stokesbury, 2013, 2014; LaFrance 2010, 2014). In contrast to fish communities and harvestable benthic species, benthic habitats in the NE Atlantic are generally stable in the absence of physical disturbance or organic enrichment (Theroux and Wigley 1998, Reid et al. 1991, Steimle 1982, HDR 2019). A BAG survey design will be used to determine the spatial scale of potential impacts on benthic habitats and biological communities within the proposed SFWF site and along the SFEC. A single benthic survey conducted in late summer (August to October) six months prior to the start of construction activity will be used to represent benthic habitats prior to potential disturbance. Subsequent surveys will be conducted in the same seasonal time frame at intervals of 1 year, 3 years and 5 years after completion of construction (Table X).

7.1.1 Survey Design/Procedures

The SPI/PV surveys will be conducted at SFWF using fixed stations to assess the spatial scale and extent of wind farm effects on benthic habitat over time. The surveys will be conducted from research vessel(s) with scientists onboard to collect images utilizing a SPI/PV camera system. This system was utilized exclusively for ground-truth imagery of high-resolution geophysical surveys to support benthic habitat mapping within SFWF for EFH characterization and was very effective (Deepwater Wind South Fork 2020). Collecting seafloor imagery does not require disturbance of the seafloor or collection of physical samples. For-hire vessels will be selected based on criteria such as survey suitability, experience, safety record, knowledge of the area, and cost. All survey activities will be conducted with strict adherence to Orsted health and safety protocols to reduce the potential for environmental damage or injury.

Replicate SPI/PV images will be collected at each station, with the number of replicates specific to survey type (*see* Sections 7.1.2 and 7.1.3). Results from the targeted number of replicates with suitable quality images will be aggregated to provide a summary value for each metric by station.

7.1.2 Sampling Stations – Turbine Foundations

The objectives for the soft bottom benthic survey are to measure changes over time in the benthic habitat and physical structure of sediments at varying spatial scales relative to turbine foundations. To accomplish the goals of this survey, data will be collected before and after installation and operation of SFWF using a BAG survey design with statistical evaluation of the spatial and temporal changes in the benthic habitat (Underwood, 1994; Methratta, 2020). The selection of a BAG design is based on an understanding of the complexities of habitat distribution at South Fork and an analysis of benthic data results from European wind farms and the RODEO study at BIWF (HDR 2017, 2019, 2020, Coates et al., 2014; Dannheim et al., 2019; Degraer et al., 2018; LeFaible et al., 2019; Lindeboom et al., 2011). SPI/PV surveys have been conducted within the SFWF and along the SFEC to provide detailed assessment of benthic habitat for EFH consultation (Deepwater Wind South Fork 2020). This information on habitat distribution at SFWF was used to design the surveys specified in this and the following section.

The proposed BAG survey design eliminates the need for a Reference Area, as this design is focused on sampling along a spatial gradient within the area of interest rather than using a control location that may not be truly representative of the conditions within the area of interest (Methratta, 2020). This design also allows for the examination of spatial variation within the wind farm and does not assume homogeneity across sampling stations (Methratta, 2020).

Habitat types mapped within SFWF include glacial moraine, coarse sediment, sand and muddy sand, and a discrete area of mud and sandy mud at the northern boundary (Figure 8). The soft bottom benthic survey will focus only on the mobile sediment classes (sand, muddy sand), while hard bottom areas (glacial moraine with boulders and cobbles) will be addressed in a separate survey (Section 7.2). Turbine locations dominated by glacial moraine within 200m in one or both of the targeted NE-SW directions (i.e., WTG#1, #4, #5, #8 #9, #10, #16A, #17A) will be excluded from the soft sediment sampling frames. In addition, sampling transects will be specifically placed to avoid adjacency to the inter-array cable route (IAC); monitoring for the effects of a buried power cable is the focus of a separate survey (Section 7.1.3).

From the turbines with appropriate soft bottom habitat, any turbines that were randomly selected for the fish pot survey (Section 5.2) will be included in this survey with additional turbine locations randomly selected to achieve a total sample size of eight turbine locations. The selected turbine locations and transect positions will remain fixed for the duration of the survey.

This survey was designed to sample at increasing distances from turbine locations, based on the hypothesis that colonization of epifaunal growth on the turbines will result in changes to the surrounding soft bottom benthic habitat. Enrichment of soft bottom habitats from the artificial reef effect is expected to be most pronounced down current and weaker up current. A current meter record collected for the RI Ocean Special Area Management Plan (Ocean SAMP) indicated that monthly mean currents near SFWF are relatively strong from March through October and generally to the west-southwest (Ullman and Codiga, 2010). Two belt transects (25m wide) of SPI/PV stations will be established to the northeast (up current) and southwest (down current) of the eight selected turbine locations to avoid IAC locations (cable effects addressed in Section 7.4). Pre-construction transects will begin at the center point of the planned foundation with two stations at equal intervals up to the maximum planned extent of the scour protection area (34 m) and then at intervals of 0-10m, 15-25m, 40-50m, 90-100m, 190-200m, and 900m extending outward from the edge of the scour protection area (i.e., a single station at each of eight distance intervals in two directions from each turbine sampled; Figure 9). Post-construction transects will repeat this design at the same turbines and the same sampling intervals. These distances were chosen based on recent research indicating that effects of turbines on the benthic environment occur on a local scale (e.g., Lindeboom et al., 2011; Coates et al., 2014; Degraer et al., 2018; HDR 2019). In the Belgian part of the North Sea, gradient sampling of benthic habitat within wind farms was conducted at close stations and far stations that were up to 500 m away from the turbine foundations (LeFaible et al., 2019). However, recent unpublished data from Belgium indicates some level of enrichment has been recorded between 200-250 m from the turbines after eight years (personal comm. S. Degraer, 4/29/2020). The turbines are proposed to be built in a regular grid pattern, with 1nm spacing between adjacent turbines. The maximum sampling distance (900m) was selected to cover half of the distance between adjacent turbines. These stations characterize habitat changes over time within the wind farm in general, representing potential cumulative effects of the wind farm in aggregate but are not associated with the enrichment hypothesis adjacent to the turbines. Turbines that are part of the fish pot survey will be additionally sampled at distance intervals that coincide with the locations of the fish pots; care will be taken to avoid interaction between the two surveys.

Eight replicate SPI/PV image pairs will be collected at each station; results from six replicate pairs with suitable quality images will be aggregated to provide a summary value for each metric by station.

To provide context for assessment of the potential enrichment effect, the vertical surfaces of all turbines selected for sampling will be surveyed using ROV (*see* Section 7.3.2). These visual surveys of the foundation (around the circumference and at different elevations from sediment surface to water surface) will provide information about cover of epifauna/epiflora on the turbine itself (the presumed source of benthic enrichment) and identification to the lowest practicable taxa without direct sampling of the turbine surface. This information will be considered as explanatory variables for the magnitude and range of benthic enrichment observed in the soft bottom habitat surrounding the turbines.

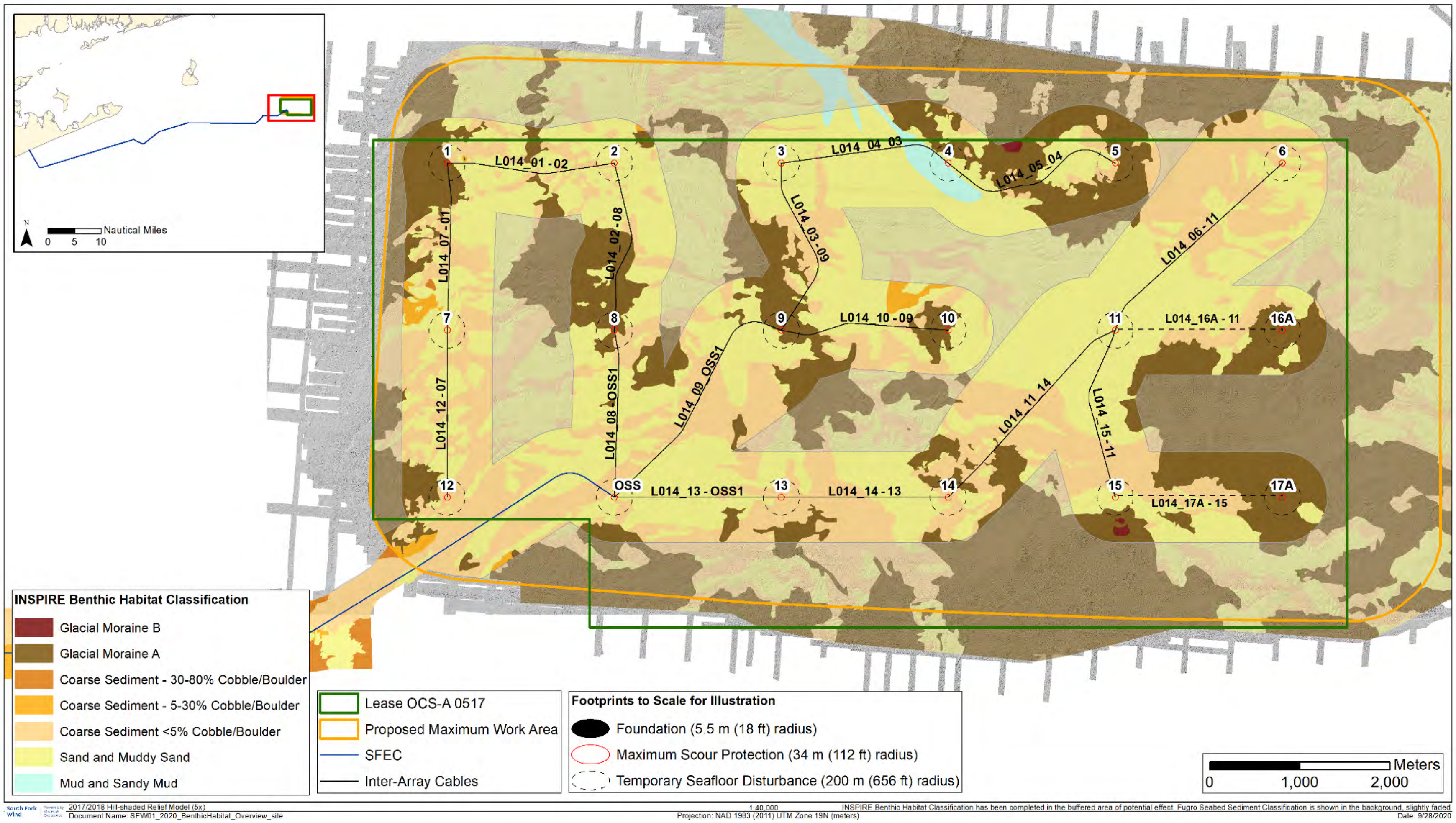

Figure 8. **Benthic habitat map around planned turbine and cable installations. For softbottom benthic survey, eight turbine foundations will be selected from this set to avoid boulder areas (glacial moraine), with consideration and coordination with fish pot survey planning.**

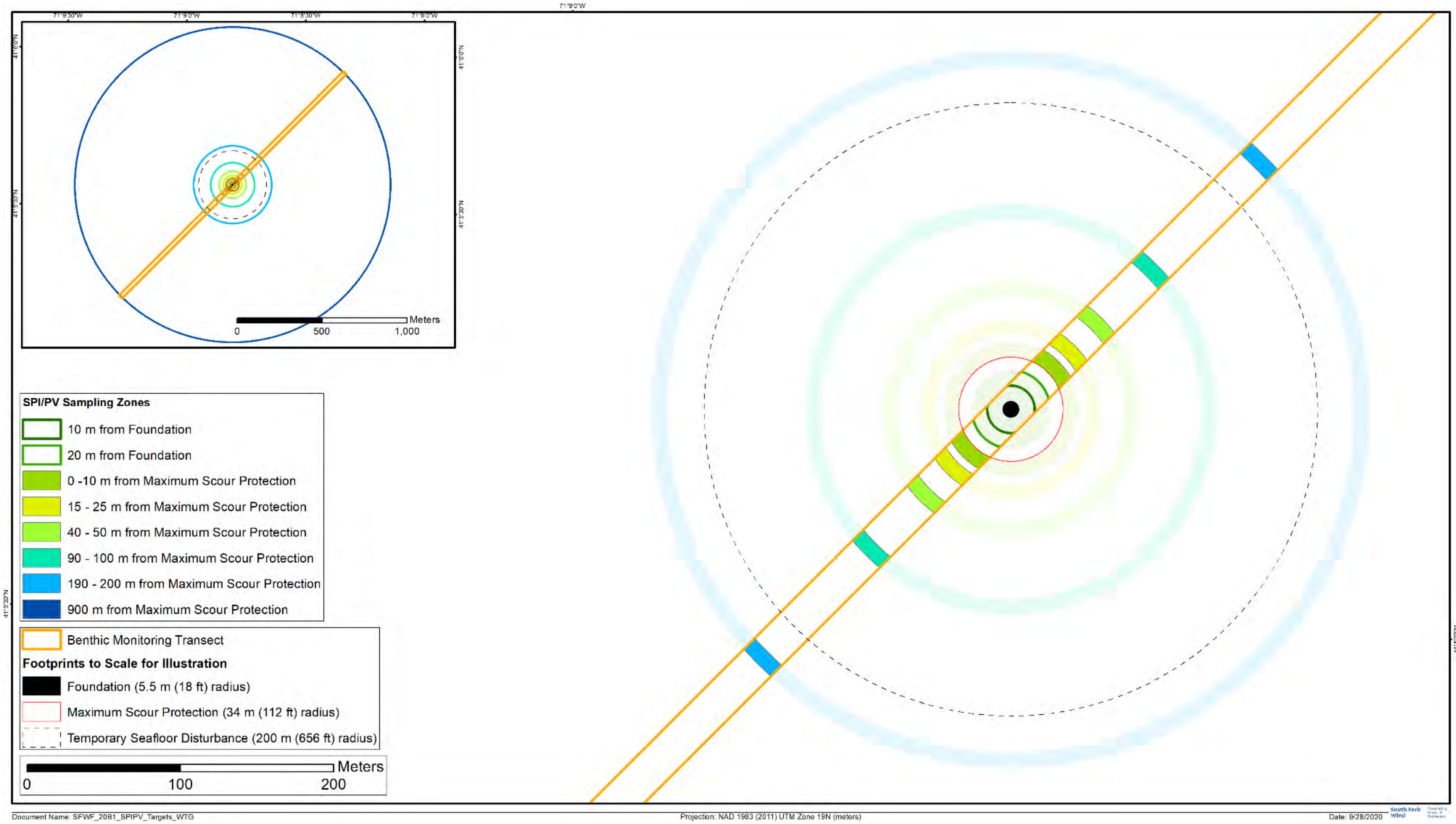

Figure 9. **Proposed soft bottom benthic survey sampling distances.**

7.1.3 Sampling Stations – South Fork Export Cable

The SFEC corridor includes a mix of soft bottom habitats ranging from coarse sand to sandy mud (Deepwater Wind South Fork 2020). The export cable transits areas with active commercial fishing with mobile gear including scallop dredging and trawling for groundfish and squid (Deepwater Wind South Fork 2020). The soft bottom survey sample design is focused on representative sections of the SFEC within areas with historically high fishing activity and areas with lower fishing activity.

Areas of coarse sand with > 30% cobbles or boulders are limited to the first 12 km of the cable route from the SFWF project site and a one km area near the NYS boundary (Figure 10). The effect of boulder relocation will be addressed in the hard bottom survey conducted within SFWF project area (Section 7.2).

The objectives of the soft bottom benthic survey at the SFEC are to examine the effects of installation and operation of an export cable on the benthic habitat using a BAG design (Ellis and Schneider, 1997). Any effects of installation and operation of the cable are expected to be roughly equivalent along the length of the cable. Some effects of installation may be altered by dredging or trawling activities as well as bottom sediment transport from tides and waves. The sampling design is intended to estimate effects along a spatial gradient away from the cable and will not estimate mean changes along the entire SFEC route. To accomplish the goals of this survey, data will be collected before construction and after operation of the SFEC at selected locations, using a BAG design similar to that proposed for the turbine foundations (Section 7.1.2). A 25m wide belt transect will be laid perpendicular to the cable route at six locations along the SFEC (Figure 9). A reconnaissance survey will be conducted prior to the first survey to define transect locations within sand habitats where there is a high expectation of sufficient fine sediment to support a robust benthic community with a measurable response to key variables of benthic health and sediment effects (aRPD, Successional Stage, grain size, sediment layering; *see* Section 7.5.1).

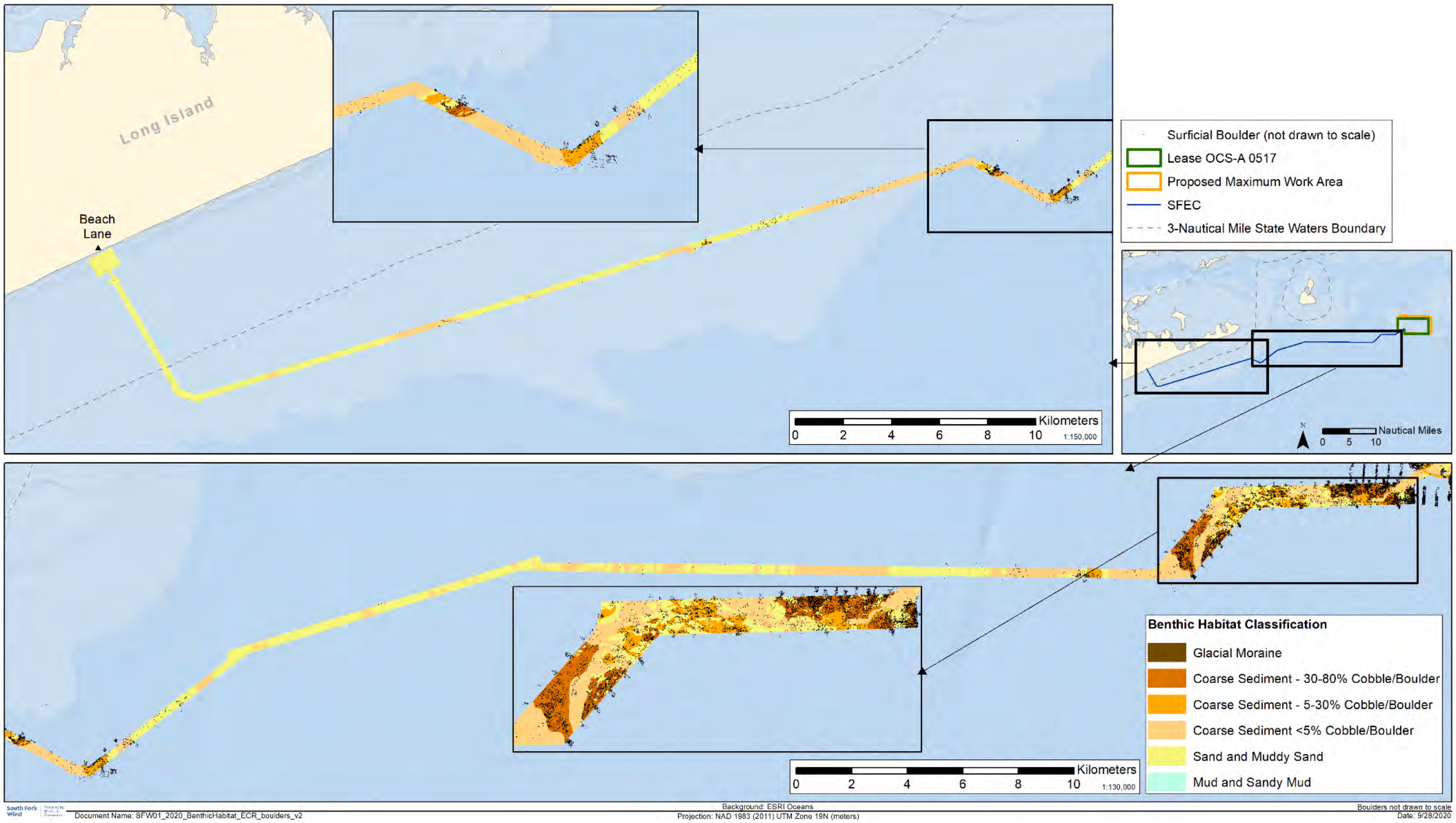

Figure 10. **Distribution of benthic habitats along the SFEC with black dots indicating locations of surficial boulders > 0.5 m.**

Three of the sampling locations will be distributed in an area where VTR data (2015-2016 or the most recent available) indicated an increased density of fishing activity, and the other three sampling locations will be distributed in similar habitat in areas with lower density of bottom contact mobile gear fishing activity. The process of cable installation will fluidize the sediments within an approximately ten meter wide band around the cable, altering the characteristics of the surface sediments down to two meters. Within the two areas (mobile gear fishing activity present or absent), sampling locations along the cable will be approximately one km apart. At each sampling location, SPI/PV images will be collected at intervals of 0-5, 10-15, 20-25, 30-40, 50-60, 90-100, 190-200, and 1000 meters on either side of the cable. The two sides of the cable are considered separate transects, for a total of six belt transects per area. The selected sampling locations and sampling intervals relative to the cable will remain fixed for the duration of the survey (Figure 11, Table 6). In previous SPI surveys of the SFEC (Deepwater Wind South Fork 2020), variability of habitat characteristics (i.e., aRPD, successional stage) was low among replicate SPI images, so fewer replicates are needed than for the survey at the turbine foundations were variability is expected to be higher. Four replicate SPI/PV images will be collected at each station; results from three replicates with suitable quality images will be aggregated to provide a summary value for each metric by station. An additional benthic survey of the SFEC will be conducted within NYS waters, which is presented in a separate monitoring plan (INSPIRE 2020).

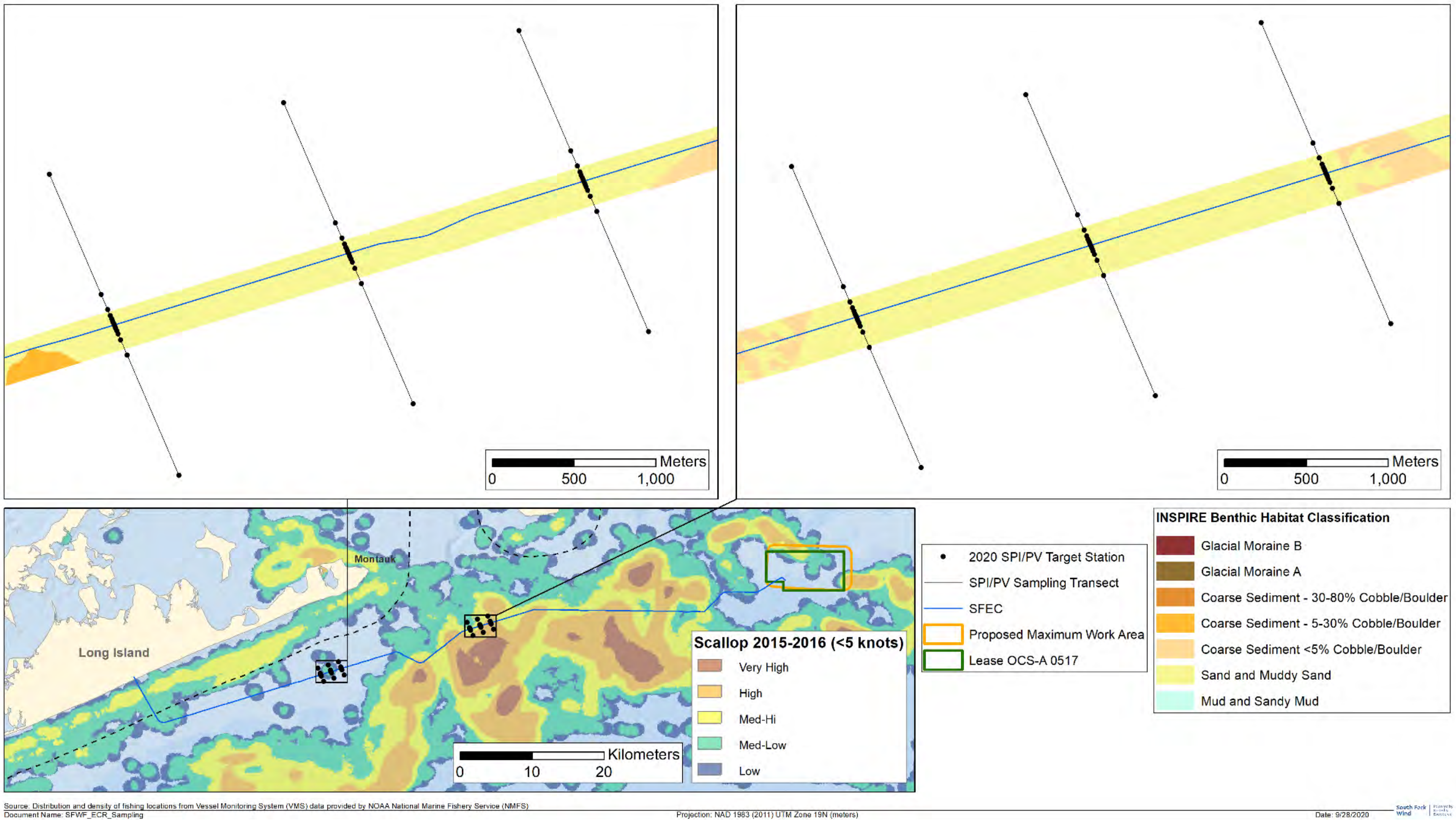

Figure 11. Proposed soft bottom benthic survey sampling design along the SFEC with black dots indicating SPI/PV stations situated along transect perpendicular to the SFEC.

7.2 Hard Bottom Monitoring

An acoustic and ROV video survey is planned to monitor hard bottom substrata within subareas of the SFWF project area. The SFWF benthic habitat includes areas with scattered boulders and cobbles on sandy substrata (Glacial Moraine A, Figure 6). Preparation of the seafloor for installation of the WTGs and IAC is expected to create clusters of natural hard bottom habitat subject to recolonization as well as discrete areas with increased rugosity and boulder density which can provide structural complexity and refuge for finfish and shellfish. Utilizing existing information about hard bottom habitat in areas expected to experience disturbance within the SFWF project area, two areas will be targeted for this survey: the IAC route south of WTG1 and IAC route north of WTG8 (Figures 12 and 13).

The primary objective for the hard bottom survey is to measure changes over time in the nature and extent of macrobiotic cover of hard bottom (i.e., percent cover and relative abundance of native vs. non-native organisms), contrasting undisturbed boulder areas with boulder areas disturbed by seafloor preparation activities for cable installation. The secondary objective is to characterize changes to the physical attributes of habitats in areas disturbed by seabed preparation for installation/construction: rugosity, boulder height, boulder density in relation to structural complexity and potential refuge for finfish and decapods.

Multibeam Echosounder (MBES) and side-scan sonar (SSS) surveys will be used to map hard bottom habitat within 12 months before (timed to avoid conflict with other surveying activities in the project area) and within one month after construction/installation is complete. From these detailed before-after acoustic maps, areas with modified boulder density (boulders > 1m in diameter) can be identified to form the sampling frames for the ROV video and imaging survey, as well as to characterize overall changes to the physical habitat attributes within the areas surveyed.

An ROV survey of boulders will be used to characterize macrobiotic cover of native vs. non-native species in the disturbed and undisturbed areas. A systematic random sample of boulders will occur within the sampling frames of disturbed/undisturbed areas approximately one month after seabed preparation (i.e. boulder relocation) has been completed, and again at six, 12, and 24 months (Table 5, based on observations at BIWF, Guarinello and Carey 2020). This design is based on an understanding of macrobiotic colonization of recently disturbed hard bottom habitat (Guarinello and Carey, 2020; De Mesel et al., 2015, Coolen et al., 2018), and detailed information of the distribution of hard bottom benthic habitat within the SFWF project area (Deepwater Wind South Fork 2020).

7.2.1 Survey Design/Procedures

Within the targeted areas (IAC routes south of WTG1 and north of WTG8), acoustic surveys will provide detailed maps of the seafloor and identify areas where boulders were undisturbed; and areas where boulders were relocated directly adjacent to the prepared IAC route (representing disturbed hard bottom; Figures 10 and 11). A single sampling frame will be identified within each of the disturbed and undisturbed areas for the two WTGs, placed to align with the presence of boulders based on the acoustic survey conducted immediately following seabed preparation for the cable installation. This type of non-probability (opportunistic) sampling will indicate macrobiotic cover within these areas but does not allow inference to the windfarm in general. A total of 20 random boulders from each sampling frame will be sampled using a systematic design.

Within one month after WTGs have been installed, an ROV will be used to collect reference images of the underwater surface of the turbine foundation to determine percent cover of macrofauna and microflora, native and non-native organisms and distribution of key suspension feeding organisms that could contribute to benthic enrichment (mussels, tube-building amphipods, etc.). ROV description and video collection methods are in Section 7.3.2.

The acoustic (SSS and MBES) and ROV surveys will be conducted from a research vessel with scientists onboard to collect acoustic data and images. The acoustic surveys of the two targeted areas will be collected in a single day and processed the following day; the ROV survey will be conducted immediately after processing of the acoustic data. Collecting seafloor imagery does not require disturbance of the seafloor or collection of physical samples. For-hire research vessels will be selected based on criteria such as survey suitability, experience, safety record, knowledge of the area, and cost. All survey activities will be conducted with strict adherence to Orsted health and safety protocols to reduce the potential for environmental damage or injury.

7.2.2 Sampling Stations

The primary objective for the hard bottom survey is to measure changes over time in the nature and extent of macrobiotic cover of hard bottom (i.e., percent cover and relative abundance of native vs. non-native organisms), in disturbed and undisturbed areas. A secondary objective is to characterize overall changes to physical hard bottom habitat as a result of seabed preparation for cable installation. Acoustic methods (SSS and MBES) will be used to map the distribution of hard bottom habitat before and within 1 month after seabed preparation for the cable installation. From these detailed before-after acoustic maps, areas with modified boulder density (boulders > 1m in diameter) can be identified to form the sampling frame for the ROV survey. The sampling will be conducted at regular distance intervals within a single sampling frame (5m wide and 200m or more in length) within each area (1 each in disturbed/undisturbed areas at WTG1 and WTG8, for a total of four frames), placed to capture sufficient density of boulders to sample. The ROV will progress along the centerline of each frame sampling boulders at 10m intervals until 20 samples have been obtained. Boulders may not be present at every planned interval, so sampling will progress as follows: the ROV will search within the 5m width of the sampling area in order to find a boulder to sample; the closest boulder to the target interval will be sampled, and the 10m interval will be reset. At each boulder, a photo image of a minimum 0.5m x 0.5m field of view of the visible portions of the boulder will be collected from which cover and native/non-native species will be identified. Data collected to inform the habitat characteristics for each sampling frame will include: rugosity and percent hard bottom to soft bottom from the acoustic surveys; height of boulder and percent cover of native and non-native species from the ROV survey.

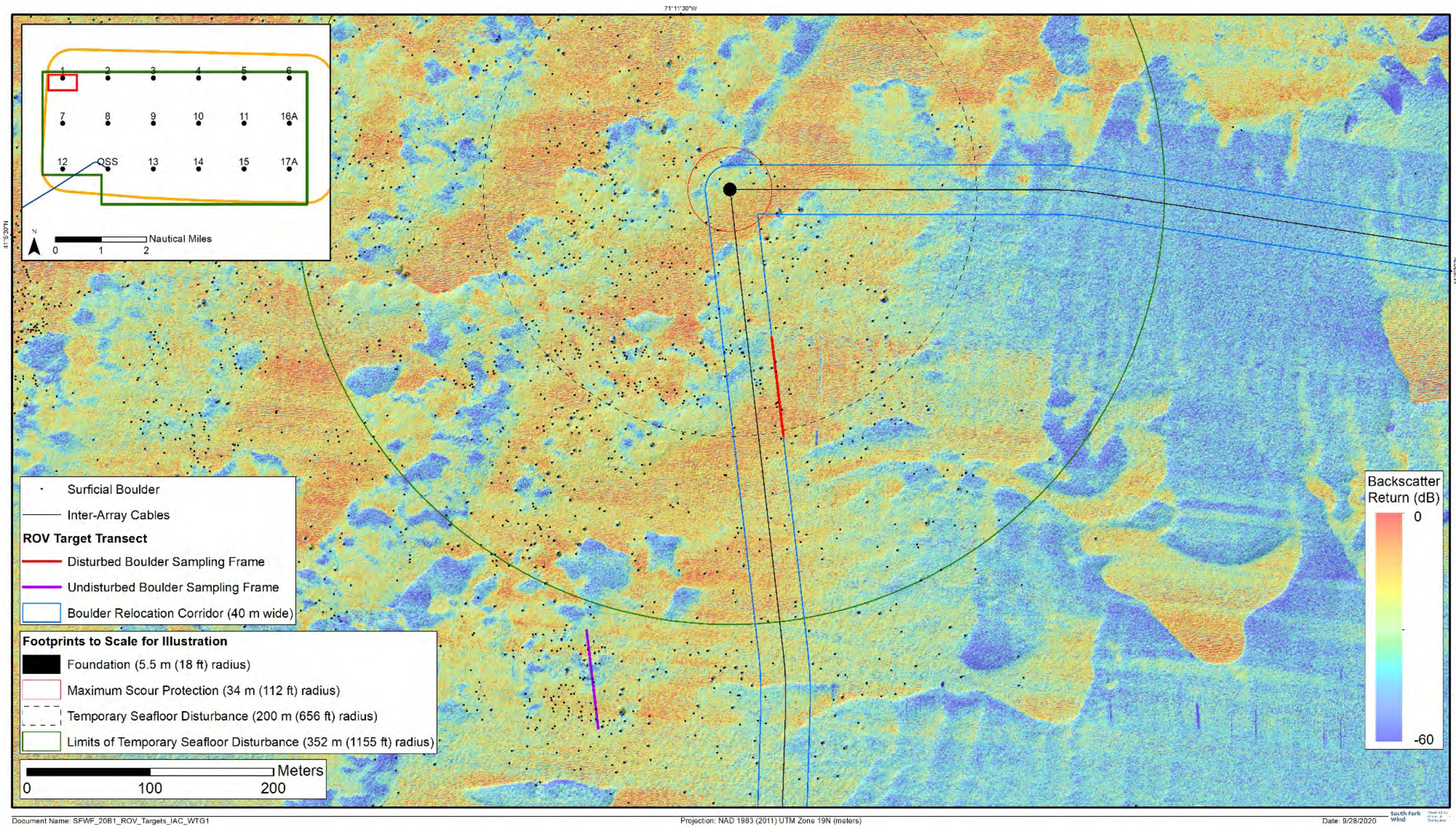

Figure 12. **Proposed hard bottom benthic survey sampling design along the IAC at WTG1.**

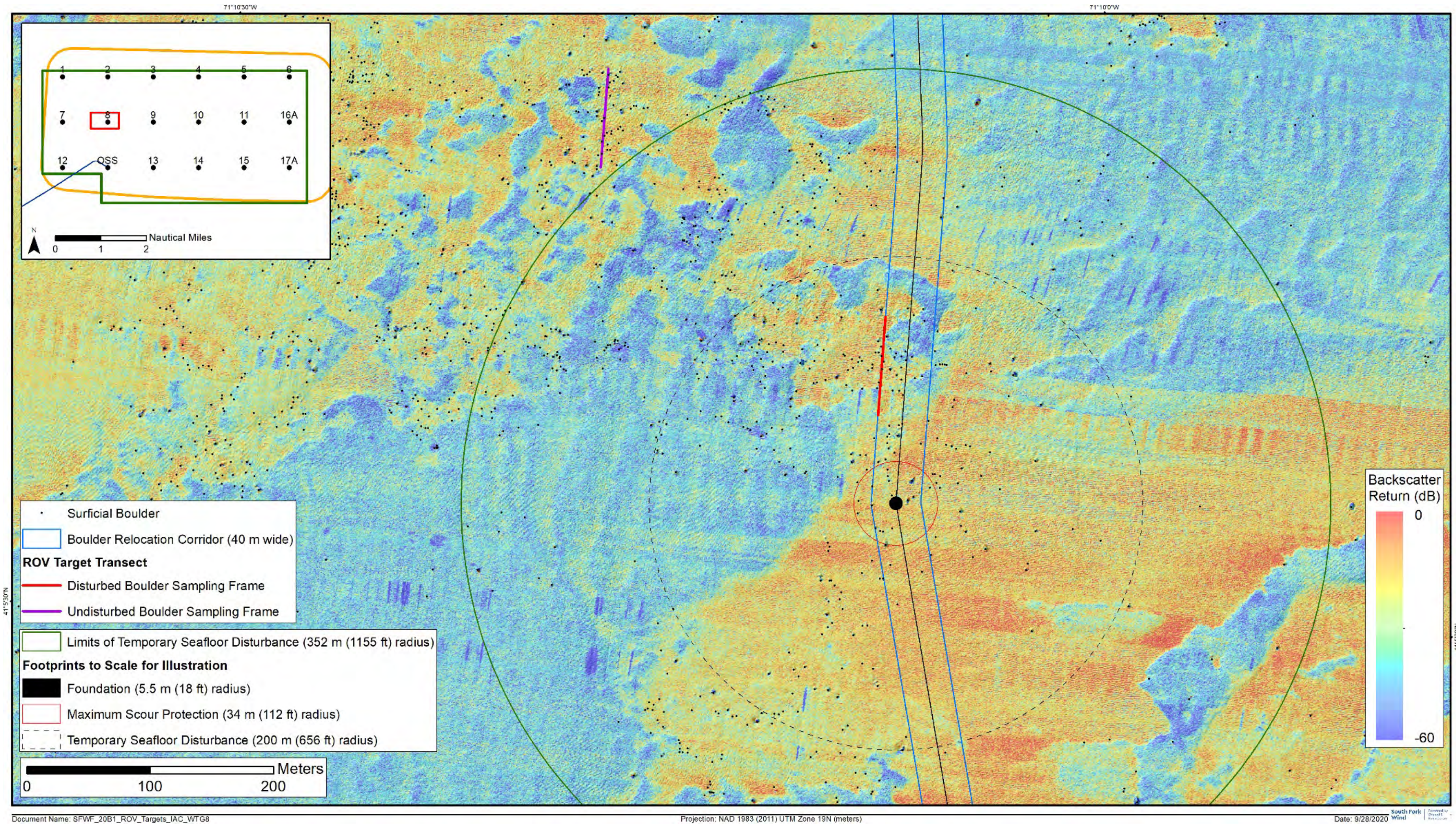

Figure 13. **Proposed hard bottom benthic survey sampling design along the IAC at WTG8.**

7.3 Field Methods General

A V102 Hemisphere vector antenna (or equivalent) will be deployed on the vessel to allow for accurate vessel heading as well as a differential position accuracy to within a meter. During mobilization, the navigator will conduct a positional accuracy check on the antenna by placing the antenna on a known GPS point and ensuring the antenna's position falls within a meter of the known coordinates. During operations, HYPACK Ultralite software will receive positional data from the antenna in order to direct the vessel to sampling stations.

The Field Lead Scientist will ensure that samples are taken according to the established protocols and that all forms, checklists, field measurements, and instrument calibrations are recorded correctly during the field sampling.

7.3.1 SPI/PV Field Data Collection

The SPI and PV cameras are state-of-the-art monitoring tools that collect high-resolution imagery over several meters of the seafloor (plan view) and the typically unseen, sediment–water interface (profile) in the shallow seabed. PV images provide a much larger field-of-view than SPI images and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint "optical core" of the sediment profile is taken. Unusual surface sediment layers, textures, or structures detected in any of the sediment profile images can be interpreted considering the larger context of surface sediment features. The scale information provided by the underwater lasers allows accurate density counts or percent cover of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may have been missed in the sediment profile cross section. A field of view is calculated for each PV image and measurements taken of parameters outlined in the survey workplan.

Once the vessel is within a 5 m radius of the target location, the SPI/PV camera system will be deployed to the seafloor. As soon as the camera system has made contact with the seafloor the navigator will record the time and position of the camera electronically in HYPACK as well as the written field log. This process will be repeated for the targeted number of SPI/PV replicates per sampling station (i.e., eight at the turbine foundations, four at the SFEC). After all stations have been surveyed the navigator will export all recorded positional data into an Excel sheet. The Excel sheet will include the station name, replicate number, date, time, depth, and position of every SPI/PV replicate.

Acquisition and quality assurance/quality control of high-resolution SPI images will be accomplished using a Nikon D7100 or D7200 digital single-lens reflex (DSLR) camera with a 24.1-megapixel image sensor mounted inside an Ocean Imaging Model 3731 pressure housing system. An Ocean Imaging Model DSC PV underwater camera system, using a Nikon D7100 or D7200 DSLR, will be attached to the SPI camera frame and used to collect PV photographs of the seafloor surface at the location where the SPI images are collected. The PV camera housing will be outfitted with two Ocean Imaging Systems Model 400 37 scaling lasers. Co-located SPI and PV images will be collected during each "drop" of the system. The ability of the PV system to collect usable images is dependent on the clarity of the water column, the ability of the SPI system to collect usable images is dependent upon the penetration of the prism.

7.3.2 Acoustic and Video Data Collection

Targeted high-resolution acoustic surveys (SSS and MBES) will be conducted over the selected IAC corridors after boulder relocation and again after all construction has been completed to map boulder locations within the survey areas. Survey areas will include existing undisturbed boulder distributions in selected areas adjacent to the IAC corridor to facilitate comparison between disturbed and undisturbed boulders. Existing MBES and SSS data will be used to define the survey areas (Figures 12 and 13).

High resolution video and still images will be acquired at targeted hard bottom areas and turbine foundations with a small remotely operated video system (ROV) comparable to a Seatronics Valor ROV (https://geo-matching.com/rovs-remotely-operated-underwater-vehicles/valor). The positioning components of the ROV would include a surface differential positioning system, an Ultra Short Baseline (USBL), as well as ROV-mounted motion and depth sensors. The USBL transceiver will communicate with acoustic beacons mounted onto the ROV allowing for the vehicle's depth and angle in relation to the transceiver to be known. Adding in the motion and depth sensors on the ROV, all this information will be connected into the ROV navigation software simultaneously tracking both the vessel's position and the ROV's position accurately.

In addition to accurate ROV positioning components, the vehicle will be equipped with powerful thrusters in both horizontal and vertical directions, creating confidence for operating in areas with higher currents. The vehicle will also be equipped with several pilot aids including, auto heading, auto depth, and auto hover. Using these tools, the ROV cameras can focus on any specifically selected habitat features during the survey allowing for better visual observations by scientists. The ROV will also allow location of boulders independent of the vessel and without relying on the vessel speed. With an umbilical and ROV operator controls, the hard bottom habitats can be mapped thoroughly in a shorter time span than a towed video system.

The ROV will supply live video feed to the surface using HD video and UHD still cameras. One pair of cameras will be downward facing to observe and capture high resolution images of seafloor surface conditions while another pair will face forward to collect data on vertical surfaces and avoid collisions. Aiding in the visual data will be high lumen LED lights that will be mounted onto the ROV frame. With sufficient lighting the images transferred to the surface will be clear, allowing for real time observations and adaptive sampling. The recorded video will be transferred to the surface through the ROV's umbilical and recorded using a Digital SubSea Edge DVR video inspection system (or equivalent). The system will provide simultaneous recording of both high definition cameras as well as the ability to add specific transect data overlays during operations. The data overlay will include ROV positioning, heading, depth, data and time as well as field observations.

The ROV will also contain a manipulator arm and basket to collect voucher specimens of encrusting species to ensure accurate identification. Some species such as *D. vexillum* require microscopic investigation to accurately identify.

7.4 Data Entry and Reporting

Data management and traceability is integral to analysis and accurate reporting. The surveys will follow a rigorous system to inspect data throughout all stages of collection and analysis to provide a high level of confidence in the data being reported. Following data entry, all spreadsheets will be proofread using the original handwritten field log. This review will be performed by someone other than the data entry specialist.

SPI and PV image QC checks include comparison of date/time stamps embedded in the metadata of every SPI and PV image to the field log and navigation times to ensure that that all images are assigned to the correct stations and replicates. Computer-aided analysis of SPI/PV images will be conducted to provide a set of standard measurements to allow comparisons among different locations and surveys. Measured parameters for SPI and PV images will be recorded in Microsoft Excel© spreadsheets. These data will be subsequently checked by senior scientists as an independent quality assurance/quality control review before final interpretation is performed. Spatial distributions of SPI/PV parameters will be mapped using ArcGIS.

During field operations, daily progress reports will be reported through whatever means are available (email, text, phone). Upon completion of the survey all analyzed images as well as a data report with visualizations will be provided.

7.5 Data Analysis

7.5.1 Soft Bottom SPI/PV

Seafloor geological and biogenic substrates will be described from SPI/PV using the Coastal and Marine Ecological Standard (CMECS; FGDC, 2012). The Substrate and Biotic components of CMECS will be used to characterize sediments and biota observed. The SPI/PV image analysis approach is superior to benthic infaunal sampling approaches because SPI/PV is more cost effective and more comprehensive. Analysis costs for benthic biological characterization using SPI/PV can be up to 75% lower than those of infaunal abundance counts derived from grab samples. Infaunal abundance assessments provide a limited view of benthic conditions whereas SPI/PV provides a more holistic assessment of the benthos that includes the relationship between infauna and sediments (Germano et al., 2011). Although infaunal abundance values are not generated from SPI/PV analysis, lists of infaunal and epifaunal species observed in SPI/PV images, the percent cover of attached biota visible in PV images, presence of sensitive and invasive species, and the infaunal successional stage (Pearson and Rosenberg, 1978; Rhoads and Germano, 1982; and Rhoads and Boyer, 1982) will be provided as part of the benthic biological assessment.

Indicators of benthic function (bioturbation and utilization of organic material) include infaunal succession stage, feeding voids, methane, *Beggiatoa* and apparent redox potential discontinuity.

The boundary between colored ferric hydroxide surface sediments and underlying gray to black sediments is called the apparent redox potential discontinuity (aRPD). The aRPD is described as "apparent" because of the potential discrepancy between where the sediment color shifts and the complete depletion of dissolved oxygen concentration occurs due to the lag time between when the redox potential (Eh) reaches 0 millivolts (mV) and the precipitation of darker sulfidic sediments (Jorgensen and Fenchel, 1974). However, the mean aRPD measured in SPI is a suitable proxy for the RPD with the depth of the actual Eh = 0 horizon generally either equal to or slightly shallower than the depth of the optical reflectance boundary (Rosenberg et al., 2001; Simone and Grant, 2017). Factors that influence the depth of the aRPD include biological processes such as respiration and bioturbation and physical processes including advection and diffusion. The mean aRPD depth also can be affected by local erosion or physical disturbance. Scouring can wash away fines and shell or gravel lag deposits and can result in a very thin surface oxidized layer. In sandy sediments that have very low sediment oxygen demand (SOD), the sediment may lack a visibly reduced layer even if an RPD is present. Because the determination of the aRPD requires discrimination of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the aRPD in well-sorted sands of any size that have little to no silt or organic matter in them. When using SPI technology on sand bottoms, estimates of the mean aRPD depths are often indeterminate with conventional white light photography. For these reasons, the SFEC transects will be located in sandy sediments with sufficient silt to measure aRPD.

Additionally, the benthic macrohabitat (*sensu* Greene et al. 2007) types observed in the SPI/PV survey of the project area will be described. Differences in abiotic and biotic composition of macrohabitats will be compared between pre- and post-construction surveys. In particular, composition and total percent cover of attached fauna on the scour mat and changes in benthic community with distance from the scour mat will be evaluated.

The approach for data analysis of the SPI/PV dataset will include modeling (e.g., GLM, GLMM, or GAM) of individual metrics that are consistently measured across stations (e.g., aRPD, Successional Stage, feeding voids). Covariates in the model for the turbine foundation dataset will include direction (categorical) and distance (continuous) from the turbine; variability among turbines will provide site-wide random error. Additionally, graphical methods and descriptive statistics will be used to assess changes in these metrics over time, as a function of distance and direction from the turbines. These graphical techniques may help to elucidate the spatial scale at which the greatest changes in benthic habitat quality occur.

7.5.2 Hard bottom Video

Video imagery will be reviewed during acquisition and observations will be logged to document biological species and geological features for each video transect. A video viewer will be used to view logs, photos and videos and confirm or add annotations. The system has the capability of taking stills from all the input video signals to document features of interest.

Hard bottom habitat quality will be summarized using the acoustic dataset. For each sampling frame rugosity, boulder height and the ratio of hard bottom to soft bottom habitat will be mapped and quantified. Video from ROV will be used to provide additional qualitative details of habitat quality including presence of fish and decapods, presence of refuge and surrounding substrata (sediment type).

Growth of macrobiotic cover will be summarized for each sampling frame from observations taken with the ROV survey. Mean macrobiotic cover and relative abundance of native vs. non-native species will be summarized for each sampling frame. The mean values may be statistically compared between disturbed and undisturbed areas, specifically for changes over time.

Table 6. Summary of planned analyses for the benthic monitoring surveys.

Report Section	Survey	Design type	Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
7.1.2	Benthic Survey (SPI/PV) - SFW	BAG	Impact only (no reference sites); stns at distances ranging from ~10m to ~900m from turbines; 2 directions from each turbine along prevailing current (NE-SW); single season	**Sampling frame** = turbines with soft bottom in NE-SW directions **Observational unit** = SPI/PV station (turbines randomized first survey event, then fixed throughout study; stations randomized every survey; replicate images are subsamples) **Response variable** = mean or max per station depending on metric. **Error variance** = among stations at the same distance-direction (turbines provide replication)	**SPI**: aRPD, Successional Stage, penetration, methane, beggiatoa **PV**: cover (macrobiota, shells, cobble), presence/absence of sensitive or invasive species	What is the pattern of temporal change (B/A) in metrics relative to direction and/or distance from turbine?	Fit the GLM (or GLMM or GAM) that best describes the data; compare the coefficient (B/A) for the distance effect. Calculate similarity between stations; graphically depict relationships between stations from different years, directions, or distances with nMDS.
7.1.3	Soft Bottom Benthic Survey (SPI/PV) - SFEC	BAG	Impact only (no reference sites); stns at distances ranging from ~5m to ~1km from cable; 6 transects in each area with/without bottom disturbance from fishing activity; single season.	**Sampling frame** = two soft bottom areas of SFEC **Observational unit** = SPI/PV station (transects randomized first survey event, then fixed throughout study; stations randomized every survey; replicate images are subsamples) **Response variable** = mean or max per station depending on metric. **Error variance** = among stations at the same distance-direction (transects provide replication)	**SPI**: aRPD, Successional Stage, penetration, methane, beggiatoa **PV**: cover (macrobiota, shells, cobble), presence/absence of sensitive or invasive species,	What is the pattern of temporal change (B/A) in metrics relative to distance from cable?	Fit the GLM (or GLMM or GAM) that best describes the data; compare the coefficient (B/A) for the distance effect. Calculate similarity between stations; graphically depict relationships between stations from different years or distances with nMDS.
7.2	Hard Bottom Benthic Survey (ROV)	SS	Disturbed and Undisturbed at two WTGs; random samples; single season.	**Sampling frame** = Boulders within Disturbed and Undisturbed hardbottom near WTG1 and WTG8 **Observational unit** = imaged quadrat (on systematically sampled boulders within frame) **Response variable** = macrobiotic cover, relative abundance of native vs invasive. **Error variance** = among samples within same treatment (disturbed/ undisturbed) and turbine	**ROV**: cover (macrobiota, relative abundance of native vs. invasive).	What is the magnitude of difference in mean response between disturbed and undisturbed areas, at each survey event?	Estimate 90% CI on the difference of means for disturbed and undisturbed areas, at each survey event.

Definitions:
BAG = before after gradient
90% CI = 90% confidence interval
SS = Systematic (random) sampling

7.5.3 Regional Comparable Datasets

SPI/PV surveys have been conducted for the Block Island, South Fork, Revolution, and Sunrise Wind Farms, and their respective cable routes. Vineyard Wind has a drop camera survey planned for both of their offshore wind leases. The SPI/PV survey will be conducted using methods comparable to those developed by the UMASS Dartmouth School for Marine Science & Technology (SMAST) as part of a regional sea scallop survey (Bethoney and Stokesbury, 2018). The method has been utilized for other image-based surveys and is appropriate for this use. A camera system is dropped to the seafloor and samples four quadrats at defined stations in an area and captures digital images analogous to the PV images outlined above.

8.0 Data Sharing Plan

The fisheries monitoring data associated with the gillnet survey, beam trawl survey, ventless trap survey, fish pot survey, and benthic habitat monitoring are being stored and curated by Inspire Environmental. Fisheries monitoring data will be shared with regulatory agencies and interested stakeholders upon request. Data sharing will occur on an annual cycle, which may be unique to each survey, and all data will be subject to rigorous quality assurance and quality control criterion prior to dissemination.

Individuals seeking access to the data will be required to provide a formal written data request to Inspire Environmental. As part of the data request, a brief proposal will be required which includes a description of the data that is being requested (e.g., survey type, timeframe, geographic boundaries), the intended use of the data, a list of coauthors and their affiliations, and details regarding the anticipated products of the work (e.g., stock assessment, fishery management plan, thesis, manuscripts). Data Access Conditions and Protocols are also being developed, which will outline specific conditions associated with obtaining access to the data. Raw data (i.e., station level catch, biological data, and environmental data) can be requested, and will be distributed, provided that the criteria outlined in the Data Access Conditions and Protocols are met. In most cases, the SFW team anticipates that data requests can be accommodated electronically on an individual basis, and that individuals requesting data access will be given a unique username and password, which will be used to securely facilitate electronic data transfers.

The SFW team acknowledges that regional guidance related to data sharing and data storage for fisheries monitoring studies is being developed cooperatively through ROSA. To that end, the data sharing agreement outlined above may evolve over time as regional guidance is developed.

SFW will coordinate with our scientific contractor to host an annual workshop at the conclusion of each year of field work. This event will help to explain the methodology and disseminate the results of the monitoring and will provide a forum by which the project team can receive input and feedback. The event will be open to all regional stakeholders, but efforts will be made to encourage the attendance of regional fishermen, particularly those individuals whom have been contracted to conduct the field work.

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APPENDIX A
Record of Stakeholder Engagement

September 2020

South Fork Wind | Powered by Ørsted & Eversource

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
11/14/18	BOEM, CFRF, CT DEEP, MA DMF, MA CZM, NMFS, NYS DEC, NYS DOS, NYS DPS, RI CRMC, RI DEM, RISAA, Individual fishermen	Emails from SFW and recipient responses are attached to Exhibit 1 to Appendix A	Distribution of Gillnet monitoring plan for comment	• Need for power analysis to determine level of sampling • Seasonal sampling inadequate • More specifics needed on gear used • More detail needed on survey of and impacts on specific species • Gillnets alone not enough to sample area	• Power analysis attempted but lack of comparable data prevents adequate analysis; later conducted for beam trawl and ventless trap survey (see Appendices B and D) • Monthly sampling added • Gear specifics added to plan • Additional gear types considered for sampling at SFWF; later incorporated into Fisheries Monitoring Plan (FMP) (Sections 3.0, 4.0, 5.0, 6.0, 7.0)
3/25/19	BOEM, CT DEEP, MA CZM, MA DMF, NMFS, NYS DEC, NYS DOS, RI DEM, USACE	Webinar; See Exhibit 2 to Appendix A	Review of FMP and received comments	• Additional sampling types needed including benthic • Better definition of research questions • Need to consider regional approach to sampling • More detail on how reference areas selected • Talk one on one with gillnetters to refine reference areas • Request for comment tracker	• Several other gear types under consideration for surveys; later incorporated into FMP • Regional research plan under development but permitting requirements dictate project-level plans • Language updated to address survey goals and selection of reference areas (Section 2.2) • Discussions lined up with gillnet fisherman (see below) • Comment tracker prepared

[1] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; SFW – South Fork Wind, LLC; USACE – United States Army Corps of Engineers

[2] Please see documents attached in the exhibits to this Appendix A for all the written comments received and considered. The purpose of this table in Appendix A is to present a summary of key comments received (written and verbal).

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
3/26/19	RI CRMC	RI CRMC Offices, Wakefield RI	Review of FMP and received comments	• Agreed gillnet and beam trawl surveys are appropriate and will complement each other • Look at Anna Malek's thesis results • Consider highly migratory species (HMS), coordinate with hook and line and headboats	• Additional gears under consideration; later added to FMP (Sections 4.0, 5.0, 6.0, 7.0) • Thesis results utilized to assess beam trawl design • Support for HMS project later added to FMP (Section 6.0)
3/27/19	BOEM, CT DEEP, MA CZM, MA DMF, NMFS, NYS DEC, NYS DOS, RI DEM	Webinar; See Exhibit 2 to Appendix A	Review of FMP and received comments	• Need to consider regional approach to sampling • Good to include two reference areas • May be worthwhile to narrow scope of gillnet survey and target what is in the area and what data can be captured • Restrict gillnets to tie down and one mesh size • Opportunity to deploy acoustic receivers to gather more information on tagged species in area • Request to consider how to replace NMFS stock assessments	• Regional research plan under development but permitting requirements dictate project-level plans • Sampling may be restricted to spring/fall based on input from industry, may narrow focus to monkfish and skates; later updated to spring and fall sampling season and changed gear to one mesh size using tie downs in FMP (Sections 2.2, 2.3) • Acoustic telemetry is under consideration for additional monitoring; later incorporated into FMP (Section 6.0)
4/26/19	Capt. Greg Mataronas	ALWTRT meeting, Providence, RI	FMP; gillnet survey design	• Fleet does not fish in summer due to presence of sharks and sea turtles • No fishing in winter due to no catch and weather • Provided specifics on gear dimensions	• Modified sampling to spring/fall when commercial fleet fishes and to avoid interactions with protected species (Section 2.2) • Winter season eliminated; many other surveys do not fish when resources are not in area (BIWF lobster survey) (Section 2.2)

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
				• Comparable reference areas will be difficult to locate	• Incorporated gear specifics into plan (Section 2.3) • Will reach out to additional industry and state agencies for input on comparable ref areas (see below)
6/13/19	BOEM, CFRF, CT DEEP, MA CZM MA DMF, MA FWG, NMFS, NYS DEC, NYS DOS, NYS DPS, RI CRMC, RI DEM, RISAA, Individual fishermen	Emails from SFW and recipient responses are attached to Exhibit 3 to Appendix A	Distribution of updated version of FMP for comment	• Beam trawl is good compromise as additional gear due to otter trawling not being possible at site • Adaptive sampling approach is good strategy in absence of background data for gillnet power analysis • Gillnet and beam trawl alone still not enough to adequately sample area • Acoustic monitoring should occur before, during, and after construction • Concern about maintaining control areas located in the wind farm lease area • Concerns with data-sharing among stakeholders	• Additional gears still under consideration for site; later added to FMP (Sections 4.0, 5.0, 6.0, 7.0) • Power analysis for beam trawl ongoing; see Appendix B
8/20/19	RI CRMC Habitat Advisory Board (HAB)	URI Coastal Institute, Narragansett, RI	Project update including fisheries monitoring	• Concerns with gillnet and protected species interactions in April/May • Consider acoustic receivers in use and placed on foundations in the future	• This is the time of year the gillnet fishery occurs in the area • Acoustic telemetry under consideration for additional monitoring; later added to FMP (Section 6.0)
9/9/19	RI CRMC Fishermen's Advisory Board (FAB)	URI Coastal Institute, Narragansett, RI	Project update including fisheries monitoring	• Surveys already too late as Geophysical and Geotechnical (G&G) vessels impacting area	• Important to continue to develop plan quickly to sample • Ensure reference areas outside of geophysical survey footprint

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
				• Gillnet and beam trawl alone still not enough to adequately sample area • No consideration for recreational interests; particularly HMS; no rod and reel survey	• Additional gears still under consideration for site; later added to FMP (Sections 4.0, 5.0, 6.0, 7.0) • Rod and reel survey for cod did not result in many samples; difficult to standardize; Highly Migratory Species (HMS) are being considered, , candidate for acoustic telemetry; later added to FMP (Section 6.0)
9/19/19	Capt. Mike Marchetti	F/V Mister G, Point Judith, RI	Beam trawl gear overview and discussion	• Provided specifics on areas to tow and showed beam trawl used in previous work	• Details of gear incorporated into plan and tow areas considered in development of new reference areas (Sections 3.2, 3.3)
9/27/19	Capt. Mike Monteforte	F/V Second Wind, Point Judith, RI	Discuss otter trawling in SFW	• Provided tow tracks of area towed within SFW • Discussed time of year his target species occur in area	• Determined that based on his tow tracks, towable area is too narrow and short for conducting full survey • He only fishes at SFW for a short time period so not conducive to full year survey
9/30/19	RI CRMC FAB	URI Coastal Institute, Narragansett, RI; Subsequent communications with the RI CRMC FAB included in Exhibit 4 to Appendix A	Marine Affairs and FMP updates	• Sampling gillnet once per month is not enough, may miss things • Reference areas need to be relocated far from development areas • Lobster survey should be extended to Nov. as lobsters still around in numbers	• Sampling increased to twice per month; up to five strings per set (from two initially) (Sections 2.2, 2.3) • Work will be done to consult with industry members, agencies, and review other studies to identify suitable reference areas; conducted later and outlined in Exhibit 4 to Appendix A • Lobster survey protocol updated to include Nov. sampling
10/8/19	Capt. Mike Marchetti	F/V Mister G, Point Judith, RI	Overview of previous beam trawl work and reference site discussion	• Provided tow tracks and information on previous work • Identified areas appropriate for beam trawling to use as reference areas	• Information provided used in part to identify new reference areas for both gillnet and beam trawl outlined in Exhibit 4 to Appendix A

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
10/29/19	RI DEM	RI DEM Offices, Jamestown, RI	Discussion on reference areas for fisheries monitoring	• Understands difficulties in designing gillnet survey and is happy with Ørsted's approach; beam trawl also a welcomed addition • Proposed Reference Area East should be moved north to accommodate rocky area • Expand on data sharing approach	• Reference Area East moved north to accommodate this recommendation (Sections 2.2, 3.2) • Data sharing language added to next version of FMP (Section 8.0)
11/7/19	RI CRMC	RI CRMC Offices, Wakefield RI	FMP update	• Suggest consulting with MA DMF on plan and reference site locations • Supportive of approach to identifying reference sites • Suggest another follow-up with RI DEM on power analysis approach	• Meeting scheduled with MA DMF to review plan and discuss control site locations; see below • Follow-up with RI DEM scheduled to discuss power analysis; see below
11/21/19	RI DEM	RI DEM Offices, Jamestown, RI	FMP power analysis	• Suggest sampling more in year 1 for gillnet then conduct power analysis on those data to determine subsequent sampling levels	• Adaptive sampling approach adopted for gillnet and beam trawl going forward
11/22/19	MA DMF	SMAST/MA DMF offices, New Bedford, MA	FMP overview	• Welcome opportunity to meet and be kept up to date • Important ventless survey methodologies line up across groups, data very important • Stomach content analysis important, glad to see it incorporated	• Ventless survey design still in development and will look to align with other regional surveys as much as possible; protocol later added to FMP (Section 4.0) • Monkfish and skate stomach analysis added to gillnet plan per MA DMF request (Section 2.4)
11/22/19	MA FWG	SMAST/MA DMF offices, New Bedford, MA	Project updates and FMP overview	• Will exempted fishing permits be needed for surveys?	• Letter of Acknowledgement (LOA) needed (confirmed by D. Christel from GARFO)

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
				• There is a need for acoustic tagging • More gear types needed to monitor site	• Acoustic telemetry being considered and may support BOEM funded cod project currently underway; later added to FMP (Section 6.0) • Additional gears under consideration and in development; later added to FMP (Sections 4.0, 5.0, 6.0, 7.0)
11/26/19	CFRF, CFCRI	CFRF offices, Kingston, RI	FMP	• Gillnet and beam trawl not sufficient to sample area • Trawl survey should be conducted, talk with Capt. Monteforte • Fish pots also good gear to consider for structure associated species	• Additional gear types still under consideration, including fish pot; later added to FMP (Sections 4.0, 5.0, 6.0, 7.0) • Based on meeting with Capt. Monteforte trawl survey not possible as towable area is too narrow and short
2/6/20	RI DEM	RI DEM Offices, Jamestown, RI	Power analysis	• Current approach is good but worries level of sampling in year 1 is still too low; acknowledges determining what is enough is difficult • Would like species specific approach conducted in future analyses	• Will proceed as planned and adjust as actual survey sampling dictates if needed • Will conduct species specific analysis after year 1 when sufficient data are available
2/6/20	Capt. Ken Murgo	INSPIRE office, Newport, RI	Fish pot overview	• Provided fish pot gear overview and characteristics	• Information to be incorporated into potential fish pot protocol; later added to FMP (Section 5.0)
2/10/20	RI CRMC FAB	URI Coastal Institute, Narragansett, RI	Project updates and FMP	• Is distance of new reference sites adequate? • Suggest having workshop to formulate whole research plan that is amenable to all	• 24km from impact site considered sufficient. Acoustic studies suggest this distance is more than adequate • CFRF agreed to host workshop in March, SFW team will participate (see below)
3/11/20	CFRF, CRMC, RI CRMC FAB, NOAA/NMFS, RIDEM, RISAA, Vineyard Wind, Industry members	URI Coastal Institute, Narragansett, RI	Fisheries monitoring workshop	• Need to consider more gear types: rod & reel, acoustic telemetry, ventless trap, fish pot	• Protocols for ventless trap, fish pot, benthic monitoring (SPI/PV) and support for two regional telemetry studies all to be developed; later

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
				• Sampling along cable routes must be considered • Largest effects may happen near turbines (European studies) so may consider Before-After-Gradient (BAG) study design for some surveys • G&G surveys having impacts, need to know effects of these surveys on fish	added to FMP (Sections 4.0, 5.0, 6.0, 7.0) • SPI/PV being considered for scallops on cable route, benthic habitat; later added to FMP (Section 7.3) • BAG design incorporated into fish pot and wind farm benthic survey designs (Section 5.0 and Section 7.0) • More information was gathered from site investigation team to incorporate into plan (Appendix C)
4/21/20	BOEM, NOAA/GARFO, NOAA/NMFS	Conference call	Protected species and permitting requirements	• Glad to see modifications to gillnet survey but may not be enough • Need more information on how takes will be handled • Ørsted must decide which surveys will apply for LOA or Exempted Fishing Permit (EFP) (longer process)	• In case of takes, will follow observer program sampling protocols, will add language to plan (Sections 2.3, 3.3, 4.3, 5.3) • Will work with contractor conducting the work to determine which permit is needed and they will apply • Gear modifications to reduce protected species interactions added to the plan (Sections 2.1. 4.1. 5.1)
5/11/20	BOEM, CT DEEP, MA DMF, NEFMC, NOAA/GARFO, NOAA/NMFS, NYS DEC, NYS DOS, NYSERDA, RI CRMC, RI DEM, RODA, ROSA, USACE	Emails from SFW and recipient comment responses are found in Exhibit 5 to Appendix A	Distribution of Final Fisheries Management Plan	• Comments and feedback solicited through agency webinar (see below)	• Includes gillnet and beam trawl surveys and updated with ventless lobster trap, fish pot BAG, benthic monitoring (cable and wind farm BAG), support for two acoustic telemetry projects
5/22/20	BOEM, CT DEEP, MA CZM, MA DMF, NOAA/NMFS, NYS DEC, NYS DOS, RIDEM	Webinar; See Exhibit 6 to Appendix A	Updated Final Fisheries Monitoring Plan	• Agencies requested to provide written comments on plan provided 5/11/20 (See Exhibit 5 for comments submitted; comments received from agencies	• Data Sharing Plan added to the Monitoring Plan (Section 8.0) • Substantial revisions made throughout plan following written comments • Addition of a summary table of research questions and statistical

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact	Summary of Key Comments[2]	Response Summary
				between 6/9/20 and 7/13/20) • More details needed on adaptive sampling strategy • Power analysis needed for the ventless trap survey. • Data sharing needs to be clarified • Conductivity-temperature-depth profilers (CTDs) should be used to sample water column profile.	analyses (Sections 3.0, 4.0, 5.0, 7.0). Clarification of objectives • Power analyses performed for ventless trap survey (See Appendix D); further details provided on adaptive sampling design (Sections 2.6, 3.7, 5.7) • CTDs will be used to collect a vertical profile of the water column (Sections 2.5, 3.4, 4.4, 5.5)

APPENDIX B
Power Analysis for Beam Trawl Survey of Fish and Invertebrates

September 2020

South Fork Wind | Powered by Ørsted & Eversource

1.0 Introduction

For the beam trawl survey, a Before-After-Control-Impact (BACI) survey design is planned for the South Fork Wind Farm (SFWF), largely to capture benthic species and smaller fishes in this area where physical constraints make it difficult to survey using other gear types. EXA conducted an assessment for South Fork Wind, LLC and two topics are included within this appendix:

1. A review of an existing beam trawl dataset in the vicinity of the SFWF (Malek 2015) to establish the proximate range of a meaningful effect size in measuring change over time.
2. A power analysis for a BACI fish trawl survey using elements of time series of fish/invertebrate abundance collected using otter trawls during Block Island Wind Farm (BIWF) fisheries impact assessment surveys.

2.0 Power Analysis Elements

A statistical power analysis requires specification of the following:

- Study design specifics (i.e., number of replicates, number of sites, number of sampling events, number of years before and after construction), and their structure (e.g., random trawls as independent replicates within each site and sampling event, or fixed trawls nested within sites and repeatedly sampled over time).
- The statistical model, which is determined by the study design (previous bullet) and characteristics of the data (e.g., catch data as counts would be modeled with a generalized linear (potentially mixed) model with Poisson errors, or with a negative binomial if the count data are over-dispersed; presence/absence data would be modeled with logistic regression and binomial errors).

A statistical power analysis relates the following four elements; given three of these elements, the fourth can be estimated:

- **Effect size (Δ)** is the difference that the design and model will be able to identify as statistically significant. Statistical analysis of a BACI dataset relies on the <u>interaction</u> between any Before-After period differences and Control-Impact location differences to indicate when a significant impact has occurred. The effect size herein is expressed as the change between Before and After at the impact site that exceeds the change at the control site, expressed as a proportion of the impact site mean during the Before period. For example, an effect size of –0.3 could represent a 30% decrease in abundance at the impact site and no change at the control site; or a 50% decrease at the impact site and a 20% decrease at the control site; or other similar combinations that net a 30% difference.
- **Power (1-β**, where β is the Type II error**)** is the probability of rejecting the null hypothesis when the difference in the data exceeds a specific effect size (Δ_M). In the BACI design setting, it is the probability of finding the interaction term between Before-After periods and Control-Impact locations to be statistically significantly different from zero when an effect of size Δ_M is operating on the data.
- **Alpha (α)** is the Type I error, or the probability of rejecting the null hypothesis in error because the true difference is small (i.e., < Δ_M). The value α is typically fixed, at 0.05 or 0.10 (95% or 90% confidence). For power estimated through simulations, α is estimated as the percent of significant outcomes when the effect size imposed on the data was 0.

- **Sample size** encompasses the number of sites, replicates, and time periods sampled and determines the degrees of freedom for the statistical tests. All else being equal, as sample size increases, the precision estimates for the model parameters increase. This will result in higher power for a specific effect size, or a smaller detectable effect size for a specific level of power.

3.0 Review Existing Data

The Malek (2015) beam trawl dataset was used to establish a proximate range of a meaningful effect size in measuring change over time. The dataset was screened to only include:

- useable tows based on depth (Figure 1).
- relevant species (Table 1).

This dataset provides only a single survey per station in each sampling year: in November of 2010, and in August of 2011 and 2012. Catch from November surveys are expected to be in decline leading into the winter season, while August surveys are expected to be representative of the higher catch summer season. As such, this dataset provides a very limited view of the inter-annual temporal variance. The spatial variance among tows during each survey event is also contrasted with the spatial variance from the BIWF surveys that are used as a surrogate time series in the power analysis (Section 4.0).

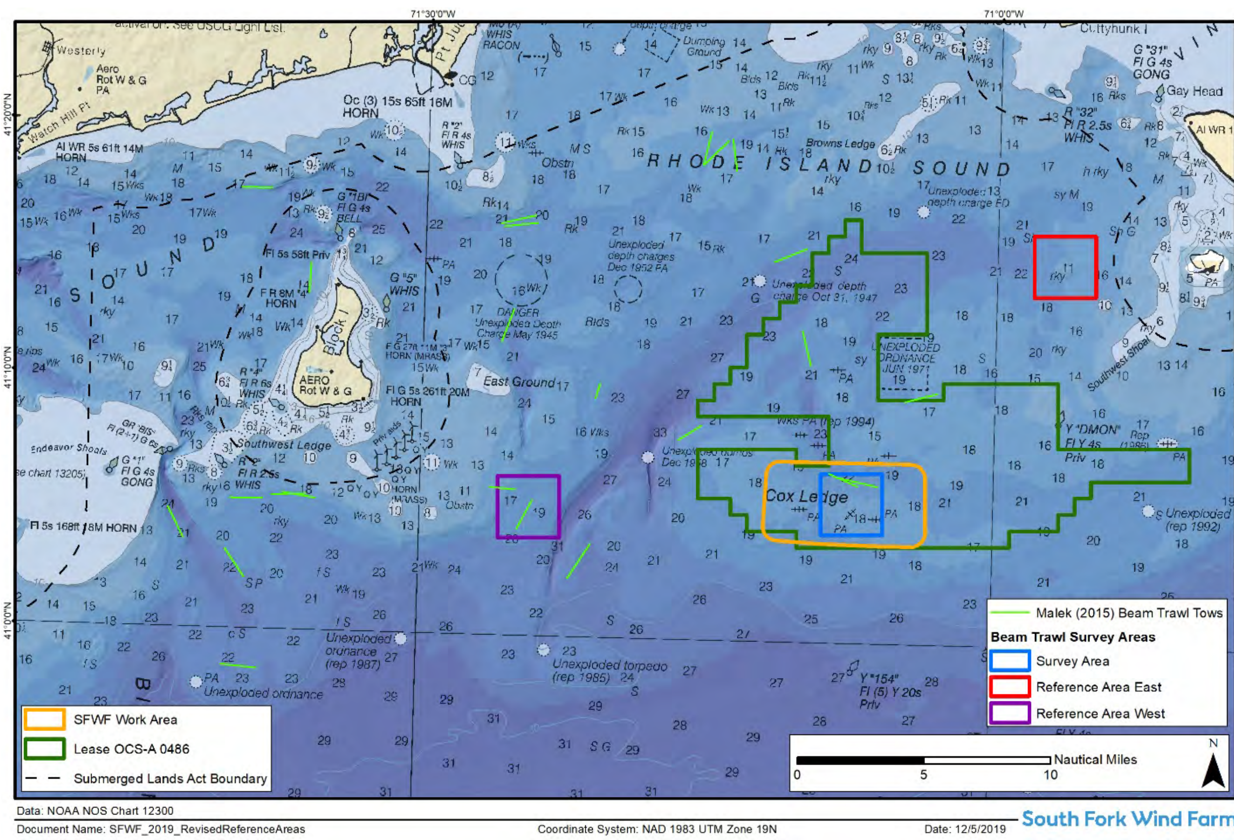


Figure 1. Map of Rhode Island Sound showing Malek (2015) tows from depths similar to the SFWF Work area, with proposed survey and reference sites.

Table 1. Individual Fish and Invertebrate species abundance from Malek (2015) that were used in this analysis

Fish	Total Abundance (all tows)		Invertebrate	Total Abundance (all tows)
Little skate	3251		Sea scallop	6496
Winter skate	1640		Sand dollar	4240
Skates (immature)	1187		Cancer crab	2638
Fourspot flounder	188		Starfish (mixed)	2545
Silver hake	153		Margined sea star	1488
Windowpane	122		Forbes sea star	1261
Red hake	88		Starfish	1256
Snailfish (Inquiline)	85		Boral sea star	935
Northern searobin	57		Pandalid shrimp	388
Gulf Stream flounder	55		Hermit crab	383
Winter flounder	51		Boreal sea star	359
Spotted hake	28		Longfin squid	270
Scup	26		Moon snail	189
Monkfish	20		Sea cucumber	61
Summer flounder	19		American lobster	39
Yellowtail flounder	15		Ocean quahog	34
Sea raven	12		Blue mussel	31
Longhorn sculpin	9		Blood star	24
Barndoor skate	8		Surf clam	20
Striped searobin	6		Conch (channeled whelk)	10
Black seabass	5		Sea mouse	9
Ocean pout	5		Waved whelk	7
Butterfish	2		Cockle	6
Cunner	2		Spider crab	6
Pipefish	2		White sea cucumber	6
Smallmouth flounder	2		Sea urchin	5
Spiny dogfish	2		Rat tailed sea cucumber	3
Atlantic torpedo	1		Horse mussel	2
Haddock	1		Orange footed sea cucumber	2
			Conrad's thracia	1

A summary of the total abundance for the species shown in Table 1 at the tows shown in Figure 1 is presented by year in Table 2 and Figure 2. There were two tows from 2010 that had catch that was 3.5 to 6.5 times higher than the next highest tow from that year. These outliers have a large effect on the outcome of the expected differences over time; but only four stations would remain if they were excluded. Consequently, they were retained in the analysis but their influence is noted.

Table 2. Summary of abundance data by year in beam trawl dataset (Malek 2015), with and without outliers from 2010.

Month - Year	Station	Total Abundance			
		Range	Mean	Std. Dev.	CV
Nov - 2010	OFF1[a]	5356	-	-	-
	PG1 [a]	2941	-	-	-
	Remaining Stations (n=4)	231 - 817	539	306	0.6
	All Stations (n=6)	231 – 5356	1742	2028	1.2
Aug - 2011	All Stations (n=9	597 – 2771	1399	762	0.5
Aug - 2012	All Stations (n=13)	52 - 1280	516	347	0.7

CV = Std. Dev. / Mean
[a] Observations represent extreme values

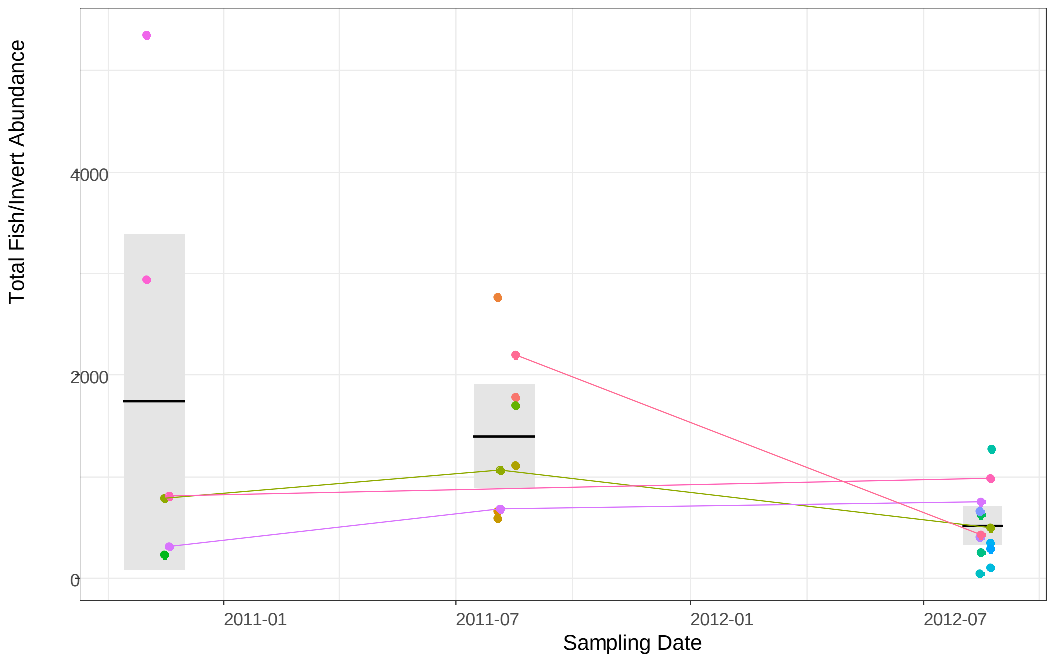


Figure 2. Total abundance for each station by date (from a single tow per date). Lines connect stations that were revisited over time. Gray bars cover the annual mean ± 2* SE, and the black line intersecting each bar is the mean of all stations for that year.

3.1 Methods

A meaningful *Effect Size* is one that is greater than differences commonly seen among control sites. The inter-annual differences in catch based on the single month beam trawl surveys provide very rough estimates of the magnitude of changes seen from natural variability. Meaningful *Effect Sizes* for the study design could not be expected to be smaller than natural variability. The range of natural variability was estimated using a bootstrap approach that assumes that all trawls in the Malek (2015) dataset are independent observations from the same population. Bootstrap estimates of differences in survey means (i.e., average of multiple tows from different areas on a single date) were calculated. Bootstrapping from the control area dataset of Malek (2015) used the following approach:

1. Randomly select k (k = 2, 3, or 4) trawls from each year t (t =2010, 2011, 2012). Note: The trawls are drawn independently from each year, with replacement.
2. Compute the annual average of the k trawls from each year, $\bar{X}_t$ for t =2010, 2011, 2012
3. Calculate and save the temporal differences, and calculate the change in means from year to year, as a proportion of the baseline year, i.e.,

$$Natural\ Temporal\ Change = (\bar{X}_{Yr2} - \bar{X}_{Yr1})/\bar{X}_{Yr1}$$

4. Repeat Steps 1-3 3000 times for each k. This will result in 3000 representations of the temporal differences in means of k trawls from a Control area.

3.2 Results

Results for the bootstrap estimates of the natural temporal change for k = 2, 3, or 4 replicates are shown in Figure 3 and summarized in Table 3. The median values of these nine bootstrapped distributions ranged from -0.7 to +0.6. The median values represent the central tendency without being overly influenced by individual high values. The 2010 survey had two extreme values which strongly influenced the annual means from this year; in addition, the 2010 survey was conducted in November, whereas the other two surveys were conducted in August, so the 2010 data introduce additional uncertainty due to the seasonal differences. The results between the August 2011 and August 2012 surveys are not confounded by seasonal differences, so these results may be most informative, albeit on a limited temporal scale. Temporal change estimates representing inter-annual August differences (and including spatial variability with k=2, 3, or 4) ranged from -0.8 to -0.5 (Table 3).

Table 3. Minimum, median and maximum temporal change estimates from bootstrap replicates shown in Figure 3.

Proportional Change[a] calculated between years	2 replicate tows			3 replicate tows			4 replicate tows		
	Min	Median	Max	Min	Median	Max	Min	Median	Max
2011 – 2010	-0.3	0.4	4.1	-0.3	0.4	4.1	-0.3	0.6	4.1
2012 – 2010	-0.8	-0.6	0.5	-0.8	-0.6	0.5	-0.8	-0.5	0.5
2012 – 2011	-0.8	-0.7	-0.5	-0.8	-0.7	-0.5	-0.8	-0.7	-0.5

[a] Proportional temporal change calculated as $(\bar{X}_{Yr2} - \bar{X}_{Yr1})/\bar{X}_{Yr1}$

The observed August differences between adjacent years for the BIWF data ranged from -0.8 to +3.6 (Table 4). The observed year-to-year differences within the same area support using multi-year surveys to measure abundance within each "Before" or "After" period. The differences using 2-year averages with 12 surveys per year are much less variable and range from -0.6 to +0.5 across the two reference areas (Table 4). While these values provide a very limited context for what level of temporal change may be natural for control sites away from a specific impact, the indication is that values much smaller than -0.6 or -0.5 may be untenable as a target effect size.

Table 4. Summary of annual BIWF fish survey results for total abundance, with estimates of natural temporal change

		August Value				12 Month Mean			
		Total Abundance		Temporal Change (single year)[a]		Total Abundance		Temporal Change (2 yr means)	
Year	Calendar Year	REF-E	REF-S	REF-E	REF-S	REF-E	REF-S	REF-E	REF-S
1	Oct 2012 – Sep 2013	3169	1048			6142	743		
2	Oct 2013 – Sep 2014	1185	239	-0.63	-0.8	4487	485		
3	Oct 2014 - Sep 2015	1129	1089	-0.05	3.6	1911	782		
4	Oct 2015 – Sep 2016	2392	2362	1.12	1.2	2043	1028	-0.63	0.5
5	Oct 2016 – Sep 2017	1285	3299	-0.46	0.4	1348	886	-0.47	0.5
6	Oct 2017 – Sep 2018	4204	915	2.27	-0.7	1975	703	-0.16	-0.1
	Minimum			-0.8				-0.6	
	Median			0.2				-0.1	
	Maximum			3.6				0.5	

[a] Single year temporal change calculated as $(\bar{X}_t - \bar{X}_{t-1})/\bar{X}_t$. Temporal change based on two year means calculated as $(\bar{X}_{t:t+1} - \bar{X}_{t-2:t-1})/\bar{X}_{t-2:t-1}$

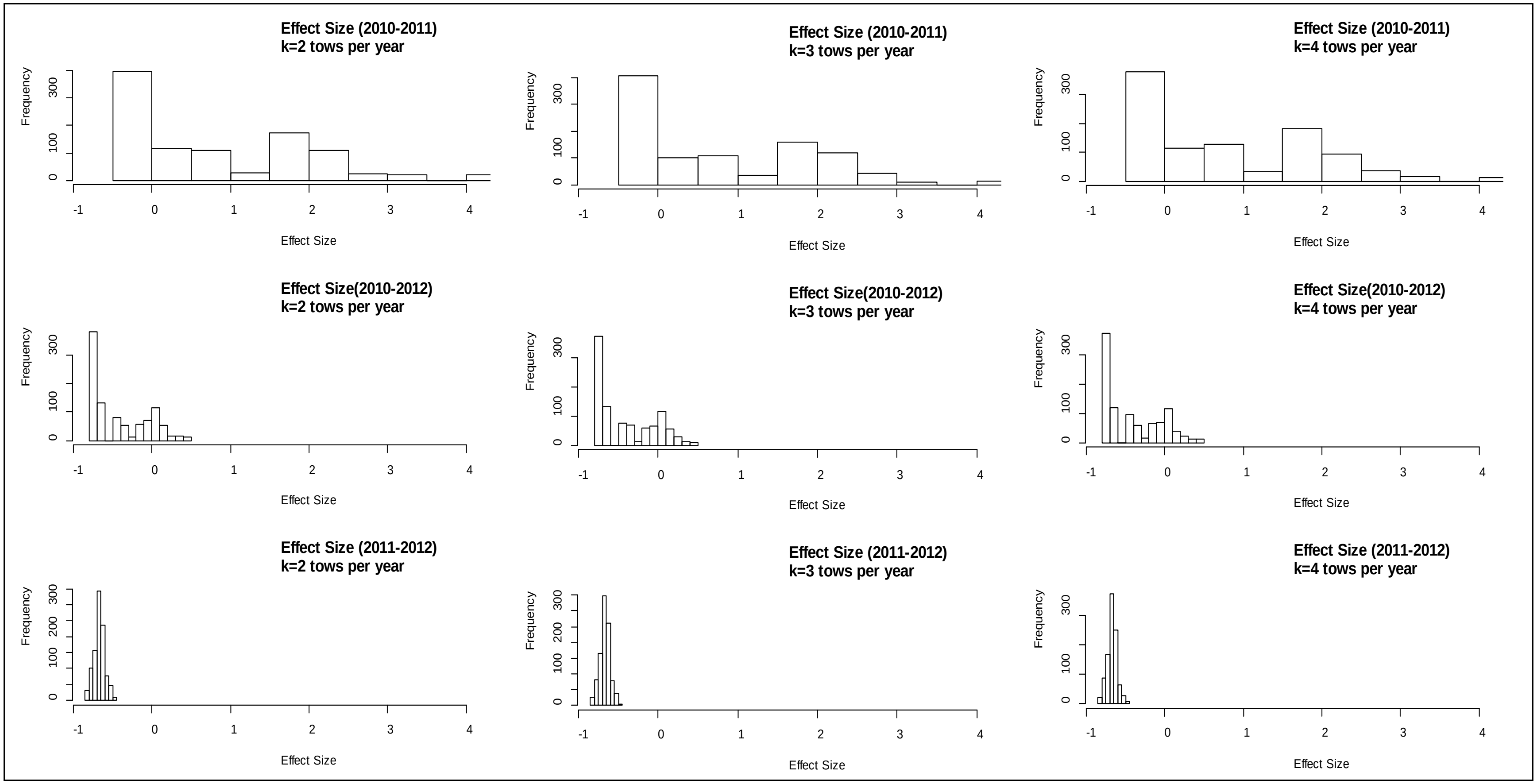


Figure 3. Bootstrap distributions (m=3000) of "effect sizes" for the differences in annual means as a percent of the "before" year. The three rows show three pairwise combinations of annual means, and three columns show different number of tows (for k=2, 3, and 4). Each annual mean is derived from k tows on a single survey date in the screened Malek (2015) dataset.

4.0 Power Analysis Methods

Statistical power was estimated using the program *epower* (Fisher et al. 2019), which requires pilot "Before Impact" data to estimate the posterior probability of model parameters in a Bayesian framework; the "After Impact" data are then simulated from these posterior probabilities under the effect size specified by the user. "Before" datasets that captured realistic spatial and temporal variability were needed for this analysis. The Malek (2015) beam trawl dataset provided estimates of total abundance and synoptic spatial variability among independent tows; these data were used to estimate natural temporal change as frame of reference for reasonable effect sizes to target in the SFWF beam trawl survey. However, in the Malek dataset the level of replication over time was insufficient to estimate temporal variability at the scale needed for the power analysis (i.e., intra-annual variance at a monthly scale, and inter-annual variance over multiple years). Consequently, the BIWF fish trawl datasets were mined for estimates of temporal variability. The BIWF dataset provides a 6-year time series of monthly observations at two reference areas (REF-E and REF-S), and one area of potential impact (APE) (Figure 4).

Year-to-year differences are present within each of the areas sampled from the BIWF dataset, particularly in the period 2013 to 2015 (Figure 4). The Malek survey did not overlap temporally with the BIWF survey so catch data from the two datasets represent different years as well as very different sampling frequencies and gear types. The magnitude of total catch values from the two datasets are not dramatically different for surveys from the same months (i.e., November or August) in most years (Table 5). This comparability is important since the BIWF time series will be used as a surrogate for the beam trawl surveys. The spatial variability within survey events of the Malek beam trawl surveys was moderate with CV values in the range 0.5 to 0.7 (or up to 1.2 if the 2010 outliers were included; Table 2). These values are within the range of CV values observed among spatial areas within the BIWF dataset, which ranged from 0.01 to 1.12 for August and November surveys (Table 5).

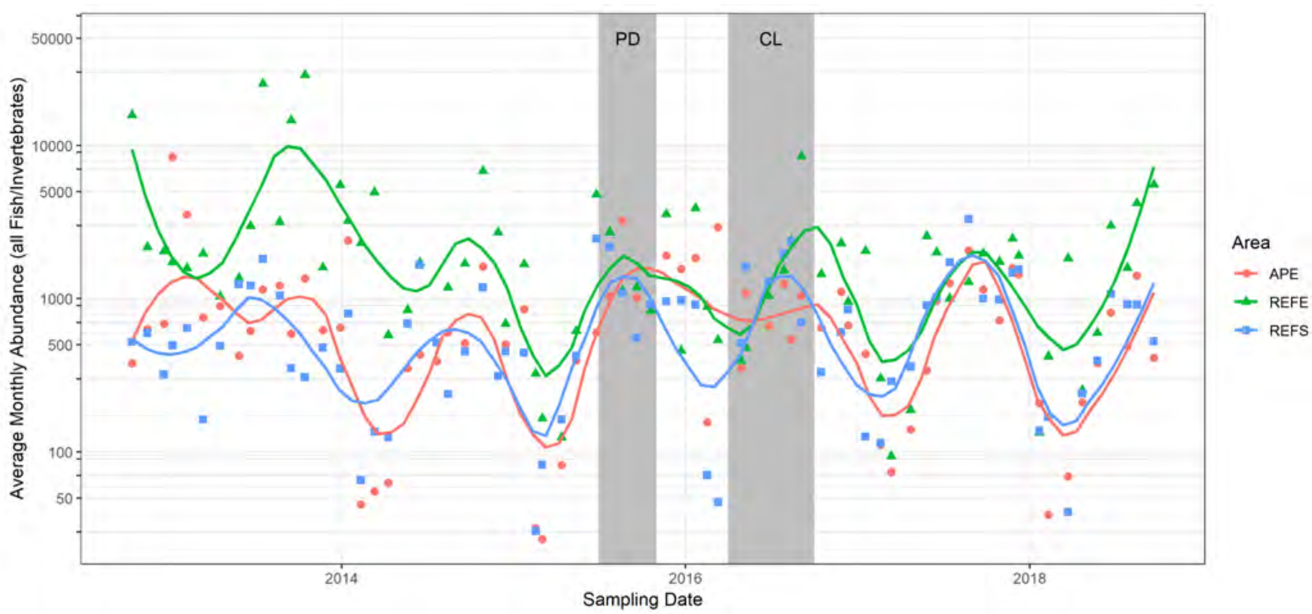
Table 5. Summary of annual mean (October – September) and November and August total abundance for BIWF otter trawl datasets at reference areas and the Malek (2015) beam trawl dataset

		12 Months		November			August		
Year	**Calendar Year**	**REF-E**	**REF-S**	**REF-E**	**REF-S**	**CV[a]**	**REF-E**	**REF-S**	**CV**
1	Oct 2012 – Sep 2013	6142[b]	743	2171	598	0.79	3169	1048	0.65
2	Oct 2013 – Sep 2014	4487	485	1597	480	0.67	1185	239	0.71
3	Oct 2014 - Sep 2015	1911	782	2716	313	1.12	1129	1089	0.03
4	Oct 2015 – Sep 2016	2043	1028	3566	961	0.81	2392	2362	0.01
5	Oct 2016 – Sep 2017	1348	886	2302	603	0.83	1285	3299	0.62
6	Oct 2017 – Sep 2018	1975	703	2463	1477	0.35	4204	915	0.91
6-Year BIWF Average		**2984**	**771**	**2469**	**739**	**0.76**	**2227**	**1492**	**0.49**
Minimum		1348	485	1597	313	0.35	1129	239	0.01
Median		2009	763	2383	601	0.80	1839	1069	0.64
Maximum		6142	1028	3566	1477	1.12	4204	3299	0.91
Beam Trawl Mean (2010 – 2012) [c]				**1219** (1 year)			**958** (2 years)		
Excluding outliers				**818** (1 year)					

[a] CV = coefficient of variation (standard deviation / mean) between areas within each year. The CV for years 1 and 2 include values for the APE (not shown).

[b] The data series in year 1 for REF-E had several extreme values (see Figure 4); the time series components for REF-E data excluding this year were also estimated.

[c] Data extracted from Malek (2015), as summarized in Table 2, shown here for some context in how total catch differed spatially and temporally for the two datasets.



Note: PD = pile driving and CL = cable laying

Figure 4. Time series for fish trawl data sets from the BIWF area of potential impact (APE) and two reference areas. Temporal patterns in the data are highlighted with a smoothing function (i.e., loess, span=0.20).

4.1 Estimate time series components

The time series attributes (i.e., stationarity, autocorrelation, seasonality) were estimated for the BIWF otter trawl data set from the REF-S reference area to simulate data for one of the variance scenarios used in the power simulations (Sections 4.2 and 4.3). Area REF-S was selected for modeling because it had the most consistent patterns from year-to-year (blue line, Figure 4), and therefore would provide the best-fitting model without the need to de-trend the series or remove extreme values. An auto-regressive integrated moving average (ARIMA) time series model with log-normal errors was estimated in R (R Core Team, 2019) using *forecast::auto.arima* (Hyndman et al. 2019 and Hyndman and Khandakar 2008), and simulations from the model were made using *sarima::sim_sarima* (Boshnakov and Halliday 2019*).* A description of the best-fitting time series model is presented in Table 6. Two-year time series simulations from this model were added to two different reference area mean abundance values to simulate references for scenario #2 in Section 4.2.

Table 6. Summary of best fit time series model for BIWF REF-S otter trawl dataset

Area Modeled	Time Series Length	Best model from auto.arima()	General Description
REF-S	6 years	ARIMA(0,0,1)(1,0,0)[12] with non-zero mean	Stationary series with a moving average (lag 1) smoothing function; seasonal pattern (1,0,0) is auto-regressive (lag 1) for 12 seasons per year. Mean = 761 and sigma = 518.

4.2 Construct alternative time series scenarios

Four alternative time series scenarios were developed to represent pilot data for the “Before” time period. The time series scenarios are intended to model the potential range of spatial-temporal variability in future beam trawl data, with the purpose of estimating how this variability affects the power to detect a meaningful effect. The higher the spatial-temporal variability in catch data, the harder it is to confidently detect a difference that is meaningful. These four time series scenarios were based on the BIWF dataset, because this dataset is the closest analogue available for the South Fork area.

The time series for the impact site was unchanged in the four variance scenarios; only the mean and variance for the two reference areas were altered. Because the effect size is expressed as a proportion of the mean abundance at the impact site during the Before years, keeping the impact time series unchanged in these four different scenarios means that the relationship between the proportional effect size and the magnitude of total abundance stays constant across all scenarios. **In all four scenarios, the impact site was represented by the observed time series from years 5 and 6 (October 2016 to September 2018) for the APE block**, while two reference area time series were extracted or simulated from the BIWF time series as described below. The data for each area in these four alternative scenarios are graphically presented in Figure 5; summary statistics are presented in Table 7.

1. **Variance Scenario #1** used the observed time series from years 5 and 6 (October 2016 – September 2018) from BIWF reference areas (REF-S and REF-E). During this 2-year period, the time series from the impact and two reference areas were very similar, with minimal spatial variance and similar temporal variance among areas. Temporal-spatial interactions were also minimal.

2. **Variance Scenario #2** used the BIWF reference area surveys from years 5 and 6 with intra-annual and spatial variance increased through multiplying REFE abundances by a factor of 1.5, and REFS abundances by 0.5. Spatial variance is increased from the variance scenario #1, but temporal-spatial interactions remain minimal.

3. **Variance Scenario #3** used a simulated 2-year time series modeled from the temporal patterns observed in BIWF REF-S survey (Section 4.1), applied to two different reference means. Spatial variance is increased relative to variance scenario #1; intra-annual temporal variability is reduced and temporal-spatial interaction is increased relative to variance scenario #2.

4. **Variance Scenario #4** used the observed time series from years 1 and 2 (October 2012 – September 2014) from the BIWF reference areas (REF-S and REF-E). During this two year period there was substantial spatial and temporal variance, as well as temporal-spatial interaction.

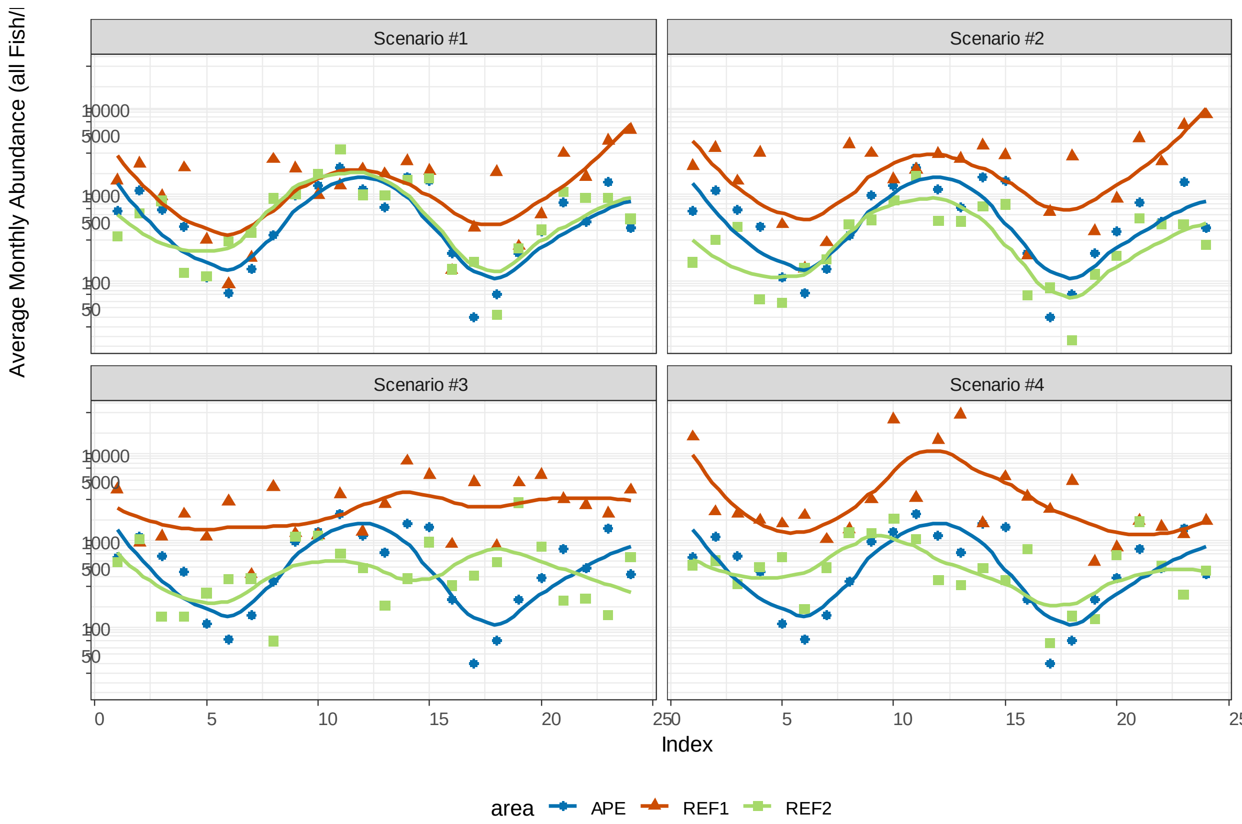


Figure 5. Time series for the four scenarios used in power simulations.

Table 7. Summary statistics[a] of total catch by area under the four alternative variance scenarios

	Scenario #1			**Scenario #2**			**Scenario #3**			**Scenario #4**		
	Mean	**SD**	**CV**	**Mean**	**SD**	**CV**	**Mean**	**SD**	**CV**	**Mean**	**SD**	**CV**
Impact	698	562	81%	698	562	81%	698	562	81%	698	562	81%
REF 1	1661	1324	80%	2492	1986	80%	2877	1982	69%	5314	7735	146%
REF 2	794	721	91%	397	361	91%	585	574	98%	614	469	76%
Standard Error of Means (n=3)	530			1133			1292			2690		

[a] Mean = average over 2 years; SD = standard deviation over 2 years (ignoring autocorrelation and assuming independence); CV = coefficient of variation = SD/mean x 100.

4.3 Estimate power using *epower* program

The *epower* program (Fisher et al, 2019) was initially run using 100 Monte Carlo simulations for each of the four scenarios used to describe the “Before Impact” period. Using 100 simulations provides preliminary results to highlight the patterns observed in the estimated power for various design and data scenarios. Three hundred simulations were run for effect sizes of -0.5 to refine the power estimates in this effect size range.

The model fit to the data is defined below, using model notation consistent with the notation used in Fisher et al (2019). Total abundance (Y) is modeled as a function of fixed and random effects using a generalized linear mixed model (GLMM). Y is distributed as a negative binomial variable, and the logarithm of its expected value (E[Y]) can be modeled as a linear function of the fixed and random effects.

$$log(E[Y(iltj)]) = \mu + u(l) + v(t) + k(lt) + z([t]j) + p(lj)$$

$$\mu = \beta_0 + \tau + \kappa + (\tau\kappa)$$

Where

$Y(iltj)$	=	total abundance in replicate (tow) *i* from location (or block) *l*, time (or year) *t*, subtime (or month) *j*
β_0	=	grand mean as intercept
τ	=	Before-After fixed effect
κ	=	Control-Impact fixed effect
$(\tau\kappa)$	=	fixed effect for BACI interaction term
$u(l)$	=	random effect for location *l* (*l*=1, 2, 3 for APE, REF1, and REF2)
$v(t)$	=	random effect for time (year) *t*
$k(lt)$	=	random effect for interaction between location *l* and time *t*
$z[t]j$	=	random effect for subtime (month) *j* nested within time (year) *t*
$p(lj)$	=	random effect for interaction between location and subtime

The basic study design for the SFWF beam trawl survey is described in Table 8 by the set design variables. The number of replicate tows per station per sampling event was varied in this analysis to explore how statistical power was affected by sampling effort. This analysis focused on total abundance as the response variable to be tested.

Table 8. Study design for SFWF beam trawl survey

Set design variables
• Impact Areas = 1 impact block
• Control Areas = 2 control/reference blocks
• Habitat Strata = 1 (a single stratum for habitat type was dominant within the areas that are fishable with the beam trawl)
• Frequency = once per month at each station (12 sampling events per year)
• Number of years Before impact = 2 • Number of years After impact = 2
Variables altered in the power analysis:
• Number of replicate tows (or stations) = 2, 3, or 4 tows per area per sampling event. Each tow represents a newly selected random station.

The variables altered in the power analysis (Table 8: three levels of replication) resulted in three different alternative designs. Power simulation results for the four alternative variance scenarios under these three alternative designs are shown in Table 9. The following conclusions can be made:

- Effect Size of 0 was used to estimate the Type I error (α) for each model and data scenario. For all scenarios, the type I error rate was a maximum of 1%, less than the nominal 5% Type I error rate that is typically used. A low Type I error indicates that spurious interaction effects are unlikely to be detected. The testing approach appears to be robust[1].

- Effect Size of -0.3 was found to have low power (< 50%) for all scenarios tested. This is not unexpected given the range of temporal differences observed in the bootstrapped results for the beam trawl survey and the BIWF dataset (Tables 3 and 4).
- Effect Size of -0.5 was found to have relatively high power (≥ 80%) for 3 and 4 replicate tows for Variance Scenarios #1 and #3, but only for the highest level of replication in the other two scenarios. The power results that are close to 80% could be tested with a larger number of simulations (m ≥ 500) in order to have greater confidence in these outcomes. Once power estimates are above 90% the marginal increase in power is less important.
- Effect Size of -0.7 resulted in high power (≥ 90%) for all of the designs for all four of the alternative variance scenarios tested. This provides assurance that the method and designs are capable of detecting fairly large effects (consistent with natural temporal variability) with consistently high power.

Table 9. Output from *epower* program estimating the power for three different model designs under four effect sizes for four alternative variance scenarios

		Type I error (α)			
Alternative Model Design[a]	Number of replicate tows	Variance Scenario #1	Variance Scenario #2	Variance Scenario #3	Variance Scenario #4
Effect Size = 0 (100 sims)					
1	2	0	0	0	0
2	3	0	0	0	0
3	4	0	0.01	0	0

		Power			
Alternative Model Design[a]	Number of replicate tows	Variance Scenario #1	Variance Scenario #2	Variance Scenario #3	Variance Scenario #4
Effect Size = -0.3 (100 sims)					
1	2	0.09	0.09	0.09	0.08
2	3	0.24	0.11	0.12	0.12
3	4	0.41	0.16	0.19	0.19
Effect Size = -0.5 (300 sims)					
1	2	0.79	0.51	0.65	0.46
2	3	0.93	0.72	0.83	0.66
3	4	1	0.82	0.95	0.87
Effect Size = -0.7 (100 sims)					
1	2	NT	0.99	0.98	0.97
2	3	NT	1	1	1
3	4	NT	1	1	1

[1] The same result was found by Fisher et al (2019) in their case studies. So, this robustness may be a function of the method rather than specific to the data.

[a] All model designs used the following: one impact block; two control blocks; one habitat stratum; monthly tows at each station (12 tows per year); two years of sampling Before and After the impact event.

5.0 Summary and Conclusions

As expected, increasing survey effort (i.e., more replicate tows) will increase the power to detect a given effect size. Variance Scenario #1 explored here was the last two years of the observed BIWF time series for the otter trawl surveys, representing realistic variance scenarios for fish trawl surveys in Rhode Island Sound. Three replicates resulted in high power (≥ 90%) to detect effect sizes of 0.5 or greater for this realistic variance scenario.

The power for the SFWF beam trawl surveys will depend on how the variance in those surveys compares to the surrogate variance scenarios explored in this analysis. Surveying SFWF using a survey design that samples monthly for 2 years before construction at 1 impact and 2 control locations, with three replicate stations per location will provide information similar to what was used in this power analysis, but specific to the SFWF impact assessment with a focus on the particular species of interest. After the first two years of the beam trawl surveys, this type of power analysis should be revisited to determine whether additional sampling effort during the After period is needed to achieve sufficient power given the actual spatial-temporal variability in the beam trawl catch.

Acknowledgements

Analyses were carried out using the software ‘epower’ V1.3 (BMT 2019) as described in Fisher et al (2019) and (BMT 2019) and based on the statistical programming platform R (R-Core Team, 2019). ‘epower’ has been developed jointly by BMT, the Australian Institute of marine Science and Queensland University of Technology. BMT, the Australian Institute of Marine Science and Queensland University of Technology accept no liability or responsibility for in respect of any use of or reliance upon this software.

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APPENDIX C
High-Resolution Geophysical Surveys and Fisheries Monitoring Surveys

September 2020

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High-Resolution Geophysical (HRG) surveys are conducted by wind energy developers for site investigation to inform engineering and design. These surveys are also required by the Bureau of Ocean Energy Management (BOEM) for offshore wind development activities. Some stakeholders have raised the question about any spatial and temporal overlap of HRG surveys with fisheries monitoring surveys and whether HRG survey equipment potentially affects the behavior and distribution of marine taxa. Several points address this matter.

First, seismic air guns, which studies have shown can influence the distribution and catch rates of commercially important marine fish (e.g., Lokkeborg and Soldal, 1993; Engas et al., 1996), are not used during HRG surveys for offshore wind development. HRG surveys may employ a variety of different equipment, other than seismic air guns, that operate at a wide range of frequencies (Table 1). The acoustic characteristics of representative HRG survey equipment is well known, as shown in Table 1, which incorporates data from a recent study funded by BOEM to independently measure and verify the noise levels and frequencies of HRG equipment (Crocker and Fratantonio, 2016). Additional field studies have been conducted and are in review.

Second, well established audiograms have been used to understand the hearing sensitivities for a number of species of fish (Table 2). Fish have been classified into four groupings based on their physiology and their presumed hearing sensitivity (Hawkins et al., 2020). Of the HRG equipment that is commonly employed, ‘sparkers’ and ‘boomers’ operate at the lowest range of frequencies. As noted by Nedwell and Howell, (2004) there have been no animal reaction studies to determine how marine taxa respond to the boomers and sparkers that are used during HRG surveys, although Kikuchi (2010) suggested that sparkers and boomers may affect the behavior of cod due to the overlap between the hearing sensitivities of cod and the operational frequency of the equipment. Ørsted will not use ‘sparkers’ and/or ‘boomers’ in the South Fork lease area in the fall or winter of 2020 when fisheries monitoring surveys are expected to commence.

Third, for the remainder of 2020, the only HRG equipment that Ørsted plans to use in the SFWF lease area are non-intrusive parametric sub-bottom profilers and USBL acoustic positioning systems. The parametric sub-bottom profilers all operate at a frequency of $\geq$ 60 kHz, while the USBL’s operate at a frequency of $\geq$ 17 kHz (Table 1; Ørsted, 2019). Given that the operating frequencies of these HRG equipment are well outside the auditory range of nearly all species in the region, these HRG surveys are expected to have a negligible impact on the fisheries monitoring surveys. While the HRG equipment is likely to change over time, as stated above, Ørsted commits that seismic air guns will never be used for site investigations surveys. The Ørsted site investigations team records the time, date, and location that each piece of HRG equipment is deployed during site investigations surveys.

Finally, Ørsted anticipates that there will be periods of time with no spatial overlap between HRG surveys and fisheries monitoring surveys.

Table 1. Summary of the operating frequencies and source levels of HRG equipment authorized for use under the approved 2019 Ørsted IHA application.

Representative HRG Survey Equipment	Range of Operating Frequencies (kHz)	Baseline Source Level a/	Representative RMS_{90} Pulse Duration (millisec)	Pulse Repetition Rate (Hz)	Primary Operating Frequency (kHz)
USBL & Global Acoustic Positioning System (GAPS) Transceiver					
Sonardyne Ranger 2 transponder b/	19-34	200 dB_{RMS}	300	1	26
Sonardyne Ranger 2 USBL HPT 5/7000 transceiver b/	19 to 34	200 dB_{RMS}	300	1	26
Sonardyne Ranger 2 USBL HPT 3000 transceiver b/	19 to 34	194 dB_{RMS}	300	3	26.5
Sonardyne Scout Pro transponder b/	35 to 50	188 dB_{RMS}	300	1	42.5
Easytrak Nexus 2 USBL transceiver b/	18 to 32	192 dB_{RMS}	300	1	26
IxSea GAPS transponder b/	20 to 32	188 dB_{RMS}	20	10	26
Kongsberg HiPAP 501/502 USBL transceiver b/	21 to 31	190 dB_{RMS}	300	1	26
Edgetech BATS II transponder b/	17 to30	204 dB_{RMS}	300	3	23.5
Shallow Sub-Bottom Profiler (Chirp)					
Edgetech 3200 c/	2 to 16	212 dB_{RMS}	150	5	9
EdgeTech 216 b/	2 to 16	174 dB_{RMS}	22	2	6
EdgeTech 424 b/	4 to 24	176 dB_{RMS}	3.4	2	12
EdgeTech 512 b/	0.5 to 12	177 dB_{RMS}	2.2	2	3
Teledyne Benthos Chirp III - TTV 170 b/	2 to 7	197 dB_{RMS}	5 to 60	4	3.5
GeoPulse 5430 A Sub-bottom Profiler b/, e/	1.5 to 18	214 dB_{RMS}	25	10	4.5
PanGeo LF Chirp b/	2 to 6.5	195 dB_{RMS}	481.5	0.06	3
PanGeo HF Chirp b/	4.5 to 12.5	190 dB_{RMS}	481.5	0.06	5
Parametric Sub-Bottom Profiler					
Innomar SES-2000 Medium 100 c/	85 to 115	247 dB_{RMS}	0.07 to 2	40	85
Innomar SES-2000 Standard & Plus b/	85 to 115	236 dB_{RMS}	0.07 to 2	60	85
Innomar SES-2000 Medium 70 b/	60 to 80	241 dB_{RMS}	0.1 to 2.5	40	70
Innomar SES-2000 Quattro b/	85 to 115	245 dB_{RMS}	0.07 to 1	60	85
PanGeo 2i Parametric b/	90-115	239 dB_{RMS}	0.33	40	102
Medium Penetration Sub-Bottom Profiler (Sparker)					
GeoMarine Geo-Source 400J d/	0.2 to 5	212 dB_{Peak} 201 dB_{RMS}	55	2	2
GeoMarine Geo-Source 600J d/	0.2 to 5	215 dB_{Peak} 205 dB_{RMS}	55	2	2
GeoMarine Geo-Source 800J d/	0.2 to 5	215 dB_{Peak} 206 dB_{RMS}	55	2	2
Applied Acoustics Dura-Spark 400 System d/	0.3 to 1.2	225 dB_{Peak} 214 dB_{RMS}	1.1	0.4	1
GeoResources Sparker 800 System d/	0.05 to 5	215 dB_{Peak} 206 dB_{RMS}	55	2.5	1.9

Table 1 continued.

Representative HRG Survey Equipment	Range of Operating Frequencies (kHz)	Baseline Source Level a/	Representative RMS_{90} Pulse Duration (millisec)	Pulse Repetition Rate (Hz)	Primary Operating Frequency (kHz)
Medium Penetration Sub-Bottom Profiler (Boomer)					
Applied Acoustics S-Boom 1000J b/	0.250 to 8	228 dB_{Peak} 208 dB_{RMS}	0.6	3	0.6
Applied Acoustics S-Boom 700J b/	0.1 to 5	211 dB_{Peak} 205 dB_{RMS}	5	3	0.6

Notes:

a/ Baseline source levels were derived from manufacturer-reported source levels (SL) when available either in the manufacturer specification sheet or from the SSV report. When manufacturer specifications were unavailable or unclear, Crocker and Fratantonio (2016) SLs were utilized as the baseline:

b/ source level obtained from manufacturer specifications

c/ source level obtained from SSV-reported manufacturer SL

d/ source level obtained from Crocker and Fratantonio (2016)

e/ unclear from manufacturer specifications and SSV whether SL is reported in peak or rms; however, based on SLpk source level reported in SSV, assumption is SLrms is reported in specifications.

The transmit frequencies of sidescan and multibeam sonars for the 2019 marine site characterization surveys operate outside of marine mammal functional hearing frequency range.

It is important to note that neither Crocker and Farantino (2016), nor HRG manufacturer technical specifications report source levels in terms of the RMS_{90}, which is the metric required in assessment to the distance of NOAA Fisheries Level B harassment thresholds. Therefore, careful consideration should be made when attempting to make such direct comparisons. As shown in Crocker and Farantino, the pulse duration may also be a function of HRG operator settings.

Table 2. Summary of available information regarding the hearing sensitivities for fish species that are commonly encountered in the northwest Atlantic.

Species/Species Group	Family	Order	Sound Detection	Sensitivity
American eel	Anguillidae	Anguilliformes	Swim bladder close but not connecting to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 3 Up to 1-2 kHz
Alewife/herring/menhaden	Clupeidae	Clupeiformes (includes anchovies)	Weberian ossicles connecting swim bladder to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 4 Up to 3-4 kHz Alosinae detect to over 100 kHz
Cod/Pollock/Haddock/Hake	Gadidae	Gadiformes	Swim bladder close but not connecting to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 3 Up to 1-2 kHz
Mako sharks/mackerel sharks	Lamnidae	Lamniformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Monkfish/goosefish	Lophiidae	Lophiiformes		unknown
Bluefish	Pomatomidae	Perciformes		unknown
Sea bass/groupers	Serranidae			unknown
Striped bass	Moronidae			unknown
Sand lance	Ammodytidae			unknown
Tautog	Labridae			unknown
Tunas/mackerels/albacores	Scombrinae		Swim bladder far from ear; Particle motion only	Hawkins et al. 2020 Group 2 Up to 1 kHz
Billfish/swordfish	Xiphiidae			unknown
Flounders/flatfish/sole/halibut	Pleuronectidae	Pleuronectiformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Skates/rays	Rajidae	Rajiformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Spiny dogfish	Squalidae	Squaliformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz

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APPENDIX D
Power Analysis for Lobster and Crab Ventless Trap Survey

September 2020

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1.0 Introduction

For the ventless trap survey, a Before-After-Control-Impact (BACI) design is planned to sample lobsters, Jonah crabs and rock crabs within the SFWF Project Area and two selected reference areas. EXA conducted an assessment for South Fork Wind, LLC, including a power analysis for this survey.

For the ventless trap survey, the trap size/configuration and trawl layout will be identical to that used by the University of Rhode Island and the Commercial Fisheries Research Foundation in the Southern New England Cooperative Ventless Trap Survey (SNECVTS). The SNECVTS datasets from 2014 and 2015 (Collie and King 2016) were queried to assess the residual variance estimates of lobster, Jonah crab and rock crab catch for use in this power analysis. The relationship between effect size and statistical power for the specific BACI contrast of interest was estimated under several alternative hypotheses about declines in the impact area relative to the control areas, and two different design alternatives were considered (i.e., two or three years post-construction).

2.0 Data and Assumptions

The survey design employed in the SFWF area will utilize 10-trap trawls configured identical to the trawls used in the SNECVTS survey (Collie and King 2016). The SNECVTS survey sampled three times per month over 6 months (May – October) each year. The SFWF ventless trap survey will sample twice per month over 7 months (May – November). The SFWF survey design will have an equal number of trawls in each area (Project Area and two reference areas) each year, with trawl locations randomly set during the first sampling event of each year and held fixed throughout the year, so that the response variable is annual average catch per trawl.

Details about the SNECVTS design:

- Each SNECVTS trawl was comprised of 10 traps, with six ventless (V) and four vented (or standard, S) using the following pattern: V-S-V-S-V-V-S-V-S-V. The trawl layout for the SFWF survey will be identical.
- Aliquot = random station location where a 10-trap trawl was placed. Same location was fished throughout the year, and a new location was randomly selected the next year. Similar approach will be used in the SFWF survey.

Data summaries were derived from the SNECVTS database as follows:

- The Lobsters table was queried, and the total lobster catch per 10-trap trawl was tallied. The Lobsters table only recorded non-zero catch, so zero catch trawls were added to the analysis table for trawls that were present in the Trawls table and absent in the Lobsters table.
- The final catch is summarized as average catch (number of lobsters) per trap (averaged over both trap types). The SFWF survey will use the same trawl configuration as the SNECVTS survey. Results may easily be converted to average catch per 10-trap trawl by multiplying catch results by 10.
- Similar queries were done on the bycatch tables for each year to obtain estimates for the Jonah and rock crab catch.

In the SNECVTS study, there were 24 aliquots sampled per year across the entire RI/MA BOEM lease area; five of these aliquots were within the SFWF footprint. Variances were summarized for the entire BOEM lease area, and separately for the SFWF Project Area. Aliquot numbers associated with the SFWF Project Area by year were:

- 2014: 14, 15, 20, 21, 22
- 2015: 38, 39, 44, 45, 46

In the SNECVTS study, each aliquot was fished three times per month over 6 months. For this analysis, annual catch rates were divided by 18 to get an annualized average catch per trawl in each aliquot. The database did not have information on missing/compromised traps, so all trawls were assumed to have 10 traps and catch per trawl was divided by 10 to estimate the annual average catch per trap (CPUE). Mean and variability across aliquots were summarized for the entire lease area, and for the subset of aliquots present within the SFWF footprint (Table 1). The CPUE data followed a lognormal distribution both for the SNECVTS dataset and the BIWF ventless trap dataset (2013-2018), so the data are summarized both on original and natural log scale. The mean, standard deviation and coefficient of variation (CV = standard deviation / mean) are reported, as well as the residual standard error (RSE). The RSE is used in the power calculations.

Table 1. Summary of mean and standard deviation for average catch of lobster and crab per trap (averaged over both trap types) in the SNECVTS dataset.

			Lobster		Jonah Crab		Rock Crab	
Group	**Scale**	**Summary Statistic**	**2014**	**2015**	**2014**	**2015**	**2014**	**2015**
All (n=24)	Original Scale	Mean	2.49	2.10	7.29	4.91	3.57	4.34
		Std Dev	1.60	0.83	3.27	1.84	3.59	4.11
		CV	64%	40%	45%	37%	100%	95%
	Log-scale	Mean	0.75	0.67	1.90	1.51	0.94	1.28
		Std Dev	0.57	0.37	0.44	0.44	0.85	0.55
		CV	76%	56%	23%	29%	90%	43%
			RSE = 0.48		**RSE = 0.44**		**RSE = 0.72**	
SFWF (n=5)	Original Scale	Mean	1.45	1.75	9.53	4.83	2.10	3.53
		Std Dev	0.61	0.53	5.41	0.55	0.92	1.13
		CV	42%	30%	57%	11%	44%	32%
	Log-scale	Mean	0.3	0.51	2.12	1.57	0.66	1.23
		Std Dev	0.4	0.33	0.58	0.12	0.48	0.29
		CV	130%	66%	27%	8%	73%	23%
			RSE = 0.36		**RSE = 0.42**		**RSE = 0.39**	

The SFWF ventless trap survey is designed to sample twice per month for 7 months. Bootstrapping was used to estimate the RSE for a 2x per month survey design using the SNECVTS dataset. The temporal patterns of catch in both the SNECVTS and BIWF surveys indicated that peak abundance had not always passed as of October, so sampling through November should result in variance estimates that are less than the values estimated here. The bootstrap estimates from the SNECVTS database used the following approach:

- Sample two dates per month (without replacement) to reflect the design planned for SFWF and estimate an annual mean per trawl.
- Sample k=5 trawls (with replacement) for each year from the entire BOEM lease area (n=24) and from the SFWF area (n=5). Repeat for k=5, 6, 7, 8 trawls.
- Calculate the RSE from the bootstrapped dataset for the BOEM lease area and the SFWF Project Area.
- Repeat process 5000 times. Results are summarized in Table 2.

Table 2. Table of RSE from bootstrap resampling (R=5000) of results on entire BOEM lease area and SFWF Project Area, sampling 2 dates per month and drawing 5, 6, 7, or 8 trawls per year.

	BOEM lease area (n=24)			SFWF Project Area (n=5)		
	Percentile			Percentile		
Trawl Count	**50th**	**75th**	**90th**	**50th**	**75th**	**90th**
Lobsters						
5 Trawls	0.47	0.56	0.63	0.34	0.39	0.45
6 Trawls	0.48	0.55	0.61	0.34	0.39	0.44
7 Trawls	0.48	0.54	0.60	0.34	0.39	0.44
8 Trawls	0.48	0.54	0.59	0.34	0.39	0.43
Jonah crabs						
5 Trawls	0.43	0.51	0.57	0.38	0.44	0.49
6 Trawls	0.43	0.50	0.55	0.38	0.43	0.48
7 Trawls	0.43	0.49	0.54	0.38	0.42	0.47
8 Trawls	0.44	0.49	0.54	0.38	0.42	0.46
Rock crabs						
5 Trawls	0.68	0.84	0.98	0.36	0.41	0.45
6 Trawls	0.69	0.83	0.96	0.36	0.40	0.44
7 Trawls	0.70	0.83	0.95	0.36	0.40	0.43
8 Trawls	0.70	0.82	0.93	0.36	0.40	0.43

The results for the SFWF Project Area changed very little when the number of trawls increased from 5 to 8, likely due to the small sample size from which the estimates were bootstrapped (n=5). However, the results for the BOEM lease area suggest that more trawls should reduce the upper bound of the expected variance, with little effect on the median value. Conservative results for all three species in the SFWF Project Area indicate an RSE in the range of [0.34, 0.49].

3.0 Methods

A power analysis is specific not only to study design and statistical model, but the hypothesis within that model that we want to test. The interaction hypotheses of interest associated with the ventless trap survey are as follows:

- $H_{\emptyset}$: Changes in CPUE in both the control and impact sites will be identical over time
- H_1: Changes in CPUE will not be the same at the control and impact sites over time (two-tailed)

Consistent with the SNECVTS and BIWF ventless trap datasets, the SFWF CPUE data are expected to be lognormally distributed. Consequently, a standard ANOVA model with normal errors may be used which greatly simplifies the power calculations. The effect sizes and residual variability were expressed on the log-scale, and power was estimated using the function *pwr::pwr.f2.test* (Champely 2020) within R version 4.0.0 (R Core Team 2020).

The study design has 2 years nested within each time period (before/after), and 2 control sites and an impact site within treatment. The interaction contrast we wish to test is the difference between the temporal change at the windfarm and the temporal change at the control sites, or $\Delta = \delta_{SFWF} - \delta_C$ where:

> $\delta_{SFWF} = \mu_{SFWF,B} - \mu_{SFWF,A}$ is the temporal difference in means (two-year average from the "before" period minus two-year average from the operation period) at the SFWF site.
>
> $\delta_C = \mu_{C,B} - \mu_{C,A}$ is the temporal difference in means at the control sites (multiple control sites are averaged within each period)

As a linear contrast, this test of Δ has the following coefficients, c_{ij}: (0.5, 0.5, -0.5, -0.5, -0.25, -0.25, 0.25, 0.25, -0.25, -0.25, 0.25, 0.25) where i = 1 (SFWF), 2 (Control 1), or 3 (Control 3); and j = years 1 to 4. The effect size for this contrast is calculated as in Perugini et al (2018) using following formula:

$$f = \left|\sum c_{ij}\mu_{ij}\right| / \sqrt{k \sum c_{ij}^2 \sigma^2} \qquad \text{[Eq. 1]}$$

where μ_{ij} is the mean of log(CPUE) in the ith area and jth year, and σ is the residual standard error (RSE = standard deviation of annualized log(CPUE) among trawls within each area and year). The RSE for the trawls within the SFWF footprint (n=5 in each of 2 years) for lobsters and crabs had median and 90th percentiles within the range of 0.34 to 0.49 (Table 2). Therefore, the following four RSE values will be used to capture the range of expected variability in the annual mean CPUE for lobsters and crabs: 0.35, 0.40, 0.45, 0.50.

The interaction effect size was calculated for a pattern of response with the temporal shift at the SFWF being a proportion of the shift at the control sites. All else being equal, the effect size 'f' is the same whether SFWF decreases by 50% and control sites are unchanged, or SFWF doubles and control sites increase by factor of 4: the relative change at control to SFWF is still 2 to 1. The SNECVTS 2014-2015 average CPUEs were used as the baseline year averages in all 3 areas (SFWF and Control 1 and Control 2). Effect sizes were calculated for two different proportional changes:

- **Level 1** (a small to moderate delta): a multiplier of change of 3/2 at controls or 2/3 at wind farm (a relative delta of 0.67), e.g., for baseline wind farm catch of 2 lobsters/trap the catch would decrease by 1/3 to 1.33 lobsters/trap during operation, and controls would stay the same.

- **Level 2** (a large delta): a multiplier of change of 2/1 at controls or 1/2 at windfarm (a relative delta of 0.5), e.g., for baseline wind farm catch of 2 lobsters/trap the catch would decrease by 50% to 1 lobster/trap during operation, and catches at the control sites would stay the same.

- The same effect size could be achieved with both the RSE and % change at windfarm either increasing or decreasing. For example, an interaction effect size of 0.27 could be achieved with all of the following combinations: (RSE =0.45, 40% decrease at windfarm), (RSE=0.35, 33% decrease), and (RSE=0.25, 25% decrease).

A spatially asymmetrical design is assumed with a single impact site and two control sites. Two different temporal scales are tested: two years of monitoring before construction contrasted with either two or three years of monitoring after construction.

Table 3. Interaction effect sizes calculated for BACI contrast (using Equation 1) for two different levels of change and range of likely RSE values

RSE	Change Level 1 Relative Delta = 0.67	Change Level 2 Relative Delta = 0.5
Two years before; Two years after		
0.35	0.27	0.47
0.40	0.24	0.41
0.45	0.21	0.36
0.50	0.19	0.33
Two years before; Three years after		
0.35	0.26	0.46
0.40	0.23	0.40
0.45	0.21	0.36
0.50	0.18	0.32

4.0 Results

Power was calculated as a function of sample size, for the range of interaction effect sizes shown in Table 3 for a design with one impact area and two control areas for 2 years before construction, and either 2 years (Figure 1) or 3 years (Figure 2) after operation. The minimum sample sizes to achieve 80% power with 90% confidence for the specific interaction effect sizes are presented in Table 4.

Table 4. Minimum sample sizes (power= 80%, confidence = 90%) for select interaction effect sizes

Interaction Effect Size	No. of Years in Operation Period		Assumptions
	2 years	3 years	
0.19	16	13	Small-moderate delta; high RSE
0.24	10	9	Small-moderate delta; moderately high RSE
0.27	9	7	Small-moderate delta; median RSE
0.33	6	5	Large delta; high RSE
0.41	5	4	Large delta; moderately high RSE
0.47	4	3	Large delta; median RSE

Notes:
Small-moderate delta is a 33% decrease at the windfarm with no change at control sites; a large delta is a 50% decrease at windfarm with no change at controls. The same effect size could be achieved if both delta and RSE decreased or increased.
RSE = residual standard error

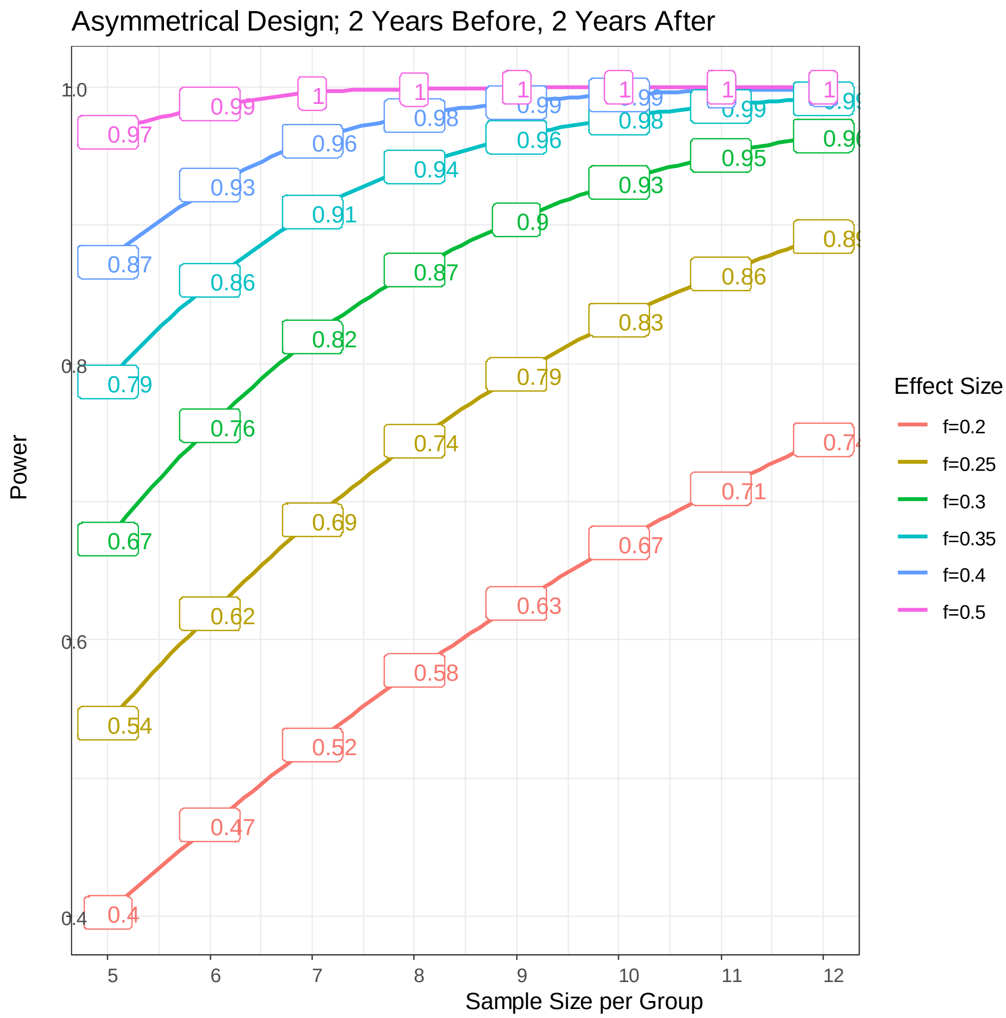

Figure 1. Power versus sample size (number of trawls) per area-year group for a range of interaction effect sizes (see Table 3), using a study design with single impact and two control areas for 2 years before and 2 years after construction, and α= 0.10.

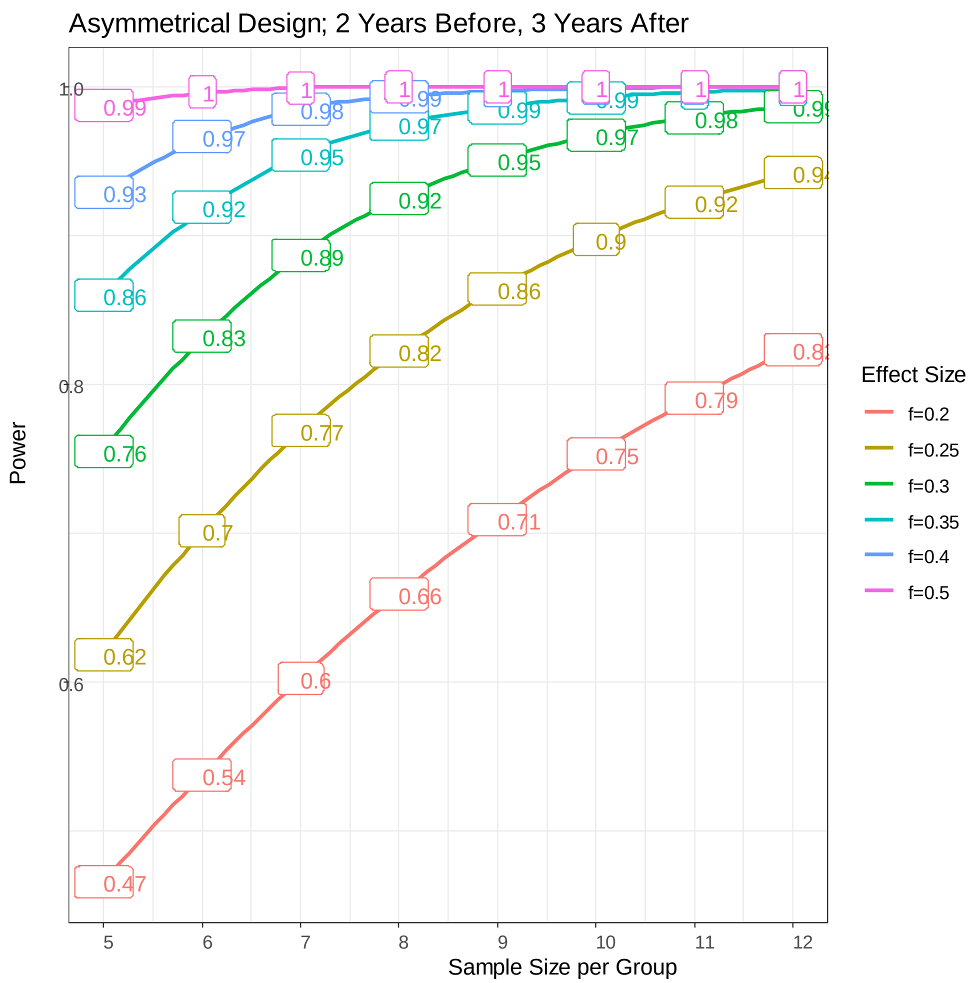

Figure 2. Power versus sample size (number of trawls) per area-year group for a range of interaction effect sizes (see Table 3), using study design with single impact and two control areas for 2 years before and 3 years after construction, and α= 0.10.

5.0 References

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EXHIBIT 1

Date	Organizations/Individuals Contacted[1]	Location/Form of Contact and Response	Purpose of Contact
11/14/18	BOEM, CFRF, CT DEEP, MA DMF, MA CZM, NMFS, NYS DEC, NYS DOS, NYS DPS, RI CRMC, RI DEM, RISAA, Individual fishermen	Emails from SFW and recipient responses are attached to Exhibit 1 to Appendix A	Distribution of Gillnet monitoring plan for comment

[1] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

Document Title: Demersal Fisheries Resources Survey Protocol - ***DRAFT***
Issued for Comment: November 14, 2018
Comments Due: December 14, 2018
Submit comments via email to: Melanie Gearon at mgearon@dwwind.com

1.0 Introduction

The South Fork Wind Farm (SFWF) is proposed in the Bureau of Ocean Energy Management (BOEM) Lease Area OCS A-0486 (Figure 1). Permit review for the SFWF is underway with offshore construction scheduled to begin in Spring 2021. Over the last three years, the SFWF team has spoken extensively with regional fishing organizations, working groups, and individual fisherman about their work in the project area as development of the wind farm has evolved. In addition, the SFWF team has consulted with several states (e.g., NY, CT, RI, and MA) and federal fisheries resource management agencies.

Based on feedback and data received to date, an approach to assess commercially and recreationally targeted demersal fish at the SFWF is needed. DWSF contracted INSPIRE Environmental, LLC. to draft this protocol for a Demersal Fisheries Resource Survey (Survey), which will provide data on:

1) Demersal species (susceptible to gillnets) that occur in and around the SFWF;
2) The seasonal timing of the occurrence of these species; and
3) Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods, i.e., do some species have reduced abundance and/or new species appear?

This draft Survey protocol has been prepared for review by fishermen and state and federal resource management agencies. Comments on this draft Survey protocol must be submitted via email by December 14, 2018 to:

Melanie Gearon
South Fork Wind Farm
Manager, Permitting and Environmental Affairs
mgearon@dwwind.com

All comments will be considered. A final protocol will be published in a Request for Proposals (RFP) in the Winter of 2019 with the goal of starting the Survey in the Spring of 2019. Similar to the principles and practices for the Block Island Wind Farm, SFWF is committed to conducting scientific surveys and assessments that are collaborative with the fishing industry. SFWF will select for-hire gillnet fishing vessels from which the Survey will be conducted.

The SFWF "Project Area" is defined as the maximum work area required to install the SFWF (yellow outline in Figure 1 below). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations.

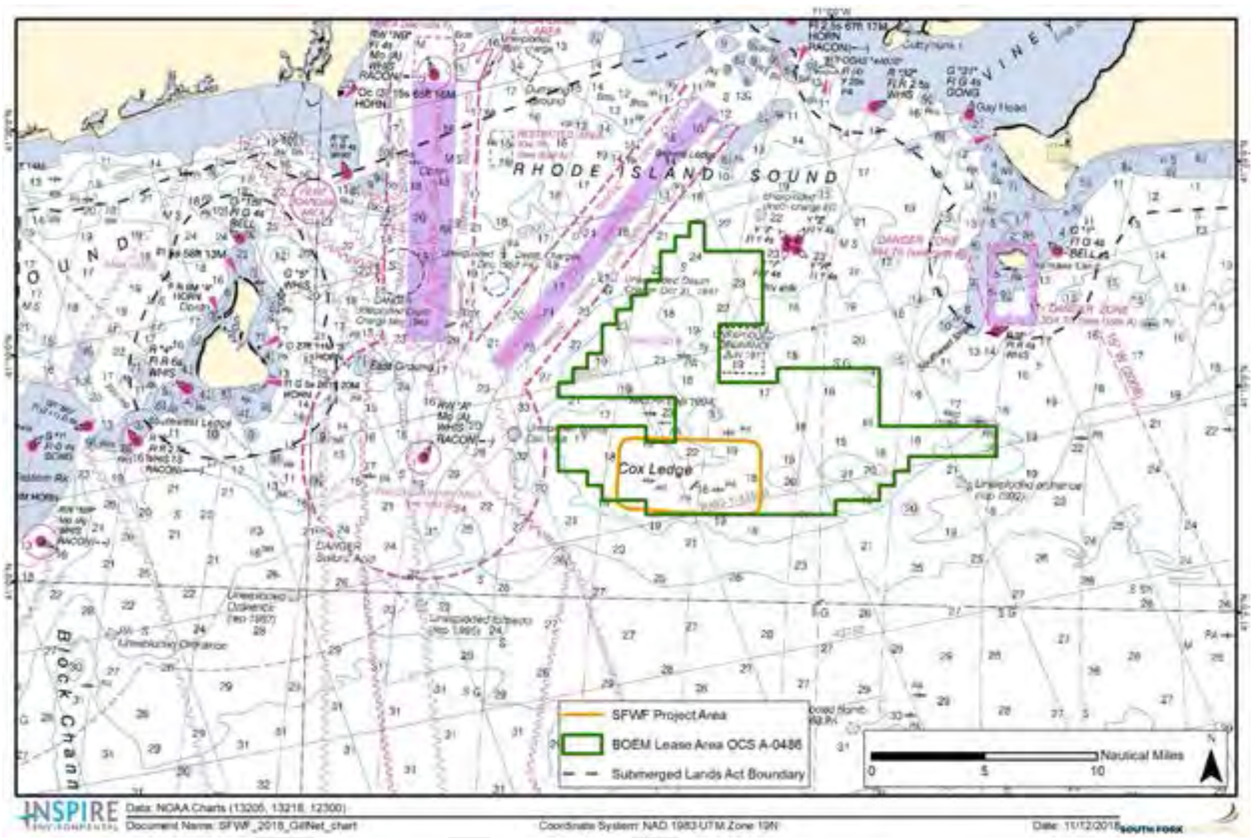

Figure 1. South Fork Wind Farm Project Area

2.0 Demersal Fisheries Resources Survey

The Survey will help establish pre-construction baseline community composition and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance during and after construction.

2.1 Rationale

Federal Vessel Trip Report (VTR) data indicate bottom trawling and sink gillnets have the highest revenue and landings over all gear types fished within the Rhode Island-Massachusetts Wind Energy Area (RI-MA WEA). However, as indicated by fishermen, and further supported by Vessel Monitoring System (VMS) data, the SFWF Project Area within the larger RI-MA WEA, has minimal trawl effort. Gillnet high fliers have been observed in and around the proposed SFWF Project Area and participants in fisheries outreach meetings have indicated they actively gillnet in the Project Area. Details of the SFWF fisheries data assessment and stakeholder feedback can be found in the SFWF COP Appendix Y - *Commercial and Recreational Fisheries Technical Report*[1].

Southern New England waters are host to a large monkfish fishery, much of it permitted under gillnet licenses. Commercial fishermen who hold federal monkfish permits may also hold northeast multispecies, small mesh multi-species, spiny dogfish, and/or skate permits to optimize potential revenue and reduce bycatch return. As a result, a wide variety of demersal species are commercially fished using gillnets in the SFWF Project Area. Therefore, gillnets are proposed as the method of sampling for the Survey.

Gillnet selectivity depends mainly on fish size and shape and mesh size, but is also affected by the thickness, material, and color of net twine, hanging of net, and method of fishing (Hamley 1975). Using specific gear placements and prescribed mesh sizes, gillnets may be designed to target specific species, or subgroupings of species, and life stages.

Sampling demersal species with bottom otter trawls, similar to those used by NEAMAP[2] and at the Block Island Wind Farm, is less feasible within the SFWF Project Area due to the presence of boulders and mobile gear "hangs". Additionally, gillnets are static, or a fixed gear type, and exhibit low impact to benthic habitats (Thomsen et al., 2010).

2.2 Survey Design/Procedures

The Survey will be conducted from commercial fishing vessel(s) with scientists on board to process the catch. As summarized in Section 1.0, SFWF will run a procurement process for the selection of for-hire fishing vessels. Vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. Vessels will be required to have one or more federal gillnet permits for the monkfish, northeast multispecies, small mesh multi-species, spiny dogfish, and/or skate fishery management plans (FMP). The vessel's federal fishing permits will include incidental take under the Marine Mammal Protection Act (MMPA). Efforts will be taken to reduce marine mammal injuries and mortality caused by incidental interactions with fishing gear. Specific guidelines and plans (e.g., Harbor Porpoise Take Reduction Plan) will be implemented to reduce the potential for interaction or injury.

2.2.1 Proposed Sampling Stations

Three Survey blocks will be designated for sampling, two Survey blocks within the SFWF Project Area and one block within a reference area. Each Survey block contains three-predetermined gillnet areas delineated by bottom type: rocks and boulder, gravel, and sand/fines. One gillnet line per habitat type per block is randomly selected from the Survey areas for each Survey, resulting in nine independent gillnets conducted per Survey. Designation of Survey areas will be based on detailed geophysical seafloor Survey data as well as input from commercial gillnet fishermen regarding areas important to their work. Location of gillnets may be subject to change due to seasonal location of other fixed fishing

[1] The SFWF Construction and Operations Plan (COP) and Appendices can be accessed online at: https://www.boem.gov/South-Fork/

[2] NorthEast Area Monitoring and Assessment Program (NEAMAP)

gear (e.g., lobster pots). If a Survey line is found to have poor conditions for setting gillnets it may be moved based on the captain's professional judgement.

Data will be collected in the Project Area (near field) and a farfield reference area with similar habitat characteristics as the SFWF. The reference area will serve as a general index of demersal fish abundance in Rhode Island Sound in an area well outside of the direct influence of the SFWF. Sampling in a reference area is necessary because differences in demersal fish abundance data from this Survey before and after construction might be due to regional trends rather than impacts due to construction. The study will be a before-after control-impact (BACI) experimental design for direct effects, with quantitative comparisons made before and after construction and between control and impact areas (Underwood, 1994). A BACI design will allow for assessment of detectable shifts in fish presence, absence, or abundance associated with construction and proposed operations.

The systematic sample design consists of sampling each of the treatment blocks (Survey block x habitat type) with a gillnet. SFWF is requesting feedback on this draft Survey plan, including the identification of suitable locations in the Project Area and the farfield reference area. The proposed sampling locations will be selected to ensure both a robust statistical sampling approach, e.g., matching habitat and depth conditions among the sampling blocks, and to enhance operational execution of the Survey and minimize space conflicts with other active uses.

2.2.2 Gillnet Methods

A gillnet is a wall of netting that hangs in the water column, it is typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. Factors that can influence the catch rate of gillnets for target species include: fish density in the vicinity of gears, the behavior of the target species, the ability of fish to detect and locate the gillnet, and environmental factors such as water temperature, visibility, current direction, and velocity. It is often challenging to calculate catch per unit effort (CPUE) from gillnets due to potential changes in efficiency (e.g., fluctuating soak time and catch rate). This Survey is designed to account for as many variables as possible to standardize CPUE. Comparison of this gillnet Survey data to other baseline sampling efforts (e.g., nearby federal NEAMAP trawl stations) will be limited due to gear and effort differences.

The gillnet Survey may be conducted using two types of gillnets including experimental gillnets with multiple mesh sizes (e.g., four panels of 5", 6", 6.5" and 7" mesh) and typical, single mesh size gillnets commonly used in Rhode Island and Massachusetts fisheries (including the Southern New England Monkfish and Dogfish Gillnet Exemption Area) as determined through consultation with contracted fishermen.

Sampling will take place a minimum of once per season, year-round for a minimum of one year prior to the start of construction and for up to two years post construction. During the year of construction, sampling will track with the period of actual construction activities. The standard soak time of approximately 16 hours, is proposed to be consistent with recent scientific surveys (Kelly 2006, Grizzle et al., 2009), coupled with input from gillnet fisherman, to maximize catch and standardize catch rates. Soak time will remain consistent throughout the duration of the Survey. Each Survey event will be managed by a team of qualified scientists including a lead scientist with experience performing fisheries research. The catch will be removed from the gillnets by the boat crew for processing. The lead scientist will be responsible for collection of data and data recording.

Fish collected in each gillnet will be identified, weighed, and enumerated consistent with the sampling approach of Northeast Area Monitoring and Assessment Program (NEAMAP). Scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species. Taxonomic guides include: NOAA Guide to Some Trawl Caught Marine Fishes (Flescher, 1980), Kells and Carpenter (2011) Field Guide to Coastal Fishes from Maine to Texas and Peterson's Field Guide to the Atlantic Seashore (Gosner, 1999).

The catch will be sorted by species. All specimens are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the lead scientist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of skates and rays (disc width), and sharks (pre-caudal length). Total weight of all individuals of each respective species will be recorded.

2.2.3 Atlantic Cod Reproductive Stage

Atlantic cod is historically an important cultural and commercial species in New England and is believed to be dependent on geographically-specific spawning areas. Atlantic cod length, weight, location caught, and spawning condition will be recorded for all individuals caught. All Atlantic cod caught will be examined externally for signs indicating they are in the ripe and running maturity stage (Table 1). When caught individuals are not in the ripe and running maturation stage they will be dissected to determine maturation stage (Hutchings et al., 1999, Siceloff and Howell 2013, Dean et al., 2014). The maturity stage of each individual dissected will be assigned based on guidelines determined by Burnett et al. (1989) and updated by O'Brien et al. (1993): immature, developing, ripe, ripe and running, spent, resting, unknown (*Table* 1). Weight (g) of dissected gonads will be recorded. Photographs of gonads will be recorded for all individuals dissected for QA/QC analysis.

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Table 1. Maturity staging criteria used during the Northeast Fisheries Science Center trawl surveys and to be utilized in determining Atlantic cod maturity (from O'Brien et al., 1993)

Stage	Description and Criteria
Female	
Immature	Ovary paired, tube-like, small relative to body cavity; colorless to pink jell-like tissue, no visible eggs; thin transparent outer membrane.
Developing	Ovaries large, occupying up to 2/3 of the body cavity; blood vessels prominent when present; ovary appears granular as yellow to orange yolked eggs develop. A mix of yolked and hydrated eggs.
Ripe	Ovaries large, may fill entire body cavity; hydrated eggs present. Transparent ovary wall.
Ripe and Running	Eggs flow from vent with little or no pressure to abdomen.
Spent	Ovaries flaccid, sac-like similar in size to ripe ovaries; color red to purple; ovary wall thickened, cloudy and translucent; some hydrated eggs may adhere to ovary wall.
Resting	Ovaries smaller than ripe ovaries, but larger than immature. Interior jell-like, no visible eggs.
Male	
Immature	Testes small relative to body cavity, colorless to gray and translucent. Testes narrow, lobed and elongated, resembles crimped ribbon.
Developing	Testes large, grey to off-white, firm consistency with very little or no milt present.
Ripe	Testes larger than 'Developing', chalk white, consistency mostly liquid. Milt flows easily when testes dissected.
Ripe and Running	Chalk white milt flows easily from the vent with little or no pressure on abdomen. Once dissected, milt flows easily.
Spent	Testes flaccid, may contain residual milt, less robust than 'Ripe'. Edges or other parts of testes starting to turn reddish to brown or grey as milt recedes.
Resting	Testes shrunken in size relative to 'Ripe'. Color is yellow, brown or grey with little or no milt.

2.2.4 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and

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salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

2.2.5 Gillnet Station Data

The following data will be collected during each sampling effort:

- Station number
- Latitude and longitude
- Soak start and end time and date
- Water depth
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

2.2.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

2.3 Potential Demersal Species Catch

It is anticipated that species primarily targeted in the monkfish, northeast multispecies, small mesh multi-species, spiny dogfish, and skate FMPs will account for a majority of the catch (Table 2). Table 2 is not all inclusive, additional fish and invertebrates will be caught in Survey gillnets.

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Table 2. Example species likely to be collected in gillnet Survey.

Resource	FMP/Permit
Monkfish	Monkfish
Atlantic cod	Northeast Multispecies
Haddock	Northeast Multispecies
Atlantic pollock	Northeast Multispecies
Witch Flounder	Northeast Multispecies
Yellowtail Flounder	Northeast Multispecies
American Plaice	Northeast Multispecies
Winter flounder	Northeast Multispecies
Atlantic halibut	Northeast Multispecies
Redfish	Northeast Multispecies
White hake	Northeast Multispecies
Silver hake	Small-Mesh Multispecies
Red hake	Small-Mesh Multispecies
Offshore hake	Small-Mesh Multispecies
Spiny dogfish	Spiny Dogfish
Winter skate	Skate
Barndoor skate	Skate
Thorny skate	Skate
Smooth skate	Skate
Little skate	Skate
Clearnose skate	Skate
Rosette skate	Skate
Conger eel	NA
Black sea bass	NA
Tautog	NA
Cunner	NA
American lobster	NA

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Monday, November 19, 2018 6:19 PM
To: fredmattera@cfcri.org
Cc: John O'Keeffe <jokeeffe@dwwind.com>; Rodney Avila <ravila@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>
Subject: SFWF - Demersal Fisheries Resources Survey Protocol

Hi Fred,

Please find attached the South Fork Wind Farm (SFWF) *Draft Demersal Fisheries Resources Survey Protocol* for CFCRI review. Our team is seeking initial comments on this draft by **December 14, 2018**. This plan is part of the overall science agenda currently under development for the SFWF. This has been submitted to the following agencies for technical review: BOEM, NMFS, MA DMF, MA CZM, RI DEM, RI CRMC, CT DEEP, NYS DEC, NYS DPS, and NYS DOS. In addition, it has been circulated for comment to various regional fisheries organizations and fishermen that the SFWF fisheries outreach team regularly meet with.

I know that Rodney already sent this draft to several folks (including you) last week, but I want to make sure that CFCRI has received the document and is circulating within the Center.

Please let me know if you have any questions.

Thanks!
Melanie

DEEPWATERWIND
Clean energy is just over the horizon.®

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From: Rodney Avila <ravila@dwwind.com>
Date: Friday, November 16, 2018 at 2:40 PM
To: Lanny <lad0626@aol.com>, Julia Prince <jprince@dwwind.com>, John O'Keeffe <jokeeffe@dwwind.com>, Julie Evans <jevansmtk@gmail.com>, Dave Beutel <dbeutel@crmc.ri.gov>, "edward.anthes-washburn@newbedford-ma.gov" <edward.anthes-washburn@newbedford-ma.gov>, Pamela Lafreniere <Pamela.Lafreniere@newbedford-ma.gov>, Fred Mattera <fredmattera@cfcri.org>, Richard Fuka <captlobster@yahoo.com>, Greg Duckworth <truetwistreap@yahoo.com>, Elizabeth Marchetti <rifisheryliaison@gmail.com>, Rodman Sykes <crfisheries@gmail.com>, Beth Casoni <beth.casoni@gmail.com>, Greg Materoins <saklob@aol.com>, Greg Dubrule <blackhawkfishing@gmail.com>, Capt Mike Barnett <mbarnett@optonline.net>, Michael Pierdinock <cpfcharters@yahoo.com>, Chris Brown <gvdwood@cox.net>, Jeff Kaelin <jkaelin@lundsfish.com>, Peter Hughes <phughes@atlanticcapes.com>, Gary Cobb <12thgenbonacker@gmail.com>, Score Alert <gary@davisplumbingmaterials1.net>, Tom Mikoleski <grandslamcharter@aol.com>, Tom Jordan <ebbtidemtk@optonline.net>, Jerry Borriello <jerryborrillo@gmail.com>, Orla Reville <orlareville@gmail.com>, Skip Rudolph <captskip2@optonline.net>, Andy Corrigan <hattandtails@gmail.com>, Burton Prince <Suziecharters@gmail.com>, Barry Kohlus <antj2@aol.com>, Scott Albrecht <scott@albrechtlaw.com>, Peter Anthony <peter@easternfisheries.com>, Ronnie Enoksen <ronnie@easternfisheries.com>, Steve Arnold <steve_sherry4@verizon.net>, Gary Yerman <swim@snet.net>, William Wells <WellsScals@aol.com>, Jim Auteri <jimauteri@gmail.com>, Jessica Coakley <jcoakley@mafmc.org>, Bill Grim <fvperception@gmail.com>, Dave Aripotch <captainhappy@optonline.net>, Danny Giunta <DoubleDMTK@yahoo.com>, Dan Farnham SR <offshorefishery@aol.com>, Dewey Wilson <andrew@amoryseafood.com>, Gary Stephens <GaryToad@aol.com>, Greg DiDomenico <gregdidomenico@gmail.com>, Harold Seybert <hseybert@hotmail.com>, James Jolly <rustyboat@gmail.com>, Annie Hawkins <annie@rodafisheries.org>, Richard Canastra <richie@baseseafood.com>, Bonnie Brady <greenfluke@optonline.net>, Scott Schafer <CaptScott@Runawayfishingcharters.com>, Capt Charlie <vecchmi@optpnline.net>, William McCann <william.mcCann@comcaast.net>, Tommy Williams <twilliams194@cox.net>, Arron Williams <Arronfisheries@hotmail.com>, Charles Weinon <star2017@aol.com>, Charlie Borden <choggiefish@hotmail.com>, Dave Lofstead <daveylof@msn.com>, David Pierce <david.pierce@state.ma.us>, Erling Berg <erlingberg99@yahoo.com>, Joy Weber <jweber@dwwind.com>, Chad Brayton <cbrayton@atlanticcapes.com>, Marc Palombo <calicolob@comcast.net>, Dan Farnham JR <siverdollarseafood@gmail.com>, Mike Theiler <lobster.mike@yahoo.com>, Skip Rudolph <captskip2@optonline.net>, Stu Foley <airandspeedsurf@gmail.com>, Matthew Trombly <matt.trombly@gmail.com>, Crista Banks <cbank@vineyardwind.com>, Donald Fox <dfox@towndock.com>, Rodney Avila <ravila@dwwind.com>, Katie Almeida <kalmeida@towndock.com>,

Eric Reid <ericreidri@gmail.com>, Richie Rosenkranz <wfs447@optonline.net>, Wayne Reichle <wreichle@lundsfish.com>, Richard Canastra <richie@baseseafood.com>, Dan Farnham <siverdollarseafood@gmail.com>, Megan Lapp <Meghan@seafreezeltd.com>, Saving Seafoods <taz@savingseafoods.org>, Ryan Fallon <covereaper@gmail.com>, Scott Berglin <bergman353@gmail.com>, Scott Leonard <topgunfishing27@gmail.com>, Al Schafer <alfred.schfer@icloud.com>, Art Cortes <captainart@earthlink.net>, Ben Philbrick <bphilbrick43@gmail.com>, Beth Casoni <beth.casoni@lobstermen.com>, Bill Reed <providencefisheries@gmail.com>, Ryan Fallon <covereaper@gmail.com>, Bob Markis <fishbones21@verizon.net>, Bob Smith <r.smith@tvcconnect.net>, Brent Lofres <blofres@hotmil.com>, Joe Mcbride <captmcbride@optonline.net>, Capt Ron <captron1@optonline.net>, Captain John <lotsoffish@aol.com>, Carl Forsberg <vikingfleet@gmail.com>, Mike Vegess <mabones@optonline.net>, Charles Donilon <snappacharters@cox.net>, Chris Healy <christopher.healy@cga.ct.gov>, Chris Westcott <chris_westcott200@yahoo.com>, Christine Blount <francesflt@aol.com>, Dan Buckley <capdanbuckley@gmail.com>, Danny Eilertsen <deilertsen@comcast.net>, Donald Frel <don.frel@noaa.gov>, Ed Renner <joxer821@aol.com>, Gary Rutty <tamgary399@gmail.com>, Gene Bergson <gene@harborblueseafood.com>, George Pharo <evets2409@outlook.com>, Jay Elsner <jaymassfab@verizon.net>, Jeff Grant <jeffgrant19@cox.net>, Joe Mcbride <captmcbride@optonline.net>, Joe Wagner <lobsterboy17@icloud.com>, John Deluca <john@johnnymarlin.com>, John Verissimo <JVerissimo@mfmga.org>, John Gillin <Gillinjohn@yahoo.com>, Julie Lofstad <jlofstad@southamptontownny.gov>
Subject: Demersal Fisheries Resources Survey Protocol

Demersal Fisheries Resources Survey Protocol

Rodney Avila
Fisheries Liaison – www.dwwind.com
Mobile: 508-889-0401
55 Pleasant Street, 5C, New Bedford, MA 02740

Subject:	FW: Demersal Fisheries Resources Survey Protocol - DRAFT
Date:	Monday, December 17, 2018 at 10:28:43 PM Eastern Standard Time
From:	Melanie Gearon
To:	Caitlin O'Mara
Attachments:	2018-11-13_SFWF-DraftDemersal_GillNetsurvey_for comment_JW .docx, image001.png

Comments from John Williamson below and attached. Please save his tracked version with comments, pdf email on BOX and extract his comments from the email and put into the comment tracker.
Thanks

From: John Williamson <john@seakeeper.org>
Date: Sunday, December 16, 2018 at 12:35 PM
To: Melanie Gearon <mgearon@dwwind.com>, John O'Keeffe <jokeeffe@dwwind.com>
Cc: Kris Ohleth <KRIOH@orsted.com>
Subject: Demersal Fisheries Resources Survey Protocol - DRAFT

Hi Melanie,

John O asked me to take a look at the Demersal Fisheries Resources Survey Protocol which you have circulated for comment. Attached is the document with my comments and small wording edits in Track Change.

I have several years' experience as a sink-gillnet fisherman in New England, and also worked in an Alaska drift gillnet fishery. A couple of concerns on this proposal:

First. It's admirable that you have reached out to local gillnet fishermen for input on this protocol. Unfortunately, I find the text confusing and, reading between the lines, I suspect that the author of the draft study (INSPIRE Environmental, LLC.) is confounding an understanding of the way gillnets are used on the Pacific coast and the way they are used here, which are significantly different. If your fisherman-reviewers also express confusion, that could be a reason.

Second. The stated objectives of the study:
1) Demersal species (susceptible to gillnets) that occur in and around the SFWF;
2) The seasonal timing of the occurrence of these species; and
3) Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods, i.e., do some species have reduced abundance and/or new species appear?

The protocol design is "open ended" with no effective standardization and therefore may not achieve the intended ends, especially the much needed information in point 3

The survey protocol does not take into account the wide variation in gillnet use and design. In my experience:

- A New England gillnet is 300 feet long; fishermen tie gillnets together in multiple-net strings of 10 to 30, meaning that a string of gillnets may range from 0.5 miles to 1.5 miles long depending on the species being targeted and the terrain.
- Soak time may vary from a few hours (dogfish) to several days (monkfish/skates), depending on the species being targeted.
- Gillnets are highly selective due to mesh size – from 6" mesh (dogfish seasonal area exemption), to

6.5” mesh (groundfish minimum), to 11” mesh (typical monkfish).
- Another variation is the tied-down gillnet.

Because of this extensive variation in fishing practice, coupled with the limited amount of monthly sampling described, data generated in the described protocol will probably have low statistical power. Without rigid standardization of the length of gillnet strings, mesh size or soak times, the survey time-series will be unlikely to generate useful comparison of catch rates of any given species among the three treatment areas.

It might be better and more useful science therefore, to add specificity to this list and focus on one or two primary objectives (an example: changes in behavior and abundance of cod), in each case adopting a more structured sampling protocol tailored to each more limited objective.

Sorry to seem critical – it’s not intended. I think there are very useful data to be obtained in this overall approach – it just needs more thought. You might also seek input from the newly-hired NJ-based Orsted Fishery Liaison – Kevin Wark. Kevin is also an experienced gillnet fisherman who has participated in a lot of collaborative research. Kevinwark@comcast.net

Finally, NOAA has done surveys using gillnets in the past. Paul Rago was head of NOAA Populations Dynamics Branch in Woods Hole until his recent retirement. You might do a quick consult with Paul. paulrago22@gmail.com

Best regards,
John Williamson

Fishery Liaison Ørsted US
Mobile: (207) 939-7055
john@seakeeper.net

Ørsted
Formerly DONG Energy

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:41:27 PM
Attachments: image002.jpg
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf
2018-11-16_SFWF Demersal Fisheries Survey-transmittal-NMFS.pdf

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Friday, November 16, 2018 7:39 PM
To: Susan Tuxbury - NOAA Federal <susan.tuxbury@noaa.gov>
Cc: Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Aileen Kenney <akenney@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Sue,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NMFS review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject:	Re: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Thursday, December 13, 2018 at 4:24:01 PM Eastern Standard Time
From:	Susan Tuxbury - NOAA Federal
To:	Melanie Gearon
CC:	Caitlin O'Mara, Stephanie Wilson, Mary Colbert, John O'Keeffe, Aileen Kenney, Sharon Benjamin - NOAA Affiliate, Andrew Lipsky - NOAA Federal
Attachments:	image001.png, 2018-12-13_NMFS Comments on Draft Demersal Fisheries Resources Survey Protocol.docx

Hi Melanie,

Thank you for the opportunity to review the SFWF Draft Demersal Fisheries Research Survey Protocol. In addition to our review in the regional office, we distributed the survey protocol for review by experts in our Science Center. We received some good feedback that we think will be helpful to you as develop the survey. Please let me know if you have any questions or want to discuss any of these comments further.

Thank you.

Sue

On Fri, Nov 16, 2018 at 7:39 PM Melanie Gearon <mgearon@dwwind.com> wrote:

> Hi Sue,
>
> Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NMFS review. Please provide comments by December 14, 2018.
>
> Thanks,
>
> Melanie
>
> DEEPWATERWIND
> Clean energy is just over the horizon.
>
> ## Melanie Gearon
>
> *Manager, Permitting & Environmental* ***Affairs*** – www.dwwind.com
>
> **Direct:** 401-648-2628 **Mobile:** 401-486-7797
>
> 56 Exchange Terrace, Suite 300, Providence, RI 02903

NMFS Comments on Draft Demersal Fisheries Resources Survey Protocol
December 14, 2018

General Comments

We appreciate the opportunity to review and provide comments on the Draft Demersal Fisheries Resources Survey protocol for the South Fork Wind Farm. The proposed study was reviewed by our Northeast Fisheries Science Center and our regional office. While we are providing specific comments by section, we would like to highlight some of the more significant comments and questions related to the proposed study. First, we have questions on the gear type proposed and the target species identified for the survey. While gillnets may be optimized for capturing monkfish, they may not be effective for other important demersal species. The target species identified for the project focus on the New England fish complex and is not representative of all the species that are likely to occur in and around the project area.

The duration of the survey (1 year pre- and 2 years post construction) is limited and may not provide enough data to quantify impacts of construction. The duration of the survey may depend on what the survey is attempting to quantify. For example, is it abundance in the specific area or overall impacts to demersal fish abundance from the wind farm? These are two different questions and the latter would require long-term monitoring surveys to answer the question. Furthermore, detecting spatial shifts or impacts on migratory pattern in species, and seasonal availability to local ports, will be difficult to answer at a small scale. It is important to design a study that can be calibrated with existing federal trawl surveys to allow for comparison with existing long-term data sets. We would encourage you to continue working with our agency as you finalize the designs for this survey.

1.1 Introduction

This section should include a statement of the reason for conducting this study, its goals, and the questions addressed.

It is not clear to which organizations and agencies the first paragraph refers - the agencies should be listed.

2.1 Demersal Fisheries Resources Survey

This section is quite vague and does not clarify the intent of this study. Everything proposed should flow from what the purpose, objectives, and questions this monitoring is focused on. In addition, this statement should include aspects beyond just presence, absence, and abundance, including fish condition and reproduction.

2.2. Rationale

We concur that minimal trawl effort exists within this area, but what has been done should not be ignored as it provides background coverage in space and time that the proposed monitoring program cannot cover. The NEFSC has completed trawl surveys in this area, as illustrated by the figure below.

4.2.5.2 NEFSC Seasonal Trawl Survey

The locations of seasonal trawls in the NEFSC seasonal trawl survey between 2003 and 2016 are illustrated in Figure 4-17.

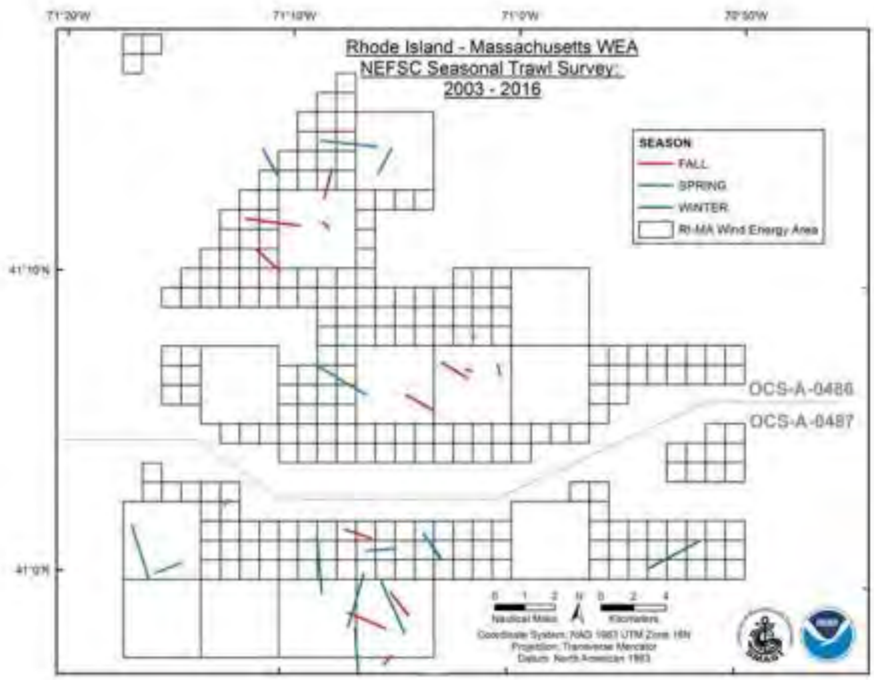

Figure 4-17. Locations of NEFSC seasonal trawls from 2003 to 2016 in the RIMA WEA.

It is not clear why only one gear type is being considered. While gill net fishing makes sense for the SFWF area in providing intensive data in an area where bottom trawling is difficult, it does have some downsides. Gillnets optimized for catching monkfish may not be effective on other demersal species. Gillnetting may or may not capture squid, crab and lobster resources or small juvenile cod and black sea bass that are specialized for utilizing certain rough-bottom habitats. It is not useful for assessing effects on bivalves, including sea scallops, which are known to be in the vicinity. Additional gear types for sampling should also be considered.

Since existing databases are largely populated with bottom trawl data, we recommend at a limited number of stations where gill net and trawl gear data are collected simultaneously, you make a comparison or calibrate gill net results. This will also make the results amenable to comparison with existing trawl data and across wind energy areas. Without any possibility of associating results in this study with the larger database, this becomes an isolated "black box" study where you can see the input (initial fishery abundance and wind farm installations) and output (resulting fishery abundance). It provides little extra data to begin to look for causes or connect it with a larger regional picture. We recommend these studies be designed to allow for comparison with existing survey data.

2.3.1 Proposed Sampling Stations

It will be difficult, if not impossible to examine the choices for sampling areas without review of the high-resolution geophysical data collected for the project. We request that you provided us with the geophysical data so we can provide input into the proposed sampling stations.

Biological sampling should be consistent with 'regional' surveys so comparisons to regional trends are valid. Priority species should be sampled in the same manner (e.g. length, weight, sex, maturity, age sample) and protocol (i.e. numbers per cm size bins) to compare fish condition and spawning, or potential different habitat use by size/age.

2.3.2 Gillnet Methods

While the SFWF is well outside the NEAMAP coverage, this area is within the NEFSC trawl survey coverage. While comparison may be limited, it certainly needs to be done and, therefore, simultaneous sampling via gill net and trawl is recommended. This will also be effective in sampling multiple species at different life stages.

Gillnet sampling should include an analysis of gillnet observations and characteristics of the soak duration, targets, and catches in order to be compared with the gill net catch data collected by fisheries observers. The design should provide sufficient observations to answer the pertinent questions. Part of this should include the description of the gillnet (as in, sink nets or floating nets, anchored or drift nets) and more detailed explanation of survey methods. For example, for the soak procedure, is the 16 hour standard soak time described starting regardless of time of day, or is it an overnight set? If the 16-hour soak time was determined in order to maximize catch and based on commercial catch, is fish condition a priority? Will the catch be retained by cooperating fishermen?

The mesh size protocol as described may not adequately capture effects on species that are affected, but are not caught (as in smaller than the 5” mesh will catch).

The number of samples proposed (for three fixed habitat stations, within two areas within the lease site and one outside control, a total of nine stations, once per season (assuming four seasons) would total 36 observations. In comparison many gear studies use paired trawls or paired gillnets, and we suggest the survey designers conduct an appropriate power analysis to determine the number of samples and soak times necessary to observe an affect. Spatial scale is simply not appropriate given the size of the lease sites and cumulative impacts. An immediate evaluation of soak times might help inform soak duration decisions. Similar analyses were conducted relative to the design of the ventless trap survey for scup and seabass that was an earlier cooperative research activity under Mid-Atlantic Research Set Asides (RSA) and Northeast Cooperative Research Program (NCRP) funding.

Justification for the timeline and schedule should be included, and clarification if “seasonal” means four times each year, three months apart. In addition, with only one year of data prior to construction, there is no way to control for inter-annual variability unrelated to the construction activity. This is an additional reason to plan protocol to make surveys comparable to existing datasets.

The last paragraph in this section refers to sub-sampling procedures - these should be described or referenced.

Recommend the sampling approach follow the NOAA trawl surveys since this project area overlaps with NOAA survey strata. Match the sampling protocols to those used for NEAMAP and NEFSC Bottom Trawl Survey, so that relevant comparisons are possible. Specifically, recording individual lengths, weights, sex, maturity, and potentially ages. Individual weights will be necessary to evaluate relative condition, which may be sex and maturity stage dependent (thus the need to determine those as well). Aim for individual weights at the 0.5-1 g resolution, as done on surveys with motion compensated balances.

Regarding measurements of sharks and rays, the NEFSC measures total length (TL) for skates, and disc width for rays. VIMS (and now NEAMAP) have a history of measuring pre-caudal lengths. The NEFSC shark longline survey measures over the body fork length as well as straightline for comparison to other studies. The longline survey also measures TL in natural position, the same two ways. In a dogfish reproduction study, NEFSC measured FL, natural and stretched TL. For skates and rays, suggest measuring both disc width and total length. If you must pick a single measurement pre-caudal is not appropriate. Thus to correspond to most studies and enforcement you should take straightline FL. For dogfish take stretched straightline TL for comparison to the NEFSC trawl survey. In general, we recommend working with the Apex Predators group at Narragansett Lab for guidance on protocols from their surveys.

This section should also provide protocols for lobsters, crabs, squid and scallops if there is anticipation of catching these species.

2.3.3 Atlantic Cod Reproductive Stage

More details should be provided on cod maturity portion of the proposed study plan. The purpose and objective of this section is not clear (e.g. Is this an attempt to document cod spawning in the area or determine if the wind farm impacts cod maturity?). More information should be provided so we can provide better feedback on this aspect of the study.

Measurements should include length (+/- 0.5 cm) and weight (+/- 0.5 g); the weight of dissected gonads should be record to 0.5 g precision as well.

A major problem with macroscopic maturity classification is the lack of a physical sample to revisit later (unlike age samples). Photos can help somewhat, but it is very easy to take a lot of terrible and useless photos at sea. If samples are taken from gonads, preserved, and processed for histology, these can serve as definitive diagnosis of reproductive condition, and also serve as an archive-able sample to be revisited as needed, shared with experts for agreement/confirmation, etc. Histology adds costs, but given expected low occurrence of cod in the area, this wouldn't be too large of a burden, and would provide the most accurate diagnosis.

2.4 Potential Demersal Species Catch

The list in Table 2 seems to "target" species that are commercially and recreationally caught in the SFWF area and certain important permitted fisheries. Based on NEFSC trawl survey data, the most abundant catch species within the RI WEA between 2003 and 2006 were longfin squid, scup, butterfish, and round herring (#1-4 in Fall), and Atlantic herring (#1 in Spring). None of these appear in this list. Only Northeast and Small-Mesh Multispecies, Monkfish, and Spiny Dogfish, and skate FMPs are mentioned. It is not clear why some species on the list have “NA” under the FMP/Permit column. Black sea bass is actually under the MAFMC Summer Flounder, Scup & Black Seabass FMP, tautog and American lobster are managed by the ASMFC via the states. It is not clear how these target species were selected, but this list appears very slanted toward certain New England fisheries and ignores others that could be important, particularly outside or adjacent to the project boundary. If this study only focuses on species fished within the SFWF project boundary, it could mask the true impact of this wind farm on the larger ecosystem by regarding only those species of commercial value within the project boundary.

From:	Melanie Gearon
To:	Brian Gervelis
Subject:	FW: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Wednesday, July 1, 2020 2:11:48 PM
Attachments:	image002.jpg 2018-11-15_SFWF Demersal Fisheries Survey-transmittal-BOEM.pdf 2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf

---

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Thursday, November 15, 2018 11:51 AM
To: Stromberg, Jessica <jessica.stromberg@boem.gov>
Cc: Hooker, Brian (Brian.Hooker@boem.gov) <Brian.Hooker@boem.gov>; Stephanie Wilson <swilson@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Aileen Kenney <akenney@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Jessica,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for BOEM review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: BOEM Comments: Deepwater Wind New England, LLC Draft Demersal Fisheries Resources Survey Protocol - OCS-A 0486

Date: Thursday, December 6, 2018 at 10:29:24 AM Eastern Standard Time

From: Melanie Gearon

To: Mary Colbert, Caitlin O'Mara

Attachments: BOEM Comments_Draft Demersal Fisheries Resources Survey Protocol_OCS-A 0486_120618.pdf, BOEM Comments_Draft Demersal Fisheries Resources Survey Protocol_OCS-A 0486_120618.docx

Caitlin,
Please file these comments on gill net plan from BOEM, integrate into comment tracker.

Mary
Please pdf email and put up in BOEM incoming correspondence

Thanks
Mel

From: "Stromberg, Jessica" <jessica.stromberg@boem.gov>
Date: Thursday, December 6, 2018 at 10:26 AM
To: Aileen Kenney <akenney@dwwind.com>, Stephanie Wilson <swilson@dwwind.com>, Melanie Gearon <mgearon@dwwind.com>
Cc: David Macduffee <david.macduffee@boem.gov>, Mary Cody <mary.cody@boem.gov>, Motunrayo Kemiki <motunrayo.kemiki@boem.gov>, "Hildreth, Emily" <emily.hildreth@bsee.gov>, "Boatman, Mary" <mary.boatman@boem.gov>
Subject: BOEM Comments: Deepwater Wind New England, LLC Draft Demersal Fisheries Resources Survey Protocol - OCS-A 0486

Aileen, Stephanie, Melanie,

On November 15, 2018, Deepwater Wind New England, LLC submitted a Draft Demersal Fisheries Resources Survey Protocol for the South Fork Wind Farm to BOEM for commercial lease OCS-A 0486. BOEM has reviewed the draft survey protocol and included comments in the attached comment/response matrix. A .PDF and Microsoft Word version of the comment/response matrix are available, with a column on the right-hand side for the Lessee to indicate how the comment has been addressed with the submission of the revised survey plan.

Staff are available to discuss the attached comments and how they can be resolved. Please let us know if you have any questions.

Thanks,

Jessica Stromberg
Project Coordinator
Office of Renewable Energy Programs
Bureau of Ocean Energy Management
Office: (703) 787-1730
Mobile: (571) 393-4371

BOEM Comment Matrix
Deepwater Wind New England, LLC - Commercial Lease OCS-A 0486
Draft Demersal Fisheries Resources Survey Protocol Review (November – December 2018)

#	Location		BOEM Comment (December 6, 2018)	Type*		Reviewer	Lessee Response (to be completed with revised submission): Explanation of how comment has been addressed
	Section	Page		C	Q		
1.	2.2	3	Section 2.2 includes discussion regarding the authorized take of marine mammals that may occur. However, sea turtles may also be taken by these fisheries surveys, but such documentation of authorized take is absent from the plan. The plan must include a discussion of authorized turtle takes to ensure compliance with Section 7 or Section 9 of the Endangered Species Act. It is likely that NMFS has information regarding authorized take under a biological opinion associated with approval of a fishery management plan(s), but I am not aware of what that may cover or of the date it was issued. Please discuss and reference how take of sea turtles is authorized under the fishing activities proposed in the plan.	X		Baker	
2.	2.2	3	Please document and report to BOEM any take of seabirds or other avian species, if this should occur during demersal fisheries surveys, with photos if possible.		X	Bigger	

* Comment Type:
C = Completeness comment. Is something missing that should be included to meet the provisions of 30 CFR 585?
Q = Quality comment. A comment related to the quality of the methodology employed or the quality of the data, if said results were to be submitted in support of the Lessee's COP.

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:58:57 PM
Attachments: image002.jpg
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf
2018-11-16_SFWF Demersal Fisheries Survey-transmittal-CTDEEP.pdf

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Saturday, November 17, 2018 10:04 AM
To: Aarrestad, Peter <Peter.Aarrestad@ct.gov>
Cc: Alexander, Mark <Mark.Alexander@ct.gov>; Matthew Morrissey <mmorrissey@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Peter,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for CT DEEP review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

From:	Melanie Gearon
To:	Brian Gervelis
Subject:	FW: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Wednesday, July 1, 2020 1:57:09 PM
Attachments:	image002.jpg 2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf 2018-11-15_SFWF Demersal Fisheries Survey-transmittal-MA CZM.pdf

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Thursday, November 15, 2018 12:11 PM
To: Carlisle, Bruce (ENV) <bruce.carlisle@state.ma.us>; Engler, Lisa (ENV) <lisa.engler@state.ma.us>
Cc: Stephanie Wilson <swilson@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Aileen Kenney <akenney@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Bruce and Lisa,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for MA CZM review. Please provide comments by December 14, 2018. We respectfully request that MA CZM circulate this plan to the Massachusetts Fisheries Working Group (MA FWG) on offshore wind energy for review and comment.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: Deepwater Wind SFWF Survey Plan
Date: Monday, December 17, 2018 at 9:54:12 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara, Mary Colbert
Attachments: CZM to DWW SFWF re fishery survey plan 12 14 18 - signed.pdf

Comments from MA CZM

From: "Boeri, Robert (ENV)" <robert.boeri@state.ma.us>
Date: Friday, December 14, 2018 at 4:10 PM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: "Pierce, David (FWE)" <david.pierce@state.ma.us>, "Ford, Kathryn (FWE)" <kathryn.ford@state.ma.us>, Aileen Kenney <akenney@dwwind.com>, Stephanie Wilson <swilson@dwwind.com>, Mary Colbert <mcolbert@dwwind.com>, "'Brian.Krevor@boem.gov'" <Brian.Krevor@boem.gov>, "mary.boatman@boem.gov" <mary.boatman@boem.gov>, "jessica.stromberg@boem.gov" <jessica.stromberg@boem.gov>, "susan.tuxbury@noaa.gov" <susan.tuxbury@noaa.gov>, "Engler, Lisa (ENV)" <lisa.engler@state.ma.us>, "Bordonaro, Patrice (ENV)" <patrice.bordonaro@state.ma.us>, "Callaghan, Todd (ENV)" <todd.callaghan@state.ma.us>
Subject: Deepwater Wind SFWF Survey Plan

Good afternoon Melanie,

I have attached CZM's comments on the above-referenced survey plan. Please feel free to contact Todd Callaghan at CZM should you have any questions.

Regards,

Bob Boeri

Robert L. Boeri
Massachusetts Office of Coastal Zone Management | Project Review Coordinator/Dredging Coordinator | 251 Causeway Street, Suite 800| Boston, MA 02114 | 617.626.1050 | robert.boeri@mass.gov

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

December 14, 2018

Ms. Melanie Gearon
Manager, Permitting and Environmental Affairs
Deepwater Wind South Fork, LLC
56 Exchange Terrace
Providence, RI 02903

Dear Ms. Gearon,

Thank you for providing the Massachusetts Office of Coastal Zone Management (CZM) the opportunity to review and comment on the document titled, "Demersal Fisheries Resources Survey Protocol-Draft" ("the survey") dated November 14, 2018. Below we offer comments and recommendations.

Survey Summary

Deepwater Wind (DWW) has proposed the South Fork Wind Farm (SFWF) in the Bureau of Ocean Energy Management's (BOEM) Lease Area OCS A-0486, roughly 15 nautical miles south west of Martha's Vineyard and adjacent to Cox Ledge, a well-known commercial and recreational fishing area. The intention of the survey is to provide data on:

1. Demersal species susceptible to gillnets that occur in and around the SFWF;
2. Seasonal timing of the occurrence of these species; and
3. Changes in taxonomic compositions of demersal fish assemblages between the baseline and post-construction time periods; i.e., do some species have reduced abundance and/or do new species appear after construction of SFWF?

DWW has proposed to define the fisheries community composition within the SFWF Project Area by deploying nine 4-panel gillnets with 5, 6, 6.5, and 7-inch mesh for 16 hours each. DWW proposes to use gillnet sampling rather than a traditional trawl survey since portions of the study area are too rocky to be trawled. DWW also states that based on Vessel Monitoring System data, field observations of gillnet "high fliers," and statements by fishermen at outreach meetings, that a wide variety of demersal species are commercially fished using gillnets in the SFWF Project Area. While the survey is designed to target monkfish, DWW expects that species included under the northeast multispecies, small mesh multispecies, spiny dogfish, and skate Fishery Management Plans will also be caught.

The statistical design includes three survey blocks: two within the SFWF Project Area and one block within a reference area. Each survey block would contain three-predetermined gillnet areas delineated by bottom type: rocks and boulder, gravel, and sand/fines. One gillnet setting site per habitat type per block would be randomly selected from the survey areas for each survey, resulting in nine independent gillnets conducted per survey. The surveys are proposed to be repeated four times prior to construction (seasonally for one year) and eight times post construction (seasonally for two years). After the 16-hour soak time, all organisms captured would be identified, counted, and measured for length. Any Atlantic cod captured would also be assessed for maturity stage. The surveys are proposed to be completed using for-hire commercial vessels whose owners hold the appropriate permits.

CZM Comments

The design of successful surveys and experiments often requires a power analysis to determine the minimum number of samples necessary to detect a measurable effect. It is not clear from the brief description of the proposed statistical design if a power analysis was performed. CZM suggests that DWW use existing fishery-dependent data from the gillnet fishery as the basis of a power analysis for determining how many samples (i.e., replications via gillnet sets) will be needed to achieve the twin goals of baseline characterization and detection of any changes in the community composition of the Project Area over time.

CZM agrees that a stratified approach to sampling is appropriate for the proposed survey. We recommend that the individual gillnet sites be randomly selected within each survey block in advance, and that a set of alternative sites be generated in case the initial list of sites cannot be occupied.

The draft protocol is not clear as to why the experimental design is set up asymmetrically (i.e., two survey blocks within the SFWF and only one reference survey block) and why more effort is proposed within the wind farm. Underwood (1992) highlighted the importance of replication, in general, and the importance of replication in reference sites. The proposed three gillnet sites in the reference block are likely inadequate replication to detect a change in the community. As stated above, a power analysis will help identify the necessary sampling effort for the proposed project's goals. CZM recommends that DWW consider a more balanced experimental design, or an asymmetrical design with more effort in the reference block(s), as DWW does for the Block Island Wind Farm trawl surveys.

CZM encourages DWW to consult with Massachusetts Division of Marine Fisheries and National Marine Fisheries Service to determine if other assessment means are warranted in the Project Area. In particular, ventless traps may be needed to assess potential changes to American lobster abundances and acoustic receivers may assist in assessing spatial use and any potential impacts to previously-tagged species of importance including Atlantic cod, haddock, striped bass, etc.

Thank you for the opportunity to provide comments on this draft survey. CZM appreciates DWW's commitment to balancing ocean renewable energy development with preserving existing resources and water dependent uses. CZM looks forward to working with DWW on the final survey.

Sincerely,

Lisa Berry Engler

Lisa Berry Engler
Acting CZM Director

Cc: David Pierce, Kathryn Ford DMF
Robert Boeri, Todd Callaghan, David Janik, CZM
Aileen Kenney, Stephanie Wilson, Mary Colbert, DWW
Mary Boatman, Jessica Stromberg, BOEM
Sue Tuxbury, NOAA-NMFS

Underwood, A.J. 1992. Beyond BACI: the detection of environmental impacts on populations in the real, but variable, world. Journal of Experimental Marine Biology and Ecology 161: 145-178.

From:	Melanie Gearon
To:	Brian Gervelis
Subject:	FW: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Wednesday, July 1, 2020 1:55:47 PM
Attachments:	image002.jpg 2018-11-15_SFWF Demersal Fisheries Survey-transmittal-MA DMF.pdf 2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Thursday, November 15, 2018 12:22 PM
To: Ford, Kathryn (FWE) <kathryn.ford@state.ma.us>
Cc: david.pierce@mass.gov; Stephanie Wilson <swilson@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Aileen Kenney <akenney@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Kathryn,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for MA DMF review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Monday, December 17, 2018 at 10:37:57 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara, Mary Colbert
Attachments: DMF to SFWF fisheries survey 12-13-2018.doc, image001.jpg

Comments from MA DMF

From: "Ford, Kathryn (FWE)" <kathryn.ford@state.ma.us>
Date: Thursday, December 13, 2018 at 7:35 PM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: "Pierce, David (FWE)" <david.pierce@state.ma.us>, "Pol, Mike (FWE)" <mike.pol@state.ma.us>, "Logan, John (FWE)" <john.logan@state.ma.us>, "Burke, Erin (FWE)" <erin.burke@state.ma.us>, "Whitmore, Kelly (FWE)" <kelly.whitmore@state.ma.us>, "OKeefe, Catherine (FWE)" <catherine.okeefe@state.ma.us>, "DeCelles, Gregory (FWE)" <gregory.decelles@state.ma.us>, "Pugh, Tracy (FWE)" <tracy.pugh@state.ma.us>, "Callaghan, Todd (ENV)" <todd.callaghan@state.ma.us>, "Carlisle, Bruce (ENV)" <bruce.carlisle@state.ma.us>, Susan Tuxbury - NOAA Federal <susan.tuxbury@noaa.gov>, Julia Livermore <julia.livermore@dem.ri.gov>, "dbeutel@crmc.ri.gov" <dbeutel@crmc.ri.gov>, "Brunbauer, Morgan A (DEC)" <morgan.brunbauer@dec.ny.gov>, Michelle Bachman <mbachman@nefmc.org>, Brian Hooker <brian.hooker@boem.gov>
Subject: RE: SFWF - Draft Demersal Fisheries Resources Survey

Melanie,
Please see attached comments from Mass DMF. Regards, Kathryn

From: Melanie Gearon [mailto:mgearon@dwwind.com]
Sent: Thursday, November 15, 2018 12:22 PM
To: Ford, Kathryn (FWE)
Cc: Pierce, David (FWE); Stephanie Wilson; Caitlin O'Mara; Mary Colbert; John O'Keeffe; Aileen Kenney
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Kathryn,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for MA DMF review. Please provide comments by December 14, 2018.
Thanks,
Melanie

DEEPWATERWIND
Clean energy is just over the horizon.®

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David E. Pierce, Ph.D.
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Karyn E. Polito
Lieutenant Governor
Matthew A. Beaton
Secretary
Ronald Amidon
Commissioner
Mary-Lee King
Deputy Commissioner

Ms. Melanie Gearon
Manager, Permitting and Environmental Affairs
South Fork Wind Farm
56 Exchange Terrace
Providence, RI 02903

December 13, 2018

Dear Ms. Gearon,
Thank you for providing the Massachusetts Division of Marine Fisheries (MA DMF) the opportunity to provide comment on the document, "Demersal Fisheries Resources Survey Protocol-Draft" dated November 14, 2018 for the South Fork Wind Farm (SFWF).

SFWF has proposed define the study area's baseline community composition by deploying nine 4-panel gillnets with 5, 6, 6.5, and 7 inch mesh for 16 hours[1]. This survey will be repeated four times prior to construction (seasonally for one year) and eight times post construction (seasonally for two years). The survey uses a random stratified design stratified by bottom type into three strata: rocks and boulder, gravel, and sand/fines. Within each stratum 3 samples will be taken: 2 in the impact area and 1 in a reference area. The survey uses a gillnet since some areas of the study area are too rocky to be trawled and "a wide variety of demersal species are commercially fished using gillnets in the SFWF Project Area" (page 3). Whatever is captured will be identified, counted, and measured for length. Any Atlantic cod captured will also be assessed for maturity stage. Surveys will be done using for hire vessels (e.g., commercial vessels hired for the purpose of conducting the survey).

Our comments are organized by topic area below.

Survey purpose

- The plan states that "baseline community composition" is the primary goal. The survey plan focuses on in-water data collection and does not describe baseline work using available data, the identification of gaps in that data, and how this survey addresses those gaps. We believe this survey is an effort to increase the spatial resolution of existing datasets. The selection of the gillnet method we assume is to enable standard sampling across a broad range of substrate types.
- The purpose statement on page 2 also says the survey "may be used to assess whether detectable shifts occur in fish presence, absence, or abundance during and after construction." This objective should be clearly identified and the survey plan should describe how the proposed method will address this objective.
- A section describing reproductive sampling of cod is included but the purpose for that sampling is not described.
    - If the objective is to define the timing of spawning, then samples should be obtained on a monthly basis (at a minimum).

---

[1] The survey plan recognizes the wide variability in gillnet gear and the need for standardization but other specifications have yet to be determined.

  - If the objective is to determine whether or not cod spawn in the construction area, there are much more direct and effective ways to answer that question (e.g., high resolution rod and reel survey, passive acoustics, or a dedicated acoustic telemetry experiment).
  - What is the plan if few or no cod are caught during sampling in that quarter? Will additional gillnet sets be made to obtain samples?
  - Prior training with fresh or preserved samples to assess reproductive condition is recommended to ensure accuracy.
- Spatial distribution and relative abundance are typically sampled using different survey designs. Please be clear regarding the survey objectives and how the data will be used to address specific questions.
- MA DMF recommends that data collection should provide information on at least species composition, pelagic-demersal ratio, biomass, and relative abundance.

Survey design

- The main weakness to the proposed design is inadequate proposed sampling on all levels (in terms of proposed number of sites, stations per site, sampling years, and sampling frequency). For a given habitat type, there is only a single gillnet sample site for a reference and only two within the wind farm site. Replication should occur at the site-bottom type level (e.g., multiple sites within the reference area sampled over rock/boulder, several in ref site over sand/fines, etc and same for wind site). As proposed, comparisons of species composition between wind farm and reference for, say, a sand/fines bottom would be based on a single sampling location in the reference and only 2 sites in the farm. One reference site and one year of pre-construction baseline is inadequate for the stated objectives. The number of control sites should at least be equal to, if not exceed, the number of impact sites.
- Given the inherent interannual variability of fish distributions, especially on the scale proposed, it will be difficult to assess whether the baseline data are representative of a "typical" year. The proposed soak time is 16 hours/net. In total, if four samples were taken per year, the temporal intensity of sampling (64 hours/year) at the control and impact sites is very poor.
- It is likely that the samples sizes as proposed will be too small to detect changes in abundance, assemblage, or spatial distribution. A power analysis is needed to estimate the statistical power that would result from this (and alternative) sampling designs, before any decisions are made as to the intensity of sampling. Existing fishery dependent data from the gillnet fishery could be used as the basis of this power analysis.
- The alternative survey lines for when poor setting conditions are found should be pre-selected to avoid loss of randomization in the survey design.
- The uncertainty of the sampling frequency ("a minimum of once per season") is not appropriate. Please establish a sampling rate.

Survey method

- Gillnets can be a very effective monitoring tool and are legitimate to assess part of the baseline community composition. Furthermore, they are a sensible gear type for looking at pre and post-construction questions given concerns regarding access to trawlers among turbine fields both due to turbine spacing and the potential additional of hard bottom for scour protection. However, additional gear types should be used to appropriately assess baseline community composition, especially for the benthos. Gillnets will not adequately sample shellfish, Jonah crabs, or lobsters and the limited sampling will likely miss important migratory species. The Jonah crab and lobster resources around this location support the bulk of the remaining nearshore lobster fishers in the region, and as such require consideration in survey efforts. We recommend this study be combined with a ventless lobster trap study and the deployment of acoustic receivers at a minimum. We recommend the ventless lobster trap study utilize a fishery-independent BACI design with stratified random placement of stations using substrate type to define the strata (complex and not complex).
- A frequent concern in gillnet studies is how to handle fish caught in different ways within the net analytically (i.e. should they be included?). Suggested readings to better understand the advantages and limitations of gillnet sampling include Hubert, W. A., Pope, K. L., & Dettmers, J. M. (2012). Passive capture techniques. Pages 223-253 in A.V. Zale, D.L. Parrish, and T.M. Sutton. Fisheries

Techniques, 3rd Edition. American Fisheries Society, Bethesda, Maryland and He, P., and M. V. Pol. 2010. Fish Behavior near Gillnets: Capture Processes and Influencing Factors. Pages 183–198 in P. He, editor. Behavior of Marine Fishes: Capture Processes and Conservation Challenges. Wiley-Blackwell, Ames, Iowa. Numerous details affect catch in gillnets, including hanging ratios, mesh depth, twine diameter, and many others that must be vetted and standardized.
- The use of the meshes suggested will likely only capture fish recruited to the fishery. Of particular interest is the effect of construction and operation on abundance and presence of juvenile fish, which the survey gear will not capture.
- The plan should describe the order of meshes within gillnet strings, which should either be randomized, or designed so that each mesh occupies a position within the string an equal number of times. Gillnet strings are known to have end effects where the end panels capture fish at different rates than other panels.
- It is unclear why single mesh size gillnets will be deployed. The rationale for this sampling is not described, and is not recommended for abundance or assemblage changes.
- Commercial effort for monkfish and skates in the region uses larger mesh sizes (>10 inches) as well as tie-downs that restrict the floatline height. Intention to use this type of gear to sample these species should be explicit, as tie-downs and large meshes will yield very different results and samples differently than the other gillnets described.
- The soak time may not include a full diurnal cycle which is recommended for assessing species assemblages (Rotherham et al. 2006; Minns and Hurley 1988; Mattson and Mutales 1992; Šmejkal et al. 2015).
- Verification of fish species identification through freezing or photographing of samples is needed to assure accuracy. Of the guides suggested, Flescher is a dichotomous key but does not cover gillnet species and the others are not keys.
- The sampling plan is not appropriate for gillnet vessels. When gillnetting, fish will typically arrive singly and can be weighed and measured immediately; sorting is likely not necessary unless processing for scientific samples occurs later.
- What happens to live and dead catch? Are they landed or discarded?

Results
- A description of planned analyses is needed.
- Several of the species marked NA in Table 2 are included in Fisheries Management Plans.
- Please define how survey results will be made available and incorporated into data management systems.

General comments
- Other surveys have been conducted for SFWF, including a cod spawning survey and ventless lobster trap survey. It is our understanding that hydrodynamic studies are also required. How will these surveys be continued and used to inform both a baseline characterization of species and impact studies?
- There are specific impacts anticipated from offshore wind, in particular from sound during construction. Since a unique Atlantic cod spawning ground occurs at this potential wind farm site, it is important to fully characterize the timing, location, and sensitivity of the spawning activity to wind farm development. This should be a clear priority in any fisheries survey plan for the site.
- Other surveys are highly relevant to fisheries habitat, including surveys for benthic biota and oceanographic conditions. Are studies of these variables being conducted, and what fisheries concerns can they address? For example, we recommend that benthic grab studies be used to assess changes in prey composition. Benthic photo surveys should be used to assess changes in prey composition and shellfish abundance.
- A very important missing component is the assessment of fish condition. In addition to length, stomach contents and/or isotopes should be used to measure fish condition in several target species (e.g., monkfish, flounders, and skates).
- According to BOEM guidelines (BOEM 2013), the overall purpose of the fishery plan is to characterize the fishery resources within the survey area that may be affected by the proposed actions. The guidelines state:

The fish survey plan should describe how the following goals will be accomplished:

- Identify and confirm dominant benthic, demersal, and pelagic species within the project footprint and surrounding areas (see Section IV below);
- Establish a pre-construction baseline that may be used to assess whether detectable changes occurred in fish presence, absence, or abundance post-construction;
- Collect additional information aimed at reducing uncertainty associated with existing fish data and/or to help inform the interpretation of survey results; and
- Develop an approach to quantify any substantial changes in fish presence, absence, or abundance associated with proposed operations.

The survey specifications should state the issues to be investigated, hypotheses, assumptions, data collection techniques, standards, analytical and statistical techniques, and quality control.

The survey plan we reviewed only proposes a single study using a single gear type which will not identify and confirm dominant benthic, demersal, and pelagic species; it does not address the majority of the items to be covered in a fish survey plan as recommended by BOEM.

Questions pertaining to this review can be directed to John Logan (john.logan@mass.gov) or Kathryn Ford (kathryn.ford@mass.gov).

Sincerely,

Kathryn Ford, Ph.D.
Habitat Program Leader

Cc:
Pierce, Logan, Pol, Pugh, Burke, Whitmore, O'Keefe, DeCelles, MA DMF
Callaghan, MA CZM
Carlisle, MA CEC
Tuxbury, NOAA-NMFS
Livermore, RIDEM; Beutel, RI CRMC
Brunbauer, NYDEC
Bachman, NEFMC
Hooker, BOEM

References

BOEM 2013. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf. https://www.boem.gov/Fishery-Survey-Guidelines/

Minns, C.K. and D.A. Hurley. 1988. Effects of net length and set time on fish catches in gill nets. North American Journal of Fisheries Management 8: 216-223

Mattson, N. S., & Mutales, J. C. (1992). Multi-mesh gillnets to estimate species composition and catch per unit effort of fish in a small water body in Zambia. Journal of Fish Biology, 41(6), 897-908.

Šmejkal, M., Ricard, D., Prchalová, M., Říha, M., Muška, M., Blabolil, P., & Encina, L. (2015). Biomass and abundance biases in European standard gillnet sampling. PloS one, 10(3), e0122437.

Rotherham, D., Gray, C. A., Broadhurst, M. K., Johnson, D. D., Barnes, L. M., & Jones, M. V. (2006). Sampling estuarine fish using multi-mesh gill nets: effects of panel length and soak and setting times. Journal of Experimental Marine Biology and Ecology, 331(2), 226-239.

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:43:08 PM
Attachments: image002.jpg
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf
2018-11-16_SFWF Demersal Fisheries Survey-transmittal-NYDEC.pdf

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From: Melanie Gearon <mgearon@dwwind.com>
Sent: Friday, November 16, 2018 8:16 PM
To: Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>
Cc: Chytalo, Karen (DEC) <karen.chytalo@dec.ny.gov>; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Karen,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NY DEC review. Please provide comments by December 14, 2018. We respectfully request that NY DEC circulate this plan to the New York Fisheries-Technical Working Group (F-TWG) for review and comment. I believe that Morgan and Karen (cc'd) participate in that working group.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:42:34 PM
Attachments: image002.jpg

From: Chytalo, Karen (DEC) <karen.chytalo@dec.ny.gov>
Sent: Monday, November 19, 2018 1:19 PM
To: Melanie Gearon <mgearon@dwwind.com>; Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>
Cc: Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>
Subject: RE: SFWF - Draft Demersal Fisheries Resources Survey

Thanks Melanie. Morgan will send to the TWG.

From: Melanie Gearon [mailto:mgearon@dwwind.com]
Sent: Friday, November 16, 2018 8:16 PM
To: Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>
Cc: Chytalo, Karen (DEC) <karen.chytalo@dec.ny.gov>; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Hi Karen,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NY DEC review. Please provide comments by December 14, 2018. We respectfully request that NY DEC circulate this plan to the New York Fisheries-Technical Working Group (F-TWG) for review and comment. I believe that Morgan and Karen (cc'd) participate in that working group.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:42:43 PM
Attachments: image001.jpg

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Tuesday, November 27, 2018 4:19 PM
To: Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>
Subject: Re: SFWF - Draft Demersal Fisheries Resources Survey

Hi Morgan,
Thanks for distributing it to F-TWG. And, yes you have our permission to post to the website.
Best,
Melanie

From: "Brunbauer, Morgan A (DEC)" <morgan.brunbauer@dec.ny.gov>
Date: Tuesday, November 27, 2018 at 1:06 PM
To: Melanie Gearon <mgearon@dwwind.com>
Subject: RE: SFWF - Draft Demersal Fisheries Resources Survey

Hi Melanie,

We will share this with the F-TWG – should go out in the next day or so. Do you also want this posted on the F-TWG public website? We wanted to ask your permission before we posted it.

Thanks,

Morgan

From: Melanie Gearon [mailto:mgearon@dwwind.com]
Sent: Friday, November 16, 2018 8:16 PM
To: Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>
Cc: Chytalo, Karen (DEC) <karen.chytalo@dec.ny.gov>; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Hi Karen,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NY DEC review. Please provide comments by December 14, 2018. We respectfully request that NY DEC circulate this plan to the New York Fisheries-Technical Working Group (F-TWG) for review and comment. I believe that Morgan and Karen (cc'd) participate in that working group.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

NYSDEC Marine Resources Comments on SFWF Demersal Fisheries Resources Survey Protocol

page 4, 2nd to last paragraph: They need to select a gillnet mesh size and use it consistently at all stations during the whole survey. Otherwise they won't be able to compare catch

Page 4, Last paragraph: Please define the seasons sampling will occur. Is it just spring in fall? Four times a year? Being consistent from year to year will be important to compare catch data.

Page 4, Last paragraph: A minimum of two years of data should be collected prior to construction, three would be preferable. Three years post construction data collection is also suggested.

page 7, 1st paragraph: They should bring along a thermometer for air temperature. It's a small inexpensive piece of equipment - they shouldn't need to rely on the fisherman's equipment or download the data after the fact.

Page 7, 2,2,5, gillnet station data: They should record latitude and longitude at each end of the gillnet when they set them.

From:	Melanie Gearon
To:	Brian Gervelis
Subject:	FW: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Wednesday, July 1, 2020 1:45:09 PM
Attachments:	image002.jpg 2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf 2018-11-16_SFWF Demersal Fisheries Survey-transmittal-NYS DOS.pdf

---

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Friday, November 16, 2018 8:25 PM
To: McLean, Laura (DOS) <Laura.McLean@dos.ny.gov>
Cc: Maraglio, Matthew (DOS) <Matthew.Maraglio@dos.ny.gov>; Aileen Kenney <akenney@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Laura,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NY DOS review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

From: [Melanie Gearon]
To: [Brian Gervelis]
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:47:51 PM
Attachments: image002.jpg
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf
2018-11-16_SFWF Demersal Fisheries Survey-transmittal-NYS PSC.pdf

---

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Saturday, November 17, 2018 9:37 AM
To: Davis, Andrew (DPS) <Andrew.Davis@dps.ny.gov>
Cc: Aileen Kenney <akenney@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Andy,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for NYS PSC review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Draft Demersal Fisheries Resources Survey
Date: Wednesday, July 1, 2020 1:52:17 PM
Attachments: image002.jpg
2018-11-16_SFWF Demersal Fisheries Survey-transmittal-RIDEM.pdf
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Friday, November 16, 2018 7:50 PM
To: McNamee, Jason (DEM) <jason.mcnamee@dem.ri.gov>
Cc: Julia Livermore <julia.livermore@dem.ri.gov>; Aileen Kenney <akenney@dwwind.com>; Stephanie Wilson <swilson@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Jason,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for RIDEM review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: RIDEM DMF Comments on SFWF Gillnet Survey
Date: Monday, December 17, 2018 at 9:55:55 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara, Mary Colbert
Attachments: RIDEM_Comments_on_Demersal_Fish_Survey.docx, image001.png

Comments from RI DEM

From: "Livermore, Julia (DEM)" <Julia.Livermore@dem.ri.gov>
Date: Friday, December 14, 2018 at 3:49 PM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: "McNamee, Jason (DEM)" <jason.mcnamee@dem.ri.gov>, "Mcmanus, Conor (DEM)" <Conor.McManus@dem.ri.gov>, Susan Tuxbury - NOAA Federal <susan.tuxbury@noaa.gov>, "Ford, Kathryn (FWE)" <kathryn.ford@state.ma.us>, "Brunbauer, Morgan A (DEC)" <morgan.brunbauer@dec.ny.gov>
Subject: RIDEM DMF Comments on SFWF Gillnet Survey

Hello Melanie,

Thank you for the opportunity to provide feedback on the proposed South Fork Wind Farm gillnet survey. Attached you will find our comments. Please contact me with any questions.

Happy holidays,
Julia

Julia Livermore, Supervising Marine Biologist
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Ft. Wetherill Rd.
Jamestown, RI 02835
Office: 401.423.1937
Fax: 401.423.1925

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF MARINE FISHERIES
Three Fort Wetherill Road
Jamestown, Rhode Island 02835

To: Melanie Gearon, Manager of Permitting and Environmental Affairs

From: Jason McNamee, Chief of Marine Resources

Date: December 14, 2018

Re: Comments on Gillnet Survey

Staff at the Rhode Island Department of Environmental Management (RIDEM) Division of Marine Fisheries have reviewed the document titled "Demersal Fisheries Resources Survey Protocol – DRAFT". We commend your effort to collect data on demersal fish communities given the challenges associated with conducting an otter trawl survey in this area. We offer the following comments regarding the survey protocol:

Sampling Design

- No description of potential analysis is provided. This is necessary to determine how data will be used, and if the survey design meets the needs of the questions to be answered.
- The term "detectable shift" is not defined. What is meant by detectible and has a power analysis been done to determine whether shifts could be detectible from a statistical standpoint?
- The use of specific gear placements may target specific species and/or life history stages.
  - This is problematic if you are trying to detect changes in species assemblages, as the assemblages caught may be reflective of the areas and mesh sizes selected, rather than the actual community within the survey blocks. Current sampling protocol may not provide enough samples to make these determinations. However, if the focus is to identify changes in abundance and condition of specific species, targeted sampling may be appropriate.
- The distances of survey Blocks from the construction area are not described for the project area or the farfield reference areas.
  - This information is essential to understand what types of environmental effects may be detectible within each Block (e.g., how far away is pile driving noise disruptive?).
  - More information is necessary to understand siting of impact and reference areas.
- The word "season" is not defined within this sampling protocol and therefore the sampling frequency is not clearly presented.
  - Sampling should occur at least once per month to effectively capture change, as the timing of seasonal changes in temperature fluctuate from year-to-year.

    - Increased sampling will also be necessary from a statistical standpoint to evaluate any temporal or spatial changes.
- 16 hours is a relatively short soak time for a gillnet. While this will lead to a fresher catch and reduce predation on fish caught in the net, the shorter time may result in lower catch or missed movements of fish through the area. To correct this issue, better describe the seasonality component and increase sampling frequency (i.e., monthly) to improve the statistical power of the dataset.
    - Further, if a large school of fish moves though the area, they may fill up the net quickly, which reduces the amount of time that the net is actually fishing.
        - One method to understand whether a net was not fishing actively for the whole soak time is to use depth sensors on lead and float lines. This will show when the net collapsed under the weight of the catch.
- The time frame of data collection is too short if only one year of baseline data is collected.
    - At minimum, 2 years of baseline data should be collected, as was done for the Block Island Wind Farm demersal trawl and ventless lobster pot survey.

Gillnet configuration

- We are supportive of your selection of an experimental gillnet with varying mesh sizes, as well as the use of a commercial net. However, we have the following suggestions regarding design:
    - We are confused about what mesh sizes will be used. Section 2.2.2 Gillnet Methods states "The gillnet survey may be conducted using two types of gillnets including experimental gillnets with multiple mesh sizes (e.g., four panels of 5', 6', 6.5', and 7' mesh) and typical, single mesh size gillnets commonly used in Rhode Island and Massachusetts fisheries (including Southern New England Monkfish and Dogfish Gillnet Exemption Area) as determined through consultation with contracted fishermen." Given that nine nets will be used per Survey, the use of two nets is not possible. The same net configuration must be used in all locations for the data to be useful in detecting effects. The only way multiple nets could be used is if both an experimental (four mesh sizes) and a typical commercial (single mesh size) net were set at each block to show side-by-side results.
    - Nets with multiple panels should be arranged in a random sequence to reduce some of the selectivity bias that can exist between different mesh panels across the nets.
    - FAO has some literature explaining proper gillnet study design. Another good resource is: Holst, René & Madsen, Niels & Fonseca, Paulo & Moth-Poulsen, Thomas & Campos, Aida. (2005). Manual for gillnet selectivity.
- No mention is made of the use of tie-downs in the survey protocol. While tie-downs are common in the commercial fishery, they decrease net selectivity, and are not suitable for sampling. We therefore recommend that tie-downs be avoided.

- Generally, in gillnet surveys the fish captured in the first and last panel (the two outermost panels) are not considered. These two panels move around more frequently than other panels due to the floats and can frequently lift off the bottom allowing demersal fish to swim beneath. Therefore, the catch in the outermost panels is not representative of the area, as they “fish” inconsistently. If catch from these panels is included, an analysis should be done to ensure the catch is not significantly different within these panels as compared to other panels (of identical mesh size) in the net.

General Comments

- If possible, the RIDEM DMF would like to gain access to the survey data for use in species stock and habitat assessments.
- Given the selectivity of gillnets, other surveys (ventless lobster pot and hook and line) may be necessary to fill data gaps and collect data on a broader intersection of the fish community in the area.
- We would also recommend that you measure skates by total length. Total length is a better measurement to assess growth and is used in RIDEM DMF surveys.
    - If the disk with measurement is a function of NEAMAP sampling protocol, we recommend measuring both disk width and total length to improve utility of the gillnet survey data in assessment work.

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: FAB review of South Fork proposed fisheries survey
Date: Wednesday, July 1, 2020 1:48:38 PM
Attachments: South Fork Fisheries Survey 2018.pdf

From: Dave Beutel <dbeutel@crmc.ri.gov>
Sent: Thursday, November 15, 2018 2:57 PM
To: saklob@aol.com; LAD0626@aol.com; 'Brian' <Kwe5tbos90@yahoo.com>; 'Polark' <polark1@verizon.net>; gvdwood@cox.net; 'Mike Marchetti' <fvmisterg@gmail.com>; 'Rick Bellavance' <makosrule@verizon.net>; 'Erich Stephens' <estephens@vineyardwind.com>; 'Erik Peckar' <erik@vineyardpower.com>; 'Rachel Pachter' <rpachter@vineyardwind.com>; 'Matthew Robertson' <mrobertson@vineyardwind.com>; john@seakeeper.net; 'James Neveu' <JANEV@orsted.com>; 'Laura Morse' <LAURM@orsted.com>; 'Michael Evans' <MICEV@orsted.com>; 'Donald Fox' <dfox@towndock.com>; 'Lisa Turner' <lturner@crmc.ri.gov>; Rodney Avila <ravila@dwwind.com>; 'Cristiana Bank' <cbank@vineyardwind.com>; 'Katie Almeida' <kalmeida@towndock.com>; 'Rodman Sykes' <crfisheries@gmail.com>; 'Fred Mattera' <fredmattera@cfcri.org>; 'Meghan Lapp' <Meghan@seafreezeltd.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; 'R. Daniel Prentiss' <Dan@prentisslaw.com>; Melanie Gearon <mgearon@dwwind.com>
Cc: 'Grover Fugate' <gfugate@crmc.ri.gov>; 'Janet Coit' <Janet.Coit@DEM.RI.GOV>; 'Kearns, Christopher (DOA)' <Christopher.Kearns@energy.ri.gov>; 'Powers, Rosemary (GOV)' <Rosemary.Powers@governor.ri.gov>; 'Grant, Carol (DOA)' <Carol.Grant@energy.ri.gov>; 'Porfilio, Jaclyn (GOV)' <Jaclyn.Porfilio@governor.ri.gov>; 'James Boyd' <jboyd@crmc.ri.gov>; 'Dave Reis' <dreis@crmc.ri.gov>; 'Dan Goulet' <dgoulet@crmc.ri.gov>; Julia Livermore <julia.livermore@dem.ri.gov>; 'Jeff Willis' <jwillis@crmc.ri.gov>
Subject: FAB review of South Fork proposed fisheries survey

Fishing industry members,

Deepwater Wind has provided a draft of the fisheries survey proposed for the South Fork Wind Farm. Please review and provide comments. Thank you.

Dave

David Beutel
Coastal Resources Management Council
Aquaculture Coordinator
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
401-783-3370

From: Melanie Gearon
To: Brian Gervelis
Subject: FW: SFWF - Consistency Certification and Monitoring Plan
Date: Wednesday, July 1, 2020 1:50:29 PM
Attachments: image002.jpg
App A_SFWF_CZM Rvw 2018-11-10_Clean.pdf
App A_SFWF_CZM Rvw 2018-11-10_Redline.pdf
2018-11-13_SFWF-RI CRMC_Additional Info Request-Transmittal-Final.pdf
2018-11-14_SFWF-DraftDemersal_GillNetsurvey_for comment.pdf

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Tuesday, November 13, 2018 5:26 PM
To: Grover Fugate <gfugate@crmc.ri.gov>
Cc: Stephanie Wilson <swilson@dwwind.com>; Aileen Kenney <akenney@dwwind.com>; Mary Colbert <mcolbert@dwwind.com>; Stromberg, Jessica <jessica.stromberg@boem.gov>; John O'Keeffe <jokeeffe@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>; 'Dave Beutel' <dbeutel@crmc.ri.gov>; James Boyd <jboyd@crmc.ri.gov>; David Schwartz <dschwartz@dwwind.com>
Subject: SFWF - Consistency Certification and Monitoring Plan

Dear Grover,
In response to your email sent on October 24, 2018 requesting additional information to support the Rhode Island Coastal Resources Management Council (CRMC) federal consistency review for the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC), I am submitting the attached package:

- Submission cover letter
- Revised COP Appendix A - Coastal Zone Management Consistency Statements (New York, Rhode Island, and Massachusetts) (clean and redline versions)
- Draft Demersal Fisheries Resources Survey Protocol

Please do not hesitate to contact me if you have any questions. We will FedEx a hard copy of these materials to the CRMC office tomorrow.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: FAB review of South Fork proposed fisheries survey
Date: Monday, November 19, 2018 at 5:31:25 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara
Attachments: South Fork Fisheries Survey 2018.pdf

Dave Beutel's original email to FAB, please pdf email and post to BOX and make sure these emails are added to the gill net survey distribution list spreadsheet

---

From: Dave Beutel <dbeutel@crmc.ri.gov>
Date: Thursday, November 15, 2018 at 2:53 PM
To: "saklob@aol.com" <saklob@aol.com>, "LAD0626@aol.com" <LAD0626@aol.com>, 'Brian' <Kwe5tbos90@yahoo.com>, 'Polark' <polark1@verizon.net>, "gvdwood@cox.net" <gvdwood@cox.net>, 'Mike Marchetti' <fvmisterg@gmail.com>, Rick Bellavance <makosrule@verizon.net>, 'Erich Stephens' <estephens@vineyardwind.com>, 'Erik Peckar' <erik@vineyardpower.com>, 'Rachel Pachter' <rpachter@vineyardwind.com>, 'Matthew Robertson' <mrobertson@vineyardwind.com>, "john@seakeeper.net" <john@seakeeper.net>, 'James Neveu' <JANEV@orsted.com>, 'Laura Morse' <LAURM@orsted.com>, 'Michael Evans' <MICEV@orsted.com>, 'Donald Fox' <dfox@towndock.com>, 'Lisa Turner' <lturner@crmc.ri.gov>, Rodney Avila <ravila@dwwind.com>, 'Cristiana Bank' <cbank@vineyardwind.com>, 'Katie Almeida' <kalmeida@towndock.com>, 'Rodman Sykes' <crfisheries@gmail.com>, 'Fred Mattera' <fredmattera@cfcri.org>, 'Meghan Lapp' <Meghan@seafreezeltd.com>, Aileen Kenney <akenney@dwwind.com>, John O'Keeffe <jokeeffe@dwwind.com>, "'R. Daniel Prentiss'" <Dan@prentisslaw.com>, Melanie Gearon <mgearon@dwwind.com>
Cc: 'Grover Fugate' <gfugate@crmc.ri.gov>, 'Janet Coit' <Janet.Coit@DEM.RI.GOV>, "'Kearns, Christopher (DOA)'" <Christopher.Kearns@energy.ri.gov>, "'Powers, Rosemary (GOV)'" <Rosemary.Powers@governor.ri.gov>, "'Grant, Carol (DOA)'" <Carol.Grant@energy.ri.gov>, "'Porfilio, Jaclyn (GOV)'" <Jaclyn.Porfilio@governor.ri.gov>, 'James Boyd' <jboyd@crmc.ri.gov>, 'Dave Reis' <dreis@crmc.ri.gov>, 'Dan Goulet' <dgoulet@crmc.ri.gov>, Julia Livermore <julia.livermore@dem.ri.gov>, 'Jeff Willis' <jwillis@crmc.ri.gov>
Subject: FAB review of South Fork proposed fisheries survey

Fishing industry members,

Deepwater Wind has provided a draft of the fisheries survey proposed for the South Fork Wind Farm. Please review and provide comments. Thank you.

Dave

David Beutel
Coastal Resources Management Council
Aquaculture Coordinator
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
401-783-3370

Subject: FW: Demersal Fisheries Resources Survey Protocol
Date: Monday, November 19, 2018 at 10:07:14 AM Eastern Standard Time
From: Rodney Avila
To: Melanie Gearon, Caitlin O'Mara
Attachments: image001.png

From: Rodney Avila <ravila@dwwind.com>
Date: Friday, November 16, 2018 at 4:17 PM
To: Gary Yerman <swim@snet.net>
Subject: Re: Demersal Fisheries Resources Survey Protocol

Thank you if you need more copies I will send you some
Rodney

Get [Outlook for iOS]()

From: Gary yerman <swim@snet.net>
Sent: Friday, November 16, 2018 3:07 PM
To: Rodney Avila
Subject: Re: Demersal Fisheries Resources Survey Protocol

Hello Rodney,

I have downloaded the info. I'll make copies and give to our group of concerned individuals.

Regards,
Gary

On Friday, November 16, 2018, 2:41:18 PM EST, Rodney Avila <ravila@dwwind.com> wrote:

Demersal Fisheries Resources Survey Protocol

Rodney Avila

Fisheries Liaison – www.dwwind.com

Mobile: 508-889-0401

From:	Melanie Gearon
To:	Brian Gervelis
Subject:	FW: FAB review of South Fork proposed fisheries survey
Date:	Wednesday, July 1, 2020 1:49:56 PM

From: Dave Beutel <dbeutel@crmc.ri.gov>
Sent: Monday, November 19, 2018 9:08 AM
To: lad0626@aol.com
Cc: saklob@aol.com; 'Brian' <Kwe5tbos90@yahoo.com>; 'Polark' <polark1@verizon.net>; gvdwood@cox.net; 'Mike Marchetti' <fvmisterg@gmail.com>; 'Rick Bellavance' <makosrule@verizon.net>; 'Erich Stephens' <estephens@vineyardwind.com>; 'Erik Peckar' <erik@vineyardpower.com>; 'Rachel Pachter' <rpachter@vineyardwind.com>; 'Matthew Robertson' <mrobertson@vineyardwind.com>; john@seakeeper.net; 'James Neveu' <JANEV@orsted.com>; 'Laura Morse' <LAURM@orsted.com>; 'Michael Evans' <MICEV@orsted.com>; 'Donald Fox' <dfox@towndock.com>; 'Lisa Turner' <lturner@crmc.ri.gov>; Rodney Avila <ravila@dwwind.com>; 'Cristiana Bank' <cbank@vineyardwind.com>; 'Katie Almeida' <kalmeida@towndock.com>; 'Rodman Sykes' <crfisheries@gmail.com>; 'Fred Mattera' <fredmattera@cfcri.org>; 'Meghan Lapp' <Meghan@seafreezeltd.com>; Aileen Kenney <akenney@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; 'R. Daniel Prentiss' <Dan@prentisslaw.com>; Melanie Gearon <mgearon@dwwind.com>; 'Grover Fugate' <gfugate@crmc.ri.gov>; 'Janet Coit' <Janet.Coit@DEM.RI.GOV>; 'Kearns, Christopher (DOA)' <Christopher.Kearns@energy.ri.gov>; 'Powers, Rosemary (GOV)' <Rosemary.Powers@governor.ri.gov>; 'Grant, Carol (DOA)' <Carol.Grant@energy.ri.gov>; 'Porfilio, Jaclyn (GOV)' <Jaclyn.Porfilio@governor.ri.gov>; 'James Boyd' <jboyd@crmc.ri.gov>; 'Dave Reis' <dreis@crmc.ri.gov>; 'Dan Goulet' <dgoulet@crmc.ri.gov>; Julia Livermore <julia.livermore@dem.ri.gov>; 'Jeff Willis' <jwillis@crmc.ri.gov>
Subject: RE: FAB review of South Fork proposed fisheries survey

Lanny,

We will have copies of the DWW draft for distribution to the FAB. Unfortunately, because it is not on the agenda, we cannot discuss the draft proposal. We will not meet the Secretary of State requirements for public notice for the discussion of the proposal and it is too late to modify the agenda.

Dave

David Beutel
Coastal Resources Management Council
Aquaculture Coordinator
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
401-783-3370

From: lad0626@aol.com [mailto:lad0626@aol.com]

Sent: Saturday, November 17, 2018 7:00 AM
To: Dave Beutel
Cc: saklob@aol.com; Brian; Polark; gvdwood@cox.net; Mike Marchetti; Rick Bellavance; Erich Stephens; Erik Peckar; Rachel Pachter; Matthew Robertson; john@seakeeper.net; James Neveu; Laura Morse; Michael Evans; Donald Fox; Lisa Turner; Rodney Avila; Cristiana Bank; Katie Almeida; Rodman Sykes; Fred Mattera; Meghan Lapp; Aileen Kenney; John O'Keeffe; R. Daniel Prentiss; Melanie Gearon; Grover Fugate; Janet Coit; Kearns, Christopher (DOA); Powers, Rosemary (GOV); Grant, Carol (DOA); Porfilio, Jaclyn (GOV); James Boyd; Dave Reis; Dan Goulet; Livermore, Julia (DEM); Jeff Willis
Subject: Re: FAB review of South Fork proposed fisheries survey

Dave
I would like to request we have copies of this at Monday's FAB meeting. The FAB should take a few minutes at the end of the VW business at hand to weigh in on this being we only have until 12/18 to do so and an overly burdensome schedule of meetings for these projects already. I have heard from enough fishermen already to know there are many concerns with the proposal.
Lanny

Sent from my iPhone

On Nov 15, 2018, at 2:56 PM, Dave Beutel <dbeutel@crmc.ri.gov> wrote:

> Fishing industry members,
>
> Deepwater Wind has provided a draft of the fisheries survey proposed for the South Fork Wind Farm. Please review and provide comments. Thank you.
>
> Dave
>
> David Beutel
> Coastal Resources Management Council
> Aquaculture Coordinator
> Oliver Stedman Government Center
> 4808 Tower Hill Road
> Wakefield, RI 02879
> 401-783-3370
>
> <South Fork Fisheries Survey 2018.pdf>

Subject: FW: FAB review of South Fork proposed fisheries survey
Date: Monday, November 19, 2018 at 10:06:54 AM Eastern Standard Time
From: Rodney Avila
To: Melanie Gearon, Caitlin O'Mara

From: Rodney Avila <ravila@dwwind.com>
Date: Saturday, November 17, 2018 at 8:08 AM
To: Aileen Kenney <akenney@dwwind.com>, Melanie Gearon <mgearon@dwwind.com>
Subject: Fwd: FAB review of South Fork proposed fisheries survey

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From: lad0626@aol.com
Sent: Saturday, November 17, 2018 6:59 AM
To: Dave Beutel
Cc: saklob@aol.com; Brian; Polark; gvdwood@cox.net; Mike Marchetti; Rick Bellavance; Erich Stephens; Erik Peckar; Rachel Pachter; Matthew Robertson; john@seakeeper.net; James Neveu; Laura Morse; Michael Evans; Donald Fox; Lisa Turner; Rodney Avila; Cristiana Bank; Katie Almeida; Rodman Sykes; Fred Mattera; Meghan Lapp; Aileen Kenney; John O'Keeffe; R. Daniel Prentiss; Melanie Gearon; Grover Fugate; Janet Coit; Kearns, Christopher (DOA); Powers, Rosemary (GOV); Grant, Carol (DOA); Porfilio, Jaclyn (GOV); James Boyd; Dave Reis; Dan Goulet; Julia Livermore; Jeff Willis
Subject: Re: FAB review of South Fork proposed fisheries survey

Dave
I would like to request we have copies of this at Monday's FAB meeting. The FAB should take a few minutes at the end of the VW business at hand to weigh in on this being we only have until 12/18 to do so and an overly burdensome schedule of meetings for these projects already. I have heard from enough fishermen already to know there are many concerns with the proposal.
Lanny

Sent from my iPhone

On Nov 15, 2018, at 2:56 PM, Dave Beutel <dbeutel@crmc.ri.gov> wrote:

> Fishing industry members,
>
> Deepwater Wind has provided a draft of the fisheries survey proposed for the South Fork Wind Farm. Please review and provide comments. Thank you.
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> Dave
>
> David Beutel
> Coastal Resources Management Council
> Aquaculture Coordinator
> Oliver Stedman Government Center
> 4808 Tower Hill Road
> Wakefield, RI 02879

401-783-3370

<South Fork Fisheries Survey 2018.pdf>

Subject: FW: FAB review of South Fork proposed fisheries survey
Date: Monday, November 19, 2018 at 1:30:26 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara

From: Dave Beutel <dbeutel@crmc.ri.gov>
Date: Monday, November 19, 2018 at 9:05 AM
To: "lad0626@aol.com" <lad0626@aol.com>
Cc: "saklob@aol.com" <saklob@aol.com>, 'Brian' <Kwe5tbos90@yahoo.com>, 'Polark' <polark1@verizon.net>, "gvdwood@cox.net" <gvdwood@cox.net>, 'Mike Marchetti' <fvmisterg@gmail.com>, Rick Bellavance <makosrule@verizon.net>, 'Erich Stephens' <estephens@vineyardwind.com>, 'Erik Peckar' <erik@vineyardpower.com>, 'Rachel Pachter' <rpachter@vineyardwind.com>, 'Matthew Robertson' <mrobertson@vineyardwind.com>, "john@seakeeper.net" <john@seakeeper.net>, 'James Neveu' <JANEV@orsted.com>, 'Laura Morse' <LAURM@orsted.com>, 'Michael Evans' <MICEV@orsted.com>, 'Donald Fox' <dfox@towndock.com>, 'Lisa Turner' <lturner@crmc.ri.gov>, Rodney Avila <ravila@dwwind.com>, 'Cristiana Bank' <cbank@vineyardwind.com>, 'Katie Almeida' <kalmeida@towndock.com>, 'Rodman Sykes' <crfisheries@gmail.com>, 'Fred Mattera' <fredmattera@cfcri.org>, 'Meghan Lapp' <Meghan@seafreezeltd.com>, Aileen Kenney <akenney@dwwind.com>, John O'Keeffe <jokeeffe@dwwind.com>, "'R. Daniel Prentiss'" <Dan@prentisslaw.com>, Melanie Gearon <mgearon@dwwind.com>, 'Grover Fugate' <gfugate@crmc.ri.gov>, 'Janet Coit' <Janet.Coit@DEM.RI.GOV>, "'Kearns, Christopher (DOA)'" <Christopher.Kearns@energy.ri.gov>, "'Powers, Rosemary (GOV)'" <Rosemary.Powers@governor.ri.gov>, "'Grant, Carol (DOA)'" <Carol.Grant@energy.ri.gov>, "'Porfilio, Jaclyn (GOV)'" <Jaclyn.Porfilio@governor.ri.gov>, 'James Boyd' <jboyd@crmc.ri.gov>, 'Dave Reis' <dreis@crmc.ri.gov>, 'Dan Goulet' <dgoulet@crmc.ri.gov>, Julia Livermore <julia.livermore@dem.ri.gov>, 'Jeff Willis' <jwillis@crmc.ri.gov>
Subject: RE: FAB review of South Fork proposed fisheries survey

Lanny,

We will have copies of the DWW draft for distribution to the FAB. Unfortunately, because it is not on the agenda, we cannot discuss the draft proposal. We will not meet the Secretary of State requirements for public notice for the discussion of the proposal and it is too late to modify the agenda.

Dave

David Beutel
Coastal Resources Management Council
Aquaculture Coordinator
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
401-783-3370

From: lad0626@aol.com [mailto:lad0626@aol.com]
Sent: Saturday, November 17, 2018 7:00 AM
To: Dave Beutel
Cc: saklob@aol.com; Brian; Polark; gvdwood@cox.net; Mike Marchetti; Rick Bellavance; Erich Stephens; Erik Peckar; Rachel Pachter; Matthew Robertson; john@seakeeper.net; James Neveu; Laura Morse; Michael Evans;

Donald Fox; Lisa Turner; Rodney Avila; Cristiana Bank; Katie Almeida; Rodman Sykes; Fred Mattera; Meghan Lapp; Aileen Kenney; John O'Keeffe; R. Daniel Prentiss; Melanie Gearon; Grover Fugate; Janet Coit; Kearns, Christopher (DOA); Powers, Rosemary (GOV); Grant, Carol (DOA); Porfilio, Jaclyn (GOV); James Boyd; Dave Reis; Dan Goulet; Livermore, Julia (DEM); Jeff Willis
Subject: Re: FAB review of South Fork proposed fisheries survey

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> 4808 Tower Hill Road
> Wakefield, RI 02879
> 401-783-3370
>
> <South Fork Fisheries Survey 2018.pdf>

Subject: Re: SFWF - Demersal Fisheries Resources Survey Protocol
Date: Tuesday, November 27, 2018 at 10:44:09 AM Eastern Standard Time
From: Melanie Gearon
To: Fred Mattera
CC: Rodney Avila, John O'Keeffe, Caitlin O'Mara, Aileen Kenney
Attachments: image001.jpg

Fred,
Thank you for your call yesterday and the below questions and feedback. We will address these after the comment period has ended and will integrate details into the protocol document. I look forward to continued discussions with you regarding this plan.
Best,
Melanie

From: Fred Mattera <fredmattera@cfcri.org>
Date: Tuesday, November 27, 2018 at 10:01 AM
To: Melanie Gearon <mgearon@dwwind.com>
Subject: RE: SFWF - Demersal Fisheries Resources Survey Protocol

Hi Melanie,
A few questions,

- It says the survey is to be a 16 hour soak and then haul, once per season – is that 4 hauls (winter, spring, summer, and fall)?
- Who is determining the mesh size, web thickness, hanging ratio, number of webs per sample string, etc. that will be used for each species surveyed?
- Are the surveys going to be conducted in the same area at the same time?
- Is there some sort of standardization of nets for scientific method concerns? Such as dragging – everybody has their own tweaks and net designs per species specific net, what will be used for these surveys?
- If the fisherman is supplying the nets and fishing in rocky bottom, nets will be damaged; is this factored into the daily fee or will this be extra?
- Why aren't bluefish and scup on the species list – will they be surveyed as well?
- If a fisherman has all the permits listed but does that mean they need a multispecies A permit to conduct that survey. Do they need to use A DAS or Monk days for that survey?
- I assume you will attain an EFP/LOA?

Thank you,

Fred Mattera

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Monday, November 19, 2018 3:19 PM
To: Fred Mattera <fredmattera@cfcri.org>
Cc: John O'Keeffe <jokeeffe@dwwind.com>; Rodney Avila <ravila@dwwind.com>; Caitlin O'Mara <comara@dwwind.com>
Subject: SFWF - Demersal Fisheries Resources Survey Protocol

Hi Fred,

Please find attached the South Fork Wind Farm (SFWF) *Draft Demersal Fisheries Resources Survey Protocol* for CFCRI review. Our team is seeking initial comments on this draft by **December 14, 2018**. This plan is part of the overall science agenda currently under development for the SFWF. This has been submitted to the following agencies for technical review: BOEM, NMFS, MA DMF, MA CZM, RI DEM, RI CRMC, CT DEEP, NYS DEC, NYS DPS, and NYS DOS. In addition, it has been circulated for comment to various regional fisheries organizations and fishermen that the SFWF fisheries outreach team regularly meet with.

I know that Rodney already sent this draft to several folks (including you) last week, but I want to make sure that CFCRI has received the document and is circulating within the Center.

Please let me know if you have any questions.

Thanks!
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwin
Direct: 401-648-2628 **Mobile:** 401-486-7797
56 Exchange Terrace, Suite 300, Providence, RI 02903

Subject: FW: SFWF - gill net survey
Date: Friday, November 30, 2018 at 2:34:52 PM Eastern Standard Time
From: Melanie Gearon
To: Caitlin O'Mara
Attachments: image001.png

Caitlin,
Can you please log in our comment tracker for gill net that Rick contacted us and add his concerns below.
Thanks
Mel

From: Aileen Kenney <akenney@dwwind.com>
Date: Friday, November 30, 2018 at 11:53 AM
To: Rick Bellavance <makosrule@verizon.net>, Melanie Gearon <mgearon@dwwind.com>, Drew Carey <drew@INSPIREenvironmental.com>, Rodney Avila <ravila@dwwind.com>
Cc: John O'Keeffe <jokeeffe@dwwind.com>
Subject: SFWF - gill net survey

Mel, Drew, and Rodney:

Rick would like to get together to discuss the gill net survey. He is specifically wondering where the gill nets will be placed since they do a lot of fishing out there and the gill nets can present a conflict.

Mel – please reach out to Rick and set a meeting up.

Thank you,
Aileen

Aileen Kenney
Head of Development and Permitting
Ørsted US
mobile: +1-617-852-7031

From: Melanie Gearon <mgearon@dwwind.com>
Sent: Sunday, January 6, 2019 11:32 AM
To: Caitlin O'Mara <comara@dwwind.com>; Rich Balouskus <rich@inspireenvironmental.com>
Cc: Rodney Avila <ravila@dwwind.com>; John O'Keeffe <jokeeffe@dwwind.com>; Aileen Kenney <AILKE@orsted.com>
Subject: FW: Comments on SF Demersal Fisheries Survey

Caitlin,
Please add this email (make a pdf) from Rick B to the collection of comments on BOX for the gill net survey. Add into the comment tracker that he formally submitted written comments on this date, etc.

Rich,
Please review.

All, Inspire is in the process of reviewing comments and updating the plan accordingly. Next week we need to do some planning for next steps.
Thanks
Mel

From: Rick Bellavance <rickbellavance@gmail.com>
Date: Saturday, January 5, 2019 at 9:38 AM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: Steve Anderson <saboat10@gmail.com>, 'Andy Dangelo' <maridee2@gmail.com>, 'Paul Johnson' <pbjfishing@yahoo.com>, Frank Blount <FrancesFlt@aol.com>
Subject: Comments on SF Demersal Fisheries Survey
Resent-From: <mgearon@dwwind.com>

Hello Melanie,

I have reviewed the Draft Demersal Fisheries Resources Survey Protocol and I would like to offer the following comments.

The Project Area falls within historical fishing grounds for the recreational for hire fishing industry. The area is fishing for Demersal species such has Cod, Haddock, Pollock, Black Sea Bass, Scup, Hake, and Tautog. Bluefish and Winter Flounder are also caught inside the project area. The project area is fished year-round by RI's recreational for hire fishing fleet.

A major concern I have is related to gear conflicts within the survey blocks. Any added survey gear left inside the survey blocks will potentially conflict with our fleet trying to conduct our business. Steaming 20-25 miles only to find out that the area you planned to fish is covered with survey gill nets in addition to the commercially fished gill nets could be problematic. Our clients often reserve their fishing dates in advance and they have expectations of fishing for particular species in the places that will give them the best fishing. That needs to be considered when planning the survey effort. Communication will need to be as clear as possible and timely.

The experimental mesh sizes considered may have a localized depletion affect in the areas where we fish. This will result in diminished fishing experiences for our clients. Gill nets in general can create high mortality when compared to hook and line and it is likely that additional survey nets with experimental mesh sizes will only make matters worse. Hook and Line surveys and Hab Cam type surveys should also be considered when characterizing demersal populations

In addition to demersal species, RI's for hire fleet targets Highly Migratory Species(HMS) in the project area. Bluefin Tuna, Skipjack Tuna, Bonito, Sharks and Billfish are all caught within the project area. I have not seen any attempt to better understand these species and that is also problematic. Many for hire recreational trips will target demersal and HMS on the same trip. The value of HMS to our fleet during the months of June thru September should not be minimized and the relationship between demersal species and HMS should not be underestimated. Many of our clients chose a trip targeting demersal species with consideration that they may encounter HMS and vice versa.

I would also appreciate any information on survey's that will look at forage species within the project area. Herring, mackerel, sand lance, and other species are critical to the availability of the species we target, and any affects construction may have on the behavior of forage species should be understood.

Thanks for the chance to comment on this important survey and I look forward to continued dialogue as you work to better understand the resources within the project area. Feel free to contact me if you have any questions about my comments.

Rick

Capt. Rick Bellavance, President
RI Party and Charter Boat Association
401-741-5648
www.rifishing.com

CC:
RIPCBA Executive Board
Frank Blount NEFMC RAP Chair

EXHIBIT 2

Date	Organizations/Individuals Contacted[2]	Location/Form of Contact and Response	Purpose of Contact
3/25/19	BOEM, CT DEEP, MA CZM, MA DMF, NMFS, NYS DEC, NYS DOS, RI DEM, USACE	Webinar; See Exhibit 2 to Appendix A	Review of FMP and received comments
3/27/19	BOEM, CT DEEP, MA CZM, MA DMF, NMFS, NYS DEC, NYS DOS, RI DEM	Webinar; See Exhibit 2 to Appendix A	Review of FMP and received comments

[2] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

SFWF Fisheries Research and Monitoring

Webinar

Ørsted

March 25 & 27, 2019

Webinar Agenda

2:00 – Welcome and Introductions
2:10 – SFWF Fisheries Research Plan Overview
2:45 – Questions and Input from Agencies
3:20 – Next Steps
3:30 – Adjourn

Today's Meeting - federal and state agencies

– Provide an update on fisheries research and monitoring planning for SFWF.

– **Goal:** Continued collection of feedback to prioritize research topics and refine sampling plans.

South Fork Wind Farm research & monitoring

- **Purpose:** Conduct sound, credible science to detect and help prevent or mitigate negative project impacts on fisheries resources.

- **Adapt:** Make changes to meet new monitoring and research needs as we learn and get feedback from stakeholders.

Principles that guide Ørsted's approach

- Producing transparent, unbiased, and clear results
- Working with commercial fishermen to identify areas of importance
- Collecting long-term data sets to determine trends
- Promoting the smart growth of the American offshore wind industry
- Completing scientific research collaboratively with the fishing community
- Utilizing standardized monitoring protocols and building on and supporting existing fisheries research
- Sharing data with stakeholder groups
- Maintaining data confidentiality for sensitive fisheries-dependent monitoring data

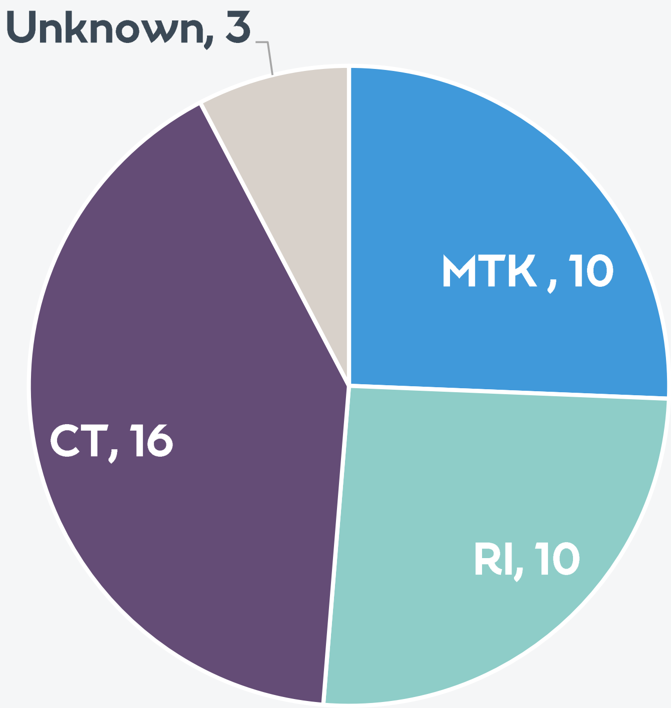
Outreach activities

- Attend fisheries-related meetings to answer questions and seek input
  - NE and Mid-Atlantic Fisheries Management Council meetings
  - State Fishing Industry Advisory Groups
  - Local and regional fishing organization’s events
- Questionnaire to solicit fishermen’s priorities
- Website
- One-on-one outreach through FRs/FLs
- Circulation and comment on draft plans
- Agency Webinars

Report out from our outreach team……

- Questionnaire:
  - What we have heard so far
  - Continue distribution
- One-on-one conversations about monitoring priorities is effective, will continue at port visits and at fisheries related meetings
- Types of fishing occurring in the project area

39 responses so far.....



Question: Please rank from 1 to 7 the following resources[1] that are most important to monitor (1 being the most important):

★ Bottom fish, e.g., flounder, monkfish, Atlantic Cod

★ Pelagic fish, e.g., herring and mackerel, tuna, bluefish, sharks

★ Structure-associated species, e.g. black sea bass, scup, tautog and benthos

____ Sea Scallops

____ Lobster

★ Spawning activities of relevant fish and shellfish

____ Hard and soft benthic habitat in the project area

Results:

12 were not ranked (put all 1s)

25 were fully/partially ranked

2 were N/A

[1] Resources identified by the fishing industry and agencies through stakeholder outreach to date

Question: Please rank from 1 to 3 the following research topics you think should be investigated further:

★ Potential impact of electromagnetic fields on fish behavior

★ Potential impact of noise from pile driving on fish behavior during construction

★ Potential impact on fish from alterations in benthic habitat, like scouring or sedimentation

Results:

19 were not ranked (put all 1s)

18 were fully/partially ranked

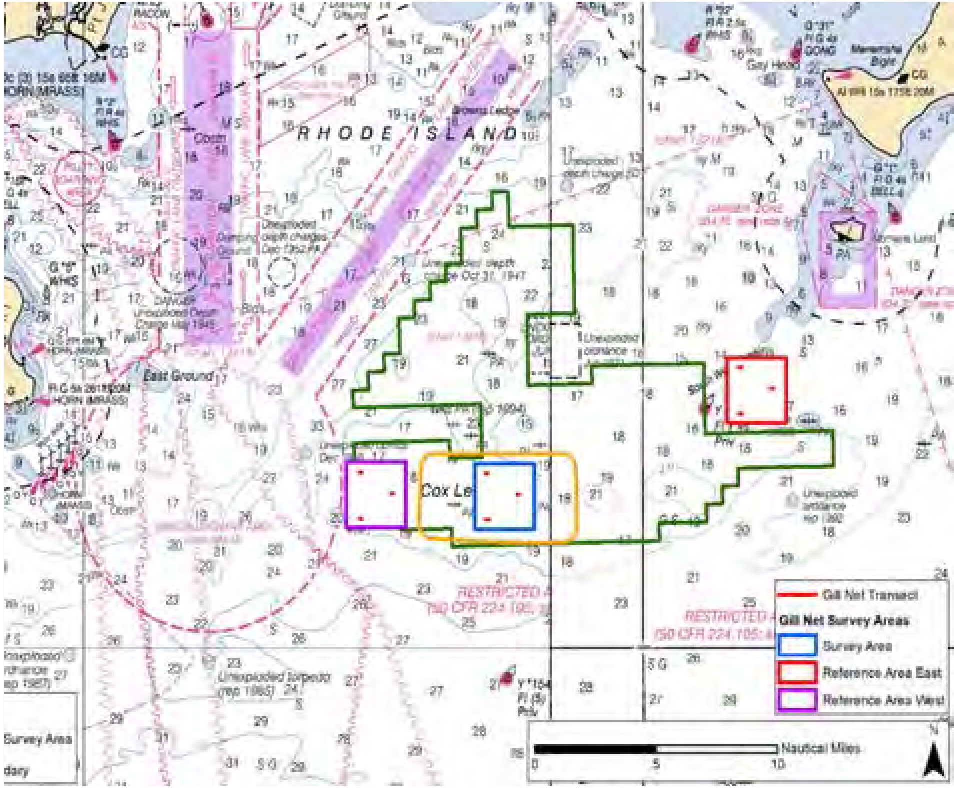
2 were N/A

Potential monitoring & survey methods

- Gillnet
- Scallop dredge
- Ventless trap
- Beam trawls
- Benthic camera and grab sampling
- Hook and line
- Acoustic telemetry

Gillnet Survey

- Rocky habitat prohibits otter trawling
- Common gear used in area to target monkfish, skates
- Low impact on bottom habitat
- Sample pre- and 2 years post-construction
- Continue cod spawning data collection (supplement reconnaissance and observational surveys)



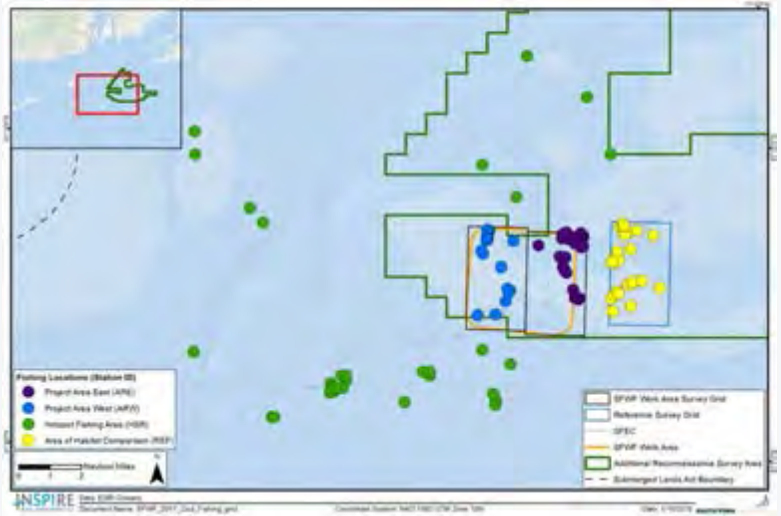
Gillnet Survey – summary of comments circulated November 2018 (fishing stakeholders and agencies)

- **Need for power analysis and description of statistical design –** Initial power analysis predicted an unobtainable level of sampling effort. Asymmetrical BACI design will be utilized (one control area, two reference areas) where data from each string combined to estimate area wide abundance
- **Seasonal sampling frequency inadequate –** Monthly sampling to occur in spring, fall, winter (no gillnetting in March due to harbor porpoise closure; summer sampling may be omitted to minimize interactions with other protected species)
- **More specifics on gear –** 4 panel strings (300ft panels), each panel with different mesh size, two stand-up, two tie-down; 8 hour soak time; 6 strings sampled per trip (2 each area)
- **Gillnet alone not adequate to sample area**

Cod Spawning Survey Update

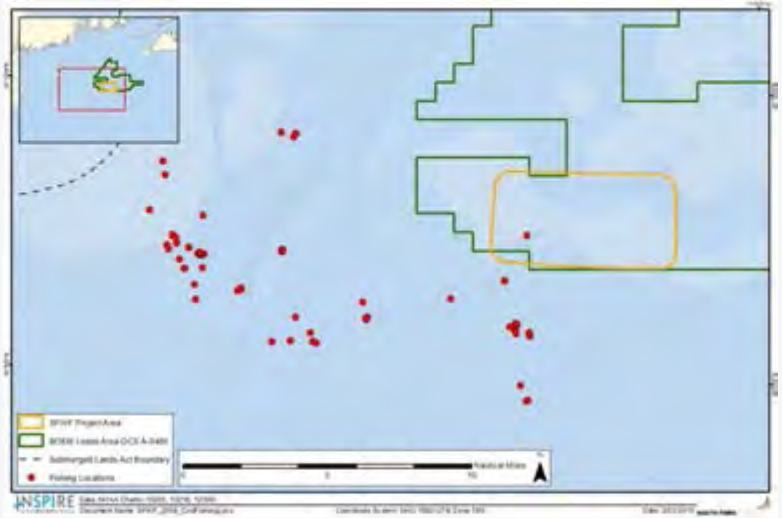
Year 1 (winter/spring 2018)

- Chartered headboat trips with dedicated anglers
- Dedicated sampling areas
- 15 sampling trips conducted
- 17 cod sampled



Year 2 (winter/spring 2018-2019)

- Observers onboard normal headboat trips with paying anglers (voluntary participation)
- Areas fished based on captain's knowledge and historic catches
- 11 sampling trips conducted (targeting 20 trips)
- ~ 60 cod sampled



Agency input & discussion

- Comments on outreach process to the fishing industry?
- Additional monitoring and sampling methods?
- Additional research questions?
- Other feedback?

Next steps

- Continue to solicit input from stakeholders
- Next draft of survey protocols
- Continued development of overall SFWF Fisheries Monitoring & Research Plan
- Planning for pre-construction surveys to begin in 2019

Thank You!

Contact:

Melanie Gearon
Melge@Orsted.com
(857)-348-3261

EXHIBIT 3

Date	Organizations/Individuals Contacted[3]	Location/Form of Contact and Response	Purpose of Contact
6/13/19	BOEM, CFRF, CT DEEP, MA CZM MA DMF, MA FWG, NMFS, NYS DEC, NYS DOS, NYS DPS, RI CRMC, RI DEM, RISAA, Individual fishermen	Emails from SFW and recipient responses are attached to Exhibit 3 to Appendix A	Distribution of updated version of FMP for comment

[3] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

Brian Gervelis

From: Melanie Gearon <MELGE@orsted.com>
Sent: Thursday, June 13, 2019 5:38 PM
To: lisa.engler@state.ma.us; Boeri, Robert (ENV); annie@rodafisheries.org; andrew.lipsky@noaa.gov; Brunbauer, Morgan A (DEC); Gregory.Lampman@nyserda.ny.gov; mbachman@nefmc.org; Dave Beutel
Cc: McLean, Laura (DOS; Susan Tuxbury - NOAA Federal; Ford, Kathryn (FWE; McNamee, Jason (DEM; Julia Livermore; Gaidasz, Karen M (DEC; Sharon Benjamin - NOAA Affiliate; Mary Colbert; John O'Keeffe; Rodney Avila; Aileen Kenney; Caitlin O'Mara; Julia Prince; Drew Carey; Brian Gervelis; Jill Johnen; Hooker, Brian; Stromberg, Jessica
Subject: SFWF - Fisheries Research and Monitoring Plan
Attachments: 2019-6-13_SFWF_fisheries research & monitoring plan_Draft.pdf

Good Afternoon All,
Thank you for your continued engagement with Orsted on developing the South Fork Wind Farm Fisheries Research and Monitoring Plan. This plan has been previously reviewed and commented on widely by fishing stakeholders and agencies. Attached is the most recent draft ready for circulation.

The next step in vetting the plan is reviewing with the various state fisheries advisory boards and offshore wind fisheries working groups. I ask that you please distribute this draft to members of your representative group(s) (RI FAB, MA FWG, RODA, ROSA, NYS Fish TWG, NEFMC Habitat Committee) for review.

Please submit comments via email on this draft Fisheries Research and Monitoring plan by July 8, 2019 to:

Melanie Gearon
South Fork Wind Farm
Manager, Permitting and Environmental Affairs
melge@orsted.com

We would also like to present and discuss this plan in person with working groups if possible. I will be reaching out to individuals to see if we can be included on upcoming meeting agendas.

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Orsted

Learn more at orsted.com

Tel. 857-348-3261

melge@orsted.com
orsted.com

South Fork Wind Farm

South Fork Wind Farm: Fisheries Research and Monitoring Plan - ***Draft***
June 2019

1.0 Introduction

The South Fork Wind Farm (SFWF or project) is proposed to be located in Bureau of Ocean Energy Management (BOEM) Lease Area OCS A-0486, which is within the Rhode Island – Massachusetts Wind Energy Area (RI-MA WEA) (Figure 1). The SFWF includes up to 15 wind turbine generators (WTGs or turbines) with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the WTGs (Inter-array Cables), and an offshore substation (OSS), all of which will be located approximately 19 miles (30.6 kilometers [km], 16.6 nautical miles [nm]) southeast of Block Island, Rhode Island, and 35 miles (56.3 km, 30.4 nm) east of Montauk Point, New York.

Deepwater Wind South Fork, LLC (DWSF), now a wholly-owned indirect subsidiary of North East Offshore, LLC, a joint venture between Ørsted and Eversource , submitted the major federal permit application, *The South Fork Wind Farm Construction and Operations Plan*[1] (COP), to BOEM in June, 2018 and submitted a revised COP to BOEM in May, 2019. The Project is scheduled to be installed during 2021 and 2022, and to be commissioned and operational by the end of 2022.

The SFWF project team has spoken extensively with regional fishing organizations, working groups, and individual fisherman over the last three years as development of the project has evolved. In addition, through the permitting and development process the SFWF project team has consulted with several state (e.g., NY, CT, RI, and MA) and federal fisheries resource management agencies. It has become clear, based on feedback received to date, that an approach to assess commercially and recreationally targeted demersal fish at the SFWF is a priority.

[1] The full revised COP document can be found online at: https://www.boem.gov/South-Fork/

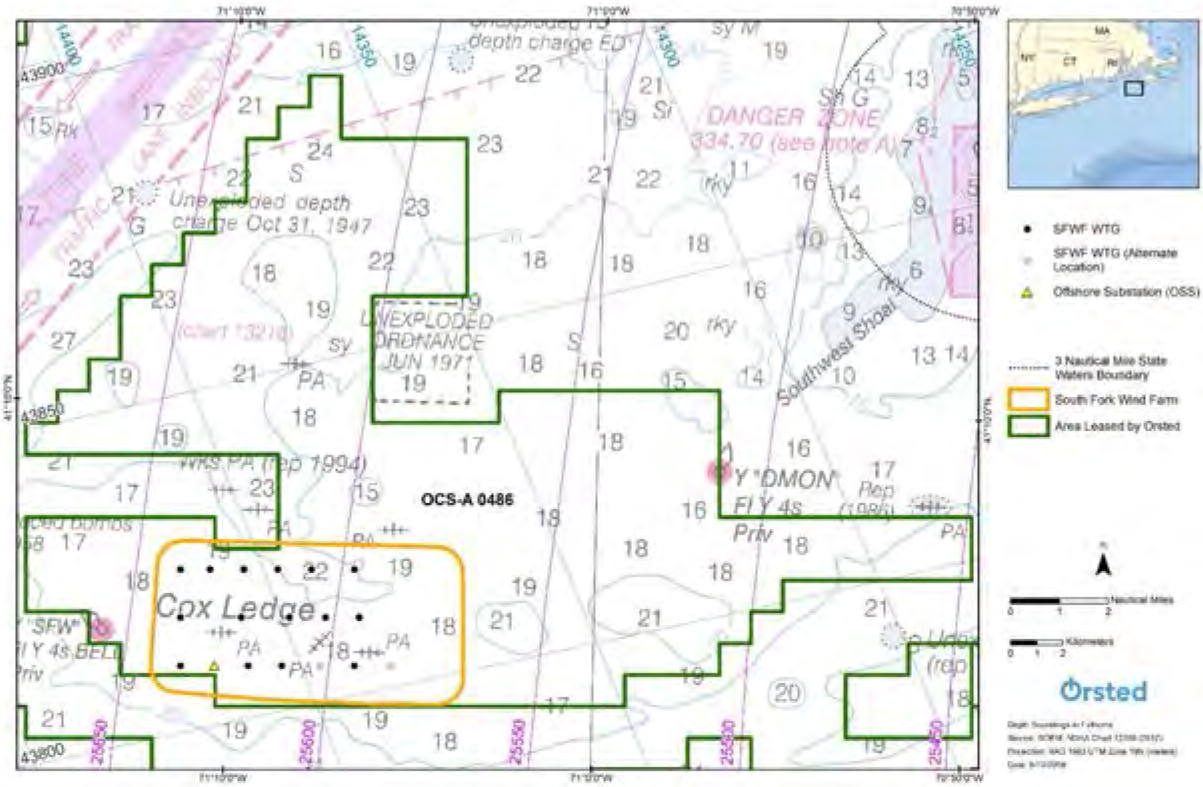


Figure 1: Location of South Fork Wind Farm.

DRAFT

DWSF is committed to conducting sound, credible science. Biological surveys, developed in coordination with the commercial fishing fleet and state agencies, have been conducted at the Block Island Wind Farm (BIWF) since 2012 and will continue through at least 2019. The guiding scientific principles implemented beginning with the BIWF and continuing into the future include:

- Producing transparent, unbiased, and clear results from all research
- Working with commercial fishermen to identify areas important to them
- Collecting long-term data sets to determine trends and develop knowledge
- Promoting the smart growth of the American offshore wind industry
- Focusing on maintaining access and navigation in, and around, our wind farms for all ocean users
- Completing scientific research collaboratively with the fishing community
- Being accessible and available to the fishing industry
- Utilizing standardized monitoring protocols when possible and building on and supporting existing fisheries research
- Sharing data with all stakeholder groups

- Maintaining data confidentiality for sensitive fisheries dependent monitoring data

The SFWF site is situated atop Cox's Ledge, an area with extensive areas of boulders and mobile gear "hangs". Therefore, fishery independent data are lacking in the SFWF because sampling demersal species with bottom otter trawls, similar to those used by the Northeast Fisheries Science Center (NEFSC) Bottom Trawl Survey, NEAMAP[2], and at the BIWF, is less feasible. Feedback from commercial fishermen combined with vessel Monitoring System (VMS) data indicate there is little commercial trawl effort in the area. Details of the SFWF fisheries data assessment and stakeholder feedback can be found in the SFWF COP Appendix Y - *Commercial and Recreational Fisheries Technical Report*.[3]

Through extensive outreach efforts with the fishing community, feedback from state and federal agencies, and exploration of existing datasets, the SFWF project team has developed gillnet and beam trawl survey designs to acquire pre-construction baseline data on demersal species that occur in and around the SFWF. These two gear types can also be used effectively, and with limited impact, on the rocky habitat within the SFWF (Thomsen et al., 2010; Malek, 2015).

Gillnet selectivity depends mainly on fish size and shape and mesh size, but is also affected by the thickness, material, and color of net twine, hanging of net, and method of fishing (Hamley, 1975). Using specific gear placements and prescribed mesh sizes, gillnets may be designed to target specific species, or subgroupings of species, and life stages. Southern New England waters are host to a large monkfish gillnet fishery, as well as a lucrative wing fishery for winter skate. The proposed gillnet survey will focus on monitoring these two species pre- and post-construction of the SFWF.

Veteran fishermen report that sections of the Project Area (defined below) likely allows for collection via beam trawl, as beam trawls are smaller in size than traditional otter trawls and more maneuverable (R. Sykes, pers. comm.). Previous studies have used beam trawls to sample in the vicinity of the Project Area and have proven to be an effective gear for sampling demersal species, including juveniles (Malek, 2015; Walsh and Guida, 2017).

Different gear types select for different fish and macro-invertebrate species, therefore, using multiple gear types to sample species assemblages is needed for assessing potential impacts from the SFWF (Wilson et al., 2010; Walsh and Guida, 2017). Gillnet and beam trawl surveys will monitor a large portion of the species assemblage present in and around the SFWF over a varying temporal scale (Figure 2).

[2] NorthEast Area Monitoring and Assessment Program (NEAMAP)

[3] Appendix Y can be found online at: https://www.boem.gov/Appendix-Y/

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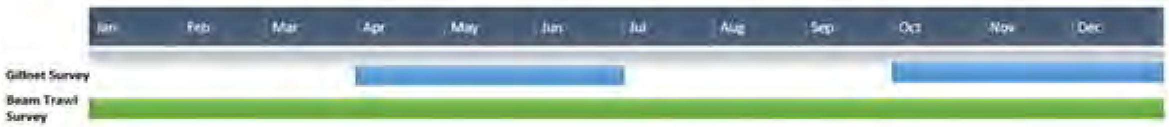

Figure 2: Survey timeline for SFWF monitoring.

These surveys will provide data that can be used to evaluate:

1) Demersal species that utilize the area in and around the SFWF.
2) The seasonal timing of the occurrence of these species.
3) Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods. For example, do some species have reduced abundance and/or do new species appear?

The survey protocols have been designed to address requirements and guidelines outlined in the national register (30 CFR 585.626), BOEM fishery guidelines, and Rhode Island Coastal Resources Management Council policies (11.10.9 C).

Final survey protocols will be incorporated into a Request for Proposal (RFP) with the goal of starting the surveys in 2019. Similar to the principles and practices executed for the Block Island Wind Farm, DWSF is committed to conducting science surveys and assessments that are collaborative with the fishing industry. DWSF will select for-hire gillnet fishing vessels from which the survey will be conducted.

2.0 Demersal Fisheries Resources Survey - Gillnet

The survey will help establish pre-construction baseline community composition, with a focus on monkfish and winter skate, and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance before and after construction.

2.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Efforts will be taken to reduce marine

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mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

2.1.1 Proposed Sampling Stations

The SFWF "Project Area" is defined as the maximum work area required to install the SFWF (yellow outline in Figure 2 below). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Three survey areas are proposed for sampling; one survey area within the SFWF Project Area and two reference areas. Each survey area will contain three predetermined gillnet survey lines. Two gillnet lines per area will be randomly selected for each survey, resulting in six gillnet strings conducted per survey. Final designation of survey areas and survey lines within each area will be based on detailed geophysical seafloor survey data as well as input from commercial gillnet fishermen regarding areas important to them. Location of gillnets may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for setting gillnets it may be moved based on the captain's professional judgement.

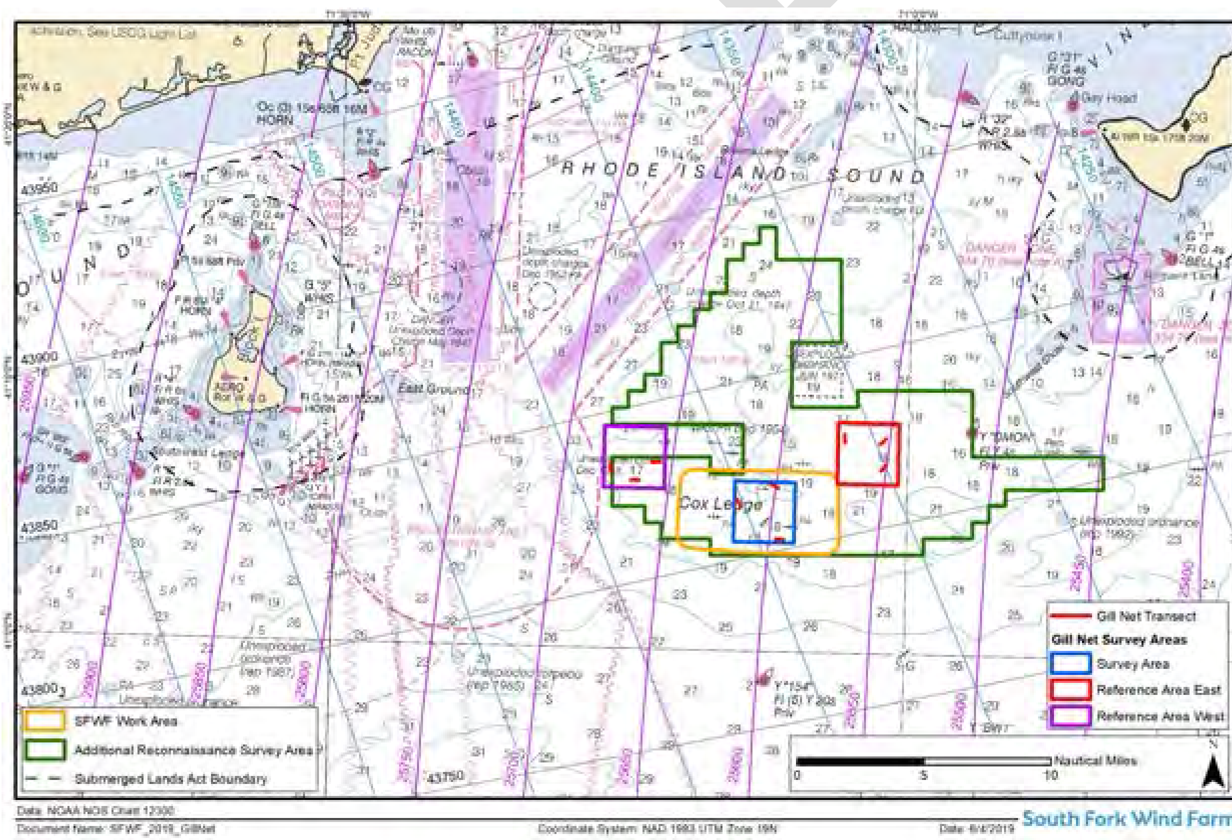

Figure 3. South Fork Wind Farm Project Area with Proposed Gillnet Survey and Reference Areas

Data will be collected in the Project Area and two reference areas with similar habitat characteristics as the Project Area. The reference areas will serve as an index of demersal fish abundance in Rhode Island

Sound in an area outside of the direct influence of the SFWF. Concurrent sampling in the Project Area and the two reference areas will help identify whether temporal changes in demersal fish abundance data observed within the Project Area are consistent with regional trends rather than representing a localized impact in the vicinity of the SFWF. The study will use an asymmetrical before-after-control-impact (BACI) experimental design[4], with statistical evaluation of the differences between control and impact areas contrasted in the before and after construction time periods (Underwood 1994; Smith 2002). A BACI design will allow for assessment of shifts in fish presence, absence, or abundance that correlate with proposed operations at the SFWF.

The study design consists of sampling each of the treatment areas with a gillnet. The proposed sampling locations will be selected such that:

1. There is comparability among all sampling areas with respect to current, habitat and depth condition;
2. Reference areas are outside the area of influence from the SFWF but are still utilized by the same/similar fish populations;
3. Areas allow optimal operational execution of the survey (e.g., minimal travel times between sampling locations);
4. Space conflicts are minimized with other active uses.

2.1.2 Gillnet Methods

A gillnet is a wall of netting that hangs in the water column and is typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. Factors that can influence the catch rate of gillnets for target species include: fish density in the vicinity of gears, the behavior of the target species, the ability of fish to detect and locate the gillnet, and environmental factors such as water temperature, visibility, current direction, and velocity. It is often challenging to calculate catch per unit effort (CPUE) from gillnets due to potential changes in efficiency (e.g., fluctuating soak time and catch rate). This survey is designed to account for as many variables as possible to standardize CPUE. Comparison of this gillnet survey data to other baseline sampling efforts (e.g., nearby federal NEAMAP trawl stations) will be limited due to gear and effort differences.

The gillnet survey may be conducted using gillnets that are typical of the commercial fishery in Rhode Island and Massachusetts. Each gillnet string will consist of six net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs. Sampling will take place once per month from April-June and October-December. These months see the majority of commercial gillnet activity as monkfish and skates migrate through the area in spring and fall. Sampling in July-September has been eliminated to minimize interactions with protected species and elasmobranchs that are common in the area during that time. The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), minimize depredation of catch, and keeping the survey trip length logistically feasible. Soak time will remain consistent throughout the duration of the survey. Each survey

[4] In this asymmetrical BACI design there is a single putative impact area, and two control areas. The area is assumed to be the observational unit and the two gillnet lines per area are subsamples which will be combined to estimate the area-wide abundance (or CPUE) during each sampling event.

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event will be managed by a team of qualified scientists including a lead scientist with experience performing fisheries research. The catch will be removed from the gillnets by the boat crew for processing. The lead scientist will be responsible for collection of data and data recording.

Fish collected in each gillnet will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. Scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species. Taxonomic guides include: *NOAA's Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas*, and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The catch will be sorted by species. All specimens are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the lead scientist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), and squids (mantle length). Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (gadids, flounder, black sea bass) to determine if construction and operation of the project could affect fish prey items. Each fish sampled will be sampled for length and weight individually to assess relative condition before the stomach is removed.

2.1.3 Atlantic Cod Reproductive Stage Methods

Atlantic cod is historically an important cultural and commercial species in New England and is believed to be dependent on geographically specific spawning areas. Cod spawning on or near Cox Ledge are thought to belong to a southern, winter-spawned complex to the south of Cape Cod (Zemeckis et al., 2014a). Cod spawning has been associated with bottom water temperatures that range from 0°C to 10°C (Brander, 1993) and areas of rough bottom habitat (Siceloff and Howell, 2013), such as rocky slopes (Meager et al., 2010) and cobble or boulder outcrops (Dean et al., 2012). Inter-annual spawning site fidelity has been well described through tagging/telemetry studies (Robichaud and Rose, 2001; Skjæraasen et al., 2011; Dean et al., 2014; Zemeckis et al. 2014b). These characteristics make it important to gather site-specific information on Atlantic cod spawning. Atlantic cod length, weight, location caught, and spawning condition will be recorded for all individuals caught. All Atlantic cod caught will be examined externally for signs indicating they are in the ripe and running maturity stage (Table 1). When caught individuals are not in the ripe and running maturation stage, they will be dissected to determine maturation stage (Hutchings et al., 1999; Siceloff and Howell, 2013; Dean et al., 2014). The maturity stage of each individual dissected will be assigned based on guidelines determined by Burnett et al. (1989) and updated by O'Brien et al. (1993): immature, developing, ripe, ripe and running, spent, resting, unknown. All Atlantic cod caught on the gillnet survey will be assessed for reproductive stage and spawning condition and these data will supplement data collected previously on the SFWF Atlantic Cod Spawning Survey that occurred during the winters of 2018 and 2019.

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Table 1. Maturity staging criteria used during the Northeast Fisheries Science Center trawl surveys and to be utilized in determining Atlantic cod maturity (from O'Brien et al., 1993)

Stage	Description and Criteria
Female	
Immature	Ovary paired, tube-like, small relative to body cavity; colorless to pink jell-like tissue, no visible eggs; thin transparent outer membrane.
Developing	Ovaries large, occupying up to 2/3 of the body cavity; blood vessels prominent when present; ovary appears granular as yellow to orange yolked eggs develop. A mix of yolked and hydrated eggs.
Ripe	Ovaries large, may fill entire body cavity; hydrated eggs present. Transparent ovary wall.
Ripe and Running	Eggs flow from vent with little or no pressure to abdomen.
Spent	Ovaries flaccid, sac-like similar in size to ripe ovaries; color red to purple; ovary wall thickened, cloudy and translucent; some hydrated eggs may adhere to ovary wall.
Resting	Ovaries smaller than ripe ovaries, but larger than immature. Interior jell-like, no visible eggs.
Male	
Immature	Testes small relative to body cavity, colorless to gray and translucent. Testes narrow, lobed and elongated, resembles crimped ribbon.
Developing	Testes large, grey to off-white, firm consistency with very little or no milt present.
Ripe	Testes larger than 'Developing', chalk white, consistency mostly liquid. Milt flows easily when testes dissected.
Ripe and Running	Chalk white milt flows easily from the vent with little or no pressure on abdomen. Once dissected, milt flows easily.
Spent	Testes flaccid, may contain residual milt, less robust than 'Ripe'. Edges or other parts of testes starting to turn reddish to brown or grey as milt recedes.
Resting	Testes shrunken in size relative to 'Ripe'. Color is yellow, brown or grey with little or no milt.

2.1.4 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

2.1.5 Gillnet Station Data

The following data will be collected during each sampling effort:

- Station number

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- Latitude and longitude
- Soak start and end time and date
- Water depth
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

2.1.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

2.1.7 Data Analysis

Prior to the project being built, data analysis will focus on comparing the fish communities in the impact and the control areas to describe spatial differences. CPUE and length data will be quantitatively compared on a per species basis between the impact and the control areas. Similar analyses will occur using the post-construction data, however the focus will be on identifying changes in the fish community in the impact area between pre- and post- construction that did not also occur at the control areas that could be attributed to either construction or operation of the wind turbines. Confidence intervals for the size of the apparent effects of the SFWF will be the focus of the analyses, rather than simply Yes or No statements about the statistical significance of any observable effects. More detailed or appropriate analyses may be included as the project progresses.

3.0 Demersal Fisheries Resources Survey – Beam Trawl

The survey will help establish pre-construction baseline community composition, with a focus on demersal fish and macroinvertebrates species, and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance before and after construction.

3.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Efforts will be taken to reduce marine

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mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

3.1.1 Proposed Sampling Stations

The SFWF "Project Area" is defined as the maximum work area required to install the SFWF (yellow outline in Figure 3 below). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Three survey areas are proposed for sampling; one survey area within the SFWF Project Area and two reference areas. Each survey area will contain three predetermined beam trawl lines. Two beam trawl lines per area will be randomly selected for each survey, resulting in six beam trawls conducted per survey. Final designation of survey areas and survey lines within each area will be based on detailed geophysical seafloor survey data as well as input from commercial gillnet fishermen regarding areas important to them. Location of beam trawls may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for beam trawling it may be moved based on the captain's professional judgement.

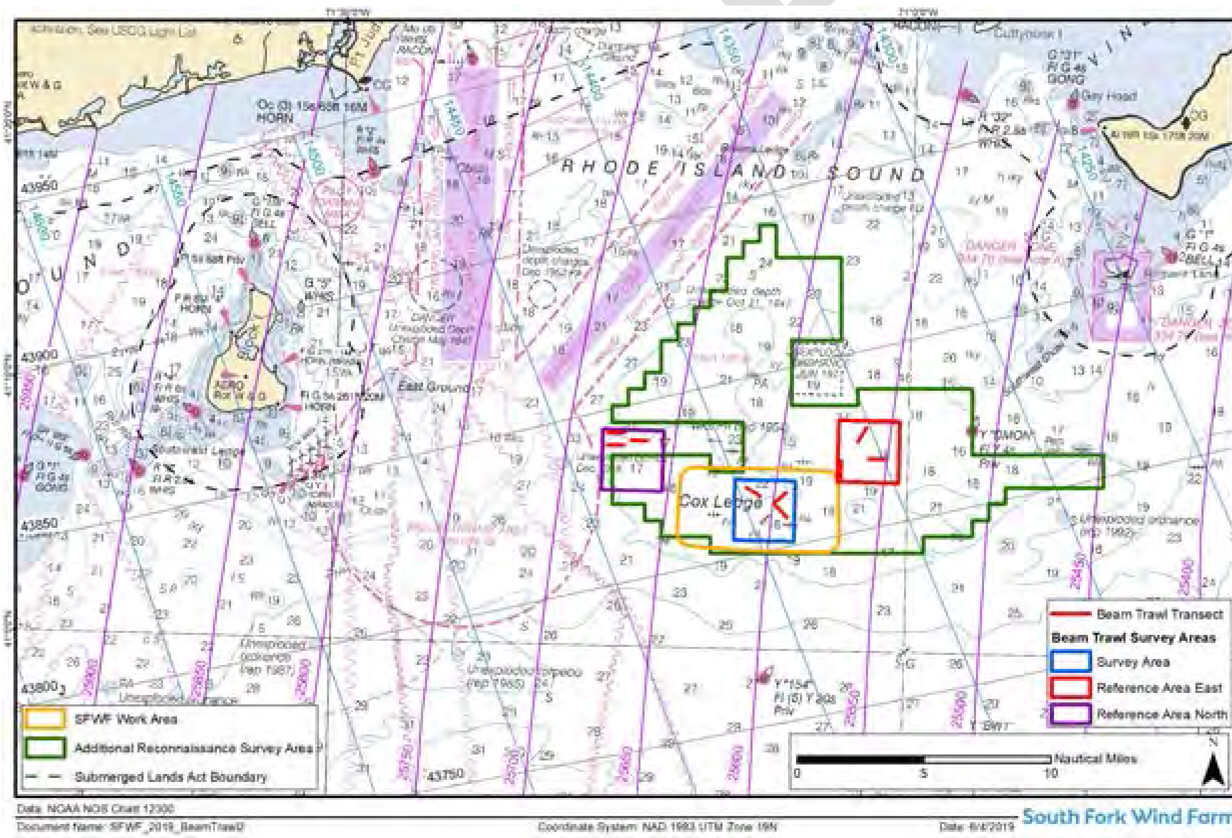

Figure 4. South Fork Wind Farm Project Area with Proposed Beam Trawl Survey and Reference Areas

3.1.2 Beam Trawl Methods

Beam trawling will be conducted monthly by a commercial fishing vessel using a 5.5-m beam trawl and a 1-inch (2.54-cm) knotless cod end liner (or similar; equivalent to NEAMAP cod end) to ensure retention of the smaller fish (Malek, 2015). Once on station, the crew of the vessel lowers the net into the water fully and allows it to drag behind the boat. When the gear is fully deployed and the winch brakes are set, the timer is set for 20 minutes, and the start coordinates, start time, date, tow direction, water depth, and tow speed are recorded. Towing speed is maintained at approximately 2.0 knots (Malek, 2015). Upon completion of the tow, end time and end coordinates are recorded.

Fish collected in each tow will be identified, weighed, and enumerated consistent with the sampling approach of Northeast Area Monitoring and Assessment Program (NEAMAP).

Onboard scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species including fish and mega-invertebrates such as squid, lobsters, *Cancer* spp. crabs, sand dollars, and urchins. Taxonomic guides include: NOAA's *Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas* and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The catch will be sorted by species. In the case of large catches with a range of size classes, the catch may be sorted by relative size categories within each species. The use of size categories is to ensure that all sizes are equally represented in the data if subsampling is used. The chief biologist will determine the categories and approximate length ranges to be used for each species.

All specimens, fishes and invertebrates, are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the chief biologist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), and squids (mantle length). Miscellaneous invertebrates (e.g. worms, hermit crabs, snails) will be counted but not measured. Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (gadids, flounder, black sea bass) to determine if construction and operation of the project could affect fish prey items. Each fish sampled will be sampled for length and weight individually to assess relative condition before the stomach is removed.

In the case of larger catches (e.g., >900 kg), one or multiple subsampling procedures may be used. Subsampling protocols for the beam trawl are adapted from the subsampling procedures of the NEAMAP survey (Bonzek et al., 2008). The decision of which subsampling protocol, or protocols, to use will be at the discretion of the chief biologist.

3.1.3 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the

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instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

3.1.4 Tow Station Data

The following data will be collected during each sampling effort:

- Station number
- Start latitude and longitude
- Start time and date
- Start water depth
- Tow direction
- Tow speed
- Tow duration
- End latitude and longitude
- End time and date
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

3.1.5 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

3.1.6 Data Analysis

The BACI survey design will allow for characterization of baseline pre-construction demersal fish and invertebrate community structure. By continuing sampling during and after construction the survey will allow quantification of any substantial changes in species presence, absence, or abundance associated with proposed operations. The use of reference control sites will ensure that larger regional changes in demersal fish and invertebrate community structure will be captured and delineated from potential impacts of the proposed SFWF. The survey plan allows the comparison of the catch of key, numerically dominant species between the before and after construction periods, using a BACI statistical model.

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From: Melanie Gearon
To: Drew Carey; Brian Gervelis; Jill Johnen
Subject: FW: NOAA Fisheries comments
Date: Tuesday, July 9, 2019 4:31:52 PM
Attachments: NOAA_Comments_SFWF_Monitoring_July7_2019.docx

NEFSC comments on plan

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: Sharon Benjamin - NOAA Affiliate <sharon.benjamin@noaa.gov>
Sent: Tuesday, July 9, 2019 4:27 PM
To: mgearon@dwwind.com
Cc: Sue Tuxbury <susan.tuxbury@noaa.gov>; Andrew Lipsky - NOAA Federal <andrew.lipsky@noaa.gov>; Christopher Boelke - NOAA Federal <Christopher.Boelke@noaa.gov>; Douglas Christel - NOAA Federal <douglas.christel@noaa.gov>
Subject: NOAA Fisheries comments

Hi Melanie,

I hope you are well. My apologies for the delay in sending you this, I know you were looking to have feedback in by yesterday. Please find attached the combined comments from NOAA Fisheries' Greater Atlantic Regional Office and the NEFSC.

Thank you,
Sharon

--
Sharon Benjamin
Marine Habitat Resource Specialist
978-281-9197 ext. 6197

Habitat Conservation Division | Greater Atlantic Regional Fisheries Office
NOAA National Marine Fisheries Service
Gloucester, MA 01930
http://www.nmfs.noaa.gov/

Contractor with Integrated Statistics.

NOAA Fisheries comments regarding the
***South Fork Wind Farm Fisheries research and Monitoring* Plan (June 2019)**

Plan Page #	Comment
1-3	The introduction is generally good; particularly like the inclusion of "guiding principles"
3	A beam trawl survey as the second method is a good compromise when weighing the need for representative demersal catches against the issue of difficult bottom topography for otter trawl nets.
3	Acknowledgement of strength of multiple sampling methods (last paragraph) is good, but even this combination has weaknesses that should be acknowledged. You won't catch much pelagic fauna: squids, butterfish, and herring species in the MA-RI Wind Energy area are numerically important, but easily escape large mesh gill nets and slow-moving beam trawls. This should be acknowledged.
4	#3 in list in 1st paragraph: the data being collected do not only address "taxonomic composition", but also numerical abundance and biomass; that should be stated
4	Paragraph 1: There needs to be a clear statement as to the purpose of this program: is it a once-and-done assessment or is it a program to monitor effects for some extended period? It is not clear from the rest of the document which it is.
4	It would be helpful to include e-links to this and other documents mentioned in the document.
4	There needs to be a clarification on how sampling is going to be done in time and how that relates to analysis and reporting. How many times will sampling be conducted and at what intervals? BACI design assumes there will be before and after sampling and there is mention of during construction as well, but will there be any extended monitoring program to detect slow-developing effects? When will reports be made? A Gantt chart to suggest the conduct of the entire project would be useful. The Gantt chart provided (Fig. 2) is inadequate: it seems to indicate seasonal gill netting, but continuous beam trawling (year round) and does not address the issue of how many times over what period the entire project is planned.
N/A	The survey methodology refers repeatedly to collection of "pre-construction baseline data" but does not state the number of years of data that will be collected. The survey timeline also indicates "the goal of starting the surveys in 2019." It should be noted that BOEM's Fisheries Survey Guidelines note that pre-construction baseline surveys should be conducted for 2 years, and the research plan indicates construction will begin in 2021. It would be helpful to provide a more detailed explanation of the survey timeline and plan.

N/A	Both gillnets and trawl sampling methods pose risks to protected species, including critically endangered North Atlantic right whales. Additionally, right whales occur in the proposed sampling areas in the spring and fall periods identified for the gillnet gear. Effects to listed species (large whales, sea turtles, Atlantic sturgeon) should be considered before any sampling occurs and measures to avoid, minimize and monitor effects should be incorporated into study plans. South Fork should ensure that any necessary ESA and MMPA authorizations/consultations are completed before sampling occurs.
N/A	Reference areas used to compare with the survey areas are located in an existing lease area that may be used to site other wind turbines. Therefore, they are not appropriate as controls for a BACI design.
N/A	The plan notes that lobster traps are in the area (p. 5), but does not include any ventless trap survey to assess impacts to lobsters and crabs. This should be included to monitor and fully evaluate potential impacts of this project.
5-6	Gill net and beam trawl sites will be placed randomly for each survey…that's necessary for statistical validity…but with some concessions to commercial fishing activity, poor setting, and untrawlable conditions: understandable. Thus this is a randomized unstratified BACI sampling design. However, there is a problem with that in this case. While the limits of project area in human terms is set to encompass the placement patterns for the turbines plus a buffer to accommodate construction activity, we cannot assume that the biological effects will follow the same system of boundaries. Previous experience in Europe has indicated that there are measurable effects, but they are largely confined to a limited radius (300 m) from turbine foundations. Fifteen 300 m – radius circles within South Fork would occupy about 4 sq km, or ~6% of the area of the wind farm (est.72 sq km). Under these conditions, an unstratified random sampling pattern within South Fork would have only a 6% chance of encountering an effect, even a very large one. A sampling program utilizing only 3 samples (gill net sets or beam trawls) per treatment would have only a small chance of "hitting" a measurably affected area, even if the effects were very large within those small areas. If the small areas around the turbines would support 10X the number of black sea bass per unit area than the rest of the farm (not unreasonable), the output for the entire farm would increase by 1.5X, but that would remain undetected because the unstratified random sampling program would likely miss sampling it. In other words, this could be a sampling scheme guaranteed to find no effect. One possible solution might be to create a stratified random sampling program in which the strata are determined by distance from turbine foundations. The simplest case would be two strata: one stratum with sampling sites within 300 m or some other distance considered appropriate, and one with sites outside 300 m or another appropriate distance. This could preserve the BACI design, but have a better chance of capturing any highly measureable effects of limited areal extent. This would involve additional sampling to cover the strata.

6	It is not clear in the description of the proposed study design's location conditions (#2) how the "area of influence" will be determined and measured for establishing reference areas. It should be clarified how the area of influence is determined - whether it is by the extent of scour protection around turbine bases, or by the detection of sound/EMF in the water column. This is also confusing because the reference areas must also be comparable in terms of current, habitat and depth, which are additional factors that complicate the selection of reference sites if the "area of influence" is not well defined.
6	As noted in the gillnet methods, comparison of this gillnet survey data to other baseline sampling efforts will be limited due to gear and effort differences; furthermore, although typical of the commercial fleet in RI and MA, it is not clearly explained why the 12" mesh will be use, which may not catch all species in the area (a noted goal of the gillnet survey is to establish a pre-construction baseline community composition).
N/A	The sample size needed to assess cod spawning condition is undefined and should be specified in this report. As written, an unlimited number of cod could be sampled.
7	Stomach content analysis is valuable, but should be described in greater detail, including the classification level of prey species, sampling and sample preservation methods, and other basic details of protocol.
8	The Hydrographic/Atmospheric data collection programs are adequate, though they provide only snapshots of conditions during sampling excursions.
N/A	The duration of sampling is not specified in this draft plan. We cannot determine if sufficient sampling will occur after construction has been completed to assess whether the sampling design is sufficient to conduct a BACI approach.
N/A	The stated goal of the proposed plan is to assess commercially and recreationally important demersal fish species. However, there are other resources that should also be evaluated to understand project impacts, such as benthic and pelagic habitats, and macrobenthic communities. Project effects on fisheries resources and habitat should be considered, including effects from electromagnetic fields along the cable corridor, changes in hydrodynamics, conversion of habitat, and acoustic effects. We recommend that you review the NOAA Fisheries June 27, 2019 letter to BOEM that provide EFH conservation recommendations and discusses monitoring needs.
N/A	The acoustic environment is a key component of marine habitat; the proposed monitoring plan does not indicate any monitoring of project-related construction or operational noise. Noise from these activities may affect how some commercially and recreationally important species utilize the area in both the short and long term. Acoustic monitoring is strongly recommended along gradients from near field to areas outside the range of expected project effects. . This should be done before,

	during, and after construction. Not only will it provide an acoustic metric to compare to other survey data, but the data can also be used to detect changes in species presence. Passive acoustics studies could detect biological sounds and be used to see if there are any deterrent or attractive responses to changes in ambient noise or suitable habitat.
N/A	As one of the stated guiding scientific principles of this proposed plan is to share data with all stakeholder groups, it would be helpful for the research plan to provide more details on how the data will be made available, and if it will be shared in accordance with BOEM's guidelines.
General	It appears that some our comments we provided on the previous draft proposal were not fully addressed in the latest draft. For example, the sampling period suggested for establishing baseline conditions is not clearly defined, but still appears to be limited to 1 year. This will be insufficient to understand impacts because there is no control for interannual variability.

Brian Gervelis

From: Douglas Christel - NOAA Federal <douglas.christel@noaa.gov>
Sent: Thursday, December 12, 2019 2:24 PM
To: Melanie Gearon; Brian Gervelis; Drew Carey; Robert Soden
Cc: Susan Tuxbury - NOAA Federal; Nick Sisson - NOAA Affiliate; Ryan Silva - NOAA Federal
Subject: Re: SFWF Gillnet/Beam Trawl we lan
Attachments: 2019-9-19_SFWF_fisheries research monitoring plan_Dec 2019.docx

Good morning all,
See attached for additional comments from Center staff regarding this monitoring plan. We're happy to discuss these with you further if you have any questions or are interested in following up. I'll forward any additional comments I receive through Friday.

Once again, we're hoping you will reach out to our Protected Species folks in preparation of the LOA request before you begin the research. I've cc'd Nick Sisson on this email in case you need anything in that regard.
Thanks,
Doug

On Thu, Dec 5, 2019 at 12:59 PM Douglas Christel - NOAA Federal <douglas.christel@noaa.gov> wrote:

> Hi Melanie,
> I hope you are well and had a good Thanksgiving. Do you have any update on the LOA submission? We're trying to plan out future workload. I spoke with Ryan today and he hasn't received anything. We're trying to better keep everyone informed of what's going on, so he'll be meeting with our Protected Species Division to ensure marine mammal issues are properly considered in such surveys.
>
> Also, are you still considering comments on this? Perhaps I misheard something, but I thought you suggested at the FWG there may still be an opportunity for refinement. If so, we may have some additional input. If not, please forgive me for misunderstanding. We're all trying to keep our heads above water and tracking all of these simultaneous projects has been challenging.
> Doug
>
> On Fri, Nov 22, 2019 at 3:27 PM Melanie Gearon <MELGE@orsted.com> wrote:
>
>> Hi Doug,
>> Latest plan attached. And today's ppt. We have also been asked by Sue Tuxbury re: permits to check in with Jordon Carduner and Julie Crocker which we will be doing in the near future. We will keep you and Ryan looped in to those conversations.
>>
>> Best regards,
>> **Melanie Gearon**
>> Manager, Permitting & Environmental Affa
>> US Permitting
>> Offshore
>>
>> Learn more at orsted.com
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South Fork Wind Farm

South Fork Wind Farm: Fisheries Research and Monitoring Plan
September 2019

1.1 Introduction

The South Fork Wind Farm (SFWF or project) is proposed to be located in Bureau of Ocean Energy Management (BOEM) Lease Area OCS A-0486, which is within the Rhode Island – Massachusetts Wind Energy Area (RI-MA WEA) (Figure 1). The SFWF includes up to 15 wind turbine generators (WTGs or turbines) with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the WTGs (Inter-array Cables), and an offshore substation (OSS), all of which will be located approximately 19 miles (30.6 kilometers [km], 16.6 nautical miles [nm]) southeast of Block Island, Rhode Island, and 35 miles (56.3 km, 30.4 nm) east of Montauk Point, New York.

Deepwater Wind South Fork, LLC (DWSF), now a wholly-owned indirect subsidiary of North East Offshore, LLC, a joint venture between Ørsted and Eversource , submitted the major federal permit application, The South Fork Wind Farm Construction and Operations Plan[1] (COP), to BOEM in June, 2018 and submitted a revised COP to BOEM in May, 2019. The Project is scheduled to be installed during 2021 and 2022, and to be commissioned and operational by the end of 2022.

The SFWF project team has spoken extensively with regional fishing organizations, working groups, and individual fisherman over the last three years as development of the project has evolved. In addition, through the permitting and development process the SFWF project team has consulted with several state (e.g., NY, CT, RI, and MA) and federal fisheries resource management agencies. It has become clear, based on feedback received to date, that an approach to assess commercially and recreationally targeted demersal fish at the SFWF is a priority.

Commented [1]: There is no indication in this Introduction of the legal obligation of the developer that is driving this proposer's investigation, nor the details of how the conduct of the proposed study relates to the actual development of the South Fork Wind Farm. The assumption is that it will be conducted before construction and afterward, hence the BACI design. Will this be before-during-after construction and continued for some period thereafter? How long? What is required legally or as guidelines from BOEM and how does this plan fulfill those requirements? Don't assume that the reviewer is totally cognizant of all the details of these issues. This needs to be stated. Proper evaluation of this proposal depends on understanding the requirements and this monitoring plan in the context of the larger wind farm development plan.

[1] The full revised COP document can be found online at: https://www.boem.gov/South-Fork/

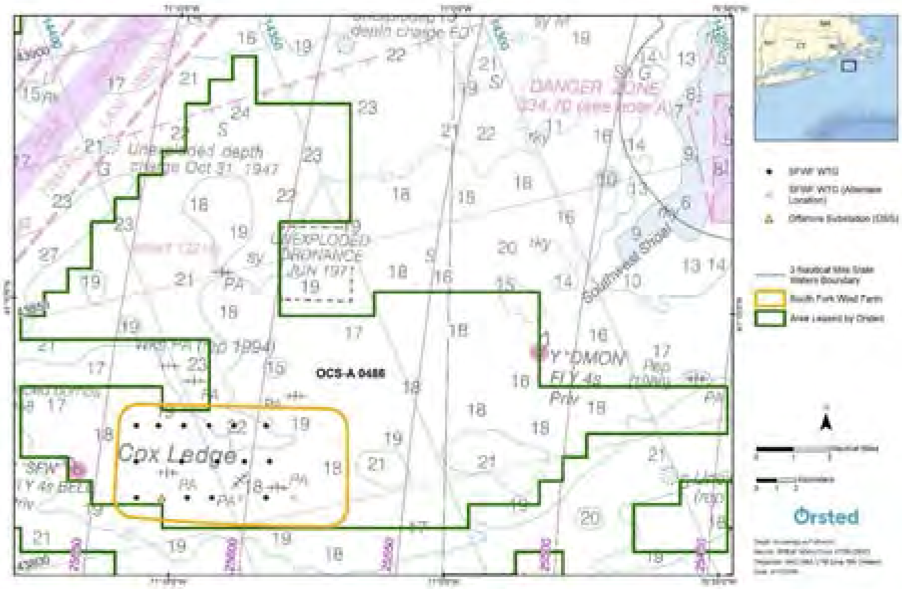

Figure 1: Location of South Fork Wind Farm.

DWSF is committed to conducting sound, credible science. Biological surveys, developed in coordination with the commercial fishing fleet and state agencies, have been conducted at the Block Island Wind Farm (BIWF) since 2012 and will continue through at least 2019. The guiding scientific principles implemented beginning with the BIWF and continuing into the future include:

- Producing transparent, unbiased, and clear results from all research
- Working with commercial fishermen to identify areas important to them
- Collecting long-term data sets to determine trends and develop knowledge
- Promoting the smart growth of the American offshore wind industry
- Focusing on maintaining access and navigation in, and around, our wind farms for all ocean users
- Completing scientific research collaboratively with the fishing community
- Being accessible and available to the fishing industry
- Utilizing standardized monitoring protocols when possible and building on and supporting existing fisheries research
- Sharing data with all stakeholder groups

Commented [2]: How will these data be shared?

- Maintaining data confidentiality for sensitive fisheries dependent monitoring data

The SFWF site is situated atop Cox's Ledge, an area with extensive areas of boulders and mobile gear "hangs". Therefore, fishery independent data are lacking in the SFWF because sampling demersal species with bottom otter trawls, similar to those used by the Northeast Fisheries Science Center (NEFSC) Bottom Trawl Survey, NEAMAP[2], and at the BIWF, is less feasible. Feedback from commercial fishermen combined with vessel Monitoring System (VMS) data indicate there is little commercial trawl effort in the area. Details of the SFWF fisheries data assessment and stakeholder feedback can be found in the SFWF COP Appendix Y - Commercial and Recreational Fisheries Technical Report.[3]

Through extensive outreach efforts with the fishing community, feedback from state and federal agencies, and exploration of existing datasets, the SFWF project team has developed gillnet and beam trawl survey designs to acquire pre-construction data on demersal species that occur in and around the SFWF. These two gear types can also be used effectively, and with limited impact, on the rocky habitat within the SFWF (Thomsen et al., 2010; Malek, 2015).

Gillnet selectivity depends mainly on fish size and shape and mesh size, but is also affected by the thickness, material, and color of net twine, hanging of net, and method of fishing (Hamley, 1975). Using specific gear placements and prescribed mesh sizes, gillnets may be designed to target specific species, or subgroupings of species, and life stages. Southern New England waters are host to a large monkfish gillnet fishery, as well as a lucrative wing fishery for winter skate. The proposed gillnet survey will focus on monitoring these two species pre- and post-construction of the SFWF.

Veteran fishermen report that sections of the Project Area (defined below) likely allows for collection via beam trawl, as beam trawls are smaller in size than traditional otter trawls and more maneuverable (R. Sykes, pers. comm.). Previous studies have used beam trawls to sample in the vicinity of the Project
Area and have proven to be an effective gear for sampling demersal species, including juveniles (Malek, 2015; Walsh and Guida, 2017).

Commented [3]: Perhaps a study of the variance structures in these data sets could inform the sample size needed to detect effects.

Different gear types select for different fish and macro-invertebrate species, therefore, using multiple gear types to sample species assemblages is needed for assessing potential impacts from the SFWF (Wilson et al., 2010; Walsh and Guida, 2017). Gillnet and beam trawl surveys will monitor a large portion of the species assemblage present in and around the SFWF over a varying temporal scale (Figure 2).

[2] NorthEast Area Monitoring and Assessment Program (NEAMAP)

[3] Appendix Y can be found online at: https://www.boem.gov/Appendix-Y/

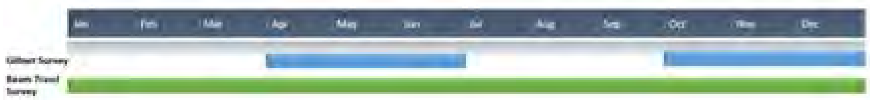

Figure 2: Survey timeline for SFWF monitoring.

These surveys will provide data that can be used to evaluate:

1) Demersal species that utilize the area in and around the SFWF.
2) The seasonal timing of the occurrence of these species.
3) Whether the taxonomic composition, abundance, and/or biomass of demersal fish assemblages change between the pre-construction and post-construction time periods. For example, do some species have reduced abundance and/or do new species appear?

Commented [4]: How will the survey design be adapted once turbines are in place? Previous studies suggest that the strongest effects occur nearer the turbines. How close to the turbines do you plan to sample and is there any plan to conduct distance-based sampling?

Commented [5]: In support of the issue of adaptive survey design, assuming that, as in Europe, strong effects are confined to the regions immediately around turbines, a random sampling scheme with a small number of replicates that does not take into account turbine placement has little chance of detecting an effect, even if it exists, and even if it is quite strong. My preliminary estimate is that only 5-10% of a wind farm's area may be subject to strong effects, but that those effects, e.g. probable large increases in black sea bass aggregation due to habitat creation, could be quite substantial nevertheless and have important implications for the larger fishery for that species. There needs to be some concession expressed here regarding sample positioning to capture effects close to turbines in recognition of the likelihood of this kind of change.

The survey protocols have been designed to address requirements and guidelines outlined in the national register (30 CFR 585.626), BOEM fishery guidelines, and Rhode Island Coastal Resources Management Council policies (11.10.9 C).

Final survey protocols will be incorporated into a Request for Proposal (RFP) with the goal of starting the surveys in 2019. Similar to the principles and practices executed for the Block Island Wind Farm, DWSF is committed to conducting science surveys and assessments that are collaborative with the fishing industry. DWSF will select for-hire fishing vessels from which these surveys will be conducted.

2.1 Demersal Fisheries Resources Survey - Gillnet

The survey will help establish pre-construction community composition, with a focus on monkfish and winter skate, and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance before and after construction.

2.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson- Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Efforts will be taken to reduce marine

mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

2.1.1 Proposed Sampling Stations

The SFWF “Project Area” is defined as the maximum work area required to install the SFWF (yellow outline in Figure 2 below). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Three survey areas are proposed for sampling; one survey area within the SFWF Project Area and two reference areas. Each survey area will contain three predetermined gillnet survey lines. Two gillnet lines per area will be randomly selected for each survey, resulting in six gillnet strings conducted per survey. Final designation of survey areas and survey lines within each area will be based on detailed geophysical seafloor survey data as well as input from commercial gillnet fishermen regarding areas important to them. Location of gillnets may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for setting gillnets it may be moved based on the captain’s professional judgement.

Commented [6]: Several comments here: 1) Assigning sampling stations in this way assumes that each box is homogeneous with regard to habitat variables that affect the distribution of fish which is unlikely to be true, 2) How were the reference stations chosen? They appear to still overlap the WEA which means they could be the site of future wind farm development, 3) n=2 is a small sample size. How was this sample size determined? Is there some statistically-based justification that indicates that this sample size would be able to detect a change if in fact one occurs?, 4) What are the criteria by which sites will be "predetermined.", 5) Are sampling sites proposed to be fixed for the duration of the study (following random selection from a predetermined set)?

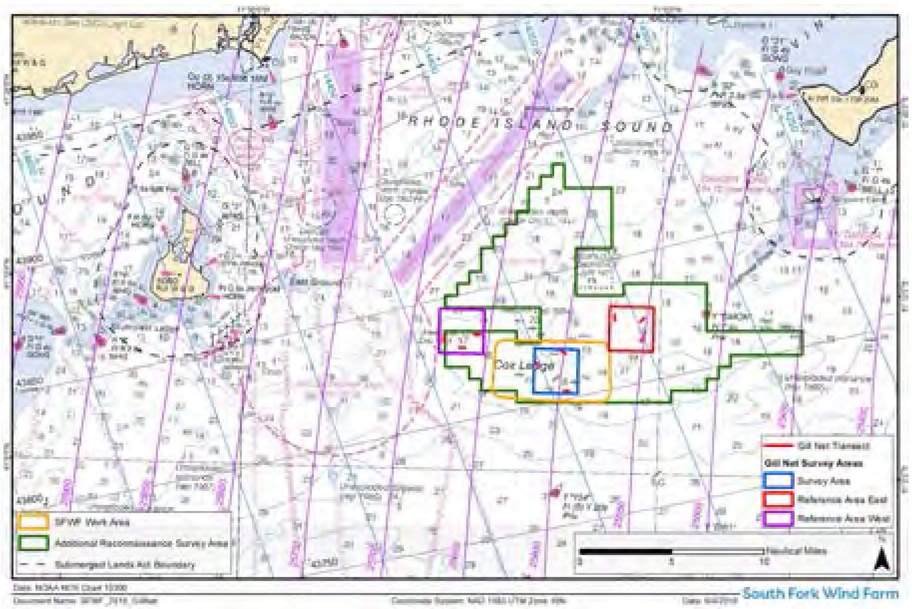

Figure 3. South Fork Wind Farm Project Area with Proposed Gillnet Survey and Reference Areas

Commented [7]: What are the areas (km2) of these boxes?

Data will be collected in the Project Area and two reference areas with similar habitat characteristics as the Project Area. The reference areas will serve as an index of demersal fish abundance in Rhode Island

Sound in an area outside of the direct influence of the SFWF. Concurrent sampling in the Project Area and the two reference areas will help identify whether temporal changes in demersal fish abundance data observed within the Project Area are consistent with regional trends rather than representing a localized impact in the vicinity of the SFWF. The study will use an asymmetrical before-after-control- impact (BACI) experimental design[4], with statistical evaluation of the differences between control and impact areas contrasted in the before and after construction time periods (Underwood 1994; Smith 2002). A BACI design will allow for assessment of shifts in fish presence, absence, or abundance that correlate with proposed operations at the SFWF.

The study design consists of sampling each of the treatment areas with a gillnet. The proposed sampling locations will be selected such that:

1. There is comparability among all sampling areas with respect to current, habitat and depth condition;
2. Reference areas are outside the area of influence from the SFWF but are still utilized by the same/similar fish populations;
3. Areas allow optimal operational execution of the survey (e.g., minimal travel times between sampling locations);
4. Space conflicts are minimized with other active uses.

2.1.2 Gillnet Methods

A gillnet is a wall of netting that hangs in the water column and is typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. Factors that can influence the catch rate of gillnets for target species include: fish density in the vicinity of gears, the behavior of the target species, the ability of fish to detect and locate the gillnet, and environmental factors such as water temperature, visibility, current direction, and velocity. It is often challenging to calculate catch per unit effort (CPUE) from gillnets due to potential changes in efficiency (e.g., fluctuating soak time and catch rate). This survey is designed to account for as many variables as possible to standardize CPUE. Comparison of this gillnet survey data to other pre-construction sampling efforts (e.g., nearby federal NEAMAP trawl stations) will be limited due to gear and effort differences.

The gillnet survey may be conducted using gillnets that are typical of the commercial fishery in Rhode Island and Massachusetts. Each gillnet string will consist of six, 300-ft net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs. Sampling will take place once per month from April- June and October-December. These months see the majority of commercial gillnet activity as monkfish and skates migrate through the area in spring and fall. Sampling in July-September has been eliminated to minimize interactions with protected species and elasmobranchs that are common in the area during that time. The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), minimize depredation of catch, and keeping the survey trip length logistically feasible. Soak time will remain consistent throughout the duration of the survey. Each survey

[4] In this asymmetrical BACI design there is a single putative impact area, and two control areas. The area is assumed to be the observational unit and the two gillnet lines per area are subsamples which will be

Commented [8]: A BACI design will only work if the control areas are truly uninfluenced by the impact (likely in this case), and if they remain control areas for the entire lifetime of the study. The control areas are within the RIMA WEA. Can the proposer state unequivocally that they will remain undeveloped throughout the lifetime of this study? If not, then the study needs to be redesigned, either with different control areas that will remain undeveloped, or through use of some scheme that does not require control areas. This is part of the reason why it is essential to state the lifetime of the project and the context within the WEA development plan in the Introduction. If future developments are not clear, perhaps a contingency plan could be offered.

Commented [9]: What aspects of habitat will be considered?

Commented [10]: The scale of effect of offshore wind farms on fish is not well understood. How will you know when you are outside the area of influence?

Commented [11R10]: Agree- impact producing effects that we are trying to measure a response from occur at different scales, e.g., sound is much greater distances than changes in habitat (reef effect), wind wake effects recently reported by Thunen show a 80KM effect area

Commented [12]: Agreed that this is unfortunate, but this area is not trawlable by standard survey methods and there have not been any rigorous inter-calibration efforts between survey trawl and gill net methods in this region. That is what would be needed to rectify this deficiency. As is, gill net catches can at least reveal the kinds of changes taking place in semi-quantitative terms.

Commented [13]: This is particularly unfortunate. Comparability of this information with that collected by other regional surveys is crucial.

combined to estimate the area-wide abundance (or CPUE) during each sampling event.

event will be managed by a team of qualified scientists including a lead scientist with experience performing fisheries research. The catch will be removed from the gillnets by the boat crew for processing. The lead scientist will be responsible for collection of data and data recording.

Fish collected in each gillnet will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. Scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species. Taxonomic guides include: NOAA's Guide to Some Trawl-Caught Marine Fishes (Flescher, 1980), Kells and Carpenter's (2011) Field Guide to Coastal Fishes from Maine to Texas, and Peterson's Field Guide to the Atlantic Seashore (Gosner, 1999).

The catch will be sorted by species. All specimens are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the lead scientist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), and squids (mantle length). Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (monkfish, winter skate, gadids, black sea bass) to determine if construction and operation of the project could affect fish prey items. Each fish sampled will be sampled for length and weight individually to assess relative condition before the stomach is removed. Atlantic cod are known to spawn on or near Cox Ledge (Zemeckis et al., 2014). In addition to stomach sampling, any Atlantic cod caught on the gillnet survey will be assessed for reproductive stage and spawning condition according to the protocols used for SFWF Atlantic Cod Spawning Survey (adapted from
Burnett et. al [1989] and O'Brien et al. [1993]) that occurred during the winters of 2018 and 2019.

2.1.3 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

2.1.4 Gillnet Station Data

The following data will be collected during each sampling effort:

- Station number
- Latitude and longitude
- Soak start and end time and date

- Water depth
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

2.1.5 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

2.1.6 Data Analysis

Prior to the project being built, data analysis will focus on comparing the fish communities in the impact and the control areas to describe spatial differences. CPUE and length data will be quantitatively compared on a per species basis between the impact and the control areas. Similar analyses will occur using the post-construction data, however the focus will be on identifying changes in the fish community in the impact area between pre- and post- construction that did not also occur at the control areas that could be attributed to either construction or operation of the wind turbines. Confidence intervals for the size of the apparent effects of the SFWF will be the focus of the analyses, rather than simply Yes or No statements about the statistical significance of any observable effects. More detailed or appropriate analyses may be included as the project progresses.

Commented [14]: How will stomach content data and data on cod reproductive stage/spawning be analyzed?

Commented [15]: How will data be temporally aggregated? Do you plan to examine monthly, seasonal, and/or annual changes or just pre vs. post construction?

Commented [16]: Before-After-Control-Impact studies rely heavily on having appropriate controls. What will you do if the controls differ from the wind farm area before construction, or if patterns in the controls diverge from each other after construction? These scenarios have arisen in previous wind farms studies and have made it difficult to discern wind farm effects.

Commented [17]: Given that sample size is small (n=2 per time point) and that sites are not stratified by any habitat variables that are meaningful to fish, the confidence intervals are likely to be large. This will make it difficult to discern real effects.

3.0 Demersal Fisheries Resources Survey – Beam Trawl

The survey will help establish pre-construction community composition, with a focus on demersal fish and macroinvertebrates species, and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance before and after construction.

3.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson- Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered

Species Act (ESA). Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor

Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

3.1.1 Proposed Sampling Stations

The SFWF "Project Area" is defined as the maximum work area required to install the SFWF (yellow outline in Figure 3 below). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Three survey areas are proposed for sampling; one survey area within the SFWF Project Area and two reference areas. Each survey area will contain three predetermined beam trawl lines. Two beam trawl lines per area will be randomly selected for each survey, resulting in six beam trawls conducted per survey. Final designation of survey areas and survey lines within each area will be based on detailed geophysical seafloor survey data as well as input from commercial gillnet fishermen regarding areas important to them. Location of beam trawls may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for beam trawling it may be moved based on the captain's professional judgement.

Commented [18]: Repeating previous comments regarding adaptive design: There needs to be some concession expressed here regarding sample positioning to capture effects close to turbines in recognition of the likelihood of this kind of change. Otherwise there is little chance of detecting strong, but localized effects in the vicinity of turbines.

Commented [19]: Same questions as above: 1) Assigning sampling stations in this way assumes that each box is homogeneous with regard to habitat variables that affect the distribution of fish which is unlikely to be true, 2) How were the reference stations chosen? They appear to still overlap the WEA which means they could be the site of future wind farm development, 3) n=2 is a small sample size. How was this sample size determined? Is there some statistically-based justification that indicates that this sample size would be able to detect a change if in fact one occurs?, 4) What are the criteria by which sites will be "predetermined.", 5) Are sampling sites proposed to be fixed for the duration of the study (following random selection from a predetermined set)?

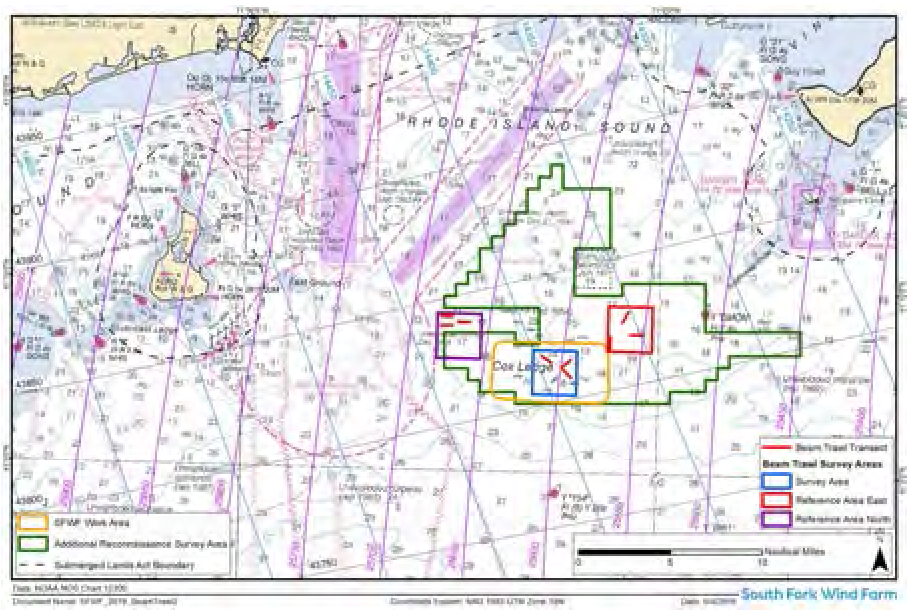

Figure 4. South Fork Wind Farm Project Area with Proposed Beam Trawl Survey and Reference Areas

3.1.2 Beam Trawl Methods

Beam trawling will be conducted monthly by a commercial fishing vessel using a 3-m beam trawl, with a cod-end of double 4.75 inch mesh and a 1-inch (2.54-cm) knotless cod end liner (or similar; equivalent to NEAMAP cod end) to ensure retention of the smaller fish (Malek, 2015). Rock chains will also be fitted across the mouth of the beam trawl to prevent larger rocks from entering and damaging the catch or net. Once on station, the crew of the vessel lowers the net into the water fully and allows it to drag behind the boat. When the gear is fully deployed and the winch brakes are set, the timer is set for 20 minutes, and the start coordinates, start time, date, tow direction, water depth, and tow speed are recorded. Towing speed is maintained at approximately 4.0 knots (Malek, 2015). Upon completion of the tow, end time, and end coordinates are recorded.

Fish collected in each tow will be identified, weighed, and enumerated consistent with the sampling approach of Northeast Area Monitoring and Assessment Program (NEAMAP).

Onboard scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species including fish and mega-invertebrates such as sea scallops, squid, lobsters, Cancer spp. crabs, sand dollars, and urchins. Taxonomic guides include: NOAA's Guide to Some Trawl-Caught Marine Fishes (Flescher, 1980), Kells and Carpenter's (2011) Field Guide to Coastal Fishes from Maine to Texas and Peterson's Field Guide to the Atlantic Seashore (Gosner, 1999).

The catch will be sorted by species. In the case of large catches with a range of size classes, the catch may be sorted by relative size categories within each species. The use of size categories is to ensure that all sizes are equally represented in the data if subsampling is used. The chief biologist will determine the categories and approximate length ranges to be used for each species.

All specimens, fishes and invertebrates, are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the chief biologist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), sea scallops (shell height), and squids (mantle length). Miscellaneous invertebrates (e.g. worms, hermit crabs, snails) will be counted but not measured. Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (gadids, flounder, black sea bass) to determine if construction and operation of the project could affect fish prey items. Each fish sampled will be sampled for length and weight individually to assess relative condition before the stomach is removed. In addition to stomach sampling, any Atlantic cod caught on the beam trawl survey will be assessed for reproductive stage and spawning condition according to the protocols used for SFWF Atlantic Cod Spawning Survey (adapted from Burnett et. al (1989) and O'Brien et al. (1993)) that occurred during the winters of 2018 and 2019.

In the case of larger catches (e.g., >900 kg), one or multiple subsampling procedures may be used. Subsampling protocols for the beam trawl are adapted from the subsampling procedures of the NEAMAP survey (Bonzek et al., 2008). The decision of which subsampling protocol, or protocols, to use will be at the discretion of the chief biologist.

Commented [20]: It was mentioned previously that gill net catches can not be compared with NEAMAP trawl survey data, but you don't say anything about comparison between beam trawl and NEAMAP trawls. Can these be compared or not? Again, if not, another gear calibration exercise would be required for comparison to render results comparable. Need to state comparability (or lack thereof) as with gill net catches.

3.1.3 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

3.1.4 Tow Station Data

The following data will be collected during each sampling effort:

- Station number
- Start latitude and longitude
- Start time and date
- Start water depth
- Tow direction
- Tow speed
- Tow duration
- End latitude and longitude
- End time and date
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

3.1.5 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

3.1.6 Data Analysis

The BACI survey design will allow for characterization of pre-construction demersal fish and invertebrate community structure. By continuing sampling during and after construction the survey will allow quantification of any substantial changes in species presence, absence, or abundance associated with proposed operations. The use of reference control sites will ensure that larger regional changes in demersal fish and invertebrate community structure will be captured and delineated from potential impacts of the proposed SFWF. The survey plan allows the comparison of the catch of key, numerically dominant species between the before and after construction periods, using a BACI statistical model.

Commented [21]: As before, suggest a contingency plan if the character and/or endurance of control areas is not clear.

Commented [22]: Same comment as above: Before-After-Control-Impact studies rely heavily on having appropriate controls. What will you do if the controls differ from the wind farm area before construction, or if patterns in the controls diverge from each other after construction? These scenarios have arisen in previous wind farms studies and have made it difficult to discern wind farm effects.

4.0 References

Burnett, J., O'Brien, L., Mayo, R. K., Darde, J., and Bohan, M. 1989. Finfish maturity sampling and classification schemes used during Northeast Fisheries Center bottom trawl surveys, 1963–1989. NOAA Tech. Mem. NMFS-F/NEC, vol. 76. 14 p.

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Thomsen B., Humborstad O. B., Furevik D. M. 2010. Fish pots: fish behaviour, capture processes, and conservation issues. In Behaviour of Marine Fishes: Capture Processes and Conservation Challenges, pp. 143–158. Ed. by He P. John Wiley and Sons, Iowa. 392 pp.

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Zemeckis, D.R., M.J. Dean, and S.X. Cadrin. 2014. Spawning dynamics and associated management implications for Atlantic cod. North American Journal of Fisheries Management, 34: 424-442.

From:	Melanie Gearon
To:	Drew Carey; Brian Gervelis; Jill Johnen
Subject:	FW: SFWF - Draft Demersal Fisheries Resources Survey
Date:	Monday, July 8, 2019 4:33:22 PM
Attachments:	DMF to SFWF fisheries survey 12-13-2018 with June 2019 Revised Monitoring Plan_Final.doc

More comments from MA DMF, you know the drill!

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: Logan, John (FWE) <john.logan@state.ma.us>
Sent: Monday, July 8, 2019 3:25 PM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: Pierce, David (FWE) <david.pierce@state.ma.us>; Pol, Mike (FWE) <mike.pol@state.ma.us>; Burke, Erin (FWE) <erin.burke@state.ma.us>; Whitmore, Kelly (FWE) <kelly.whitmore@state.ma.us>; OKeefe, Catherine (FWE) <catherine.okeefe@state.ma.us>; DeCelles, Gregory (FWE) <gregory.decelles@state.ma.us>; Pugh, Tracy (FWE) <tracy.pugh@state.ma.us>; Callaghan, Todd (ENV) <todd.callaghan@state.ma.us>; Carlisle, Bruce (ENV) <bruce.carlisle@state.ma.us>; Susan Tuxbury - NOAA Federal <Susan.tuxbury@noaa.gov>; Livermore, Julia (DEM) <Julia.Livermore@dem.ri.gov>; dbeutel@crmc.ri.gov; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Michelle Bachman <mbachman@nefmc.org>; Brian Hooker <brian.hooker@boem.gov>; Ford, Kathryn (FWE) <kathryn.ford@state.ma.us>
Subject: RE: SFWF - Draft Demersal Fisheries Resources Survey

Melanie,

Please find attached comments from MA DMF on the revised fisheries monitoring plan.

Best,

John

____

John Logan, Ph.D.
MA Division of Marine Fisheries
836 South Rodney French Boulevard
New Bedford, MA 02744
(508) 742-9722
http://www.mass.gov/eea/agencies/dfg/dmf/
https://www.researchgate.net/profile/John_Logan
Join the conversation! DMF is on Twitter, Flickr, Facebook, and YouTube.

From: Ford, Kathryn (FWE) <kathryn.ford@mass.gov>
Sent: Thursday, December 13, 2018 7:36 PM
To: Melanie Gearon <mgearon@dwwind.com>
Cc: Pierce, David (FWE) <david.pierce@mass.gov>; Pol, Mike (FWE) <mike.pol@mass.gov>; Logan, John (FWE) <john.logan@mass.gov>; Burke, Erin (FWE) <erin.burke@mass.gov>; Whitmore, Kelly (FWE) <kelly.whitmore@mass.gov>; O'Keefe, Catherine (FWE) <Catherine.OKeefe@mass.gov>; DeCelles, Gregory (FWE) <gregory.decelles@mass.gov>; Pugh, Tracy (FWE) <tracy.pugh@mass.gov>; Callaghan, Todd (EEA) <todd.callaghan@mass.gov>; Carlisle, Bruce (EEA) <bruce.carlisle@mass.gov>; Susan Tuxbury - NOAA Federal <Susan.tuxbury@noaa.gov>; Livermore, Julia (DEM)

<Julia.Livermore@dem.ri.gov>; dbeutel@crmc.ri.gov; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Michelle Bachman <mbachman@nefmc.org>; Brian Hooker <brian.hooker@boem.gov>
Subject: RE: SFWF - Draft Demersal Fisheries Resources Survey

Melanie,
Please see attached comments from Mass DMF. Regards, Kathryn

From: Melanie Gearon [mailto:mgearon@dwwind.com]
Sent: Thursday, November 15, 2018 12:22 PM
To: Ford, Kathryn (FWE)
Cc: Pierce, David (FWE); Stephanie Wilson; Caitlin O'Mara; Mary Colbert; John O'Keeffe; Aileen Kenney
Subject: SFWF - Draft Demersal Fisheries Resources Survey

Hi Kathryn,
Please find attached the SFWF *Draft Demersal Fisheries Resources Survey Protocol* for MA DMF review. Please provide comments by December 14, 2018.
Thanks,
Melanie

Melanie Gearon
Manager, Permitting & Environmental Affairs – www.dwwind.com
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Secretary
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Commissioner
Mary-Lee King
Deputy Commissioner

Ms. Melanie Gearon
Manager, Permitting and Environmental Affairs
South Fork Wind Farm
56 Exchange Terrace
Providence, RI 02903

July 8, 2019

Dear Ms. Gearon,
Thank you for providing the Massachusetts Division of Marine Fisheries (MA DMF) the opportunity to provide comments on the document, "Fisheries Research and Monitoring Plan-Draft" dated June 2019 for the South Fork Wind Farm (SFWF). This document is the second draft of a document we reviewed in December 2018 which was titled, "Demersal Fisheries Resources Survey Protocol-Draft" dated November 14, 2018.

SFWF has proposed to define the study area's pre- and post-construction demersal fisheries community composition by conducting gillnet and beam trawl surveys. According to SFWF, these surveys will provide data that can be used to evaluate:

1) Demersal species that utilize the area in and around the SFWF.
2) The seasonal timing of the occurrence of these species.
3) Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods. For example, do some species have reduced abundance and/or do new species appear?

The gillnet survey "will focus on monitoring [monkfish and winter skates] pre- and post-construction of the SFWF" (page 3). The beam trawl survey will "focus on demersal fish and macroinvertebrate species" (page 9).

The survey plan includes deploying six 6-panel gillnets with 12 inch mesh (standard commercial gillnets used in the area) for 48 hours[1]. These nets will be used to sample 2 control and 1 impact treatment areas monthly from Apr-Jun and Oct-Dec at two fixed stations (a total of six stations per sampling event). The plan is to start surveys in 2019 (page 4) and the project will be constructed in 2021 (page 1), so it is possible the survey could occur nine times pre-construction. The length of post-construction monitoring effort is not identified (in the first draft, a 2-year post-construction timeline was laid out). The survey has changed from a random stratified design (stratified by bottom type into three strata: rocks and boulder, gravel, and sand/fines) to a fixed station design. Whatever is captured in the gillnets will be identified, counted, and measured for length (with subsampling as necessary) and stomach contents analysis will be performed on gadids, flounders, and black sea bass. Any Atlantic cod captured will also be assessed for maturity stage. Surveys will be done using for hire vessels (e.g., commercial vessels hired for the purpose of conducting the survey).

[1] The original plan recommended using 4-panel nets with 5, 6, 6.5, and 7 inch mesh with a soak time of 16 hours.

This plan has added beam trawls as a second sampling gear type, which is responsive to comments from MA DMF, RIDEM, and NMFS that multiple gear types are necessary to adequately characterize the fish community in this area. A 5.5-m beam trawl with 1 inch knotless cod end liner will be used to sample 2 control and 1 impact treatment areas monthly at two fixed stations (a total of six tows per month). Tow speed will be 2 knots and tow duration will be 20 minutes. The plan is to start surveys in 2019 and construction will occur in 2021, so it is possible the survey could occur monthly from about Oct 2019 to Dec 2020, or about 15 months pre-construction. Whatever is captured in the beam trawl will be identified, counted, and measured for length (with subsampling as necessary) and stomach contents analysis will be done on gadids, flounders, and black sea bass. No Atlantic cod maturity staging is specified.

The process used to draft, review, and redraft this survey plan has been sensible. Several of our initial comments were incorporated, including the inclusion of multiple gear types, longer soak times, a clear sampling frequency, the inclusion of stomach contents analysis, the addition of a second control site, and more clearly stated goals. However, there remain some vulnerabilities which will limit the value of this data collection effort.

Our comments on the updated plan are organized by topic area below.

Survey purpose

- The survey purpose is more clear than the first draft and identifies pre- and post-construction impact assessment as the primary goal and species composition and relative abundance as key metrics (as opposed to say, focusing on spatial distribution). Additional metrics such as length frequencies, spawning condition (for cod), and stomach contents (for gadids, flounder, and black sea bass) will also be addressed.
- A section describing reproductive sampling of cod is included but, as noted in our previous comment letter, the purpose for that sampling is not described.
    - If the objective is to define the timing of spawning, then samples should be obtained on a monthly basis (at a minimum).
    - If the objective is to determine whether or not cod spawn in the construction area, there are much more direct and effective ways to answer that question (e.g., high resolution rod and reel survey, passive acoustics, or a dedicated acoustic telemetry experiment).
    - What is the plan if few or no cod are caught during sampling in that quarter? Will additional gillnet sets be made to obtain samples?
    - Prior training with fresh or preserved samples to assess reproductive condition is recommended to ensure accuracy.

Survey design

- A major change from the original survey design is moving from a habitat-stratified survey to a fixed station survey in treatment blocks (1 impact and 2 controls). Each treatment block will be described by 2 gillnet stations (6 months a year) and 2 beam trawls (12 months a year).
    - o The proposed level of replication (2 sets or tows per station per sampling date for gillnet and beam trawl surveys, respectively) is likely inadequate given expected variability across replicates. Given the expected variability in catch rates, the low sample sizes will likely result in large confidence intervals that will preclude definitive statements about the effects of the wind farm construction. A power analysis is needed to determine a more appropriate level of replication. Existing fishery dependent data from the gillnet fishery could be used as the basis for a power analysis to estimate the statistical power that would result from this sampling design and, presuming 2 replicates are inadequate to detect changes, provide guidance towards a more appropriate number of replicates.
    - o In the gillnet survey description, it is stated that there will be "comparability among all sampling areas with respect to current, habitat and depth condition" (page 6). This is appropriate but it should be stated which habitat (we assume habitat means substrate type of either rocks and boulder, gravel, and sand/fines) will be targeted with gillnets. More

information is also required to confirm that the proposed reference areas are in fact similar to Cox's Ledge in terms of sediment type, depth, and other abiotic characteristics.
    - The same statement is not made in the beam trawl survey description and it should be.
    - Given that the same fixed stations may not be available for surveying at all time points (e.g., "may be subject to change due to seasonal location of other fixed fishing gear" (page 5)), a stratified random survey may be more appropriate than a fixed station survey. For either approach, more detail is required regarding when a station will be abandoned (e.g., what constitutes "poor conditions" on page 5).
- The two reference areas will not be "outside of the direct influence of the SFWF" (page 6) during construction if sound travels to those areas. We recommend sound levels be measured specifically in those locations to help with interpretation.

Survey method

- While we support the inclusion of complementary sampling gears in addition to the originally proposed gillnet survey, MA DMF recommends a ventless trap survey as a more appropriate gear type than a beam trawl for this study site for several reasons:
    - A trap survey will provide information on lobsters and *Cancer* crabs as well as any structure-seeking finfish species in these areas (e.g., black sea bass, tautog).
    - Trap survey data will be comparable to other survey work currently being conducted in nearby waters.
    - A trap survey has less potential gear conflict with existing pot gear fisheries in the study area than a beam trawl survey.

  We recommend the ventless lobster trap study utilize a fishery-independent BACI design with stratified random placement of stations using substrate type to define the strata (complex and not complex).
- Of particular interest is the effect of construction and operation on abundance and presence of Atlantic cod. Will existing rod and reel surveys for Atlantic cod be continued? If not, please describe why not? If they are (and our initial thought is that they should be), they should be incorporated into this survey plan. The gillnet approach to assessing spawning cod is insufficient since the gillnet mesh of 12" is unlikely to catch many cod and the timing of the survey misses part of the spawning period, which appears to extend to February. Therefore, timing on gillnet survey (Apr-Jun and Oct-Dec) will miss important reproductive periods for cod. Additional winter sampling, when a large recreational fleet targets cod in this area, is needed.
- The updated plan changed the gillnet sampling design from a multi-panel net with different mesh sizes to a single mesh size (12") with tie down (page 6). It is unclear why single mesh size gillnets will be deployed. The rationale for this sampling is that it is "typical of the commercial fishery in Rhode Island and Massachusetts" (page 6). However, it is not recommended for abundance or assemblage changes, since you will likely have very low encounter rates for other commercially important species (e.g., black sea bass), because of mesh selectivity issues. The gillnet survey as proposed will not adequately sample juvenile fish for the same reason. We recommend using a multi-panel gillnet with a wider range of mesh sizes that would allow for more representative sampling of the entire fish community in the area. As mentioned in our previous letter, the order of meshes within gillnet strings should either be randomized or designed so that each mesh occupies a position within the string an equal number of times.
- Verification of fish species identification through freezing or photographing of samples is needed to assure accuracy.
- The plan states, "The catch will be sorted by species. All specimens are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the lead scientist verifies that the sorting areas are clear of all specimens" (page 7). However, when gillnetting, fish will typically arrive singly and can be weighed and measured immediately; sorting is likely not necessary unless processing for scientific samples occurs later.
- Will catch be landed or discarded?

Results

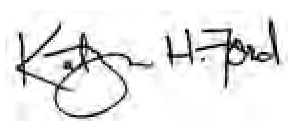
- The description of planned analyses and data management is very vague. Additional information is required specifically with respect to the following:
  - Please define how survey results will be made available and incorporated into data management systems such as NE Ocean Data Portal, BOEM data management systems, or systems run by NOAA-NMFS.
  - Exploring more specifically how the data will be used to assess change is worthwhile.

General comments

- There remains significant compartmentalization of the different surveys being conducted. Other surveys are highly relevant to fisheries habitat, including surveys and/or modeling for benthic biota, oceanographic conditions, and sound. Are studies of these variables being conducted, and what fisheries concerns can they address? For example, we recommend that benthic grab studies be used to assess changes in prey composition. Benthic photo surveys should be used to assess changes in prey composition and shellfish abundance.
- The monitoring plan refers to extensive discussions "with regional fishing organizations, working groups, and individual fisherman (page 1)" but does not specifically identify which stakeholders have been part of these discussions. It would be helpful to identify these user groups to ensure that all of the fleets using the windfarm area were included.
- We are glad to see the inclusion of stomach contents analysis of gadids, flounder, and black sea bass as such data can be used to track potential food web changes resulting from the wind farm.
  - We recommend including monkfish and winter skate since those are target species.
  - Details on this part of the study are generally lacking. Specifically, information on how samples will be preserved, level of taxonomic classification, how contents will be quantified, how they will be compared between reference and control sites, and how many individuals per species will be sampled are needed.

Questions pertaining to this review can be directed to John Logan (john.logan@mass.gov) or Kathryn Ford (kathryn.ford@mass.gov).

Sincerely,



Kathryn Ford, Ph.D.
Habitat Program Leader

cc:
Pierce, Logan, Pol, Pugh, Burke, Whitmore, O'Keefe, DeCelles, MA DMF
Callaghan, MA CZM
Carlisle, MA CEC
Tuxbury, NOAA-NMFS
Livermore, RIDEM; Beutel, RI CRMC
Brunbauer, NYDEC
Bachman, NEFMC
Hooker, BOEM

Brian Gervelis

From: Melanie Gearon <MELGE@orsted.com>
Sent: Thursday, June 27, 2019 3:15 PM
To: Brian Gervelis
Cc: Drew Carey
Subject: FW: SFWF - Fisheries Research and Monitoring Plan

Brian,
See the set of comments below

Please keep adding these comments as they come in, to the comment register and tracking sheet Inspire has been keeping.

We need the record

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: McLean, Laura (DOS) <Laura.McLean@dos.ny.gov>
Sent: Thursday, June 27, 2019 1:35 PM
To: Melanie Gearon <MELGE@orsted.com>
Cc: Hogan, Chris M (DEC) <chris.hogan@dec.ny.gov>; McReynolds, Dawn (DEC) <dawn.mcreynolds@dec.ny.gov>; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>; Snyder, Michael (DOS) <Michael.Snyder@dos.ny.gov>; Maraglio, Matthew (DOS) <Matthew.Maraglio@dos.ny.gov>
Subject: RE: SFWF - Fisheries Research and Monitoring Plan

Melanie,
DOS and DEC provide the following consolidated comments on the June 2019 version of the Fisheries Research and Monitoring Plan. The draft plan was also shared with the F-TWG members.

General comments:

1. Was a power analysis conducted to determine that an adequate sample size is being proposed?
2. Was Orsted successful in getting survey responses from other NY fishing ports like Greenport and Hampton Bay-Shinnecock? This was discussed during a coordination meeting in March 2019. It is important that NY commercial fishermen are well-represented when designating final survey areas.
3. Discuss how the proposed methods are scalable and/or transferable to other regional monitoring proposals being developed in the RI/MA WEA. This was also discussed during a coordination meeting in March 2019. It would be beneficial if the SFWF plan discussed ways that Orsted is coordinating with other research initiatives.
4. Currently there is very little information provided as to how the data will be shared. What efforts will be made to ensure that this data is publicly available and useable by others? Will data be available on the numerous data portals?

Specific comments:

5. Page 2, 8th bullet – Utilizing standard monitoring protocols is necessary to compare findings from these studies to existing datasets. All efforts should be made to ensure that data is comparable.

6. Page 4, Section 2.0 – While monkfish and winter skate are the focus of this study all efforts should be made to report out findings from all species encountered.
7. Page 5, Section 2.1 – There is no specific mention of an NOAA Take Permit. Please confirm one will be applied for and followed. If incidental take numbers become a problem (marine mammals, sea turtles, sturgeon, etc.) please elaborate on how sampling methods will be changed to accomplish study goals and reduce resource impacts.
8. Page 6, Section 2.1.2 – These methods are appropriate. Sampling time frames align with data from dealer reports. There is no mention of how long these studies will run; For example, 1, 2, or 3 years prior to construction and 1, 2, or 3 years post construction?
9. Page 8, Section 2.1.4 -The principle scientist should have a thermometer onboard to measure air temperature. This is an inexpensive piece of equipment . They should not need to rely solely on a fisherman's equipment or download the data after the fact.
10. Page 9, Section 2.1.5 – The latitude and longitude for each end of the gillnet should be recorded.
11. Page 11, Section 3.1.2 – These methods are appropriate. Will this monitoring study be conducted year round? There is no mention of how long these studies will run; For example, 1, 2, or 3 years prior to construction and 1, 2, or 3 years post construction
12. Page 12, Section 3.1.3 - The principle scientist should have a thermometer onboard to measure air temperature. This is an inexpensive piece of equipment . They should not need to rely solely on a fisherman's equipment or download the data after the fact.

Thanks,
Laura McLean
New York Department of State
O: (315) 235-0351 | Laura.McLean@dos.ny.gov

From: Melanie Gearon <MELGE@orsted.com>
Sent: Thursday, June 13, 2019 5:38 PM
To: lisa.engler@state.ma.us; Boeri, Robert (ENV) <robert.boeri@state.ma.us>; annie@rodafisheries.org; andrew.lipsky@noaa.gov; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Lampman, Gregory G (NYSERDA) <Gregory.Lampman@nyserda.ny.gov>; mbachman@nefmc.org; Dave Beutel <dbeutel@crmc.ri.gov>
Cc: McLean, Laura (DOS) <Laura.McLean@dos.ny.gov>; Susan Tuxbury - NOAA Federal <susan.tuxbury@noaa.gov>; Ford, Kathryn (FWE <kathryn.ford@state.ma.us>; McNamee, Jason (DEM <jason.mcnamee@dem.ri.gov>; Livermore, Julia (DEM) <Julia.Livermore@dem.ri.gov>; Gaidasz, Karen M (DEC) <karen.gaidasz@dec.ny.gov>; Sharon Benjamin - NOAA Affiliate <sharon.benjamin@noaa.gov>; Mary Colbert <MACOL@orsted.com>; John O'Keeffe <JOHNO@orsted.com>; Rodney Avila <RODAV@orsted.com>; Aileen Kenney <AILKE@orsted.com>; Caitlin O'Mara <CAIMA@orsted.com>; Julia Prince <JULPR@orsted.com>; Drew Carey <drew@inspireenvironmental.com>; Brian Gervelis <brian@inspireenvironmental.com>; Jill Johnen <jill@inspireenvironmental.com>; Hooker, Brian <brian.hooker@boem.gov>; Stromberg, Jessica <jessica.stromberg@boem.gov>
Subject: SFWF - Fisheries Research and Monitoring Plan

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Good Afternoon All,
Thank you for your continued engagement with Orsted on developing the South Fork Wind Farm Fisheries Research and Monitoring Plan. This plan has been previously reviewed and commented on widely by fishing stakeholders and agencies. Attached is the most recent draft ready for circulation.

The next step in vetting the plan is reviewing with the various state fisheries advisory boards and offshore wind fisheries working groups. I ask that you please distribute this draft to members of your representative group(s) (RI FAB, MA FWG, RODA, ROSA, NYS Fish TWG, NEFMC Habitat Committee) for review.

Please submit comments via email on this draft Fisheries Research and Monitoring plan by July 8, 2019 to:

Melanie Gearon
South Fork Wind Farm
Manager, Permitting and Environmental Affairs
melge@orsted.com

We would also like to present and discuss this plan in person with working groups if possible. I will be reaching out to individuals to see if we can be included on upcoming meeting agendas.

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Orsted

Learn more at orsted.com

Tel. 857-348-3261

melge@orsted.com
orsted.com

From:	Melanie Gearon
To:	Drew Carey; Brian Gervelis; Jill Johnen
Subject:	FW: [EXTERNAL] : SFWF - Fisheries Research and Monitoring Plan
Date:	Tuesday, July 9, 2019 11:47:14 AM
Attachments:	image001.png RIDEM_SFWF_Monitoring_Comments_6-20-19.docx

Comments from RIDEM

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: Livermore, Julia (DEM) <Julia.Livermore@dem.ri.gov>
Sent: Tuesday, July 9, 2019 11:20 AM
To: Melanie Gearon <MELGE@orsted.com>
Subject: RE: [EXTERNAL] : SFWF - Fisheries Research and Monitoring Plan

Hi Melanie,

Apologies for the delay on sending in these comments! Here is our input at the RIDEM DMF.

Best,
Julia

Julia Livermore, Supervising Marine Biologist
RIDEM Division of Marine Fisheries
3 Ft. Wetherill Rd.
Jamestown, RI 02835
Office: 401.423.1937
Fax: 401.423.1925

From: Melanie Gearon [mailto:MELGE@orsted.com]
Sent: Thursday, June 13, 2019 5:38 PM
To: lisa.engler@state.ma.us; Boeri, Robert (ENV) <robert.boeri@state.ma.us>; annie@rodafisheries.org; andrew.lipsky@noaa.gov; Brunbauer, Morgan A (DEC) <morgan.brunbauer@dec.ny.gov>; Gregory.Lampman@nyserda.ny.gov; mbachman@nefmc.org; Dave Beutel <dbeutel@crmc.ri.gov>
Cc: McLean, Laura (DOS <Laura.McLean@dos.ny.gov>; Susan Tuxbury - NOAA Federal <susan.tuxbury@noaa.gov>; Ford, Kathryn (FWE <kathryn.ford@state.ma.us>; McNamee, Jason (DEM) <jason.mcnamee@dem.ri.gov>; Livermore, Julia (DEM) <Julia.Livermore@dem.ri.gov>; Gaidasz, Karen M (DEC <karen.gaidasz@dec.ny.gov>; Sharon Benjamin - NOAA Affiliate <sharon.benjamin@noaa.gov>; Mary Colbert <MACOL@orsted.com>; John O'Keeffe <JOHNO@orsted.com>; Rodney Avila <RODAV@orsted.com>; Aileen Kenney <AILKE@orsted.com>; Caitlin O'Mara <CAIMA@orsted.com>; Julia Prince <JULPR@orsted.com>; Drew Carey

<drew@inspireenvironmental.com>; Brian Gervelis <brian@inspireenvironmental.com>; Jill Johnen <jill@inspireenvironmental.com>; Hooker, Brian <brian.hooker@boem.gov>; Stromberg, Jessica <jessica.stromberg@boem.gov>
Subject: [EXTERNAL] : SFWF - Fisheries Research and Monitoring Plan

Good Afternoon All,
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The next step in vetting the plan is reviewing with the various state fisheries advisory boards and offshore wind fisheries working groups. I ask that you please distribute this draft to members of your representative group(s) (RI FAB, MA FWG, RODA, ROSA, NYS Fish TWG, NEFMC Habitat Committee) for review.

Please submit comments via email on this draft Fisheries Research and Monitoring plan by July 8, 2019 to:

Melanie Gearon
South Fork Wind Farm
Manager, Permitting and Environmental Affairs
melge@orsted.com

We would also like to present and discuss this plan in person with working groups if possible. I will be reaching out to individuals to see if we can be included on upcoming meeting agendas.

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

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RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF MARINE FISHERIES
3 Fort Wetherill Road
Jamestown, RI 02835

June 20, 2019

Melanie Gearon
South Fork Wind Farm
Ørsted Offshore Wind
Manager, Permitting and Environmental Affairs

Re: South Fork Wind Farm: Fisheries Research and Monitoring Plan

Dear Ms. Gearon:

The Rhode Island Department of Environmental Management Division of Marine Fisheries (RIDEM DMF) has received and reviewed the South Fork Wind Farm Fisheries Research and Monitoring Plan and offers the following comments:

- We commend Ørsted for the development of a research and monitoring plan that will allow for approximately two years of baseline sampling prior to the commencement of offshore construction.
- We also support the use of two different sampling methodologies (gillnet and beam trawl) within and around the project area to address both fishery resource concerns and more general resource questions.
- The gillnet survey will serve to sample the species most heavily harvested commercially in the South Fork Wind Farm area.
    - The current net design (12-inch mesh size and use of net tie-downs) and seasonality (during migrations) of sampling clearly target monkfish and skates.
    - There is no issue with designing the survey to specifically assess potential changes in CPUE and length of monkfish and skates, as these are two of the most important fisheries in the area. However, the data collected may not be suitable for "identifying changes in the fish community in the impact area between pre- and post- construction…" Data used to analyze fish community assemblages should come from gears that do not target specific species, as the portion of the fish community effectively sampled using a targeted design may not be representative of the overall fish community. For example, "sampling in July-September has been eliminated to minimize interactions with protected species and elasmobranchs." This means that certain biological community components (e.g., dogfish) may not be fully addressed.
    - We encourage Ørsted to strongly engage with research collaborators on this project (e.g., CFRF, University of Rhode Island, non-profits) to extend the value of the data and samples to be collected. This could take the form of age and growth processing and analysis for use in management, stomach content or

isotope analysis for use in food web modeling, or evaluating the presence of certain parasites.

- It is not clear how the area of influence was determined? Is the distance required from the area of primary effect specific to certain sources of disruption (physical disturbance, suspended sediments, noise/vibration) or all sources?
    - Additionally, Reference Area East falls in the middle of the overall lease area. Is this portion of the lease slated for future development? It will not be an effective reference site for post-construction monitoring if development occurs nearby in the future.
- Additional detail regarding potential statistical tests to be performed on the data would also be of interest for both surveys.
    - We understand that the dearth of existing gillnet survey data may preclude conducting a power analysis to determine what level of change in abundance may be detectible, hence the use of an adaptive approach to analysis. Notwithstanding, will the data solely be used to identify simple trends or are there plans to develop more informative models (e.g., GLMs incorporating environmental and survey design covariates)?
    - A similar question arose regarding the "quantification of any substantial changes in species presence, absence, or abundance associated with proposed operations." Beam trawl data may not exist for this particular area, but can be acquired for other areas for use in a power analysis. If a power analysis is not possible, additional discussion on potential methods of analysis and a description of what is meant by "substantial changes" would be helpful.
- Will the relational databases for either survey ever be shared with the public or government agencies? Is there a data release plan, or will these data remain exclusive property of Ørsted?
    - Some of these data may be of value to stock assessment, and more generally fisheries management, by way of supplementing existing sampling. We would support the implementation of standard data delivery dates to fishery management agencies.
    - There are a few ongoing regional offshore wind science efforts (NYSERDA-led consortium, MA CEC and BOEM cooperative agreement, ROSA, etc.) and all have suggested the development of a clearinghouse where not only research findings could be shared publicly, but also the raw data. RIDEM DMF would also support this approach.

The RIDEM DMF appreciates the opportunity to review and provide comment on the draft monitoring plan. We look forward to working with you in the future. Should you have any questions or comments regarding these recommendations, please feel free to contact Julia Livermore (julia.livermore@dem.ri.gov; 401-423-1937).

DRAFT

Commercial Fisheries Center of Rhode Island

P.O. Box 5161, Wakefield, RI 02880
Tel: (401) 874-4568 Web: www.cfcri.org
Email: fredmattera@cfcri.org shayerooney@cfcri.org

CRMC & FAB
c/o Grover Fugate & Lanny Dellinger
Stedman Government Center
Suite 3
4808 Tower Hill Road
Wakefield, RI 02879-1900

October 2, 2019

Dear Grover and Lanny,

Commercial Fisheries Center of RI is submitting comments on the South Fork Wind Farm project to address, turbine layout design, environmental impacts and baseline research survey.

From the beginning of the Fishing Industry and OSW Developers meetings, there has been a consistent consensus from the industry of 1 nautical mile spacing in all directions between the turbines. The SFW proposes 1nm spacing in a N & S pattern, with only .6 to .7 nm in an E & W pattern, posing navigation, fishing and transiting concerns that will lead to unsafe measures. Commercial fishing is by far the most dangerous industry in the Nation and with proposed limited spacing of less than 1nm in the course of limited visibility, high winds and heavy sea conditions vessel navigation is in peril. USCG will present their final determination on appropriate turbine spacing in order to conduct safe and effective search and rescue missions. To reflect back, originally, there was a sea floor topographical chart identifying the hard-glacial terrain that engineers utilized to map the placement of the 15 turbines using .7 nm spacing. We were able to place the turbines with 1nm spacing using the identical chart avoiding the rocky terrain acknowledging it was doable.

We have grave concerns pertaining to the limited gear types proposed to use for the Baseline Survey. Gillnetting is effective for harvesting Monkfish and Skates and at times more so than a trawl. However, this gear type is not effective to sample species assemblage, very selective.

Proudly Representing:
Ocean State Fishermen's Association, RI Commercial Fisherman's Association, RI Lobstermen 's Association, RI Shellfishermen 's Association, Eastern New England Scallop Association, RI Monkfishermen 's Association, Point Judith Fishermen Memorial Foundation, Commercial Fisheries Research Foundation, RI Party & Charter Boat Association, Pt. Judith Scholarship Foundation

Due to the historical presence of Codfish on Cox's Ledge, we would suggest that half of the 6 – 300ft panels (strings) use 12" and 6" mesh for Codfish retention.

Especially since research conducted in the North Sea has determined that Codfish and similar species have been driven from the grounds due to noise acoustics. This research will provide a more accurate stock assessment during and post construction of Codfish, Monkfish and Skates.

The use of a 10' wide beam trawl will provide extremely limited demersal species composition due to the narrow width and low height (3'-6'). The swept area in coverage with this Beam Trawl is approximately 15% of a conventional trawl net, which is the traditionally ideal gear type for a baseline survey. The Beam Trawl survey would need 6-7 times more replicates to compare and calibrate using the NEAMAP survey. There will be negligible representation of scup, whiting, ling, cod, butterfish, squid, etc. attributable to the low headrope height. Again, we question the viability of determining accurate species assemblage for stock assessment with only a 10' wide Beam Trawl and Gillnet.

We encourage the use of additional gear types to conduct an accurate baseline survey. Cox's Ledge has been the principal spawning and migratory grounds in Southern New England for decades and is declared an essential fish habitat for as many as 36 specie. We have suggested a Trawler that has tows in the experimental and control areas and recommend adding this Trawler to your baseline survey. The continuation of a ventless trap survey should augment the baseline survey. We request that a scoping meeting and workshop be held to determine additional gear types to be applied to the SWF Wind baseline research study.

It is understood and expected that Inspire will forward and initiate an RFP to conduct all of the Baseline Research Surveys to institute a fair, balanced and transparent process. To maintain the vein of transparency, we would advocate for Inspire to establish a science review board (scientist, academia, stakeholders) to approve proposals and peer review of the research.

Thank you for the opportunity to comment on the South Fork Wind Farm Project.

Respectfully,

Frederick J Mattera

Frederick J. Mattera

Brian Gervelis

From: Melanie Gearon <MELGE@orsted.com>
Sent: Friday, June 28, 2019 12:37 PM
To: Brian Gervelis
Cc: Drew Carey
Subject: FW: SFWF - Fisheries Research and Monitoring Plan
Attachments: Comments on SFWF draft proposal (Stokesbury).pdf

Comments from Stokesbury, please add to the tracker

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: Kevin D.e. Stokesbury <kstokesbury@umassd.edu>
Sent: Friday, June 28, 2019 12:18 PM
To: Melanie Gearon <MELGE@orsted.com>
Cc: Murray, Eva (ENV) <eva.murray@state.ma.us>
Subject: RE: SFWF - Fisheries Research and Monitoring Plan

Hi Melanie, thank you for asking the members of the Fisheries Working Group on Offshore Renewable Energy to comment on the South Fork Wind Farm Fisheries Research and Monitoring Plan draft. Here are my comments. I have also been working with Beth Casoni on a possible proposal for a ventless trap survey, a draft of which she sent you earlier today. I hope you find these comments of use as you create your proposal.

Regards, Kevin

Comments on “South fork Wind Farm: Fisheries Research and Monitoring Plan – Draft” June 2019, for the Fisheries Working Group on Offshore Renewable Energy. (K. Stokesbury).

Thank you for asking me to comment on this draft proposal. The SFWF is situated on Cox’s Ledge, an area with hard-bottom including boulders, which presents a challenge for some types of sampling gear. The proposal suggests using a gillnet and beam trawl survey to monitor the demersal species assemblage in the area.

I have several comments and concerns for you to consider:

1. These two types of gear are not standardized with ongoing survey programs along the continental shelf, such as the NEMAP survey, SMAST drop camera survey, Habcam survey, and lobster ventless trap surveys conducted by the New England state agencies. In a previous meeting with Orsted representatives, they explicitly expressed their concern that any sampling be standardized and comparable to other larger data sets. It is unclear why this shift in sampling is being suggested. It does not make use of the larger monitoring efforts underway.
2. These types of gear will not estimate the microbenthic invertebrate community and only a very limited portion of the benthic fish species.
3. Selectivity will have to be determined for both types of gear, in both cases selectivity will be very low except for a few target species.
4. Gill nets are a very selective gear, in monitoring and scientific assessments usually a series are used with multiple mesh sizes. It seems only one mesh size of 12” will be used (page 6). Have trammel nets been considered? This increase the size range and body type of fish collected. No information on the length of the nets is presented.
5. The survey BACI design is “asymmetrical”, the reasoning for choosing this design is unclear. The design proposed is 1 impact area and 2 control areas (both control areas are in locations that could be later developed). So, you will be examining the difference between the 2 control areas, and/or comparing each control area to the impact area or averaging the two control areas and comparing it to the impact size? Either way you are adding a spatial component to the controls that is not there for the impact. What if the fish assemblage changes in one control but not the other? The statement, “The area is assumed to be the observational unit and the two gillnet lines per area are subsamples which will be combined to estimate the area-wide abundance (or CPUE) during each sampling event” is unclear (page 6 footnote). What exactly is the hypothesis? That after the impact the species abundance and composition will differ from each control area? Both control areas? The variation between the two control areas will differ? The statistical design to test the hypothesis is not presented. No statistical signified level is presented, what does “Confidence intervals for the size of the apparent effects of the SFWF will be the focus of the analyses, rather than simply Yes or No statements about the statistical significance of any observable effect” mean (page 9)? This sounds like an attempt to determine the level of “meaningful results” after the study has already been conducted; basically, deciding if the data mean anything once you’ve already seen the data. BACI impact studies usually follow a $p = 0.05$ significant level which means that you have a 1 in 20 (or less) chance encountering the observed difference randomly.
6. (page 5) It is not clear how many samples will be collected in each area (for both the gill nets and the beam trawls). In the text it states that “Each survey area will contain three predetermined gillnet survey lines. Two gillnet lines per area will be randomly selected for each

survey, resulting in six gillnet strings conducted per survey" (pages 5 and 10). Does this mean that on any observation you will only have 2 samples per area? Has there been a power analysis to ensure this is enough sampling to detect a change in species abundance or composition at the desired level (the desired level of measurable change is also not mentioned)? The document refers to previous studies with the beam trawl, so for at least that gear these could be easily estimated. Usually a monitoring design seeks to measure a 25% difference in the abundance of the target species. I suspect 2 samples per observation will be insufficient to do that. This leads back to my previous comment, rather than an asymmetrical design why not increase the number of samples collected within the impact and one control area so that a statistically rigorous comparison can be completed?

From:	Melanie Gearon
To:	Drew Carey; Brian Gervelis; Jill Johnen
Cc:	Aileen Kenney; John O"Keeffe
Subject:	FW: Response to SFWF Research and Monitoring Plan
Date:	Monday, July 8, 2019 2:09:41 PM
Attachments:	CFF Response to SFWF RMP - FINAL 07.08.2019.docx

FYI – From Coonamessett Farm, please add to the comment tracking sheet, and please make sure we are prepared to respond at either a follow up call or MA FWG meeting (which we are trying to schedule)

Best regards,
Melanie Gearon
Manager, Permitting & Environmental Affairs
Wind Power

Ørsted
Tel. 857-348-3261

From: Mary Newton-Lima <mary@cfarm.org>
Sent: Monday, July 8, 2019 1:52 PM
To: Eva.Murray@mass.gov; Melanie Gearon <MELGE@orsted.com>
Cc: ERIC HANSEN <ehansen4b@comcast.net>; kstokesbury@umassd.edu; nbsc@comcast.net; Peter Anthony <Peter@easternfisheries.com>; rodavila@comcast.net; warrendoty@verizon.net; Eddie Welch <welch.edward@comcast.net>; welchstephen@comcast.net; PATRIOTTOO@aol.com; jarrett@drakelobster.com; Ronald Smolowitz <cfarm@capecod.net>; beth.casoni@lobstermen.com; cpfcharters@yahoo.com; john@capecodfishermen.org; shelley.edmundson@gmail.com; seth@capecodfishermen.org; john@seakeeper.net; j st thomas <padapac@yahoo.com>; cbrayton@atlanticcapes.com; Edward Anthes-Washburn <Edward.Anthes-Washburn@newbedford-ma.gov>; silverdollarseafood@gmail.com; BasicPatrick@aol.com; dorchard@fishingpartnership.org; annie@rodafisheries.org; fredmattera@cfcri.org; kalmeida@towndock.com; Edward.G.LeBlanc@uscg.mil; susan.tuxbury@noaa.gov; andrew.lipsky@noaa.gov; Christopher.Boelke@noaa.gov; Daniel (EEA) <daniel.sieger@mass.gov>; BCarlisle@masscec.com; David (FWE) <david.pierce@mass.gov>; Lisa Berry (EEA) <lisa.engler@mass.gov>; Kathryn (FWE) <kathryn.ford@mass.gov>; NBolgen@masscec.com; Hooker, Brian <brian.hooker@boem.gov>; jessica.stromberg@boem.gov; Mike (FWE) <mike.pol@mass.gov>; Catherine (FWE) <Catherine.OKeefe@mass.gov>; estephens@vineyardwind.com; Rachel Pachter <rpachter@vineyardwind.com>; Lauren Burm <LAUBU@orsted.com>; Michael Evans <MICEV@orsted.com>; Laura Morse <LAURM@orsted.com>; James Neveu <JANEV@orsted.com>; Aileen Kenney, external user <akenney@dwwind.com>; mmorrissey@dwwind.com; jokeeffe@dwwind.com; ravila@dwwind.com; cbank@vineyardwind.com; Enrique.Alvarez-Uria@edpr.com; j.hartnett@shell.com; LMORA@equinor.com; Ruth.Perry@shell.com; William.Straus@mahouse.gov; Cynthia.Trabucco@mahouse.gov; fpullaro@renew-ne.org; fcourt@usowc.org; Sam Martin <smartin@atlanticcapes.com>; Cshriver@atlantic.com; Prassede (EEA) <prassede.vella@mass.gov>; Seth.Kaplan@edpr.com; emarc@equinor.com; emarchetti@searisksolutions.com; greenfluke@optonline.net
Subject: Response to SFWF Research and Monitoring Plan

Hello Melanie and Eva,

Attached please find CFF's responses to the South Fork Wind Farm Fisheries Research and Monitoring Plan.

Our two primary concerns, mentioned in the letter, are; 1) this plan is woefully inadequate to meet the stated goals of capturing pre- and post-construction demersal assemblages and documenting seasonal and construction impacts to these assemblages; and 2) why these comments are only requested to be sent to the company that is building the wind farm. Shouldn't the federal and state agencies and stakeholders be informed of these comments? What is the process by which this plan will be approved, and how will these comments be reviewed/incorporated into the final plan?

Please contact CFF if you have any questions.

Sincerely,

Mary Newton Lima

--

Mary Newton Lima
Research Coordinator
Coonamessett Farm Foundation
508-356-3601

Coonamessett Farm Foundation
Conducting scientific research projects that support sustainable fisheries, aquaculture, and agriculture
277 Hatchville Road • East Falmouth, MA 02536
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July 8, 2019

Melanie Gearon
Manager of Permitting and Environmental Affairs
Ørsted Deepwater Wind
melge@orsted.com

Dear Ms. Gearon,

Thank you for the opportunity to review and provide responses to the *South Fork Wind Farm Fisheries Research and Monitoring Plan* (RMP). Please find Coonamessett Farm Foundation's (CFF) comments below. Overall, this research plan, if it is the entire plan, is inadequate to meet the objectives of evaluating the demersal species, taxonomic assemblages, and seasonal variability in and around the proposed South Fork Wind Farm. We have made recommendations throughout this response that will assist in revising this RMP.

SURVEY SUMMARY

Ørsted is proposing to use beam trawls and large-mesh gillnets to evaluate the habitat and communities of demersal fish and invertebrates within and near the proposed South Fork Wind Farm (SFWF) in Lease Area OCS-A 486 of the RI/MA Wind Energy Area (WEA). One survey area (Survey Area) within the proposed maximum Work Area and two control areas, Reference Areas East (RAE) and Reference Area West (RAW), have been designated for surveying (**Figure 1)**. Each of these three areas will have three pre-determined gillnet survey lines and three beam trawl paths. Two of these gillnet lines and two beam trawl paths will be surveyed in each of the Survey Area, RAE, and RAW for a total of six gillnet lines and six beam trawl paths being surveyed at each deployment (**Figure 2)**. Beam trawl surveys will occur monthly and gillnetting will occur between Apr-Jun and Oct-Dec. Each gillnet string will consist of six net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs with a soak time of 48 hours. Each beam trawl survey will be performed using a 5.5-m beam trawl and a 1-in knotless cod end liner, which is equivalent to the NEAMAP cod end, and tows will be 20 minutes long at a speed of 2.0 knots.

Coonamessett Farm Foundation

Conducting scientific research projects that support sustainable fisheries, aquaculture, and agriculture

277 Hatchville Road • East Falmouth, MA 02536
Tel: (508) 356-3601 • Fax: (508) 356-3603
Website: www.coonamessettfarmfoundation.org

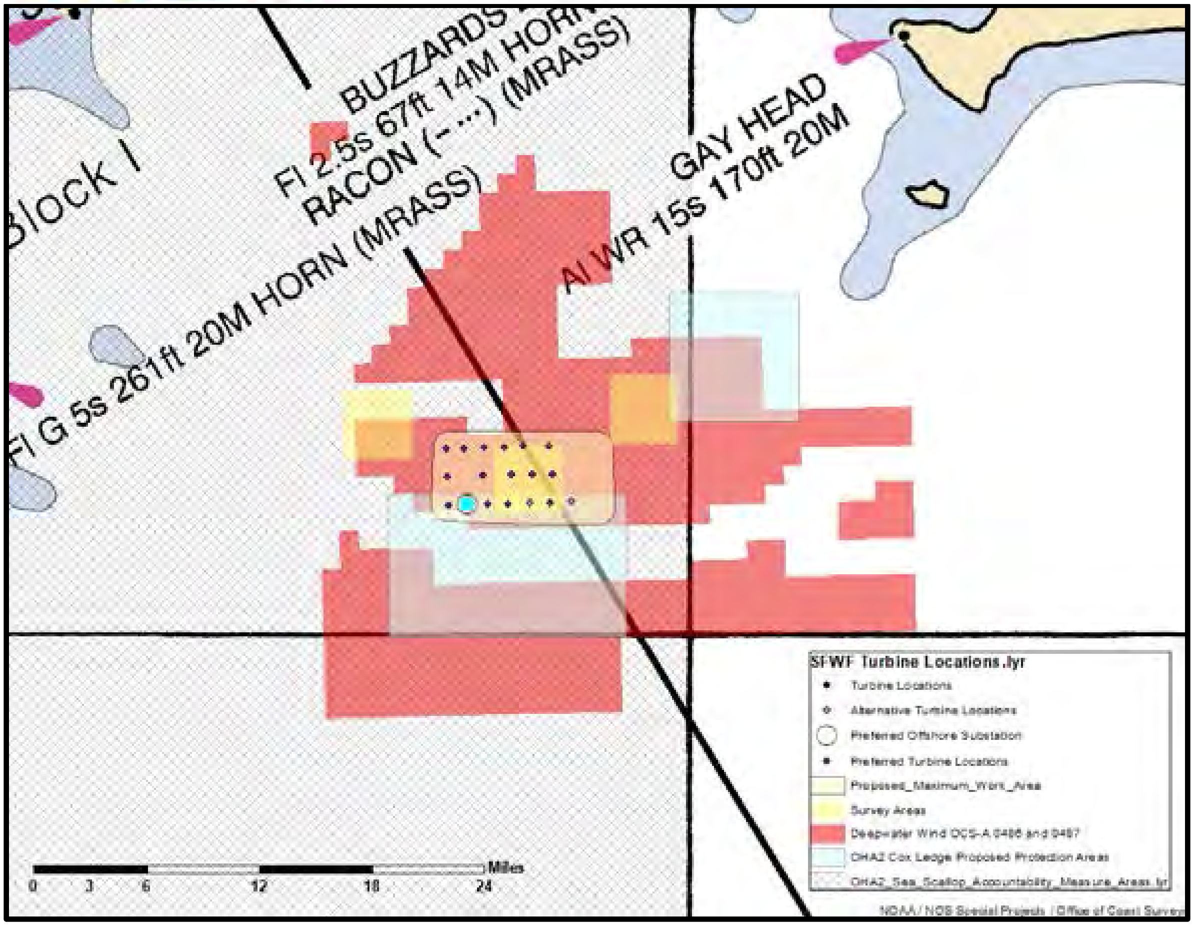

Figure 1: Proposed South Fork Wind Farm showing survey areas, proposed turbines, and survey locations. Black lines are approximate gillnet lines; green lines are approximate beam trawl paths.

REVIEW OF RESEARCH PLAN

The stated objectives of this research plan, listed on page 4 of the RMP, are to evaluate:

1) Demersal species that utilize the area in and around the SFWF.

2) The seasonal timing of the occurrence of these species.

3) Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods. For example, do some species have reduced abundance and/or do new species appear?

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CFF has serious concerns about the design on this study and doubts its ability to fulfill the stated objectives. This letter outlines our concerns by objective.

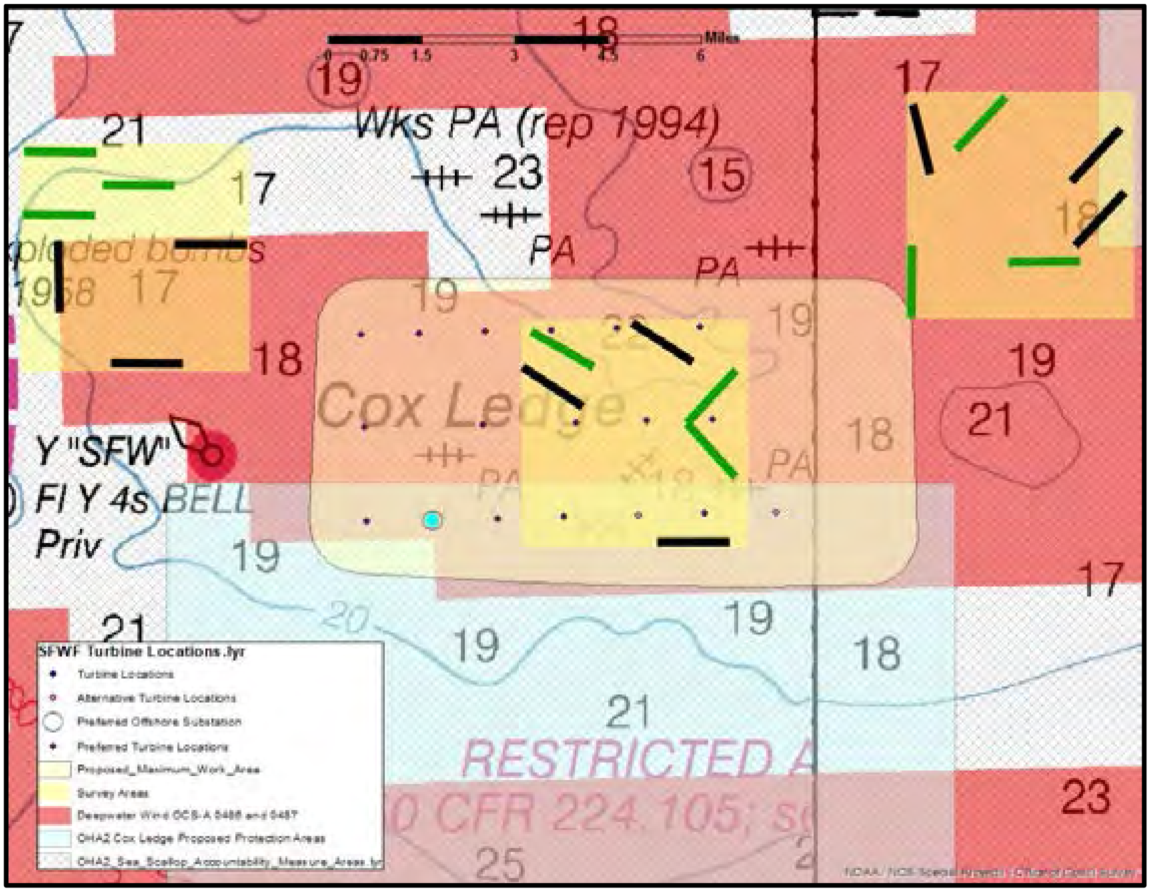

Figure 2: Closeup of Figure 1. Black lines are approximate gillnet lines; green lines are approximate beam trawl paths.

Objective 1: evaluate demersal species that utilize the area in and around the SFWF.

CFF questions the design of the gillnet survey and the focus on the monkfish and skate fishery if the intention of the RMP is to evaluate all demersal species. While monkfish and skate are both common species on Cox Ledge, other potentially important species are also present that are unlikely to be captured in this survey. Focusing on two fisheries is incompatible with the idea of a general habitat survey. It is imperative that the gillnet and trawl surveys are more comprehensive and less selective to provide a broader range of data. For example, CFF's seasonal survey of Georges' Bank is primarily to evaluate the health of the scallop habitat, but data is collected about every species captured because other species such as yellowtail and windowpane flounder are key bycatch species to the industry.

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The choice of a 12-inch mesh size is more than the minimum 10-inch mesh size for the monkfish fishery, and will likely result in no catch of other commercially important species (except dogfish, a primary bycatch of monkfish). Because the objective is to catch all species that utilize the area, a smaller mesh size must be implemented. CFF recommends using the regulatory minimum mesh size of 6.5-inches used by the groundfish fleet. This will allow capture of demersal species for which Cox Ledge is designated as Essential Fish Habitat (EFH), including highly valuable New England fish species such as Atlantic cod, Atlantic herring, haddock, monkfish, ocean pout, pollock, red hake, windowpane flounder, winter flounder, witch flounder, and yellowtail flounder (Appendix O of the SFWF COP).

Section 2.1.3, part of the gillnet survey section of the RMP, states it is "important to gather site-specific information on Atlantic cod spawning". However, using a 12-inch mesh will substantially limit the number of cod caught and at the very least will not generate a representative picture of demersal species on Cox Ledge, which is the stated objective of the RMP. A study plan to look at mature cod for spawning condition is pointless if the survey design won't catch adult cod. The change to a smaller mesh size may require an Exempted Fishing Permit (EFP) instead of a Letter of Acknowledgement, but without using a smaller mesh size, the gillnet portion of this survey will not meet this objective.

The RMP also outlines the beam trawl survey to establish baseline community composition with a focus on demersal fish and macroinvertebrate species. CFF questions using only three predetermined trawl survey lines within the Survey Area, RAE and RAW for the duration of the pre- and post-construction period. Beam trawl surveys are destructive, and parts of the southernmost section of the Survey Area and northeast corner of RAE are within areas of highly sensitive bottom habitat considered for protection under the recently passed Omnibus Habitat Amendment 2 (OHA2). In addition, survey data collected by CFF indicates the bottom in this area changes seasonally from silt to boulders (CFF 2017). Because these paths are to be sampled monthly, other locations within the Survey Area, RAE and RAW should be selected and sampled from to allow the bottom to recover between surveys and to collect a reasonable assemblage of undisturbed bottom habitat.

Objective 2: The seasonal timing of the occurrence of these species.

CFF applauds the plan to sample monthly using the beam trawl, but questions restricting the gillnet sampling to April, May and June, and then October, November, and December. This design leaves half of the year unsurveyed and will thus miss important seasonal changes in finfish species assemblages. Cox Ledge is traditionally a productive midsummer fishing ground and potential spawning ground for cod and other groundfish. The RMP is correct in that sampling may be more difficult in the summer months, but every effort should be made to collect data using the gillnet survey in the summer and winter months.

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Objective 3: Whether the taxonomic compositions of demersal fish assemblages change between the baseline and post-construction time periods. For example, do some species have reduced abundance and/or do new species appear?

We question the ability of using beam trawls during and after construction. Fishers at several meetings of the Fisheries Working Group have stated that they would not be able to dredge within wind farms, and therefore this portion of the survey may be prematurely shut down, leaving only the gillnet survey in the project area. As we have stated above, the gillnet survey will not give a representative picture of the community(ies) on Cox Ledge and within the MA/RI WEA unless the mesh size is drastically reduced. In addition, no indication is given when these surveys will begin and end in relation to construction. Surveys should begin at least one year prior to construction and continue for at least five years to fully understand the changes brought about by the wind farm.

General Concerns

As stated earlier this research plan is significantly inadequate to meet the stated objectives of evaluating the demersal species, taxonomic assemblages, and seasonal variability in and around the proposed South Fork Wind Farm. Ørsted/Deepwater Wind should substantially increase the number and types of year-round surveys to be performed. Incorporating the suggestions made by CFF is a start, but hopefully further additions will be highlighted by other members of the Fisheries Working Group as well as state and federal authorities.

As shown in Figure 1, the Survey Area, RAW and RAE are all in the Sea Scallop Accountability Measure Area designated by the OHA2, however this is not mentioned in the RMP. CFF requests that all requirements under this area be followed and incorporate in the RMP.

The RMP states the “scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries…to…conduct scientific sampling that is **not subject to** the ACFCMA, Mag-Stevenson, and 50 CFR parts 648 and 697.” As outlined in our comments to Objective 1, Deepwater Wind may need to apply for an EFP to reduce mesh size and to “monitor a large portion of the species assemblage present in and around the SFWF over a varying temporal scale” (p. 3 of the RMP). Overall, CFF supports a before and after habitat assessment of the region; however expects that these assessment actually cover the needs of the environment and local stakeholders. Through our years of fisheries research in the region, we feel confident that our suggested changes to your plan will both improve the survey design and capture the appropriate data to fulfill your objectives.

Finally, CFF questions why these comments were only to be sent to Ørsted/Deepwater Wind. In the spirit of open discussion CFF has sent our comments to Ørsted/Deepwater Wind as well a their partners in the Fisheries Working Group in the hopes that a more inclusive and open discussion can be started.

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Thank you for the opportunity to comment on the Deepwater Wind RMP. Please contact Mary Newton Lima if you have any questions or need any clarification of this document.

Sincerely,

Frank Almeida, President

Coonamessett Farm Foundation

EXHIBIT 4

Date	Organizations/Individuals Contacted[4]	Location/Form of Contact and Response	Purpose of Contact
9/30/19	RI CRMC FAB	URI Coastal Institute, Narragansett, RI; subsequent communications with RI CRMC FAB included in Exhibit 4 to Appendix A	Marine Affairs and FMP updates

[4] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

DESAUTEL LAW

Marisa A. Desautel
marisa@desautelesq.com
401.477.0023

October 23, 2019

VIA FIRST CLASS MAIL, POSTAGE PREPAID
AND ELECTRONIC MAIL

Melanie Gearon
South Fork Wind Farm
56 Exchange Terrace
Providence, RI 02903

Re: ***South Fork Wind Farm Updated Fisheries Research and Monitoring Plan September 2019 ("Plan")***

Ms. Gearon:

This office represents the Fishermen's Advisory Board ("FAB") with respect to the above-referenced matter. My client received correspondence from CRMC staff indicating that the project applicant was "willing to extend the time for the FAB's response on the [Plan] beyond October 23 by the number of days between September 30 and the date on which it responds substantively to the power analyses question including whether it will be done on the gill net -- with one caveat: Orsted would like input from the FAB on controls sites by October 23."

This letter serves as the FAB's formal response to the project applicant's request above, regarding control sites. The FAB also previously forwarded comments on the above issue, on October 18th. The comments were sent via email to CRMC staff, a copy of which is appended hereto.

To date, the project applicant has not produced a power analysis for the Plan, despite the FAB's continued request. The project applicant has, likewise, failed to submit or otherwise respond to the information requested in the attached October 18th letter from the FAB. The absence of the power analysis in this case precludes the FAB from providing "input" on control sites. To the extent that the FAB is required to provide input, the FAB's recommendation is to object to the Plan and deny any approval of its contents. This recommendation is based on insufficient information.

Thank you for your attention to this correspondence.

Sincerely,

Marisa Desautel
cc: R. Main, Esq., Client, D. Beutel, G. Fugate

Grover

As you know, the FAB requested a copy of the power analysis conducted for the South Fork monitoring plan. Since the date of that request, the FAB has not received this analysis. Instead, the applicant is countering with a request for selection of "control sites." Please be advised that control sites cannot be selected and the FAB cannot provide input on control sites, based on the current factual situation.

Again, in the absence of a power analysis, our review of the management plan and/or control site input is not possible.

Cox's Ledge is an incredibly unique area that requires an adequate assessment. To date, the FAB has not seen any such assessment. Careful selection of reference sites is essential to being able to detect potential impacts. If the reference sites are of different habitat types or are within an area where they may be affected by construction activities or operation, they are not true reference areas. The selected locations must be suitable for the type of surveying to be done (beam trawling, gillnetting).

The goal of power analysis for the monitoring plan is to ensure that impacts of a certain size (e.g., 5% or 10%) on fish populations/biomass are detected with high probability (usually 80% or 90% -- though this gets more complicated when testing multiple populations). This requires information about how much variability can be expected in the sampling for each species to be evaluated (the COP indicates Cox's Ledge is Essential Fish Habitat for 37 species), both at the target site and at the control site(s). This variability is a function of seasonal biological/migration patterns, the sampling methods themselves, and selection of the control site(s). It's entirely possible that no single control site exists for each sampling method (especially beam trawl and gillnet) to adequately measure all of the key species, and that multiple control sites would be needed. However, the FAB cannot make determinations as the power analysis glaringly absent from the application materials and has not been provided to the FAB, despite its several requests.

Further, the FAB is not clear how the area of influence was determined.

The FAB requests a clear list of primary species of concern and the size/scale/cohort of population changes designed to be detected (e.g. a 10% drop in juvenile Atlantic Cod) as the basis for a series of hypothesis testing approaches.

It is not reasonable to require the FAB to agree on control sites when other choices (list of species, mesh size/sampling method, sampling frequency/timing) potentially affecting the power analysis remain unresolved.

The FAB suggests that, in order to provide informed feedback, the FAB be provided with the resources to conduct their own power analysis, or to have such analysis done by expert staff at a state agency.

We are not waiving our opportunity to later comment further on these issues, either. This email serves to supplement the record for this matter.

Chairman FAB

Lanny Dellinger

South Fork Wind Farm

December 12, 2019

Via First Class Mail and
Electronic Mail
marisa@desautelesq.com
Marisa A. Desautel, Esq.
Desautel Law
38 Bellevue Ave., Unit H
Newport, RI 02840

Re: South Fork Wind Farm ("SFWF") Fisheries Monitoring Plan

Dear Fishermen's Advisory Board and Attorney Desautel:

Orsted thanks the Fishermen's Advisory Board ("FAB") for their comments on the updated gillnet/beam trawl plan dated September 20, 2019 (the "Plan"). The Plan has been the subject of numerous reviews, meetings, and comments since November 2018. For example, Orsted has received comments from the FAB, individual fishermen, the Coastal Resources Management Council ("CRMC"), representatives of the Rhode Island Department of Environmental Management Division of Marine Fisheries ("RIDEM DMF"), and the Massachusetts Division of Marine Fisheries ("MA DMF"), among others.

At the September 30, 2019 FAB meeting, Orsted asked the FAB to provide it with proposed control sites by October 23, 2019. In letters on behalf of the FAB dated October 18 and 23, 2019, the FAB instead asked for power analyses for the gillnet and beam trawl plan before it provided input on the proposed control sites. Orsted considered the FAB's request and has spent a considerable amount of time and resources on the power analyses issue and in reviewing again the control site areas with various stakeholders.

This letter will describe Orsted's work on the power analyses and identification of control sites. The work on the power analyses for the beam trawl and gillnet surveys is labor intensive. Orsted commits to doing such work even though part of it, particularly for the gillnet survey, will extend into 2020 and early 2021. For the gill net survey, Orsted needs to sample in 2020 and then perform the power analysis on that data toward the end of 2020 and potentially into early 2021. The power analyses will be the statistical tools to determine the level of sampling needed to detect meaningful impacts with a degree of confidence. While this tool will be used to determine the level of sampling within each identified control site, it does not impact the selection of areas suitable for control sites now. Selection of these sites will consider comparable habitat, depth, and suitability for the use of sampling gear in the region outside of the influence of any potential wind energy work area. For this reason, identification of control sites is independent of the power analyses, so control site determinations will be finalized in the near future as discussed below.

<u>Power Analyses</u>

As for the power analysis for the beam trawl survey, Orsted immediately began requesting data for such power analysis when it received the FAB's request. Those data are held by others, and it took some time to obtain the data. We are pleased to now have the data and have completed a detailed power analysis for the beam trawl survey. We have attached that power analysis in Exhibit A for your information. The data were used to formulate a relevant list of species from which a total abundance was calculated, and to establish the proximate range of a meaningful effect size in measuring change over time. The study designs had a range of statistical power, with the optimal design having a minimum 80% statistical power or, in other words, at least an 80% probability of detecting an effect that is present.

Conducting a power analysis for the gillnet survey is not currently feasible because no comparable gillnet datasets exist that can be used in the analysis. For this reason, Orsted will conduct an elevated level of sampling in the first year of the survey to collect data that can be used to inform a power analysis to determine the level of sampling for subsequent years. Orsted will conduct sampling twice per month during the survey season (Apr.-June; Oct.-Dec.) and set up to five gillnet strings in each sampling area per sampling trip. Gear parameters will remain the same as previously presented, but the increased frequency of sampling and the increased amount of gear set will allow for more data collection over the level previously proposed. A portion of the data collected will serve as pre-construction survey data allowing for survey timelines to remain unchanged. Sampling levels will then be adjusted in subsequent years based on the results of the power analysis conducted after the first year of the survey has concluded. This approach has been presented to staff at RI DEM and MA DMF and has been deemed reasonable given the lack of comparable data for a power analysis. The power analysis for the gillnet survey will be shared with interested parties, including the FAB, when it is available.

<u>Control Site Determination</u>

The SFWF Plan will use an asymmetrical Before-After-Control-Impact (BACI) design to assess shifts in fish presence, absence, or abundance that correlate with proposed operations at the SFWF. This design uses one impact area located within the SFWF and two control areas outside the area. The control areas selected must be comparable in habitat and depth, utilized by similar fish populations, and "fishable" by the survey gear. In initial versions of the Plan, the two reference areas were located outside the SFWF, but were still located within the RI Wind Energy Area ("RI WEA") (Figure 1).

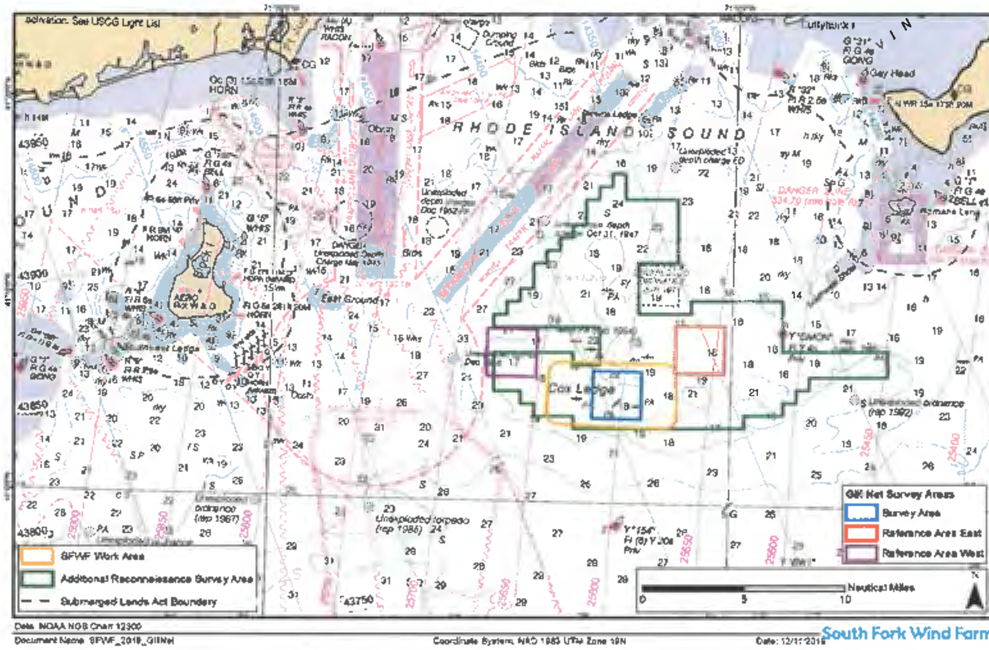

Figure 1. Original locations of control areas for SFWF research and monitoring plan.

As stated above, the Plan has been circulated for many months and has been the subject at numerous meetings including before the FAB. Multiple comments were received highlighting the need to move the control sites outside of the RI WEA to avoid impacts from future development. During the September 30, 2019 FAB meeting, Orsted requested feedback from the FAB to identify the two control areas to appropriate sites outside the RI WEA to ensure that the sites act as true reference locations. On October 18, 2019, the FAB indicated in a letter to Orsted that it could not provide input on control sites until a power analysis was provided. A power analysis is independent of control site selection. For this reason, Orsted has continued to move forward on site selection and has taken great effort to identify proposed sites outside any potential work areas. Multiple inputs were used to decide on potential locations for these sites. These included:

- Bathymetry data available through the Northwest Atlantic Marine Ecoregional Assessment
- Bathymetry data available through NOAA's online Bathymetric Data Viewer
- Gillnet activity data (VTR) for 2011-2015 available through the Northeast Ocean Data Portal
- Monkfish vessel activity data (VMS) for 2015-2016 available through the Northeast Ocean Data Portal
- Anna Mercer's beam trawl location data collected as part of her dissertation work
- Personal communications with commercial fishermen
- Consultation with staff at RI DEM and MA DMF

The areas selected (Figure 2) are of similar depth and habitat based on the available data and are equidistant (~24km) from the work area. The proposed sites appear adequate for both survey gears (gillnet and beam trawl), but additional feedback from members of the FAB would aid in assessing if these sites are appropriate for both gear types.

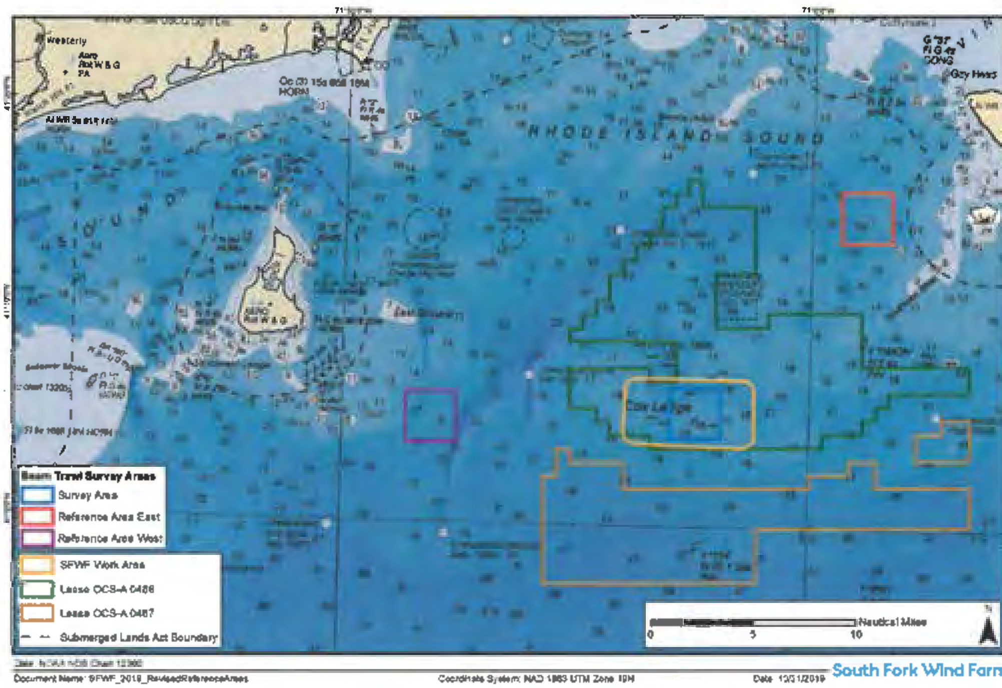

Figure 2. Proposed relocated control areas for SFWF research and monitoring plan.

Conclusion

Based on comments from the FAB and others, Orsted had a power analysis developed for the beam trawl survey as quickly as it was able to once it obtained the relevant data from a third party. Orsted also has developed a plan for an elevated level of sampling in the first year of the survey to collect data that can be used to inform a power analysis for a gillnet survey. In addition, Orsted has re-evaluated its control site areas, met with numerous stakeholders about these sites, and now presents them to the FAB for its comment. Orsted respectfully requests the FAB provide any comments on the control site areas by January 8, 2020. Thank you for your time and attention to this matter.

If you have any questions concerning the enclosed information, please do not hesitate to contact me.

Yours sincerely,

Melanie Gearon

Melanie Gearon
Manager, Permitting and Environmental Affairs
Ørsted: U.S. Wind Power
MELGE@orsted.com
Tel. +1 857 348 3261

cc: (via electronic email) Grover Fugate, James Boyd and David Beutel (CRMC)

EXHIBIT 5

Date	Organizations/Individuals Contacted[5]	Location/Form of Contact and Response	Purpose of Contact
5/11/20	BOEM, CT DEEP, MA DMF, NEFMC, NOAA/GARFO, NOAA/NMFS, NYS DEC, NYS DOS, NYSERDA, RI CRMC, RI DEM, RODA, ROSA, USACE	Emails from SFW and recipient responses are attached to Exhibit 5 to Appendix A	Distribution of Final Fisheries Management Plan

[5] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

Brian Gervelis

From:	Melanie Gearon <MELGE@orsted.com>
Sent:	Monday, May 11, 2020 6:26 PM
To:	'Engler, Lisa (ENV)'; 'Boeri, Robert (ENV)'; Callaghan, Todd (EEA); Ford, Kathryn (FWE; Pol, Mike (FWE); annie@rodafisheries.org; lyndie@rosascience.org; andrew.lipsky@noaa.gov; 'Susan Tuxbury - NOAA Federal'; 'Sharon Benjamin - NOAA Affiliate'; 'Julie Crocker - NOAA Federal'; ursula.howson@boem.gov; 'Ryan Silva'; douglas.christel@noaa.gov; Nick Sisson - NOAA Affiliate; Christopher.Boelke@noaa.gov; wendy.gabriel@noaa.gov; Gregory.Lampman@nyserda.ny.gov; mbachman@nefmc.org; 'David Beutel'; 'Grover Fugate'; 'James Boyd'; Jeff Willis; 'McLean, Laura (DOS)'; 'Maraglio, Matthew (DOS)'; Gaidasz, Karen M (DEC); Maniscalco, John D (DEC); Davis, Andrew (DPS); McNamee, Jason (DEM; 'Julia Livermore'; 'Brian Hooker'; 'Boatman, Mary'; Stromberg, Jessica; Peter.Aarrestad@ct.gov; 'Handell, Naomi J CIV USARMY CENAN (US)'
Cc:	Stephanie Wilson; Liz Gowell; Sophie Hartfield Lewis; John O'Keeffe; Rodney Avila; Ross Pearsall; Robert Soden; Robert Mastria; Main, Robin L.; Brian Gervelis; Drew Carey; Gregory DeCelles; Jennifer Garvey; Julia Prince; Berg, James; Mark Gardella, external user
Subject:	SFW - 2020 Fisheries Monitoring Plan
Attachments:	SFW01_Fisheries_Research_Monitoring_Plan_2020-05-11.pdf

Good Afternoon,

South Fork Wind is pleased to send you its Fisheries Research and Monitoring Plan, which will be implemented in 2020. As a result of the helpful and productive comments that South Fork Wind has received from agencies and stakeholders, this plan now includes: gillnet survey, beam trawl survey, ventless trap lobster survey, ventless fish pot survey, acoustic telemetry, and benthic survey.

On Friday May 22, 2020 from 10:00am to 12:00pm, the South Fork Wind team will host a webinar to walk you through the plan and describe our next steps. We will send an invite shortly and hope you can join us.

Thanks and stay safe!

Best regards,

Melanie Gearon
Project Manager
Permitting
Offshore

Orsted

Learn more at orsted.com

56, Exchange Terrace, Suite300
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South Fork Wind
Fisheries Research and Monitoring Plan

May 2020

Prepared by:

South Fork Wind
Powered by Ørsted & Eversource

Deepwater Wind South Fork, LLC

and

INSPIRE ENVIRONMENTAL

INSPIRE Environmental
513 Broadway, Suite 314
Newport, Rhode Island 02840

TABLE OF CONTENTS

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LIST OF FIGURES

LIST OF ACRONYMS

ACCOL	Anderson Cabot Center for Ocean Life
ASMFC	Atlantic States Marine Fisheries Commission
BACI	Before-After-Control-Impact
BAG	Before-After-Gradient
BIWF	Block Island Wind Farm
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operation Plan
CPUE	Catch per unit effort
DSLR	Digital single-lens reflex
DWSF	Deepwater Wind South Fork, LLC
EFP	Exempted Fishing Permit
ESA	Endangered Species Act
FGDC	Federal Geographic Data Committee
GPS	Global Positioning System
HMS	Highly migratory species
INSPIRE	INSPIRE Environmental, LLC
LOA	Letter of Acknowledgement
LPIL	Lowest possible identification level
MADMF	Massachusetts Division of Marine Fisheries
MARACOOS	Mid-Atlantic Regional Association Coastal Ocean Observing System
MMPA	Marine Mammal Protection Act
NERACOOS	Northeastern Regional Association of Coastal Ocean Observing Systems
NEAMAP	Northeast Area Monitoring and Assessment Program
NEFSC	Northeast Fisheries Science Center
NOAA	National Oceanic and Atmospheric Administration
NYSERDA	The New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
PV	Plan View
RICRM	Rhode Island Coastal Resources Management

RIDEM	Rhode Island Department of Environmental Management
SFEC	South Fork Export Cable
SFW	South Fork Wind
SMAST	School for Marine Science & Technology
SNECVTS	Southern New England Cooperative Ventless Trap Survey
SPI	Sediment Profile Imaging
WEA	Wind Energy Areas

1.0 Introduction

The Fisheries Research and Monitoring Plan (the plan) is for South Fork Wind (SFW or Project) is proposed to be located in Bureau of Ocean Energy Management (BOEM) Lease Area OCS A-0517, which is within the Rhode Island – Massachusetts Wind Energy Area (RI-MA WEA) (Figure 1) [1]. SFW includes up to 15 wind turbine generators (WTGs or turbines) with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the WTGs (Inter-array Cables), and an offshore substation (OSS), all of which will be located approximately 19 miles (30.6 kilometers [km], 16.6 nautical miles [nm]) southeast of Block Island, Rhode Island, and 35 miles (56.3 km, 30.4 nm) east of Montauk Point, New York.

This monitoring plan has been developed in accordance with recommendations made by both BOEM's "Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM, 2013) and state agencies (RICRMC, 2010; NYSERDA, 2017; MADMF, 2018). This plan has been created using an iterative process, and details have been refined and updated based on feedback received from stakeholder groups. The Deepwater Wind South Fork (DWSF) team has spoken extensively with regional fishing organizations, working groups, and individual fisherman over the last three years as development of the monitoring plan has evolved. In addition, through the permitting and development process the DWSF team has consulted with several state (e.g., NY, CT, RI, and MA) and federal fisheries resource management agencies. The team has attended several public meetings with these groups to present the development and status of the plan and to solicit feedback directly from stakeholders. Webinars have been conducted with state and federal agencies and the plan has been distributed to these entities for multiple rounds of comment. The current plan was produced utilizing the feedback received through this extensive engagement process. As a result of these efforts, the monitoring plan includes the following, in order as they appear in this plan: gillnet survey, beam trawl survey, ventless trap lobster survey, ventless fish pot survey, acoustic telemetry, and benthic survey.

[1] Deepwater Wind South Fork, LLC (DWSF), now a wholly-owned indirect subsidiary of North East Offshore, LLC, a joint venture between Ørsted and Eversource , submitted the major federal permit application, The South Fork Wind Farm Construction and Operations Plan (COP), to BOEM in June, 2018 and submitted a revised COP to BOEM in May, 2019.
The full revised COP document can be found online at: https://www.boem.gov/South-Fork/

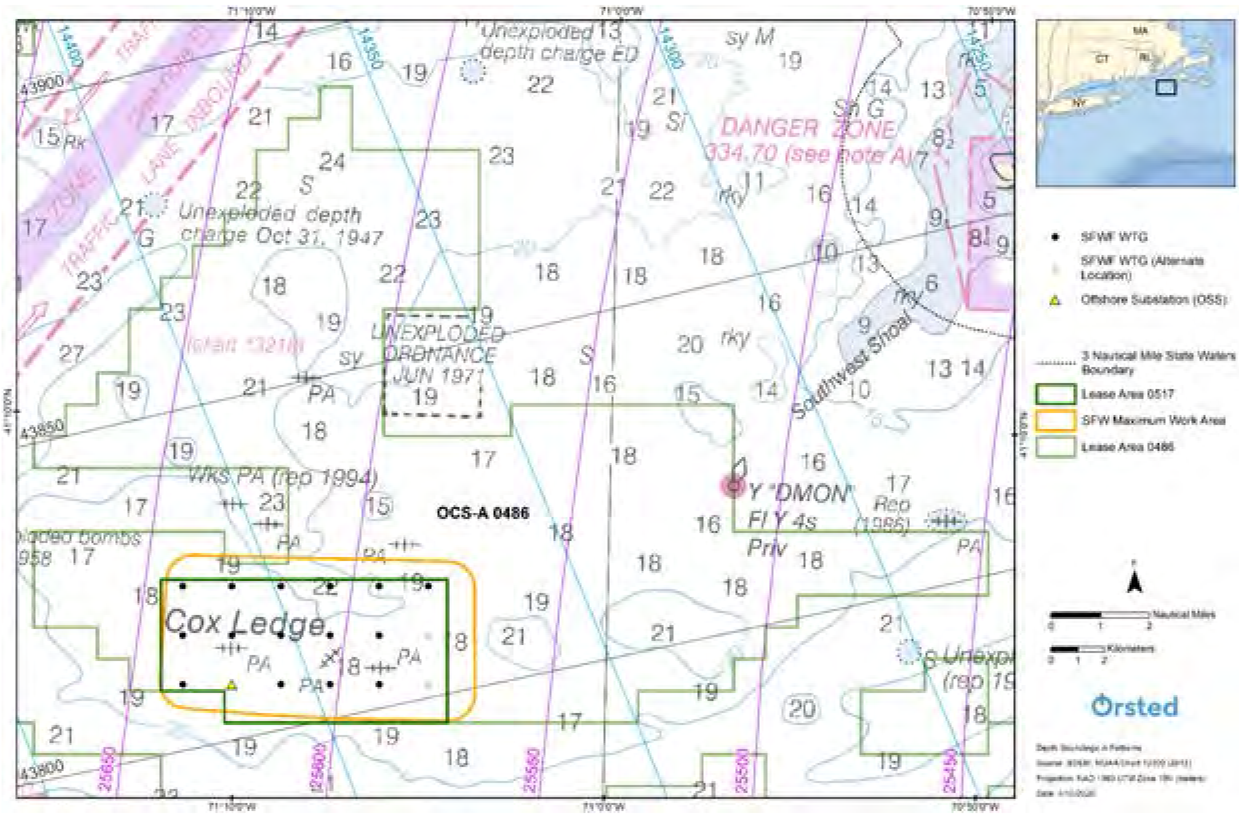

Figure 1. Location of South Fork Wind

DWSF is committed to conducting sound, credible science. Biological surveys, developed in coordination with the commercial fishing fleet and state agencies, were conducted at the Block Island Wind Farm (BIWF) from 2012 through 2019. The guiding scientific principles implemented beginning with the BIWF and continuing into the future include:

- Producing transparent, unbiased, and clear results from all research
- Working with commercial and recreational fishermen to identify areas important to them
- Collecting long-term data sets to determine trends and develop knowledge
- Promoting the smart growth of the American offshore wind industry
- Focusing on maintaining access and navigation in, and around, our wind farms for all ocean users
- Completing scientific research collaboratively with the fishing community
- Being accessible and available to the fishing industry
- Utilizing standardized monitoring protocols when possible and building on and supporting existing fisheries research
- Sharing data with all stakeholder groups
- Maintaining data confidentiality for sensitive fisheries dependent monitoring data

The SFW site is situated atop Cox Ledge, an area with complex bathymetry including extensive areas of boulders and mobile gear "hangs", making it difficult to safely operate large mobile gear (e.g., bottom trawl) in this area. Therefore, the SFW site is not sampled routinely by the Northeast Fisheries Science Center (NEFSC) bottom trawl survey. Feedback from commercial fishermen, and an analysis of vessel Monitoring System (VMS) data indicate there is little commercial trawl effort in the area. Details of the SFW fisheries data assessment and stakeholder feedback can be found in the SFW COP Appendix Y - *Commercial and Recreational Fisheries Technical Report*.[2]

The BOEM fishery guidelines recommend that trawl surveys be executed using a stratified random design. However, because of the complex bathymetry throughout the area, it is unlikely that a trawl survey can be safely conducted within the SFW site using a scientific design with random site selection. Therefore, DWSF has evaluated alternative survey designs and monitoring tools that can be used to collect pre-construction data for a wide range of taxa in the SFW site. Through extensive outreach efforts with the fishing community, feedback from state and federal agencies, and exploration of existing datasets, the DWSF team has developed survey designs using multiple sampling gears to acquire pre-construction data on the abundance, demographics, and composition of species that occur in and around the SFW site. In particular, the surveys have been designed to utilize sampling gear that can be fished effectively, and with limited impact, on the complex, rocky habitat within the SFW site(Thomsen et al., 2010; Malek, 2015).

Different gear types select for different fish and macro-invertebrate species, therefore, using multiple gear types to sample species assemblages is needed for assessing potential impacts from SFW (Walsh and Guida, 2017). Consistent survey methods and approaches will allow for data comparisons across studies, collaboration among developers and institutions, and an ability to address questions at appropriate spatial and temporal scales. Several gear types will be used to monitor a large portion of the species assemblage present in and around SFW. Some sampling will occur seasonally, while other sampling efforts will occur throughout the year (Figure 2). The proposed survey designs in this plan are not exhaustive but will form a basis for fisheries monitoring in the SFW site.

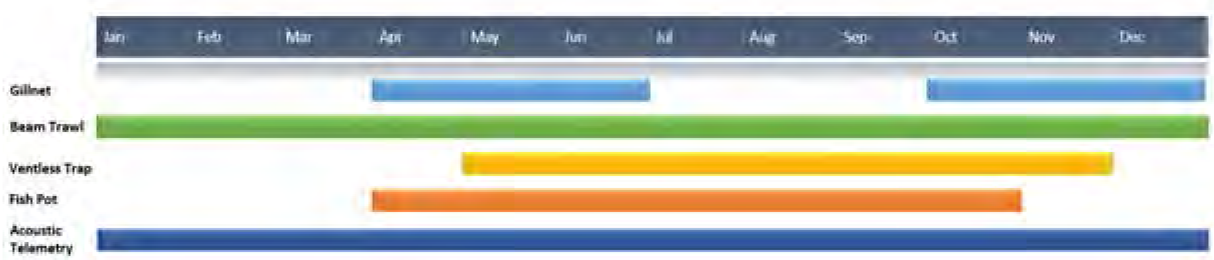

Figure 2. Generic survey timeline for SFW monitoring

[2] Appendix Y can be found online at: https://www.boem.gov/Appendix-Y/

These surveys will provide data that can be used to evaluate:

1. Commercially and recreationally important species that utilize the area in and around the SFW site.
2. The seasonal timing of the occurrence of these species.
3. Whether the taxonomic composition or relative abundance of fish and invertebrate assemblages change between the pre-construction and post-construction time periods.

The survey protocols have been designed to address requirements and guidelines outlined in the national register (30 CFR 585.626), BOEM fishery guidelines, and RICRMC policies (11.10.9 C).

DWSF issued a 'Request for Proposals' on May 5th, 2020 to local Universities and research institutions to execute elements of the monitoring plan. In some instances, the scientific researchers that are contracted to perform these surveys may work with DWSF to make slight modifications to the methodologies that are described below, provided such modifications are agreed by both parties. The proposals will be reviewed in late May and early June, and it is expected that contracts will be awarded shortly thereafter. It is envisioned that field work for these components of the pre-construction monitoring will begin in August or September 2020, but the actual start date will depend on several factors including state regulations regarding Covid-19.

Similar to the principles and practices executed for the Block Island Wind Farm, DWSF is committed to conducting scientific surveys and assessments that are collaborative with the fishing industry. The scientific contractors selected to perform the monitoring will identify for-hire fishing vessels from which these surveys will be conducted.

2.0 Demersal Fisheries Resources Survey - Gillnet

Gillnet selectivity depends mainly on fish size and shape and mesh size, but is also affected by the thickness, material, and color of net twine, hanging of net, and method of fishing (Hamley, 1975). Using specific gear placements and prescribed mesh sizes, gillnets may be designed to target specific species, or subgroupings of species, and life stages. Southern New England waters are host to an active gillnet fishery that primarily targets monkfish and winter skate. The proposed gillnet survey will focus on monitoring these two species, pre- and post-construction of SFW.

The survey will establish pre-construction data on the micro-scale distribution, abundance and composition of fish species in the area of potential affect. In particular, the study will use large-mesh gillnet gear, with a focus on monkfish and winter skate, and may be used to assess whether detectable shifts occur in the presence, relative abundance, and demographics of these species before and after construction.

2.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for an Exempted Fishing Permit (EFP) from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA). Pingers will be used on all gillnet gear as required under regulation. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

2.2 Proposed Sampling Stations

An asymmetrical Before-After-Control-Impact (BACI) design is proposed with three sampling areas; an impact area within the SFW "Project Area" and two reference areas. The SFW "Project Area" is defined as the maximum work area required to install the SFW (yellow outline in Figure 3 below). This includes the maximum spatial extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Fishable gillnet lines will be determined through consultation with the participating fishermen. Up to five gillnet lines per area will be randomly selected for each survey, resulting in up to 15 gillnet strings conducted per survey. Final designation of survey areas and survey lines within each area will be based on detailed geophysical seafloor survey data as well as input from commercial gillnet fishermen regarding areas important to them. Location of gillnets may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for setting gillnets it may be moved based on the captain's professional judgement.

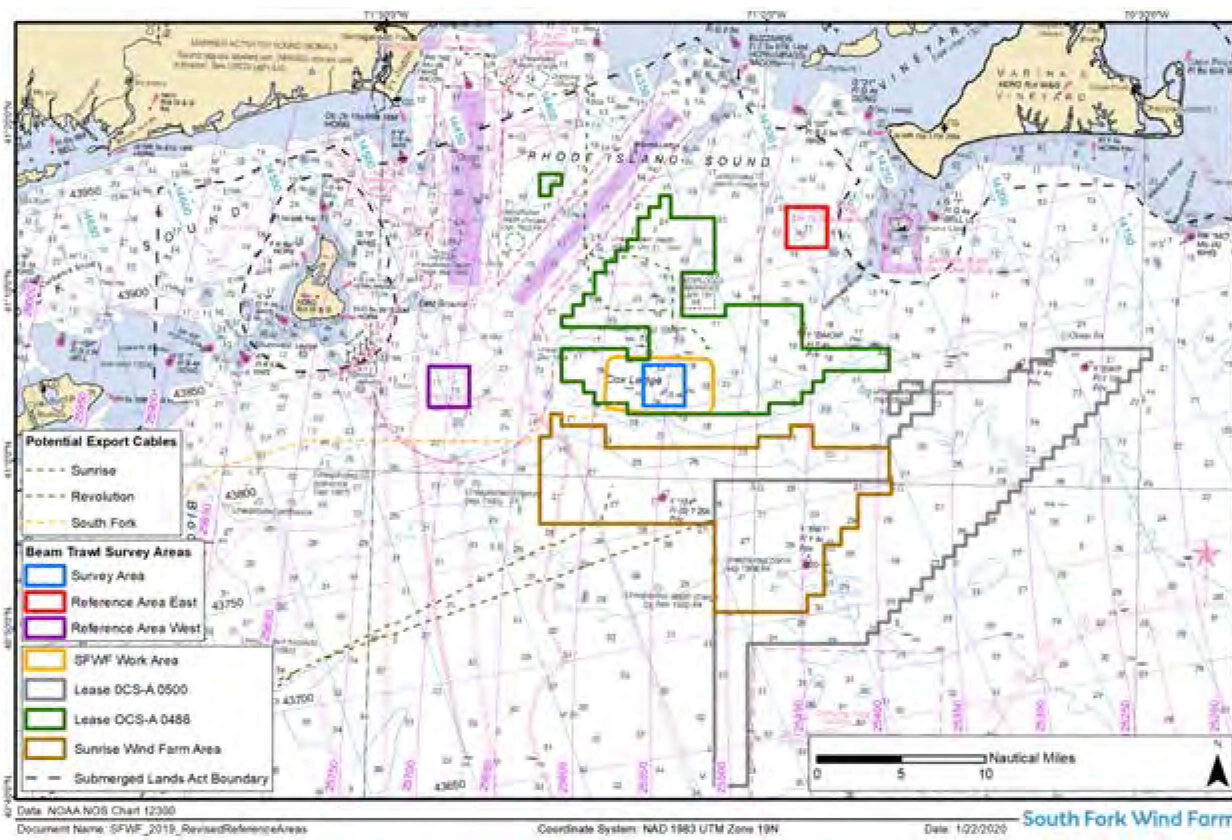

Figure 3. Northeast lease areas including the South Fork Wind Project Area with Proposed Gillnet and Beam Trawl Survey and Reference Areas

Data will be collected in the Project Area and two reference areas with similar habitat characteristics as the Project Area. The reference areas will serve as an index of demersal fish abundance in Rhode Island Sound in an area outside of the direct influence of SFW, and other future planned wind farm construction in the region. Concurrent sampling in the Project Area and the two reference areas will identify whether changes in the relative abundance and demographics of monkfish, winter skate, and other species observed within the Project Area are consistent with regional trends rather than representing a localized impact in the vicinity of SFW. The study will use an asymmetrical BACI experimental design, with statistical evaluation of the differences between control and impact areas contrasted in the before and after construction time periods (Underwood, 1994; Smith, 2002). A BACI design will allow for assessment of shifts in fish presence, absence, or abundance that correlate with proposed construction and operations at the SFW site.

The study design consists of sampling each of the treatment areas with a gillnet. The proposed sampling locations were selected in consultation with regional stakeholders to ensure that:

1. There is comparability among all sampling areas with respect to current, habitat and depth condition;
2. The reference areas are outside the area of influence from SFW but are still utilized by the same/similar fish populations;
3. Areas allow optimal operational execution of the survey (e.g., minimal travel times between sampling locations);
4. Space conflicts are minimized with other active uses.

2.3 Gillnet Methods

A gillnet is a wall of netting that hangs in the water column and is typically made of monofilament or multifilament nylon. Mesh sizes are designed to allow fish to get only their head through the netting, but not their body. The fish's gills then get caught in the mesh as the fish tries to back out of the net. Factors that can influence the catch rate of gillnets for target species include: fish density in the vicinity of gears, the behavior of the target species, the ability of fish to detect and locate the gillnet, and environmental factors such as water temperature, visibility, current direction, and velocity. This survey will use standardized fishing gear and sampling strategies across time and space to standardize catch rates to the extent possible. However, comparison of this gillnet survey data to other pre-construction fishery independent sampling efforts (e.g., nearby federal Northeast Area Monitoring and Assessment Program [NEAMAP]and NEFSC bottom trawl survey stations) may be limited due to the differences in the selectivity and catch rates of the disparate gear types.

The gillnet survey may be conducted using gillnets that are typical of the commercial fishery in Rhode Island and Massachusetts. Each gillnet string will consist of six, 300-ft net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs. Following the guidance set forth by BOEM, sampling will occur each spring and fall. Sampling will take place twice per month from April-June and again from October-December. These months see the majority of commercial gillnet activity as monkfish and skates migrate through the area in spring and fall. Sampling in July-September will not occur in order to minimize interactions with protected species (e.g., large whales, sea turtles) and to reduce the likelihood of gear damage that can occur during the seasonal migration of spiny dogfish and larger shark species through the area. The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), to minimize depredation of catch, and to improve the logistics of the survey. Soak time will remain consistent throughout the duration of the survey, to the extent practicable. Each survey event will be managed by a team of qualified scientists including a lead scientist with experience performing fisheries research. The catch will be removed from the gillnets by the boat crew for processing. The lead scientist will be responsible for collection of data and data recording.

Fish collected in each gillnet will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. Scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species. Taxonomic guides include *NOAA's Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas*, and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The following information will be collected for each gillnet string that is sampled; catch per unit effort, species diversity, and length frequency distributions for dominant and vulnerable species in the catch. The catch will be sorted by species, and size (if appropriate) until the lead scientist verifies that the sorting areas are clear of all specimens. All species that are captured will be documented for each string that is sampled.

Catch per unit effort will be calculated for each species sampled in each string with regards to abundance (number of animals captured) and biomass (weight in kg).

Length frequency distributions will be recorded for the dominant species in the catch, as well as for any vulnerable species that are encountered during sampling (e.g., Atlantic sturgeon). Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size will be measured from each gillnet string that is sampled, and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), and squids (mantle length). Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (monkfish, winter skate, gadids, black sea bass) to determine the prey composition for these species during the pre-construction period. Each fish sampled for stomach content analysis will be measured and weighed individually to assess relative condition before the stomach is removed. All prey items will be identified to the lowest possible identification level (LPIL), counted, and weighed. For all fishes and select invertebrates (i.e., squids, shrimps, crabs), individual length measurements will be recorded. Otoliths should be sampled and archived for all fish that are sacrificed for biological sampling. Atlantic cod are known to spawn on or near Cox Ledge (Zemeckis et al., 2014). In addition to stomach sampling, any Atlantic cod caught on the gillnet survey will be assessed for reproductive stage and spawning condition according to the protocols used for SFW Atlantic Cod Spawning Survey (adapted from Burnett et al. [1989] and O'Brien et al. [1993]) that occurred during the winters of 2018 and 2019.

2.4 Gillnet Methods

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

2.5 Gillnet Station Data

The following data will be collected during each sampling effort:

- Station number
- Latitude and longitude
- Soak start and end time and date
- Water depth
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

2.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

2.7 Data Analysis

Prior to the Project being built, data analysis will focus on comparing the fish communities in the impact and the control areas to describe spatial differences in abundance, species occurrence, and size structure. Catch per unit effort (CPUE) and length frequency data will be quantitatively compared on a per species basis between the impact and the control areas. Similar analyses will occur using the post-construction data, however the focus will be on identifying changes in the fish community in the impact area between pre- and post- construction that did not also occur at the control areas that could be attributed to either construction or operation of the wind turbines. Confidence intervals for the size of the apparent effects of SFW will be the focus of the analyses, rather than simply Yes or No statements about the statistical significance of any observable effects. More detailed or appropriate analyses may be included as the Project progresses. Data analysis will be executed in accordance with the BOEM fishery guidelines.

An adaptive sampling strategy will be used. Upon completion of the first year of the survey, a power analysis will be conducted using the data collected in the first year, and any other available regional data, to determine if sampling levels need to be adjusted in subsequent years.

3.0 Demersal Fisheries Resources Survey – Beam Trawl

Experienced local fishermen report that sections of the Project Area allow for data collection via beam trawl, as beam trawls are smaller in size than traditional otter trawls and more maneuverable (R. Sykes, pers. comm.). Previous studies have used beam trawls to sample in the vicinity of the Project Area and have proven to be an effective gear for sampling demersal species, including juveniles (Malek, 2015; Walsh and Guida, 2017).

The beam trawl survey will establish pre-construction data on distribution, abundance and community composition, with a focus on demersal fish and macroinvertebrates species, and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance before and after construction.

3.1 Survey Design/Procedures

The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience using a beam trawl, safety record, knowledge of the area, and cost. The scientific contractor will apply for a Letter of Acknowledgement (LOA) from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

3.2 Proposed Sampling Stations

The SFW “Project Area” is defined as the maximum work area required to install SFW (yellow outline in Figure 3). This includes the maximum extent where vessels or lift barges may anchor during construction around the wind turbines and foundations. Three survey areas are proposed for sampling: one survey area within the SFW Project Area and two reference areas. Due to the complex bathymetry (e.g., hangs and boulders) present in the impact area and the reference areas, a beam trawl survey would be difficult to execute safely using a simple random design. Conversations with fishermen indicate that there is a limited amount of benthic habitat that can be sampled safely and effectively within each area using a beam trawl. Therefore, in lieu of a simple random design, the input of commercial fishermen with experience fishing in these area, and detailed geophysical seafloor survey data, will be used to generate a map of tow tracks that can be safely sampled with the impact area, and the two reference areas.

Sampling will occur monthly within the impact and control areas. During each survey event, three beam trawl lines will be randomly selected from the universe of possible sampling locations in each area, resulting in nine beam trawls conducted per monthly survey (Read, 2019). However, during any given sampling event, the location of beam trawl sampling stations may be subject to change due to seasonal location of other fixed fishing gear (e.g., lobster pots). If a survey line is found to have poor conditions for beam trawling it may be moved based on the captain's professional judgement. In this instance an alternate trawling location will be chosen at random from the universe of potential sampling locations within that area.

3.3 Beam Trawl Methods

Beam trawling will be conducted monthly by a commercial fishing vessel using a 3-m beam trawl, with a cod-end of double 4.75 inch mesh and a 1-inch (2.54-cm) knotless cod end liner (or similar; equivalent to NEAMAP cod end) to ensure retention of the smaller fish (Malek, 2015). Rock chains will also be fitted across the mouth of the beam trawl to prevent larger rocks from entering and damaging the catch or net. Once on station, the crew of the vessel lowers the net into the water fully and allows it to drag behind the boat. When the gear is fully deployed and the winch brakes are set, the timer is set for 20 minutes, and the start coordinates, start time, date, tow direction, water depth, and tow speed are recorded. Towing speed is maintained at approximately 4.0 knots (Malek, 2015). Upon completion of the tow, end time, and end coordinates are recorded.

Fish collected in each tow will be identified, weighed, and enumerated consistent with the sampling approach of NEAMAP. The following data elements will be recorded for each tow; total biomass and total number of organisms caught, number and biomass caught for each species, species diversity, and length frequency data for dominant and vulnerable species (e.g., Atlantic sturgeon, thorny skate).

Onboard scientists will sort and identify fish, and weigh each species by the following protocol:

All organisms will be identified to species including fish and mega-invertebrates such as sea scallops, squid, lobsters, *Cancer* spp. crabs, sand dollars, and urchins. Taxonomic guides include NOAA's *Guide to Some Trawl-Caught Marine Fishes* (Flescher, 1980), Kells and Carpenter's (2011) *Field Guide to Coastal Fishes from Maine to Texas* and *Peterson's Field Guide to the Atlantic Seashore* (Gosner, 1999).

The catch will be sorted by species. In the case of large catches with a range of size classes, the catch may be sorted by relative size categories within each species. The use of size categories is to ensure that all sizes are equally represented in the data if subsampling is used. The chief biologist will determine the categories and approximate length ranges to be used for each species.

All specimens, fishes and invertebrates, are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the chief biologist verifies that the sorting areas are clear of all specimens.

Notwithstanding sub-sampling procedures, up to 50 individuals of each species (and size category) are measured and the rest counted. Individual lengths are recorded on the field data sheet. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions to these rules are the measurement of rays (disc width), sharks (straight-line fork length), dogfish (stretched total length), crabs (carapace width), lobsters (carapace length), sea scallops (shell height), and squids (mantle length). Miscellaneous invertebrates (e.g., worms, hermit crabs, snails) will be counted but not measured. Total weight of all individuals of each respective species will be recorded. Stomach content analysis will be performed for commercially important species (monkfish, winter skate, gadids, black sea bass) to determine the prey composition for these species during the pre-construction period. All prey items will be identified to the LPIL, counted, and weighed. For all fishes and select invertebrates (i.e., squids, shrimps, crabs), individual length measurements will be recorded. Each fish sampled will be sampled for length and weight individually to assess relative condition before the stomach is removed. Otoliths should be collected from fish that are sacrificed for biological sampling. In addition to stomach sampling, any Atlantic cod caught on the beam trawl survey will be assessed for reproductive stage and spawning condition according to the protocols used for SFW Atlantic Cod Spawning Survey (adapted from Burnett et al. (1989) and O'Brien et al. (1993)) that occurred during the winters of 2018 and 2019.

In the case of larger catches (e.g., >900 kg), one or multiple subsampling procedures may be used. Subsampling protocols for the beam trawl are adapted from the subsampling procedures of the NEAMAP survey (Bonzek et al., 2008). The decision of which subsampling protocol, or protocols, to use will be at the discretion of the chief biologist.

3.4 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each tow.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

3.5 Tow Station Data

The following data will be collected during each sampling effort:

- Station number
- Start latitude and longitude
- Start time and date
- Start water depth
- Tow direction
- Tow speed
- Tow duration
- End latitude and longitude
- End time and date
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

3.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

3.7 Data Analysis

The BACI survey design will allow for characterization of pre-construction demersal fish and invertebrate community structure. By continuing sampling during and after construction the survey will allow quantification of any substantial changes in species presence, absence, or abundance associated with proposed operations. The use of reference control sites will ensure that larger regional changes in demersal fish and invertebrate community structure will be captured and delineated from potential impacts of the proposed Project. The survey plan allows the catch of numerically dominant species to be compared between the before and after construction periods, using a BACI statistical model. Data analysis will be executed in accordance with the guidance provided by BOEM.

A power analysis was conducted using data from Malek (2015). These data provided approximate estimates of spatial variability in total abundance among independent tows, but the level of replication over time was insufficient to estimate temporal variability at the scale needed for the power analysis (Read, 2019). Therefore, an adaptive sampling strategy will be employed. Upon completion of the first year of the survey, a power analysis will be completed to determine if sampling levels need to be adjusted in subsequent years.

4.0 Demersal Fisheries Resources Survey – Ventless Trap, Lobster

A BACI ventless trap survey will be conducted to collect pre-construction data on lobster and crab resources in the proposed SFW site. The objective of this study is to evaluate the spatial and seasonal patterns of relative abundance of lobster and Jonah crab in the Project Area. In addition, the proposed study will classify the demographics of the lobster and Jonah crab resources, including size structure, sex ratios, reproductive status, and shell disease. Pre-construction data collected in this study may be used to assess whether detectable changes occur in the presence, relative abundance, or demographics of lobsters and crab resources during and after construction.

Based on recommendations from BOEM's renewable energy fishery guidelines (BOEM, 2013) and stakeholders, this survey will quantify pre-construction data for lobster in the SFW site (McCann, 2012; Petruny-Parker et al., 2015, MADMF, 2018) such that changes in the resource due to construction and operation of the wind farm can be evaluated.

4.1 Survey Design/Procedures

The sampling protocol proposed here is informed by the methods used by the Atlantic States Marine Fisheries Commission (ASMFC) and other regional groups to monitor lobster resources in the region (Wahle et al., 2004; O'Donnell et al., 2007; Geraldi et al., 2009; Collie and King, 2016). While the current survey is focused upon SFW, the sampling methods can be expanded to accommodate monitoring at nearby development sites that are much larger in scope. Further, the sampling methodologies proposed here are similar to sampling methods being used at the Vineyard Wind development site, as part of an effort to standardize monitoring amongst offshore wind developers. All sampling will occur on a commercial lobster vessel(s) that is chartered for the survey.

4.2 Sampling Stations

The study will be conducted using a BACI experimental design for direct effects, with quantitative comparisons made before and after construction and between control and impact area (Underwood, 1994). A control site (or multiple control sites) will be identified with similar bottom types, benthic habitat, and areal extent as the SFW site. The scientific contractor that is selected to execute the survey will with Ørsted to help to determine the final details of the survey design, including the number and location of control sites. Ideally, the control site(s) will be selected with direct input from the local lobster industry, along with consideration of the extant fishery dependent and fishery-independent data in the region. In addition, consideration will be given to the proximity of the control area(s) relative to offshore wind development that is planned in the future. Data collected at the control area(s) will serve as a regional index of lobster and Jonah crab abundance n an area well outside of the direct influence of the Project.

Following the protocols used during the Southern New England Cooperative Ventless Trap Survey (SNECVTS; Collie and King, 2016), the survey will be executed using a stratified random design. The impact area will be divided into a series of ten grid cells. Each grid cell will be further divided into aliquots (Figure 4). Similarly, the control area(s) will also be divided into grid cells and aliquots. Through consultation with local industry members, a subset of the aliquots within each grid cell will be identified as suitable sampling sites based on the location of known lobster fishing grounds, and the desire to minimize gear conflicts amongst fishermen in the area. At the beginning of each sampling season, an aliquot will be randomly selected for sampling within each grid cell. An alternative aliquot will also be selected within each grid cell, and the alternative aliquot will be sampled if needed based on local conditions (e.g., to avoid gear conflicts).

To achieve consistency with the ASMFC and SNECVTS protocols, the stations will be selected randomly at the start of each year of sampling, and the sampling locations will remain fixed for the remainder of the year. This sampling approach keeps the station occupied, reduces time that is spent moving traps between locations, and is generally similar to the routine operations of lobstermen in the region. To minimize gear interactions with other user groups in these areas, the lead scientist will work with the captain to ensure that the gear is set in accordance with local fishing practices.

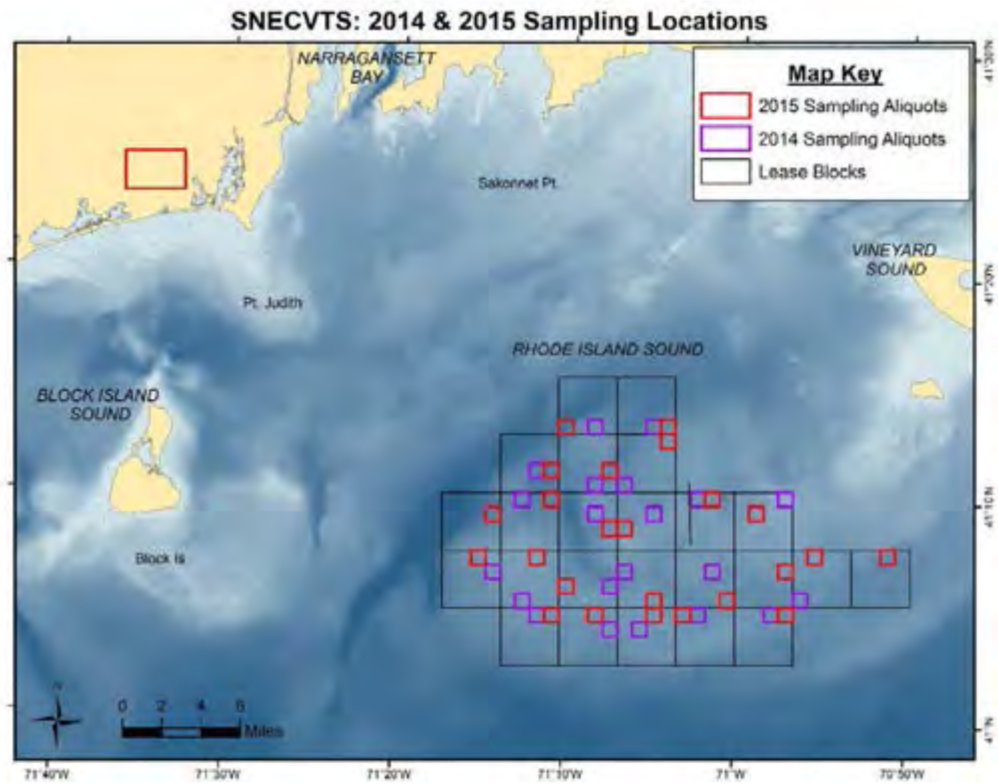

Figure 4. Example of the station selection method employed during the Southern New England Cooperative Ventless Trap Survey. The study area was stratified into 24 sampling grid cells, and each grid cell was further divided into aliquots. One aliquot from each grid was randomly selected for sampling in each year. Figure from Collie and King (2016).

4.3 Ventless Trap Trawl Methods

Lobster resources in SFW and the reference areas will be surveyed using a commercial fishing vessel with scientists onboard to process the catch. A local lobster vessel(s) will be contracted to conduct the sampling using a trap that is consistent with that used in the ASMFC and SNECVTS ventless trap surveys. This trap is a single parlor trap, 16 inches high, 40 inches long, and 21 inches wide with 5-inch entrance hoops and is constructed with 1-inch square rubber coated 12-gauge wire. The trap is constructed with a disabling door that can close off the entrance during periods between samples when the trap is on the bottom but not sampling. Trawls will be configured with 10 traps on each trawl, which is consistent with the gear configuration used in the SNECVTS (Collie and King, 2016). Local fishermen provided Input that fishing longer trawls (i.e., 10 pot vs., 6 pot) should reduce the likelihood of gear losses during the study. A combination of ventless and vented traps will be used to survey juvenile and adult lobster and crabs. Following the approach used in the SNECVTS, each trawl will be comprised of six ventless traps, and four standard vented traps. One trawl will be set in each grid cell in the control and impact area(s), with a target sampling intensity of ten trawls (100 traps) sampled in the impact area, and an equivalent level of sampling in the control area(s). A temperature logger (Onset TidBit or similar) will be attached to the first trap in each trawl to record water temperature continuously throughout the monitoring period.

Pre-construction sampling will occur twice per month from May through November. The sampling period of May through November was derived from a combination of feedback from commercial fishermen and to establish consistency with existing regional surveys (Rhode Island Department of

Environmental Management [RIDEM], Massachusetts Division of Marine Fisheries [MADMF], SNECTVS). The standard soak time will be five nights, which is consistent with local fishing practices to maximize catch, and the protocols used on the SNECVTS survey. Soak time will remain consistent throughout the duration of the survey. Traps will be baited with locally available bait. At the start of each monthly sampling event, the lobsterman will retrieve and bait the traps. After the five-day soak period, the traps will be hauled and the catch will be processed for sampling, and the traps will be rebaited for another five-night soak. Each survey event will be managed by a team of qualified scientists including a lead scientist with experience performing lobster research. The catch will be removed from the traps by the vessel crew for processing. The lead scientist will be responsible for collection and recording of all data.

The catch will be processed in a manner consistent with the ASMFC and SNECVTS ventless trap surveys. After sampling, all catch will be returned to the water as quickly as possible to minimize incidental mortality. The following data elements will be collected for each trawl sampled during the survey; total number and biomass of individuals sampled, number and biomass for each species, length frequency distribution of dominant species (lobster, and Jonah crab), and catch per unit effort at the species level. Data collected for individual lobsters will include:

- <u>Carapace length:</u> Measured to the nearest one tenth mm using calipers.
- <u>Sex</u>: Determined by examining the first pair of swimmerets.
- <u>Eggs</u>: Examine the underside of the carapace for the presence or absence of eggs.
- V-notch status: present or absent
- <u>Cull status</u>: Examine the claws for condition (claws missing, buds, or regenerated).
- Incidence of shell disease: absent, moderate, or severe
- Mortality: alive or dead

Up to 10 Jonah crabs will be measured from each trap, and subsampling may be used if catches exceed 10 individuals in a single trap. The sex of each Jonah crab that is measured will also be recorded. All black sea bass will be measured to the nearest centimeter.

4.4 Ventless Trap Station Data

The following data will be collected during each sampling effort:

- Station number
- Start latitude and longitude
- Start time and date
- Start water depth
- End latitude and longitude
- End time and date
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Bottom water temperature

4.5 Data Management and Analysis

The ventless trap survey will supplement the available pre-construction data on lobster and crab resources in the proposed SFW site. The pre-construction monitoring data will be used to evaluate the spatial and seasonal patterns of relative abundance of lobster and Jonah crab in the Project and control area(s). Sampling during and after construction will allow for quantification of any changes in the relative abundance and demographics of the lobster and crab resources. The use of a reference control site(s) will ensure that regional changes in the abundance and demography of lobsters and crabs are accounted for when assessing the potential impacts of the proposed Project. Analysis of the pre-construction data will be performed in accordance with the BOEM fishery guidelines. The spatial distribution of the lobster and crab resources will be mapped for both years of pre-construction monitoring. Catch per unit effort statistics will be summarized for both lobster and Jonah crab, and length frequency distributions will be examined. Length frequency distributions will also be provided for black sea bass. A Generalized Linear Model (or similar) will be used to examine the influence of biotic and abiotic factors on the catch rates and distribution of lobster and Jonah crab. Spatial and temporal patterns in the biological data for lobsters (shell disease, sex ratios, reproductive status) will be summarized and reported.

5.0 Demersal Fisheries Resource Survey – Ventless Fish Pot

Black sea bass, scup, and tautog are important species in both the commercial and recreational fisheries in southern New England that are typically associated with complex bottom habitats and not often well represented in trawl survey catches. There is also a significant pot fishery for these species in the region. Therefore, a fish pot survey will be a suitable gear type for monitoring these species at SFW. The emphasis on sampling for black sea bass is justified given that this species has Essential Fish Habitat throughout the Project Area and is considerable to be vulnerable to potential habitat disturbance from offshore wind construction and operation activities (Guida et al., 2017).

Fish pots are a transportable, cage-like, stationary fishing gear, which typically use bait as an attractant for target species, along with retention devices to prevent the escape of caught individuals (Suuronen et al., 2012). Fish pots possess many characteristics that are desirable in a sampling gear: they can be highly selective for targeted species, and fish can generally be returned after sampling in healthy condition and with low rates of post-capture mortality (Bjordal, 2002; Pol and Walsh, 2005; ICES, 2006; Rotabakk et al., 2011). Fish pots also provide an alternative survey and harvest method for areas inaccessible to otter-trawling, such as reefs and other hard bottom habitats (ICES, 2009; Petruny-Parker et al., 2015). As static gears, pots exhibit low impact to habitats (Thomsen et al., 2010).

Fish pots, unlike towed nets, do not sample indiscriminately. Pots are often designed to target specific species, or subgroupings of species. This is accomplished through the structural design of the pot openings, the pot holding areas, and the bait selected to attract species. Due to these characteristics, pots do not provide a comprehensive assessment of fish and invertebrates in a study area. However, they do provide important additional sampling data in areas where bottom trawling is not an option.

The SFW fish pot survey will be conducted to determine the spatial scale of potential impacts on the abundance and distribution of demersal juvenile and adult fish, particularly black sea bass, scup, and tautog, within the proposed SFW site.

5.1 Survey Design/Procedures

A Before-After-Gradient (BAG) survey will be conducted at SFW using fish pots to assess the spatial scale and extent of wind farm effects on habitat preferred by structure associated species like black sea bass, scup, and tautog. The survey will be conducted from commercial fishing vessel(s) with scientists onboard to process the catch. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. The scientific contractor will apply for a LOA from NOAA Fisheries in order to use the hired fishing vessel(s) as a scientific platform and conduct scientific sampling that is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations in 50 CFR parts 648 and 697. All survey activities will be subject to rules and regulations outlined under the MMPA and ESA. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Whale Reduction Plan, etc.) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

5.2 Sampling Stations

To accomplish the goals of this survey, data will be collected before, during construction, and after installation and operation of SFW using a BAG survey design. This RFP covers the pre-construction sampling. The study design will sample at increasing distances from turbine locations to examine the spatial scale and effects of construction and operation of a turbine on the surrounding habitat and associated fish species (Ellis and Schneider, 1997). A trawl of 25 fish pots will be placed starting approximately 50 meters from a proposed turbine location extending outward to approximately 1150 meters. Six turbine locations will be randomly selected for sampling each year, and those turbines and trawl positions will remain fixed for the duration of the survey. In order to minimize conflicts with other fishermen in the region, the location of trawl positions may be subject to seasonal location of fixed fishing gear (e.g., gill nets, other commercial fish pots). If based on the professional judgement of the captain a trawl position is found to have poor conditions for setting fish pots it may be moved to an alternative location that is selected at random.

The proposed survey design eliminates the need for a reference area as is typical in a BACI design. Sampling effort is focused on sampling sites along a spatial gradient within the work area, rather than using a control location that may not be truly representative of the conditions within the work area (Methratta, 2020). This design also allows for the examination of spatial variation and does not assume homogeneity across sampling sites (Methratta, 2020).

Each trawl line will be composed of 25 fish pots spaced ~45 meters apart. Each of the 6 turbines that are sampled will have one trawl extending the sampling distance (~1150 meters) with 150 total pots sampled per survey. To minimize gear interactions with other user groups in these areas, the lead scientist will work with the captain to ensure that the gear is set in accordance with local fishing practices. Exact locations of sampling within the Project Area will be further determined by using any additional substrate mapping as well as through consultation with the contracted fisherman to ensure that the areas can be sampled effectively and safely.

5.3 Fish Pot Methods

The fish pot survey will be conducted using typical rectangular fish pots commonly used in Rhode Island and Massachusetts fisheries and as used in other regional pot surveys (R. Balouskus, RIDEM, pers comm.). The ventless fish pots measure 43.5 inches long, 23 inches wide, and 16 inches high and are made from 1.5-inch coated wire mesh. Each pot will be baited with whole clam bellies and the entire trawl allowed to soak for 24 hours. Sampling will take place once per month from April through October for two years prior to the start of construction. The Contractor selected to carry out the survey will take efforts to ensure that the timing of sampling is approximately consistent within each month, to the extent practicable. Soak time will remain consistent throughout the duration of the survey. Each survey event will be managed by a team of qualified scientists including a lead Scientist with experience performing fisheries research. The catch will be removed from the pots by the boat crew for processing. The Lead scientist will be responsible for collection of data and data recording.

Fish collected in each pot will be identified, weighed, and enumerated. The following data elements will be recorded for each tow; total biomass and total number of organisms caught, number and biomass caught for each species, species diversity, and length frequency data for all species caught.

The catch will be sorted by species. All specimens, fishes and invertebrates, are sorted by species and size (if appropriate) into buckets or fish totes as needed. This process continues until all specimens are sorted, and the chief biologist verifies that the sorting areas are clear of all specimens. Notwithstanding sub-sampling procedures, up to 50 individuals of each species/size are measured and the rest counted. Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Dominant invertebrate species will be measured as follows: crabs (carapace width) and lobsters (carapace length), and miscellaneous invertebrates (e.g., worms, hermit crabs, snails) will be counted but not measured.

5.4 Hydrographic and Atmospheric Data

Hydrographic data will be collected using a YSI 6820 V2 multi parameter sonde coupled with a YSI 650 MDS display system (or similar). The sonde is lowered overboard and held in surface waters until the instrument equilibrates. Water temperature (degrees C), dissolved oxygen concentration (mg/l), and salinity (ppt) data are recorded for the near-surface waters. The sonde is then lowered to near-bottom and water temperature, dissolved oxygen, and salinity data are recorded. Measurements are recorded for each station at the end of each haul. A temperature logger (Onset TidBit or similar) will be attached to the first trap in each trawl to record water temperature continuously throughout the monitoring period.

Sea state and weather conditions are recorded from visual observations. Air temperature may be downloaded from a local weather station if not available onboard.

5.5 Ventless Fish Pot Station Data

The following data will be collected during each sampling effort:

- Station number
- Start latitude and longitude
- Start time and date
- Start water depth
- End latitude and longitude
- End time and date
- Wind speed
- Wind direction
- Wave height
- Air temperature
- Surface and bottom water temperature, salinity, and dissolved oxygen

5.6 Data Entry and Reporting

Data will be transcribed from hard copy datasheets into electronic worksheets. The data sheets will be reviewed for data entry errors prior to importing into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) are verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations.

5.7 Data Analysis

The BAG survey design will allow for characterization of pre-construction community structure of fish species associated with complex bottom habitats. By continuing sampling during and after construction the survey will allow quantification of any substantial changes in species presence, absence, and abundance associated with installation and operation of wind turbines in the SFW site. The use of a BAG design with sampling at increasing distances from the turbine foundation will for the examination of the spatial scale of impacts on the surrounding habitat and associated fish species. The survey plan allows the comparison of the catch of structure-associated fish species between the before and after construction periods. Data analysis will be performed in accordance with the BOEM fishery guidelines.

An adaptive sampling strategy is being proposed as part of the monitoring plan. Upon completion of the first year of the survey, a power analysis will be conducted using the data collected in the first year, and any other available regional data, to determine if sampling levels need to be adjusted in subsequent years.

6.0 Acoustic Telemetry

Passive acoustic telemetry can monitor animal presence and movements across a range of spatial and temporal scales. For instance, each acoustic receiver provides information on the fine-scale (tens to hundreds of meters) residence and movement of marine organisms. Acoustic receivers also offer continuous monitoring, allowing for behavior, movements, and residence to be investigated at a fine temporal scale (e.g., diel, tidal, etc.). By leveraging observations collected across individual receivers, and receiver arrays, telemetry can also monitor animal presence and movement over a broad spatial and temporal extent. Therefore, passive acoustic telemetry is an ideal technology to not only collect pre-construction data on species presence within WEAs, but also to monitor and evaluate short and long-term impacts of wind energy projects on species presence, distribution, and persistence.

The use of passive acoustic telemetry has grown dramatically over the past decade and continues to grow each year (Hussey et al. 2015). As a result of this rapid growth, hundreds to thousands of acoustic receivers are deployed each year in the northwest Atlantic from the Gulf of St Lawrence to the Gulf of Mexico, each of which is capable of detecting the thousands of active transmitters that are currently deployed on at least 40 species including, among many others, sturgeon, striped bass, sea turtles, sharks, bluefin tuna, and black sea bass.

6.1 Ongoing and Planned Research

Ørsted will coordinate with, and contribute to, ongoing and planned acoustic telemetry projects that are being carried out in and around the SFW site. There is an ongoing BOEM-funded study that is using passive acoustic telemetry to monitor the seasonal distribution and spawning activity of Atlantic cod on and around Cox Ledge, which lies within the SFW work area (Figure 5). This Project includes scientists from the Massachusetts Division of Marine Fisheries, the UMass Dartmouth School for Marine Science and Technology, Rutgers University, the Nature Conservancy, Woods Hole Oceanographic Institute, and the NEFSC. To date, 33 adult cod have been tagged with Vemco V16-4H acoustic transmitters, and additional tagging trips are planned for the spring and summer of 2020 to deploy the remaining transmitters (n=67). All tagging trips have been conducted on local charter and party recreational fishing vessels.

The movements and residency patterns of tagged cod are being monitored using fixed-station passive acoustics receivers, as well as a receiver that is attached to an autonomous glider. Ten acoustic receivers were deployed from a commercial gillnet vessel in November 2019, and the receiver array will remain in the water until at least May 2021. The autonomous glider allows for tagged fish to be detected over a wider area than is possible using the fixed-station receivers. In addition, the glider also collects valuable environmental data including temperature, dissolved oxygen, and turbidity. In addition to the acoustic receiver and environmental sensors, the glider is also equipped with a Passive Acoustic Monitoring device, which is used to record and document the vocalizations of whale species that are present in the study area. Further, all of the glider data is available in near real-time on the web (http://dcs.whoi.edu/cox1219/cox1219_we16.shtml). The glider deployments were scheduled to coincide with the presumed peak spawning season for Atlantic cod in southern New England. The autonomous glider was deployed in December 2019 and remained in the water until March 20th, 2020. The glider will be deployed again during the next two winters (December 2020-March 2021, and December 2021-March 2022).

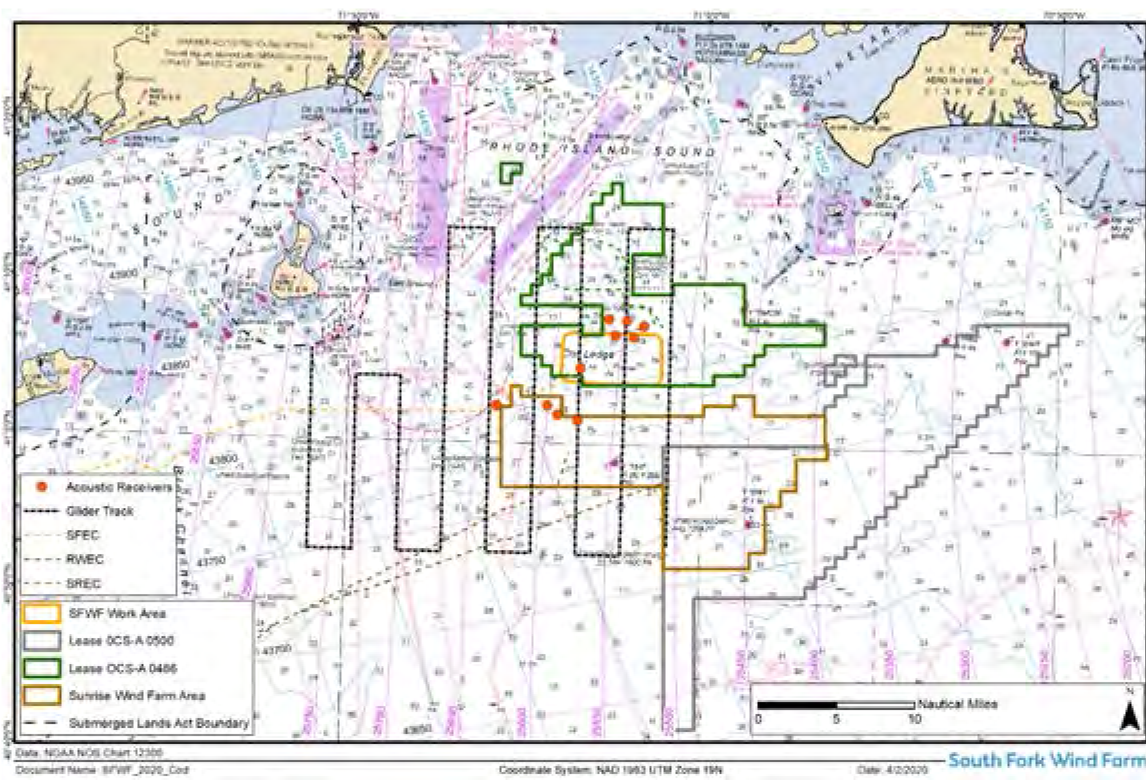

Figure 5. Study site for the Atlantic cod acoustic telemetry study, including the location of the fixed-station acoustic receivers. The general track of the autonomous glider is also shown.

A second acoustic telemetry study, beginning in the summer of 2020 and running through 2021, will examine the presence and persistence of highly migratory species (HMS) in popular recreational fishing grounds in the southern New England WEAs. INSPIRE Environmental has partnered with the Anderson Cabot Center for Ocean Life (ACCOL) at the New England Aquarium to use passive acoustic telemetry to monitor the pre-construction presence and persistence of bluefin tuna, blue sharks, and shortfin Mako sharks in the southern New England WEAs. These three species have been identified as three of the most commonly captured and targeted species by the offshore recreational community in southern New England (NOAA, 2019). This study will deploy 15 acoustic receivers at three popular recreational fishing sites within the WEAs identified through a previous recreational fishing survey carried out by the ACCOL (J. Kneebone, pers. comm.). The receivers will be deployed strategically, in conjunction with the Atlantic cod receiver array, to maximize detection coverage for both projects. For-hire tagging trips will be conducted collaboratively with the recreational fishing community to target and tag 20 individuals of each of the three HMS species listed above.

As part of the pre-construction monitoring, Ørsted is committed to using acoustic telemetry to collect high resolution information on the presence, distribution, and behavior of commercially and recreationally important species in and around SFW. These commitments will strengthen ongoing telemetry projects and contribute more broadly to regional telemetry research in the northwest Atlantic.

6.2 Acoustic Telemetry Methods

Ørsted will contribute to regional acoustic telemetry efforts by providing additional funding to support these active and planned studies. We have already reached out to principal investigators of the Atlantic cod project and the HMS telemetry studies and received confirmation of their willingness to work together to share detection data and design our receiver arrays to maximize the area that is monitored within SFW. This funding may include the purchase of acoustic transmitters to enhance ongoing tagging efforts for Atlantic cod and highly migratory species and would occur in coordination with these projects. Individuals would be tagged using a range of appropriate (species dependent) Vemco acoustic transmitters. Additional transmitters could be allocated to species that are of regional importance as identified by area researchers, industry stakeholders, and state and federal agencies. Where appropriate, funding may be provided to support additional vessel charters to deploy acoustic transmitters.

Further, Ørsted will provide support for the deployment and maintenance of additional acoustic receivers in SFW. Vemco VR2-AR 69kHz acoustic receivers (Vemco Division, InnovaSea Systems, Inc., Nova Scotia, Canada) will be deployed within SFW to monitor species outfitted with acoustic transmitters. In collaboration with the ongoing telemetry studies, additional receivers may be deployed strategically within SFW in order to increase the spatial extent of monitoring in and around the SFW area, while minimizing potential gear conflicts with local fishing effort. If deployed, the additional receivers will remain in the water year-round and one to two trips per year on board for-hire commercial fishing vessels will be made to maintain the receiver array and download collected data. As part of the ECO-PAM project, an acoustic receiver will also be deployed near SFW (41.06N 70.83W). Receivers will be rigged using standard procedures outlined by Vemco for benthic deployment (https://www.vemco.com/wp-content/uploads/2015/01/vr2ar-deploy-tips.pdf).

Vemco VR2-AR are the most suitable receiver models for passively monitoring species in an offshore environment and have been used previously in BOEM-funded telemetry projects in the mid-Atlantic (Haulsee et al., 2020). These receivers have several advantages that will maximize the likelihood of having a successful deployment. VR2-ARs have the unique ability to be remotely retrieved following extended deployment on the sea floor and are equipped with a system that allows researchers to communicate with the unit to monitor receiver status (e.g., health, tilt angle, temperature, battery life, remaining memory) and gather summary detection data (e.g., total number of detections, number of detections from specific transmitters) without bringing the receiver to the surface. This ability to deploy and monitor acoustic receivers without the need for surface retrieval systems (i.e., ropes and buoys) is advantageous for offshore work since receivers with surface mooring gear can sometimes be lost due to ship strikes or rough weather. In addition, the absence of surface mooring gear will eliminate the potential that large marine megafauna (i.e., whales and sea turtles) become entangled in the mooring line. Lastly, VR2-AR receivers are equipped with a V16-like transmitter that can be used to locate potentially lost units with a manual VR100 receiver and log temperature data throughout the entirety of their deployment.

Additional glider deployments may be funded to expand the spatial and temporal coverage of acoustic telemetry monitoring, collect detailed oceanographic data, and record spatially and temporally specific data on the presence of marine mammals in the area. Glider deployments are planned for the winter of 2021 and 2022 as part of the ongoing Atlantic cod telemetry project. Additional glider deployments in the summer and fall, when HMS species are most commonly observed in and around SFW would provide valuable information to supplement data collected by the fixed station receiver array. The glider deployments would also provide high resolution information on the presence and distribution of whale species in the Project Area, which would supplement ongoing monitoring studies (e.g., aerial surveys). Further, the glider would record vertical profiles of oceanographic data (e.g., temperature, turbidity, dissolved oxygen) during the months when the water column is stratified, which would be shared with oceanographic researchers (e.g., NERACOOS, MARACOOS) to help inform regional oceanographic models.

6.3 Data Analysis and Data Sharing

The resulting detection data downloaded from acoustic receivers will be analyzed with the overall goal of establishing pre-construction information on species presence and persistence in SFW. Short- and long-term presence, site fidelity (i.e., residency/persistence), fine- and broad-scale movement patterns, and inter-annual presence at SFW (i.e., whether individuals return to the receiver array each year) will be examined. Any detection data obtained through our participation in regional telemetry data sharing networks will be incorporated into this analysis, particularly to examine the distribution and movements of species beyond the confines of SFW. Deliverables resulting from the proposed study activities will include metadata of tagged individuals (e.g., species, sex, size, tagging location) as well as detailed detection history plots for each tagged individual that depict all detections logged for an animal over the course of a year. Summary tables and figures will be generated that describe: the number of times each fish was detected by receivers in SFW, the detection history for each fish, the total number of receivers it was detected on, movements, and monthly patterns in presence and persistence. In addition to the local-scale acoustic monitoring achieved by the proposed receiver array, broad-scale movement data will be accomplished through participation in regional telemetry data sharing programs, in an attempt to obtain detection data from our tagged animals wherever else they are detected in the greater Atlantic region.

All detection data recorded by the acoustic receivers in this Project will be distributed to researchers through participation in regional telemetry networks such as the Ocean Tracking Network, the Atlantic Cooperative Telemetry Network, the Florida Atlantic Coast Telemetry Network, and the Animal Tracking Network. This Project will capitalize on direct connections with researchers who are actively using passive acoustic telemetry to study marine organisms and will be able to determine the species that carries any transmitter that is detected by the receiver array. We will compile any detection data that we collect for transmitters that are not deployed as part of the proposed Project and disseminate that information to the tag owners (it is the policy of regional data sharing programs that the 'owner' of the data is the entity that purchased and deployed the transmitter, not the entity that detected it on their receiver). We will also approach each transmitter's owner to request the inclusion of their data (i.e., metadata on the species detected, number of detections, amount of time the animal was detected in our receiver array, etc.) in any analyses performed. We will also coordinate and cooperate with other researchers and developers who may deploy acoustic receivers elsewhere in the southern New England WEAs to further expand the spatial extent over which our tagged individuals are monitored in the WEAs. This collaboration will allow for a more holistic examination on the cumulative impacts of wind farm development on the distribution and migratory behaviors of marine taxa. Ultimately, participation in these large data sharing networks will increase both the spatial and temporal extent of monitoring for species tagged as part of this research effort and permit the collection of data on the presence and persistence of other marine species in around SFW at no additional cost.

7.0 Benthic Survey – Sediment Profile Imaging – Plan View and Video

The SFW benthic survey will be conducted not more than six months prior to construction and again after construction to determine the spatial scale of potential impacts on benthic habitats and biological communities within the proposed SFW site and along the South Fork Export Cable (SFEC), and to examine potential impacts on scallops along the SFEC.

Benthic assessments are necessary for both seafloor characterization as well as monitoring potential impacts on Essential Fish Habitat (EFH). Areas designated as EFH are important to a wide range of finfish and shellfish species for spawning, feeding, and refuge. Turbine foundations and scour mats provide area for the settlement of sessile invertebrates that can spread to the seafloor over time changing the surrounding habitat (Bishop et al., 2017). For instance, sediment grain size can change along with the densities of macrobenthic invertebrates (Coates et al., 2014). It is important to monitor these effects to understand and minimize the impacts on EFH in the project area.

A Sediment Profile and Plan View Imaging (SPI/PV) survey will be conducted within the project area and along proposed cable routes. This survey will characterize the geological (sediment size and type) and benthic (animal habitat) characteristics of the areas with potential effects from construction and operations. SPI and PV will be used to provide an integrated, multi-dimensional view of the benthic and geological condition of seafloor sediments and characterize benthic habitats as a baseline not more than six months before construction and not more than six months after operation has begun, providing neither period is during the winter. The SPI and PV cameras collect high-resolution imagery over several meters of the seafloor (plan view) as well as the sediment–water interface (profile) in the shallow seabed. SPI/PV surveys have been conducted within the SFW and along the SFEC to provide detailed assessment of benthic habitat for EFH consultation (Deepwater Wind South Fork 2020).

Most of the existing benthic data from the SFW area and the SFEC were collected in summer, when biomass and diversity of benthic organisms is greatest (Deepwater Wind South Fork 2020, Stokesbury, 2013, 2014; NYSERDA, 2017). In contrast to fish communities and harvestable benthic species, benthic habitats in the NE Atlantic are generally stable in the absence of physical disturbance or organic enrichment (Theroux and Wigley 1998, Reid et al. 1991). A single benthic survey conducted within six months of the construction activity can provide an accurate representation of benthic habitats prior to potential disturbance.

7.1 Survey Design/Procedures

A BAG survey will be conducted at SFW using fixed stations to assess the spatial scale and extent of wind farm effects on benthic habitat. The survey will be conducted from commercial research vessel(s) with scientists onboard to collect images utilizing a SPI/PV camera system. This system was utilized exclusively for ground-truth imagery to support mapping benthic habitat within SFW. Collecting seafloor imagery does not require disturbance of the seafloor or collection of physical samples. For-hire vessels will be selected based on criteria such as experience, safety record, knowledge of the area, and cost. All survey activities will be conducted with strict adherence to scientific health and safety protocols to reduce the potential for environmental damage or injury.

At least four SPI/PV replicates will be collected at each station. The three replicates with the best quality images from each station will be selected for analysis.

A V102 Hemisphere vector antenna will be deployed on the vessel to allow for accurate vessel heading as well as a differential position accuracy to within a meter. During mobilization the navigator will conduct a positional accuracy check on the antenna. This will be done by placing the antenna on a known GPS point and ensuring the antenna's position falls within a meter of the known coordinates.

During operations HYPACK Ultralite software will receive positional data from the antenna in order to direct the vessel to sampling stations. Once the vessel is within a 7.5-meter radius of the target location, the SPI/PV camera system will be deployed to the seafloor. As soon as the camera system has made contact with the seafloor the navigator will record the time and position of the camera electronically in HYPACK as well as the written field log. This process will be repeated for a minimum of four SPI/PV replicates per sampling station. After all stations have been surveyed the navigator will export all recorded positional data into an Excel sheet. The Excel sheet will include the station name, replicate number, date, time, depth, and position of every SPI/PV replicate.

7.2 Sampling Stations – Turbine Foundations

To accomplish the goals of this survey, data will be collected before and after installation and operation of SFW using a BAG survey design with statistical evaluation of the differences (Underwood, 1994; Methratta, 2020). The selection of a BAG design is based on an understanding of the complexities of habitat distribution at South Fork and an analysis of benthic data results from European wind farms and the Rodeo study at BIWF (Coates et al., 2014; Dannheim et al., 2019; Degraer et al., 2018; HDR, 2019; LeFaible et al., 2019; Lindeboom et al., 2011)

The study design will sample at increasing distances from turbine locations to examine the spatial scale and effects of construction and operation of a turbine on the surrounding benthic habitat (Ellis and Schneider, 1997). Four radial transects of SPI/PV stations will be established to the north, south, east, and west of five selected turbine locations. A current meter record collected for the RI Ocean Special Area Management Plan (Ocean SAMP) indicated that monthly mean currents near SFW are general easterly (to the west) (Ullman and Codiga, 2010). Pre-construction transects will begin at the center point of the planned foundation with two additional stations at equal intervals up to the maximum planned extent of the scour mat and then at intervals of 15, 25, 50, 100, 200, and 300 meters extending outward. Post-construction transects will begin at the edge of the scour mat and at intervals of 15, 25, 50, 100, 200, and 300 meters extending outward (Figure 6). Because current research indicates that effects of turbines on the benthic environment occurs on a local scale (e.g., Lindeboom et al., 2011; Coates et al., 2014; Degraer et al., 2018), sampling will be more intense closer to the turbine foundation. In the Belgian part of the North Sea, gradient sampling of benthic habitat within wind farms is conducted at close stations and far stations that are up to 500 m away from the turbine foundations (LeFaible et al., 2019). However, recent unpublished data from Belgium indicates some level of enrichment has been recorded between 200-250 m after eight years (personal comm. S. Degraer, 4/29/2020). Five turbine locations will be selected for sampling based on the habitat distribution adjacent to each foundation, and turbines that are part of the fish pot surveys will not be considered in order to avoid interaction between the two surveys (Figure 7). Habitat types mapped within SFW include glacial moraine, coarse sediment, sand and muddy sand, and a discrete area of mud and sandy mud at the northern boundary. The selected turbines and transect positions will remain fixed for the duration of the survey.

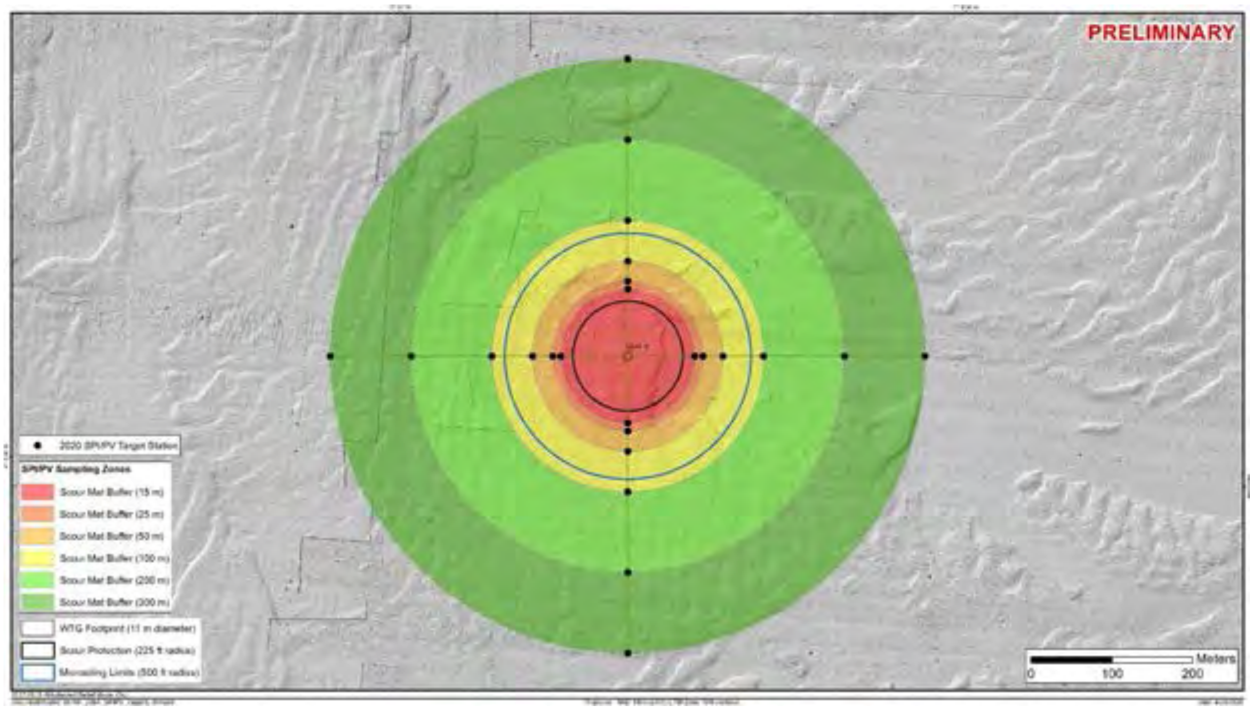

Figure 6. Proposed benthic survey sampling distances. The rings outside the scour mat protection (buffer) represent areas with temporary disturbance with no permanent structures.

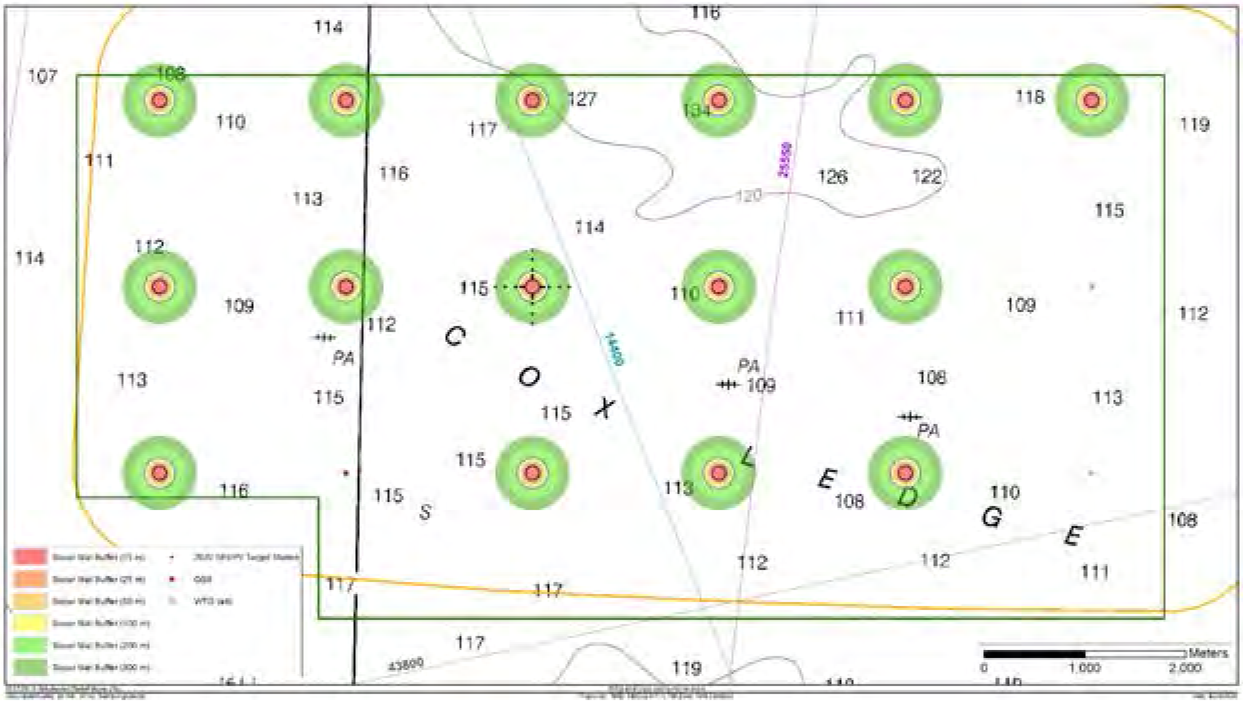

Figure 7. Proposed benthic survey sampling design. Five turbine foundations will be selected from this set, with consideration and coordination with fish pot survey planning. Note colored rings outside the scour protection represent areas with only temporary disturbance and no permanent structures.

The proposed BAG survey design eliminates the need for a reference area, which is a typical feature in a BACI design. In contrast, sampling effort in a BAG design is focused on sampling along a spatial gradient within the area of interest rather than using a control location that may not be truly representative of the conditions within the area of interest (Methratta, 2020). This design also allows for the examination of spatial variation and does not assume homogeneity across sampling sites (Methratta, 2020).

7.3 Sampling Stations – Export Cable (SFEC)

To accomplish the goals of this survey, data will be collected before and after installation and operation of the SFEC using a BACI experimental design for direct effects, with quantitative comparisons made before and after construction and between control and impact area (Underwood, 1994). A control site (or multiple control sites) will be identified with similar bottom types, benthic habitat, and water depth as the SFEC. A BACI design is appropriate for this survey component because the export cable is a linear feature with very similar habitat of primarily mobile sands with sections of mobile gravelly sands and a low density of boulders along the length of the corridor and the only gradient of potential disturbance associated with cable installation covers only a very short distance to either side of the cable (most impacts are anticipated within 100 m, maximum distance of potential impact is 340 m; Deepwater Wind South Fork, 2020). The study design includes sampling at fixed intervals along the SFEC comparable to the sampling interval used to collect baseline data (1.9 km) from the project site to the New York State (NYS) territorial waters (Figure 8). An additional survey will be conducted within NYS waters. The objectives of the study are to examine the effects of installation and operation of an export cable on the benthic habitat and scallop abundance (Ellis and Schneider, 1997). In areas where VTR data (2015-2016) indicate a high density of scallop dredging activity, sampling density will be doubled to one station per kilometer (Figure 9). Reference stations will be established 1 km from the cable route in two areas, one within the area of high scallop dredging activity and one within an area with low or no scallop dredging activity (Figure 9).

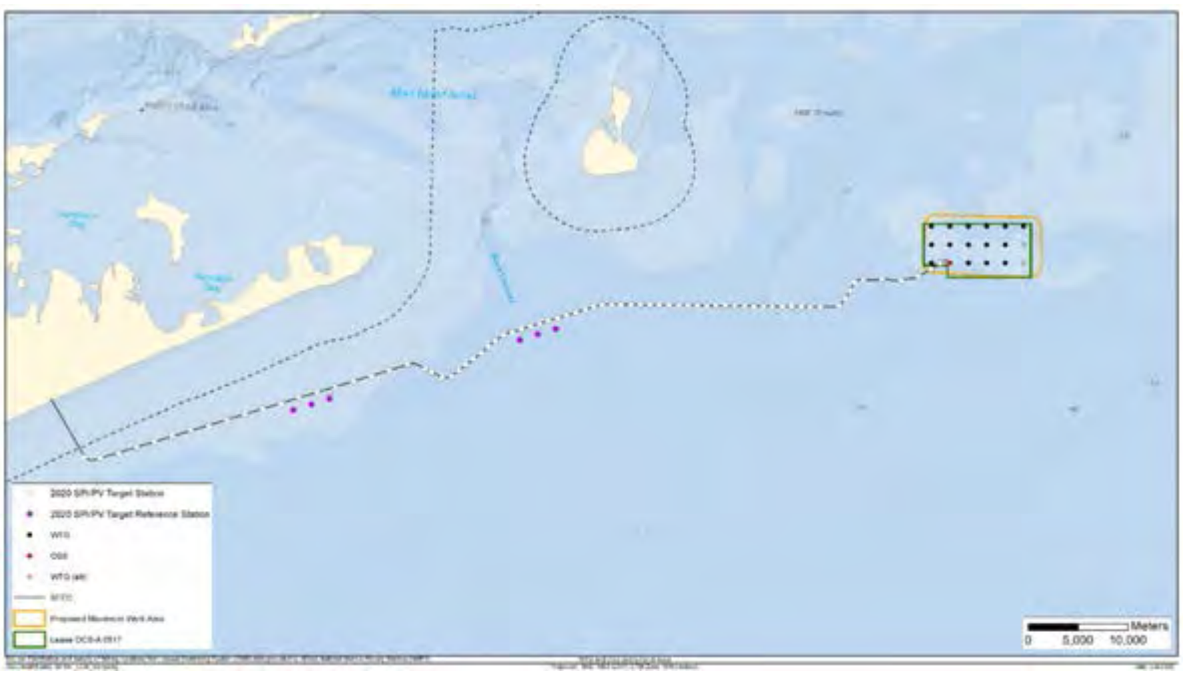

Figure 8. Proposed benthic survey sampling design along the SFEC with white dots indicating SPI/PV stations situated along the SFEC and purple dots indicating reference stations ~1km from the SFEC.

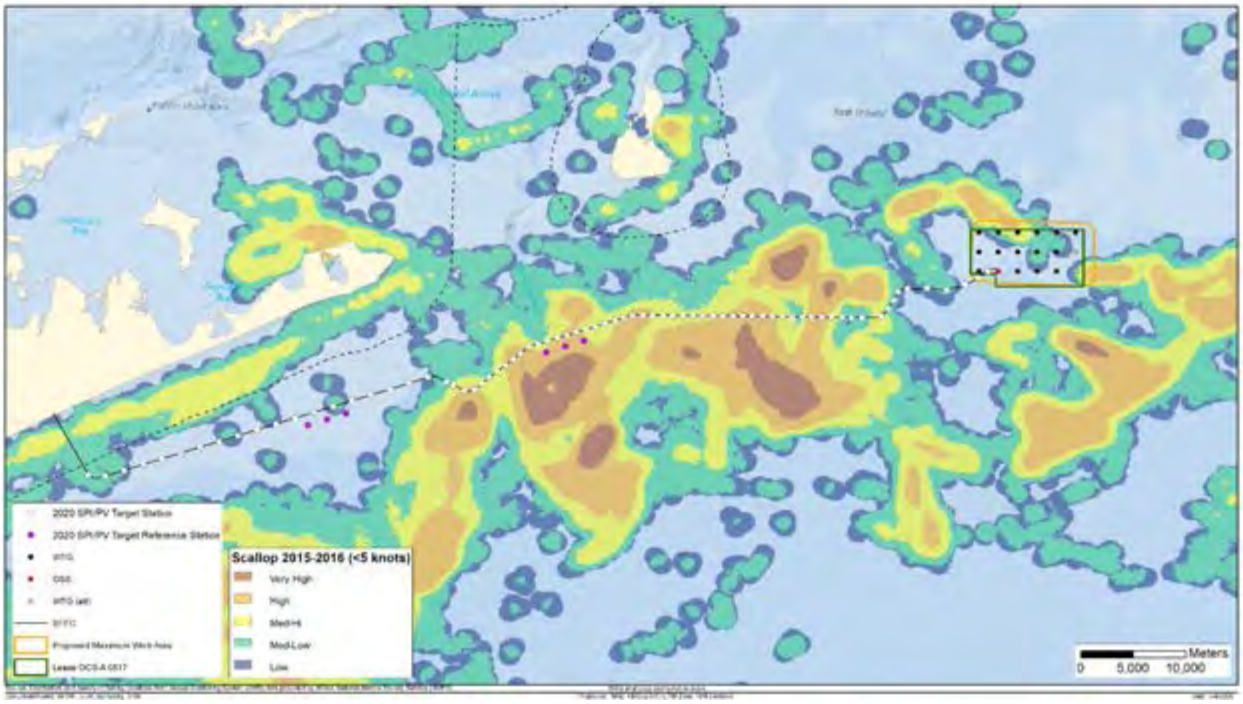

Figure 9. Proposed benthic survey sampling design along the SFEC

7.4 SPI/PV Methods

Acquisition and quality assurance/quality control of high-resolution SPI images will be accomplished using a Nikon D7100 digital single-lens reflex (DSLR) camera with a 24.1-megapixel image sensor mounted inside an Ocean Imaging Model 3731 pressure housing system. An Ocean Imaging Model DSC PV underwater camera system, using a Nikon D7100 DSLR, will be attached to the SPI camera frame and used to collect PV photographs of the seafloor surface at the location where the SPI images are collected. The PV camera housing will be outfitted with two Ocean Imaging Systems Model 400 37 scaling lasers. Co-located SPI and PV images will be collected during each "drop" of the system. The ability of the PV system to collect usable images is dependent on the clarity of the water column.

The Field Lead Scientist will ensure that samples are taken according to the established protocols and that all forms, checklists, field measurements, and instrument calibrations are recorded correctly during the field sampling.

7.5 Data Entry and Reporting

Following data entry, all spreadsheets will be proofread using the original handwritten field log. This review will be performed by someone other than the data entry specialist.

Computer-aided analysis of SPI/PV images will be conducted to provide a set of standard measurements to allow comparisons among different locations and surveys. Measured parameters for SPI and PV images will be recorded in Microsoft Excel© spreadsheets. These data will be subsequently checked by senior scientists as an independent quality assurance/quality control review before final interpretation is performed. Spatial distributions of SPI/PV parameters will be mapped using ArcGIS.

During field operations, daily progress reports will be reported through whatever means are available (email, text, phone). Upon completion of the survey all analyzed images as well as a data report with visualizations will be provided.

7.6 Data Analysis

SPI/PV provides an integrated, multi-dimensional view of the benthic and geological condition of seafloor sediments and will support achievement of project goals and objectives. The SPI and PV cameras are state-of-the-art monitoring tools that collect high-resolution imagery over several meters of the seafloor (plan view) and the typically unseen, sediment–water interface (profile) in the shallow seabed. PV images provide a much larger field-of-view than SPI images and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint "optical core" of the sediment profile is taken. Unusual surface sediment layers, textures, or structures detected in any of the sediment profile images can be interpreted considering the larger context of surface sediment features. The scale information provided by the underwater lasers allows accurate density counts or percent cover of attached epifaunal colonies, sediment burrow openings, or larger macrofauna or fish which may have been missed in the sediment profile cross section. A field of view is calculated for each PV image and measurements taken of parameters outlined in the survey workplan.

Seafloor geological and biogenic substrates will be described from SPI/PV using the Coastal and Marine Ecological Standard (CMECS; FGDC, 2012). The Substrate and Biotic components of CMECS will be used to characterize sediments and biota observed. The SPI/PV image analysis approach is superior to benthic infaunal sampling approaches because SPI/PV is more cost effective and more comprehensive. Analysis costs for benthic biological characterization using SPI/PV can be up to 75% lower than those of infaunal abundance counts derived from grab samples. Infaunal abundance assessments provide a limited view of benthic conditions whereas SPI/PV provides a more holistic assessment of the benthos that includes the relationship between infauna and sediments (Germano et al., 2011). Although infaunal abundance values are not generated from SPI/PV analysis, lists of infaunal and epifaunal species observed in SPI/PV images, the percent cover of attached biota visible in PV images, presence of sensitive and invasive species, and the infaunal successional stage (Pearson and Rosenberg, 1978; Rhoads and Germano, 1982; and Rhoads and Boyer, 1982) will be provided as part of the benthic biological assessment. Additionally, the benthic habitat types observed in the SPI/PV survey of the project area will be described. Differences in abiotic and biotic composition of habitats will be compared between pre- and post-construction surveys. In particular composition and total percent cover of attached fauna on the scour mat and changes in benthic community with distance from the scour mat will be evaluated.

7.7 Regional Comparable Datasets

SPI/PV surveys have been conducted for the Block Island, South Fork, Revolution, and Sunrise Wind Farms, and their respective cable routes. A SPI/PV survey was also conducted in Narragansett Bay near the proposed cable landing site for the Baystate Wind Farm. Vineyard Wind has a drop camera survey planned for both of their offshore wind leases. The drop camera survey will be conducted using the methods developed by the UMASS Dartmouth School for Marine Science & Technology (SMAST) as part of a regional sea scallop survey (Bethoney and Stokesbury, 2018). The method has been utilized for other image-based surveys and is appropriate for this use. A camera system is dropped to the seafloor and samples four quadrats at defined stations in an area and captures digital images analogous to the PV images outlined above.

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Subject:	Re: SFW - 2020 Fisheries Monitoring Plan
Date:	Friday, June 12, 2020 2:54:31 PM
Attachments:	2020-06-12_NMFS_Comment Responses_SFWF.xlsx

Melanie,

Thank you for the opportunity to review the South Fork Fisheries Monitoring Plan. The plan has been reviewed by both our Science Center and Regional Office and comments are compiled in the attached spreadsheet. The spreadsheet includes a second tab with a comment response matrix of comments we submitted on previous monitoring plan drafts in December 2018 and July 2019.

While we appreciate the effort you have put into developing this plan, we still have significant overarching concerns with the monitoring plan as proposed. As stated in our previous comments, the plan should clearly state the research question being addressed and the hypotheses being tested, and provide justification for choice of study methodology and design elements. Specifically, justification should be provided for the frequency and duration of sampling, the selection of control sites, distance-based sampling intervals, and sample sizes. The justification should be based on a power analysis of existing data that indicates the target level of power and the detectable effect size given the sample size proposed. The study of cod reproductive stage and spawning condition proposed should be enhanced to provide a fuller picture of the importance of cod spawning on Cox's Ledge for the recently proposed Southern New England stock of Atlantic cod (McBride and Kent Smedbol, in review).

Another point we have raised in past comments is the importance of integrating findings at South Fork with those from other projects in the region. The monitoring plan should describe at minimum how these findings will be incorporated among multiple Orsted projects. A plan for sharing and disseminating the data collected and the study results should also be provided. We are encouraged by Orsted's participation in an emerging ROSA working group that is addressing challenges related to fisheries monitoring at offshore wind farms and is working toward developing standardized and regionally coordinated approaches for monitoring study design, implementation, analysis, and data management.

The effect that wind farm development will have on NMFS long term scientific assessments remains a major concern. It is anticipated that the methodologies used to conduct these assessments will not be operable inside of wind farms as currently designed. The inability to survey within the wind farm will reduce the accuracy and precision of the biological indices derived from these surveys which are essential for informing fisheries management decisions and ecosystem level assessments. Moreover, wind farms are expected to change the variance structure of important variables such that patterns in habitat, abundance, and distribution outside of wind farms will not be representative of that inside of wind farms. This compels a need to develop standardized methodologies across lease areas for sampling inside of wind farms that are comparable with the long term monitoring that occurs outside of wind farms.

As we have discussed, your proposed sampling protocols may pose risks to protected species. Your monitoring plan should include specific mitigation measures that will be taken to minimize protected species interactions for each gear type proposed. Details should also be provided for reporting any interactions with protected species.

We appreciate the opportunity to provide feedback in your development of a fisheries monitoring plan. Please feel free to reach out with any questions.

Thank you!

Sue

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On Mon, May 11, 2020 at 6:35 PM Melanie Gearon <MELGE@orsted.com> wrote:

> Good Afternoon,
>
> South Fork Wind is pleased to send you its Fisheries Research and Monitoring Plan, which will be implemented in 2020. As a result of the helpful and productive comments that South

Fork Wind has received from agencies and stakeholders, this plan now includes: gillnet survey, beam trawl survey, ventless trap lobster survey, ventless fish pot survey, acoustic telemetry, and benthic survey.

On Friday May 22, 2020 from 10:00am to 12:00pm, the South Fork Wind team will host a webinar to walk you through the plan and describe our next steps. We will send an invite shortly and hope you can join us.

Thanks and stay safe!

Best regards,
Melanie Gearon
Project Manager
Permitting
Offshore

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Monitoring Plan Date	Document Section	Comment Number	NMFS Comment
May 2020	General Comment	1	NMFS participated in a number of meetings with Orsted during the development of this monitoring proposal. We had requested that Orsted provide a written response to previous comments on how input had been used or not used in updated monitoring versions. Can Orsted please detail how previous NMFS and other commenters' input have been incorporated into the current plan. This would help address reviewers submitting the same comments through multiple iterations of the monitoring plan.
May 2020	General Comment	2	For the BACI studies (gill net, beam trawl, ventless trap), please describe how control sites will be selected and justified from a biological perspective. The choice of BACI or BAG should be directly related to the research question and hypothesis being examined and the assumptions being made about the spatial-temporal scales of the stressor under consideration. The location of control sites should account for these differences. For example, the spatial and temporal scales of noise impacts will differ from that of wind wakes. Therefore, testing the effects of each of these stressors on fish and habitat requires the use of appropriate spatial and temporal scales of study that match the stressor being investigated.
May 2020	General Comment	3	The monitoring plan should outline any anticipated overlap between the proposed sampling and ongoing G&G activities. Should overlap occur, the plans should discuss the potential impact on biological sampling and how this will be addressed in your studies.
May 2020	General Comment	4	The monitoring plan should provide a clear statement of the goals, hypotheses, assumptions, analyses, and products of these studies. Will any specific stressors such as the following be studied: noise impacts/distance effects; EMF and potential effects on behaviour changes or changes in migratory patterns; Potential effects of habitat change on distribution, abundance, or biological rates at the wind farm scale vs. turbine scale; Effects on pelagic habitat conditions (physical and chemical oceanography) due to wind wake effects on fisheries spatial dynamics (this would involve modeling where these effects may occur and then establishing biological monitoring based on those results).
May 2020	General Comment	5	Justification for the sample sizes proposed should be provided. Please describe any other regional data that could be examined to explore patterns of variance and sample sizes needed to detect changes. For available data sets that are small or limited in scope, consider using a prospective power analysis that uses resampling techniques (e.g., bootstrapping) to amplify the data set or perhaps consider a simulated power analysis. The plan to conduct retrospective power analyses are commendable and encouraged, but the baseline year(s) data are what all subsequent years will be compared to, so if it is possible to gain some insights from existing data to inform sample sizes in year 1, that would be ideal. With respect to the power analyses, please define what amount of change is targeted to be detectable. Note that power analysis is unique to each response variable (e.g., abundance, biomass) because each of these has a specific level of sensitivity to change. Therefore, more than one set of analyses may be needed depending on study design.
May 2020	General Comment	6	Please link each research question to specific statistical methods that are planned. Define the criteria by which you assess a change caused by the wind farm.
May 2020	General Comment	7	We strongly recommend coordination of sampling (e.g., paired sampling) with these different gears so that data can be made comparable among studies. Futhermore, more informative analysis would be possible if sampling is coincidental in time with regional trawl surveys or can be spatially compared with gear selectivity studies.
May 2020	General Comment	8	On a related note, there should be some way to synthesize the findings to all of these studies, particularly in the event that they have divergent outcomes.
May 2020	General Comment	9	For other wind farms that the developer is planning for the region or nearby regions, please describe the vision for how these studies will be made comparable to future studies at other wind farm developments.
May 2020	General Comment	10	Regional fisheries resource surveys will be excluded from the South Fork project areas and all neighboring wind lease areas over time. It is not clear how Orsted intends to address filling these future data gaps with this proposed monitoring plan. Please consider how information from these studies and future monitoring at SFWF and other developments might inform regional population assessments for managed species.
May 2020	General Comment	11	As we go forward and start dealing with larger projects in a regional context, we need to consider the unique South Fork footprint and its unique sampling challenges relative to integration with historical regional trawl surveys (because it is sited on Cox's Ledge), and avoid using it as a template for future monitoring. The SFWF monitoring as proposed is not sufficient to evaluate the resource implications of that project on a regional level. Our comments should be incorporated and the trawl integration problem addressed.

Monitoring Plan Date	Document Section	Comment Number	NMFS Comment
May 2020	General Comment	12	Please provide a clear plan for how these data will be stored, curated, and shared with resource agencies, commercial fishermen, or other stakeholders. Will raw data be accessible or will only reports be accessible.
May 2020	General Comment	13	Research and monitoring plans should also consider fisheries socio-economic and operations impacts. Monitoring fishing community impacts through survey research with fishermen before, during, and after construction (longitudinal study) within the Project area would provide valuable data on a number of socio-economic concerns, including fishing displacement and changes in fishing location and effort for local ports. Conducting these types of surveys could also provide insight on revenue impacts and/or increased conflict over other fishing grounds in support of existing data (e.g. VTR, VMS, landings). For more information on this longitudinal research strategy please follow up for examples. Fisheries operations impacts should also be considered and monitored. Using fine-scale fisheries dependent data from contracted vessels could also provide valuable data on these socio-economic concerns mentioned. We recommend Orsted collaborate with ROSA to develop a regional study to understand these socio-economic impacts across projects.
May 2020	General Comment	14	The monitoring plan should describe what specific measures for each sampling type will be taken to avoid protected species.
May 2020	General Comment	15	If an interaction with a protected species occurs, is there a plan to report interactions and what will be done with potential carcasses? This plan should be provided.
May 2020	General Comment	16	Please clarify how many years before and after construction each of these sampling/experiment types will be carried out.
May 2020	Section 1.0, p. 4, paragraph 1	17	"National register" needs to be changed to "Federal Register"
May 2020	Sections 2.4, 2.5, 3.4, 3.5, 4.4, 4.5, 5.4, 5.5,	18	Complete water column profiles via CTD would be much preferable to surface and bottom sonde readings, as they would provide data for stratification structure. Alterations in the depth of mixing and intensity of thermocline as a result of turbulence created by structures will not be available with the sort of sampling suggested. Surface & bottom only could not distinguish between a warm water column with a thin layer of cold water on the bottom and a cold water column with a thin layer of warm water on top, which are very different habitat conditions as regards many species of fish and crustacens at the least.
May 2020	Sections 2.7, 3.7, and 5.7 Data Analysis	19	For retrospective power analyses, please define your decision criteria for modifying the study. Also please describe the timeline over which these decisions will be made between sampling seasons and/or years.
May 2020	Sections 2.3 Gillnet Methods and 3.3 Beam Trawl Methods	20	Please provide a clear plan for analyzing diet and otolith data.
May 2020	Section 3.2	21	The eastern reference area is not entirely comparable with the survey and western reference areas. There is a large area of muddy sediments in or near the eastern reference area left by an ice-age glacial melt water lake. The last sentence of the first paragraph should address possible incompatibility of bottom types as well as tow track safety by adding that the survey will address both tow track safety and comparability.
May 2020	Section 3.3, paragraph 1	22	The beam trawl tow speed and length should be more flexible rather than depending on someone else's fixed parameters. Develop your own that suit the conditions based on preliminary experiences in the first year.
May 2020	Section 3.3, paragarph 4	23	Identification of juvenile fishes may prove difficult with a broad-area field guide to adult fishes. Suggest you find and bring along more sophisticated identification guides (e.g. Bigelow & Schroeder's Fishes of the Gulf of Maine)
May 2020	Section 4.2 Sampling Stations	24	Please define more clearly the stratification scheme for the ventless trap survey. Note that if the grid cells are the strata, then sampling one aliquot from each stratum will not allow for the calculation of variance attributes. If strata are the areas (reference, wind farm), then this is not a stratified design.
May 2020	Sections 3.4 and 5.4 Hydrographic and Atmospheric Data	25	For hydrographic data, could these data be collected along vertical transects rather than just surface and bottom? Temperature and depth loggers could be attached to fixed gears and provide bottom temp data during the entire duration of the fishing effort - providing more info on species mixing relative to temperature fluctuations.
May 2020	Sections 5.2 and 7.2 Sampling Stations	26	Please clarify how the distances chosen for the BAG studies (Ventless fish pot, SPI) were chosen. For ventless pot, the closest distance the study monitors is 50m. Collecting data closer to the turbines would be valuable because this is where previous studies from Europe suggest the effects on fish abundance are greatest.

Monitoring Plan Date	Document Section	Comment Number	NMFS Comment
May 2020	Section 6.0	27	The Atlantic cod stock structure working group (ACSSWG) is proposing a new biological stock structure for Atlantic cod. The stock structure proposed includes five offshore stocks, one of which is the Southern New England Stock which overlaps the SFWF project area. There is initial genetic evidence that suggests that the Southern New England stock may spawn on Cox's Ledge. Further examination of the importance of spawning in the area of Cox's Ledge for this stock could be accomplished through: 1) Genetic studies: collection of tissue samples from individuals collected in the area that are in spawning condition and/or new or existing archival samples of very early stage larvae; 2) Tagging: Tag more fish in this region in different seasons to get better information on seasonal movements. In particular, while these fish are not known to go east, they are likely to go west (in cool months) and return in summer, which is known from decades ago but confirming this will help allocate catch properly for fish landed off New York and further south (NAFO Division 6); and 3) Interviews with fishermen, particularly the recreational fishermen, for historical, local ecological knowledge. This was a research recommendation of the WG's synthesis and could help put this fishery in context. For more information on this topic, please refer to the current and ongoing work of the ACSSWG. The ACSSWG draft Tech Memo is located here: https://s3.amazonaws.com/nefmc.org/Interdisciplinary-Review-of-Atlantic-Cod-Stock-Structure_200505_090723.pdf Peer Review of this work is located here: https://s3.amazonaws.com/nefmc.org/ACSSWG-Peer-Review-Panel-Report-FINAL-052920.pdf he project can be followed here: https://www.nefmc.org/committees/meetings/scientific-and-statistical-committee
May 2020	Section 7 Habitat - General Comment	28	It is not clear what are the questions/hypotheses that will be tested and how the proposed collected data will be used to address them. While using SPI/PV technology is a good way to capture screenshots of the seafloor, they are limited in both the extent of seafloor that is visualized and the information that can be obtained from them. We would recommend that video transects also be incorporated into your sampling protocols to provide a broader view of the sample stations and that you also consider the use of benthic grab samples.
May 2020	Section 7 Habitat- General Comment	29	The ability of the fisheries monitoring plan to fully evaluate impacts to YOY and smaller juvenile fish is not clear. The abundance and distribution of demersal juvenile fish species may be substantially altered as a result of a different scale of changes to the benthos than larger fish (e.g. the loss of interstitial spaces within cobble habitats through conversion to larger stone scour protection it likely to have a different effect on YOY and smaller juvenile fish species that utilize those spaces as shelter than on larger juveniles and adults). How the proposed fisheries sampling protocols will allow for detections of changes to YOY and smaller juvenile fish species should be discussed and evaluated.
May 2020	Section 7.0	30	The proposed sampling frequency is inadequate. While benthic habitats in this region are generally stable over time, particularly at higher taxonomic group levels, inter-seasonal and inter-annual variations at finer taxonomic group level (e.g. genus and species) can be highly variable. A single sampling event prior to construction will not allow for such variations to be accounted for during analysis and will limit the ability to detect changes as a result of construction versus natural variability over time. Multiple replicates, sample sizes, and sampling over a time series will likely be needed to adequately assess any changes that are a result of wind turbine installation. Multiple studies have been completed looking at changes in benthic community structure that could be used to help inform the expected annual variability of benthic communities within the lease and cable areas. The existing, collected benthic data within the lease area and along the cable route should be used to help evaluate necessary sample sizes and the power to detect changes in benthic communities. The plan includes only one post-construction sampling event within six months of the completion of construction. While it would be expected that there will be an acute impact to benthic habitats from construction, the long term changes to benthic communities that will occur post-construction would not be captured. We recommend multiple post-construction sampling events over time.

Monitoring Plan Date	Document Section	Comment Number	NMFS Comment
May 2020	7.1 Survey Design	31	It is not clear what are being considered as stations, samples, and replicates or how they will be analyzed. For example, the four/three SPI/PV images proposed to be collected at a station location are referred to as replicates versus samples. This would suggest that each station would be considered individually (i.e. the three best SPI/PV images collected at station x would only be used for an assessment of changes at station X). More information should be provided on the proposed study design, including how the SPI/PV images collected at stations located at different wind turbines and along the gradient transects will be treated as samples and replicates. As previously mentioned, existing data should be used to evaluate what sample sizes are necessary to adequately detect changes resulting from the project and addressed in the proposed study design.
May 2020	Section 7.2 - WTG BAG stations	32	Post-construction locations do not include the scour protection area. We recommend that the scour protection area be included in the post construction sampling. While SPI may not be feasible within the scour protection area, still images would be able to be captured and analyzed to evaluate benthic community changes over time. While we appreciate that four transects are proposed along a north, east, south, west orientation at five different wind turbines which could help to capture differences in responses around the turbines, it is not clear what is intended to be captured with this configuration. Are the four transects intended to be used as replicates? We would expect there to be variation in the benthic response based on the location around the turbine, and that this variation could differ from turbine to turbine. We would recommend consideration of replicating stations along each transect (e.g. three stations, with four/three SPI/PV sample images each, at the 15, 24, 50,...meter stratums) to ensure adequate replication and prevent confounding of potential localized spatial effects that may differ between transects.
May 2020	Section 7.3 - Cable Route	33	A BACI design is proposed for the export cable route instead of the BAG design proposed for the lease area. It is understood that there would be issues related to determining a pre-construction sampling transect and re-locating the sample route after construction, due to the lack of physical markers of the pre-construction route. However we believe further consideration should be made to incorporate a BAG design (for example, video and still images could be collected along transect perpendicular to the proposed cable route and the location of the constructed cable corridor could be used to refine the transects post-construction). We appreciate that areas supporting high scallop resources will be targeted for sampling along the cable corridor, but sampling stations locations should also be selected (and analyzed) based on habitat type along the cable corridor. This will help ensure each habitat type is adequately sampled.
May 2020	Section 7.6 Data Analysis	34	The sampling design and proposed analyses are not clear. It is stated that “lists of infaunal and epifaunal species observed in SPI/PV images, the percent cover of attached biota visible in PV images, presence of sensitive and invasive species, and the infaunal successional stage will be provided as part of the benthic biological assessment,” but it is not clear what analyses would be completed nor what specific parameters/criteria will be collected from SPI and PV images. For example, what is intended by (and for analysis of) lists of infaunal and epifaunal species, and will the percent cover of attached biota be assessed for each individual species, taxonomic group, or for all taxa combined? More specificity on the intended data to be collected from the images and proposed analyses should be provided. Further, while the rationale for not estimating abundances from SPI is clear, evaluation of the relative abundance of species within PV images should be feasible. Incorporation of measures such as the abundance of individual taxa allow for the analysis of changes to the benthic communities. Presence/absence data provides valuable information, but has substantial limitations for detecting changes to benthic communities and assemblages. For example, a benthic community could experience a significant shift in its community structure while still retaining each individual taxa, which presence/absence data would not be able to capture. We recommend the data to be collected from images include criteria that will allow for evaluation of changes that may occur with benthic community assemblages.

	Addressed
	Partially addressed
	Not addressed

Monitoring Plan Date	Document Section	Order	NMFS Comment	How Comment is Addressed in May 2020 Monitoring Plan	Addressed (1=not or partially addressed; 0=addressed)
6/13/19	1.0 Introduction	1	The introduction is generally good; particularly like the inclusion of "guiding principals"	Addressed	0
6/13/19	1.0 Introduction	2	A beam trawl survey as the second method is a good compromise when weighing the need for representative demersal catches against the issue of difficult bottom topography for otter trawl nets.	Addressed	0
6/13/19	1.0 Introduction	3	Acknowledgement of strength of multiple sampling methods (last paragraph) is good, but even this combination has weaknesses that should be acknowledged. You won't catch much pelagic fauna: squids, butterfish, Atl. & round herring in the MA-RI Wind Energy area are numerically important, but easily escape large mess gill nets and slow-moving beam trawls. This should be ackowledged.	Not addressed. No discussion provided on pelagic species in Current version.	1
6/13/19	1.0 Introduction	4	#3 in list in 1st paragraph: the data being collected do not only address "taxonomic composition", but also numerical abundance and biomass; that should be stated	Partially addressed. Current version added "relative abundance" to this sentence but not "biomass".	1
6/13/19	1.0 Introduction	5	Paragraph 1: There needs to be a clear statement as to the purpose of this program: is it a once-and-done assessment or is it a program to monitor effects for some extended period? It is not clear from the rest of the document which it is.	Not addressed. The Current version indicates that sampling will occur before and after construction, but the number of pre and post years is not explictly stated. One exception is the Fish pot study for which it is stated that, "Sampling will take place once per month from April through October for two years prior to the start of construction."	1
6/13/19	1.0 Introduction	6	Paragraph 2: "national register" should be changed to "Federal Register" It would be helpful to include e-links to this and other documents mentioned here.	Not addressed. The term "national register" is used in the Current version.	1
6/13/19	1.0 Introduction	7	There needs to be a clarification on how sampling is going to be done in time and how that relates to analysis and reporting. How many times will sampling be conducted and at what intervals? BACI design assumes there will be before and after sampling and there is mention of during construction as well, but will there be any extended monitoring program to detect slow-developing effects? When will reports be made? A Gantt chart to suggest the conduct of the entire project would be useful. The Gantt chart provided (Fig. 2) is inadequate: it seems to indicate seasonal gill netting, but continuous beam trawling (year round) and does not address the issue of how many times over what period the entire project is planned.	Not addressed. The current version provides some detail on the number of months per gear type. However the number of years and how data will be analyzed are not clearly explained. Reporting periodictiy is provided for some gear types. In the Current Version this text appears for the Gillnet, Beam trawl, and Ventless pot studies: "Annual reports containing catch data will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. One final report will also be produced synthesizing the findings of the pre- and post-construction evaluations."	1

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6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet AND 3.0 Demersal Fisheries Resources Survey – Beam Trawl	8	Gill net and beam trawl sites will be placed randomly for each survey…that's necessary for statistical validity…but with some concessions to commercial fishing activity, poor setting, and untrawlable conditions: understandable. Thus this is a randomized unstratified BACI sampling design. However, there is a problem with that in this case. While the limits of project area in human terms is set to encompass the placement patterns for the turbines plus a buffer to accommodate construction activity, we cannot assume that the biological effects will follow the same system of boundaries. Previous experience in Europe has indicated that there are measureable effects, but they are largely confined to a limited radius (300 m) from turbine foundations. Fifteen 300 m – radius circles within South Fork would occupy about 4 sq km, or ~6% of the area of the wind farm (est.72 sq km). Under these conditions, an unstratified random sampling pattern within South Fork would have only a 6% chance of encountering an effect, even a very large one. A sampling program utilizing only 3 samples (gill net sets or beam trawls) per treatment would have only a small chance of "hitting" a measurably affected area, even if the effects were very large within those small areas. If the small areas around the turbines would support 10X the number of black sea bass per unit area than the rest of the farm (not unreasonable), the output for the entire farm would increase by 1.5X, but that would remain undetected because the unstratified random sampling program would likely miss sampling it. In other words, this could be a sampling scheme guaranteed to find no effect.	Not addressed. In the Current version, there is no justification for the number of samples proposed, nor a discussion of statistical power to detect changes. For the Gillnet study and the Beam trawl study, distance from the turbines is not included in the design. Some of the additional gear types that were added (Fish pot and Benthic survey) propose a distance-gradient sampling design.	1
6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet AND 3.0 Demersal Fisheries Resources Survey – Beam Trawl	9	One possible solution might be to create a stratified random sampling program in which the strata are determined by distance from turbine foundations. The simplest case would be two strata: one stratum with sampling sites within 300 m or some other distance considered appropriate, and one with sites outside 300 m or another appropriate distance. This could preserve the BACI design, but have a better chance of capturing any highly measureable effects of limited areal extent. This would involve additional sampling to cover the strata.	Partially addressed. In Current version, a distance-gradient sampling design is proposed for the Fish pot and Benthic survey. However, the station selection for Gillnet will follow simple random; the Ventless trap will use stratified random,; the Beam trawl stations will be chosen systematically based on input from fishermen.	1
6/13/19	2.1.4 Hydrographic and Atmospheric Data	11	The Hydrographic/Atmospheric data collection programs are adequate, though they provide only snapshots of conditions during sampling excursions. The descriptions of data handling and analysis appear adequate.	Addressed.	0
6/13/19	3.0 Demersal Fisheries Resources Survey – Beam Trawl	12	Reference areas used to compare with the survey areas are located in an existing lease area that may be used to site other wind turbines. Therefore, they are not appropriate as controls for a BACI design.	Addressed. Figure 3 in Current version indicates both references sites are now located outside of the lease area.	0

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6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet AND 3.0 Demersal Fisheries Resources Survey – Beam Trawl	13	The duration of sampling is not specified in this draft plan. We cannot determine if sufficient sampling will occur after construction has been completed to assess whether the sampling design is sufficient to conduct a BACI approach.	Not addressed. The number of years that sampling will occur after construction is not explicitly stated.	1
6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet AND 3.0 Demersal Fisheries Resources Survey – Beam Trawl	14	The plan notes that lobster traps are in the area, but does not include any ventless trap survey to assess impacts to lobsters and crabs. This should be included to monitor and fully evaluate potential impacts of this project.	Addressed. The Current version includes a ventless trap survey for lobster and crab.	0
6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet	15	The sample size needed to assess cod spawning condition is undefined and should be specified in this report. As written, an unlimited number of cod could be sampled.	Not addressed. In Current version, sample size to be used for cod spawning is not specified. Two citations are provided for methods: Burnett et al. (1989) and O'Brien et al. (1993).	1
6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet	16	It is not clear in the description of the proposed study design's location conditions (#2) how the "area of influence" will be determined and measured for establishing reference areas. It should be clarified how the area of influence is determined - whether it is by the extent of scour protection around turbine bases, or by the detection of sound/EMF in the water column. This is also confusing because the reference areas must also be comparible in terms of current, habitat and depth, which are addiitonal factors that complicate the selection of reference sites if the "area of influence" is not well defined.	Not addressed.	1
6/13/19	2.0 Demersal Fisheries Resources Survey - Gillnet AND 3.0 Demersal Fisheries Resources Survey – Beam Trawl	17	Both gillnets and trawl sampling methods pose risks to protected species, including critically endangered North Atlantic right whales. Additionally, right whales occur in the proposed sampling areas in the spring and fall periods identified for the gillnet gear. Effects to listed species (large whales, sea turtles, Atlantic sturgeon) should be considered before any sampling occurs and measures to avoid, minimize and monitor effects should be incorporated into study plans. South Fork should ensure that any necessary ESA and MMPA authorizations/consultations are completed before sampling occurs.	Not addressed.	1
6/13/19	N/A	18	The stated goal of the proposed plan is to assess commercially and recreationally important demersal fish species. However, as there are other resources that should be monitored. We would expect monitoring to include studies on changes and impacts to benthic species; benthic habitat; HAPC and EFH; pelagic species; and pelagic habitat.	Partially addressed. In Current version, there is now a benthic habitat component that includes Sediment Profile Imaging/Plan View and Video. Pelagic species and pelagic habitat are not addressed in Current version.	1
12/14/19	General Comment	1	First, we have questions on the gear type proposed and the target species identified for the survey. While gillnets may be optimized for capturing monkfish, they may not be effective for other important demersal species. The target species identified for the project focus on the New England fish complex and is not representative of all the species that are likely to occur in and around the project area.	Not addressed. The table of target species in the earlier draft is no longer in the monitoring plan. In the Current version, the Gillnet Survey is targeted toward monkfish and winter skate. Other gear types are proposed in the Current version that could potentially address this comment but regional associations of these fish species are not explicitly stated in the text.	1

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12/14/19	General Comment	2	The duration of the survey (1 year pre- and 2 years post construction) is limited and may not provide enough data to quantify impacts of construction. The duration of the survey may depend on what the survey is attempting to quantify. For example, is it abundance in the specific area or overall impacts to demersal fish abundance from the wind farm? These are two different questions and the latter would require long-term monitoring surveys to answer the question. Furthermore, detecting spatial shifts or impacts on migratory pattern in species, and seasonal availability to local ports, will be difficult to answer at a small scale. It is important to design a study that can be calibrated with existing federal trawl surveys to allow for comparison with existing long-term data sets. We would encourage you to continue working with our agency as you finalize the designs for this survey.	Not addressed. In the Current version, the pre and post construction duration (i.e., number of years) of the studies is not explicitly stated. There is also no discussion about calibrating with existing federal trawl surveys.	1
12/14/19	1.1 Introduction	3	This section should include a statement of the reason for conducting this study, its goals, and the questions addressed. It is not clear to which organizations and agencies the first paragraph refers - the agencies should be listed.	Not addressed. Questions, hypotheses, and goals are not well defined. There are several stressors (e.g., EMF, sound, habitat modification, wind wakes, etc.) associated with OSW and none of these are being studied explicitly. Initial: "The Survey will help establish pre-construction baseline community composition and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance during and after construction. " Current: "These surveys will provide data that can be used to evaluate: 1. Commercially and recreationally important species that utilize the area in and around the SFW site.; 2. The seasonal timing of the occurrence of these species.; 3. Whether the taxonomic composition or relative abundance of fish and invertebrate assemblages change between the pre-construction and post-construction time periods."; Also, the agencies are not listed as requested.	1
12/14/19	2.1 Demersal Fisheries Resources Survey	4	This section is quite vague and does not clarify the intent of this study. Everything proposed should flow from what the purpose, objectives, and questions this monitoring is focused on. In addition, this statement should include aspects beyond just presence, absence, and abundance, including fish condition and reproduction.	Not addressed. Questions, hypotheses, and goals are not well defined. There are several stressors (e.g., EMF, sound, habitat modification, wind wakes, etc.) associated with OSW and none of these are being studied explicitly. Initial: "The Survey will help establish pre-construction baseline community composition and may be used to assess whether detectable shifts occur in fish presence, absence, or abundance during and after construction. " Current: "These surveys will provide data that can be used to evaluate: 1. Commercially and recreationally important species that utilize the area in and around the SFW site.; 2. The seasonal timing of the occurrence of these species.; 3. Whether the taxonomic composition or relative abundance of fish and invertebrate assemblages change between the pre-construction and post-construction time periods."	1

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12/14/19	2.2 Rationale	5	We concur that minimal trawl effort exists within this area, but what has been done should not be ignored as it provides background coverage in space and time that the proposed monitoring program cannot cover. The NEFSC has completed trawl surveys in this area, as illustrated by the figure below.	Not addressed. Although there is some indication that existing data were examined, it is not clear how this information informed the current design. This text appears in the Current version: "Through extensive outreach efforts with the fishing community, feedback from state and federal agencies, and exploration of existing datasets, the DWSF team has developed survey designs using multiple sampling gears to acquire pre-construction data on the abundance, demographics, and composition of species that occur in and around the SFW site. In particular, the surveys have been designed to utilize sampling gear that can be fished effectively, and with limited impact, on the complex, rocky habitat within the SFW site(Thomsen et al., 2010; Malek, 2015)." Also in the Current version: "However, comparison of this gillnet survey data to other pre-construction fishery independent sampling efforts (e.g., nearby federal Northeast Area Monitoring and Assessment Program [NEAMAP]and NEFSC bottom trawl survey stations) may be limited due to the differences in the selectivity and catch rates of the disparate gear types."	1
12/14/19	2.2 Rationale	6	It is not clear why only one gear type is being considered. While gill net fishing makes sense for the SFWF area in providing intensive data in an area where bottom trawling is difficult, it does have some downsides. Gillnets optimized for catching monkfish may not be effective on other demersal species. Gillnetting may or may not capture squid, crab and lobster resources or small juvenile cod and black sea bass that are specialized for utilizing certain rough-bottom habitats. It is not useful for assessing effects on bivalves, including sea scallops, which are known to be in the vicinity. Additional gear types for sampling should also be considered.	Addressed. Multiple gear types are proposed in the Current version.	0
12/14/19	2.2 Rationale	7	Since existing databases are largely populated with bottom trawl data, we recommend at a limited number of stations where gill net and trawl gear data are collected simultaneously, you make a comparison or calibrate gill net results. This will also make the results amenable to comparison with existing trawl data and across wind energy areas. Without any possibility of associating results in this study with the larger database, this becomes an isolated "black box" study where you can see the input (initial fishery abundance and wind farm installations) and output (resulting fishery abundance). It provides little extra data to begin to look for causes or connect it with a larger regional picture. We recommend these studies be designed to allow for comparison with existing survey data.	Not addressed. The Current version does not propose any simultaneous paired sampling.	1
12/14/19	2.3.1 Proposed Sampling Stations	8	It will be difficult, if not impossible to examine the choices for sampling areas without review of the high-resolution geophysical data collected for the project. We request that you provided us with the geophysical data so we can provide input into the proposed sampling stations.	Not addressed. In the Current version, there is no indication that the high resolution geophysical data will be shared.	1

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12/14/19	2.3.1 Proposed Sampling Stations	9	Biological sampling should be consistent with 'regional' surveys so comparisons to regional trends are valid. Priority species should be sampled in the same manner (e.g. length, weight, sex, maturity, age sample) and protocol (i.e. numbers per cm size bins) to compare fish condition and spawning, or potential different habitat use by size/age.	Partially addressed, In the Current version, the biological sampling during the Gillnet and Beam Trawl studies will follow methods of NEAMAP; Ventless sampling will follow ASMFC and SNECVTS ventless trap surveys; and all reproductive sampling cites methods in Burnett et al. (1989) and O'Brien et al. (1993). Precision levels are not addressed.	1
12/14/19	2.3.2 Gillnet Methods	10	While the SFWF is well outside the NEAMAP coverage, this area is within the NEFSC trawl survey coverage. While comparison may be limited, it certainly needs to be done and, therefore, simultaneous sampling via gill net and trawl is recommended. This will also be effective in sampling multiple species at different life stages.	Not addressed. In the Current version, there is no plan for simulteneous paired sampling.	1
12/14/19	2.3.2 Gillnet Methods	11	Gillnet sampling should include an analysis of gillnet observations and characteristics of the soak duration, targets, and catches in order to be compared with the gill net catch data collected by fisheries observers. The design should provide sufficient observations to answer the pertinent questions. Part of this should include the description of the gillnet (as in, sink nets or floating nets, anchored or drift nets) and more detailed explanation of survey methods. For example, for the soak procedure, is the 16 hour standard soak time described starting regardless of time of day, or is it an overnight set? If the 16-hour soak time was determined in order to maximize catch and based on commercial catch, is fish condition a priority? Will the catch be retained by cooperating fishermen?	Partially addressed. Current version: "Each gillnet string will consist of six, 300-ft net panels of 12-inch mesh with a hanging ratio of 1/2 (50%) and using net tie-downs." Soak times changed from 16 hrs in the earlier version to 48 hrs in the Current version. In the Current version: "The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), to minimize depredation of catch, and to improve the logistics of the survey." It is not stated whether catch will be retained by cooperating fishermen.	1
12/14/19	2.3.2 Gillnet Methods	12	The mesh size protocol as described may not adequately capture effects on species that are affected, but are not caught (as in smaller than the 5" mesh will catch).	Not addressed. In the Current version, a single mesh size of 12" inches is proposed.	1
12/14/19	2.3.2 Gillnet Methods	13	The number of samples proposed (for three fixed habitat stations, within two areas within the lease site and one outside control, a total of nine stations, once per season (assuming four seasons) would total 36 observations. In comparison many gear studies use paired trawls or paired gillnets, and we suggest the survey designers conduct an appropriate power analysis to determine the number of samples and soak times necessary to observe an affect. Spatial scale is simply not appropriate given the size of the lease sites and cumulative impacts. An immediate evaluation of soak times might help inform soak duration decisions. Similar analyses were conducted relative to the design of the ventless trap survey for scup and seabass that was an earlier cooperative research activity under Mid-Atlantic Research Set Asides (RSA) and Northeast Cooperative Research Program (NCRP) funding.	Partially addressed. There is text in the Current version that indicates that a power analysis was done with existing data, however no details of this analysis or its findings are shared. In Current version: "A power analysis was conducted using data from Malek (2015). These data provided approximate estimates of spatial variability in total abundance among independent tows, but the level of replication over time was insufficient to estimate temporal variability at the scale needed for the power analysis (Read, 2019)." There is no justification of spatial scale selected. Soak times appear to have been informed by fishermen: ""The standard soak time of approximately 48 hours is proposed after input from industry, to maximize catch and standardize catch rates, while also ensuring the gear fishes properly during the soak (i.e., not collapsed from saturation), to minimize depredation of catch, and to improve the logistics of the survey." It is not stated whether catch will be retained by cooperating fishermen.	1

Monitoring Plan Date	Document Section	Order	NMFS Comment	How Comment is Addressed in May 2020 Monitoring Plan	Addressed (1=not or partially addressed; 0=addressed)
12/14/19	2.3.2 Gillnet Methods	14	Justification for the timeline and schedule should be included, and clarification if “seasonal” means four times each year, three months apart. In addition, with only one year of data prior to construction, there is no way to control for inter-annual variability unrelated to the construction activity. This is an additional reason to plan protocol to make surveys comparable to existing datasets.	Partially addressed. Current version: ""Sampling will take place twice per month from April-June and again from October-December. These months see the majority of commercial gillnet activity as monkfish and skates migrate through the area in spring and fall. Sampling in July-September will not occur in order to minimize interactions with protected species (e.g., large whales, sea turtles) and to reduce the likelihood of gear damage that can occur during the seasonal migration of spiny dogfish and larger shark species through the area." In the Current version, there is no explanation or justification for the number of years of pre or post construction sampling.	1
12/14/19	2.3.2 Gillnet Methods	15	The last paragraph in this section refers to sub-sampling procedures - these should be described or referenced.	Not addressed for Gillnet study. In the Current version, the potential for subsampling mentioned for Gillnet, Ventless Trap, and Fish Pot Studies but no protocols defined. Some citations are provided on subsampling in the Beam Trawl study in current version: "In the case of larger catches (e.g., >900 kg), one or multiple subsampling procedures may be used. Subsampling protocols for the beam trawl are adapted from the subsampling procedures of the NEAMAP survey (Bonzek et al., 2008). The decision of which subsampling protocol, or protocols, to use will be at the discretion of the chief biologist."	1
12/14/19	2.3.2 Gillnet Methods	16	Recommend the sampling approach follow the NOAA trawl surveys since this project area overlaps with NOAA survey strata. Match the sampling protocols to those used for NEAMAP and NEFSC Bottom Trawl Survey, so that relevant comparisons are possible. Specifically, recording individual lengths, weights, sex, maturity, and potentially ages. Individual weights will be necessary to evaluate relative condition, which may be sex and maturity stage dependent (thus the need to determine those as well). Aim for individual weights at the 0.5-1 g resolution, as done on surveys with motion compensated balances.	Partially addressed. In Current version, the biological sampling during the Gillnet and Beam Trawl studies will follow methods of NEAMAP; Ventless sampling will follow ASMFC and SNECVTS ventless trap surveys; and all reproductive sampling cites methods in Burnett et al. (1989) and O’Brien et al. (1993). Precision levels are not addressed. There is no indication in the Current version that sampling will follow the NOAA trawl surveys.	1
12/14/19	2.3.2 Gillnet Methods	17	Regarding measurements of sharks and rays, the NEFSC measures total length (TL) for skates, and disc width for rays. VIMS (and now NEAMAP) have a history of measuring pre-caudal lengths. The NEFSC shark longline survey measures over the body fork length as well as straightline for comparison to other studies. The longline survey also measures TL in natural position, the same two ways. In a dogfish reproduction study, NEFSC measured FL, natural and stretched TL. For skates and rays, suggest measuring both disc width and total length. If you must pick a single measurement pre-caudal is not appropriate. Thus to correspond to most studies and enforcement you should take straightline FL. For dogfish take stretched straightline TL for comparison to the NEFSC trawl survey. In general, we recommend working with the Apex Predators group at Narragansett Lab for guidance on protocols from their surveys.	Addressed. Current verison of the Gillnet study and Beam trawl study: Fork length is recorded for all fishes with a forked tail. Total length is measured for all other fishes. Exceptions: Total length will be measured for skates; disc width will be measured for rays; stretched total length for dogfish; straight-line fork length for sharks. No indication that the Apex group at the Narragansett Lab was contacted.	0

Monitoring Plan Date	Document Section	Order	NMFS Comment	How Comment is Addressed in May 2020 Monitoring Plan	Addressed (1=not or partially addressed; 0=addressed)
12/14/19	2.3.2 Gillnet Methods	18	This section should also provide protocols for lobsters, crabs, squid and scallops if there is anticipation of catching these species.	Addressed. Current version: "...crabs (carapace width), lobsters (carapace length), and squids (mantle length)". No mention of scallop protocols for Gillnet survey. Protocols also provided for lobster, crab, squid, and scallop when caught in beam trawl; and for lobster and crab caught in ventless trap survey.	0
12/14/19	2.3.3 Atlantic cod reproductive stage	19	More details should be provided on cod maturity portion of the proposed study plan. The purpose and objective of this section is not clear (e.g. Is this an attempt to document cod spawning in the area or determine if the wind farm impacts cod maturity?). More information should be provided so we can provide better feedback on this aspect of the study.	Not addressed. The Current version does not provide a clear purpose and objective for the cod maturity study.	1
12/14/19	2.3.3 Atlantic cod reproductive stage	20	Measurements should include length (+/- 0.5 cm) and weight (+/- 0.5 g); the weight of dissected gonads should be record to 0.5 g precision as well.	Not addressed.	1
12/14/19	2.3.3 Atlantic cod reproductive stage	21	A major problem with macroscopic maturity classification is the lack of a physical sample to revisit later (unlike age samples). Photos can help somewhat, but it is very easy to take a lot of terrible and useless photos at sea. If samples are taken from gonads, preserved, and processed for histology, these can serve as definitive diagnosis of reproductive condition, and also serve as an archive-able sample to be revisited as needed, shared with experts for agreement/confirmation, etc. Histology adds costs, but given expected low occurrence of cod in the area, this wouldn't be too large of a burden, and would provide the most accurate diagnosis.	Not addressed. In the Current version, there is no explicit statement indicating that physical samples of gonads will be collected and preserved.	1
12/14/19	2.4 Potential Demersal Species Catch	22	The list in Table 2 seems to "target" species that are commercially and recreationally caught in the SFWF area and certain important permitted fisheries. Based on NEFSC trawl survey data, the most abundant catch species within the RI WEA between 2003 and 2006 were longfin squid, scup, butterfish, and round herring (#1-4 in Fall), and Atlantic herring (#1 in Spring). None of these appear in this list. Only Northeast and Small-Mesh Multispecies, Monkfish, and Spiny Dogfish, and skate FMPs are mentioned. It is not clear why some species on the list have "NA" under the FMP/Permit column. Black sea bass is actually under the MAFMC Summer Flounder, Scup & Black Seabass FMP, tautog and American lobster are managed by the ASMFC via the states. It is not clear how these target species were selected, but this list appears very slanted toward certain New England fisheries and ignores others that could be important, particularly outside or adjacent to the project boundary. If this study only focuses on species fished within the SFWF project boundary, it could mask the true impact of this wind farm on the larger ecosystem by regarding only those species of commercial value within the project boundary.	Not addressed. The table of species that this comment refered to is no longer in the monitoring plan. In the Current version, the Gillnet Survey is targeted toward monkfish and winter skate. Other gear types are proposed in the Current version that could potentially address this comment but regional associations of these fish species are not explicitly stated in the text.	1

31	# of Comments Remaining to be addressed in part or in whole	79%
39	Total Number of Comments	

Brian Gervelis

From: Ford, Kathryn (FWE) <kathryn.ford@state.ma.us>
Sent: Wednesday, June 24, 2020 7:50 AM
To: Susan Tuxbury - NOAA Federal; Melanie Gearon
Cc: Engler, Lisa (ENV); Boeri, Robert (ENV); Callaghan, Todd (ENV); Pol, Mike (FWE); annie@rodafisheries.org; lyndie@rosascience.org; andrew.lipsky@noaa.gov; Sharon Benjamin - NOAA Affiliate; Julie Crocker - NOAA Federal; ursula.howson@boem.gov; Ryan Silva; douglas.christel@noaa.gov; Nick Sisson - NOAA Affiliate; Christopher.Boelke@noaa.gov; wendy.gabriel@noaa.gov; Gregory.Lampman@nyserda.ny.gov; mbachman@nefmc.org; David Beutel; Grover Fugate; James Boyd; Jeff Willis; McLean, Laura (DOS); Maraglio, Matthew (DOS); Gaidasz, Karen M (DEC); Maniscalco, John D (DEC); Davis, Andrew (DPS); McNamee, Jason (DEM; Julia Livermore; Brian Hooker; Boatman, Mary; Stromberg, Jessica; Peter.Aarrestad@ct.gov; Handell, Naomi J CIV USARMY CENAN (US); Stephanie Wilson; Liz Gowell; Sophie Hartfield Lewis; John O'Keeffe; Rodney Avila; Ross Pearsall; Robert Soden; Robert Mastria; Main, Robin L.; Brian Gervelis; Drew Carey; Gregory DeCelles; Jennifer Garvey; Julia Prince; Berg, James; Mark Gardella, external user; Elizabeth Methratta - NOAA Affiliate; Alison Verkade - NOAA Federal; Vincent Guida - NOAA Federal; Logan, John (FWE); Pol, Mike (FWE); Pugh, Tracy (FWE); Burke, Erin (FWE); Whitmore, Kelly (FWE); Griffin, Melanie (FWE); McKiernan, Dan (FWE); Bruce Carlisle; Brunbauer, Morgan A (NYSERDA)
Subject: RE: SFW - 2020 Fisheries Monitoring Plan
Attachments: DMF to SFW fisheries survey 6-24-20 with attachment.pdf

Melanie,

Thank you for the opportunity to review the South Fork Wind Fisheries Research and Monitoring Plan. Attached are Mass DMF's comments. Regards, Kathryn Ford

On Mon, May 11, 2020 at 6:35 PM Melanie Gearon <MELGE@orsted.com> wrote:

> Good Afternoon,
>
> South Fork Wind is pleased to send you its Fisheries Research and Monitoring Plan, which will be implemented in 2020. As a result of the helpful and productive comments that South Fork Wind has received from agencies and stakeholders, this plan now includes: gillnet survey, beam trawl survey, ventless trap lobster survey, ventless fish pot survey, acoustic telemetry, and benthic survey.
>
> On Friday May 22, 2020 from 10:00am to 12:00pm, the South Fork Wind team will host a webinar to walk you through the plan and describe our next steps. We will send an invite shortly and hope you can join us.
>
> Thanks and stay safe!
>
> Best regards,
> Melanie Gearon
> Project Manager
> Permitting
> Offshore

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Ms. Melanie Gearon
Manager, Permitting and Environmental Affairs
South Fork Wind Farm
56 Exchange Terrace
Providence, RI 02903

June 24, 2020

Dear Ms. Gearon,
The Massachusetts Division of Marine Fisheries (MA DMF) has reviewed the document "South Fork Wind Fisheries Research and Monitoring Plan May 2020." This document is the third draft of the SFW fisheries studies. In addition to detailed comments for the previous two drafts, we also met with SFW in November 2019 and May 2020 to discuss the plan.

The purpose of the fisheries survey is "to acquire pre-construction data on the abundance, demographics, and composition of species that occur in and around the SFW site" (page 3). The survey data are also being collected to evaluate "timing of species occurrence" and whether the "composition or relative abundance of fish and invertebrate assemblages change between the pre-construction and post-construction time periods" (page 4). "The proposed survey designs in this plan are not exhaustive but will form a basis for fisheries monitoring in the SFW site" (page 3).

DMF strongly recommends reorienting your monitoring plan around the questions being asked. DMF has requested that SFW be clear in the purpose and objective of each study. There has been some attempt at that, but the effort still falls short of making it clear what questions are being asked and how the proposed studies will answer those questions. The only question that weaves its way through each methodological section presented in this plan is comparison of results before and after construction. Instead of asking a question, and then identifying the method(s) with which to answer that question, this fisheries monitoring plan provides a list of methodologies that will be deployed. This approach could result in data-rich-information-poor studies that European colleagues have warned of (Wilding et al. 2017).

- ➔ For example, if "timing of species occurrence" is a question, is it timing of all species or are there target species? Why are they being targeted? If so, some sampling frequencies may not be sufficient to address the question.

- ➔ What data sets will be used to identify areas within the project site that should be avoided or otherwise protected from development?
- ➔ The primary objectives in each specific section focus heavily on pre, during, and post-construction monitoring, which pose different questions than site characterization and therefore may require different methods to answer those questions.

Attached to this letter is a Draft example of how a fishery monitoring plan could better address DMF's concerns.

The SFW site is on a hard bottom region known as Cox Ledge, which is a geomporphic feature unique on the eastern seaboard. Therefore, there are specific questions unique to this site that need to be identified and addressed. Below are listed a few potential questions.

- ➔ Site characterization and pre-construction studies should focus on identifying important resources, unique or vulnerable resources, and areas to be avoided
    - o Cod spawning timing, location, and sensitivity to sound
    - o Cod abundance
    - o Monkfish, lobster, crab migration/spatial distribution through the area
    - o Number and types of fishing trips in the area
    - o Hard bottom areas with epiphtyic growth including denser stands of algae, presence of coral
- ➔ Impact assessment studies should focus on the extent and duration of foreseeable, anticipated, or potential impacts. Measured impacts can then lead to impact minimization through adaptive management and mitigation.
    - o What are sound, turbidity, or vibration impacts of construction
    - o Impact extents – how far away is effect seen in benthos, fish community
    - o Do monkfish/skates start eating different things?
    - o Black sea bass/reef effect – do you see an increase in BSB
    - o Change in number of juveniles associated with artificial vs natural hard bottoms
    - o Invasive species on turbines
    - o Shellfish on turbines
    - o Testing habitat value of different scour protection types
    - o Change in number and/or types of fishing trips in the wind farm area

The proposed plan does not address economic valuation or impact assessment to commercial fishermen. The site characterization of the project area would benefit from descriptions of fishing activities and relevant fisheries management, such as spatial regulations, in the area.

DMF recommends an annual report period to summarize activities and findings instead of separate report periods based on the methodology. In the annual report, raw and processed data products should be included. Ørsted should continue to communicate with fisheries stakeholders to provide relevant information as data needs are identified and become more standardized over time. The annual report period should include outreach with stakeholders, which may be useful to define now (e.g. annual presentation to RI FAB and MA FWG).

Specific comments on the methodological sections are listed in order of how they were presented in the plan. Generally speaking, DMF has concerns about the number of samples for all proposed studies, and whether the sampling designs are sufficient to measure change. It is fairly common for projects in information-poor areas to "oversample" in the first year or two, in order to better understand the variability of the data being collected and determine the amount of change that can be detected with various sampling designs. As proposed, the first sampling year would function more as a pilot study in which sample size adequacy would be determined post-sampling. If initial sampling effort was determined to be inadequate, the initial sampling year would be of limited use. We recommend an oversampling approach be taken here. The greater investment in year 1 sampling will help ensure that the overall design and sampling effort provides sufficient data to detect changes post-construction. Also, every study should indicate the number of sampling years anticipated, before, during, and after construction.

MA DMF is also concerned about reference site selection across all proposed BACI studies. The draft monitoring plan describes consultation with regional stakeholders to ensure that reference sites "are still utilized by the same/similar fish populations" (page 6) but does not provide any quantitative data (e.g., pilot sampling, previous biological surveys of the region) to support the use of the proposed reference regions. In addition to sharing similar abiotic characteristics, the reference sites should have similar species composition and abundance to the wind energy area to provide appropriate comparisons.

Comments on the individual sections are provided below.

Gillnet study
Less detail in gillnet section regarding data elements. Better level of detail in beam trawl/ventless studies. Please be more consistent.

Beam trawl
Differences in detail between gillnet and beam trawl studies with respect to data elements. Please be more consistent.

Ventless Trap Survey
The ventless trap survey is clear on what demographic measures are being collected. The survey section states that it "may" be used to assess post-construction impacts. Then it goes on to say "this survey will quantify pre-construction data for lobster in the SFW site such that changes in the resource due to construction and operation of the wind farm can be evaluated" (page 12). Similar to the fish species being targeted by the fish pot survey (black sea bass, scup, and tautog), lobsters and Jonah crab distribution and abundance will also likely be impacted by the turbines and surrounding scour protection habitat. The ventless trap survey design should anticipate this post-construction impact by considering lobster and Jonah crab abundance in relation to turbine proximity. This could potentially be accomplished using the same Before-

After-Gradient (BAG) design proposed for the fish pot survey, preferably with accompanying benthic habitat data.

Fish Pot Survey

Is this survey selecting 6 turbines randomly, and then sampling those 6 for multiple years, or is it selecting 6 new turbines every year?

How vulnerable is this survey to changes in where the turbines end up? The strings are proposed to radiate out approximately 1,150 m (~ 0.7 miles) from each turbine. The rationale for the proposed length should be described in more detail. The area nearest the turbines will likely have increased abundance of the structure-seeking demersal species post-construction, but it is important to understand if the overall abundance of these species increases in the wind area or whether existing fish instead just aggregate near the structures. To assess this difference, adequate sampling of areas representative of the remaining, undeveloped regions of the wind area are needed for comparison. The strings should cover a sufficient distance from the turbines to represent the broader, unaltered habitat within the wind area. Relatedly, surveying only six turbines may be inadequate for characterizing the full wind area, particularly if there is variability in depth and/or natural sediment characteristics across turbines.

Acoustic survey

This section proposes to provide additional funding for ongoing studies. Very little detail is provided and several times it was stated that the work “may” be done. We strongly recommend more concretely describing acoustic telemetry work and how it may benefit or be combined with other sampling activities. Will receivers be out full time in the wind farm post-construction? Will they be directly attached to the turbines? Will shadowing be a problem?

Glider deployments

“Glider deployments are planned for the winter of 2021 and 2022 as part of the ongoing Atlantic cod telemetry project. Additional glider deployments in the summer and fall, when HMS species are most commonly observed in and around SFW would provide valuable information to supplement data collected by the fixed station receiver array” (page 22). It is unclear if this work is being funded or not.

Benthic survey

MA DMF is pleased to see benthic surveys incorporated in the fisheries monitoring plan. However, the proposed survey only uses SPI/PV which may not be sufficient for specific questions about long-term habitat quality in and around turbines but is likely sufficient for site characterization work. Grab sampling is being done in US Wind and Vineyard Wind lease areas with 500 µm mesh.

Fish pot and benthic surveys are purposefully proposed to be conducted at different turbines to minimize interaction effects. If these two studies could be carried out at the same turbines, they would provide complementary information that would potentially improve understanding of the underlying habitat characteristics driving observed patterns in abundance rather than simply correlating abundance with distance from turbine structures. Might be better to overlap them particularly if pot trawls and benthic stations can be kept on separate lines.

Export cable
Stated objectives of the study are to “examine the effects of installation and operation of an export cable on the benthic habitat and scallop abundance” (page 27).
The export cable survey was confusing. Why are different treatments proposed based on the amount of scalloping?
An important question for export cables is how well they are staying covered. This question should be addressed. How is cable cover being monitored?

Questions pertaining to this review can be directed to John Logan (john.logan@mass.gov) or Kathryn Ford (kathryn.ford@mass.gov).

Sincerely,

Kathryn Ford, Ph.D.
Habitat Program Leader

cc: McKiernan, Logan, Pol, Pugh, Burke, Whitmore, Griffin, MA DMF
Callaghan, MA CZM
Carlisle, MA CEC
Tuxbury, Verkade, NOAA-NMFS
Livermore, RIDEM; Beutel, RI CRMC
Brunbauer, NYSERDA
Bachman, NEFMC
Hooker, BOEM

References
Wilding, T. A., Gill, A. B., Boon, A., Sheehan, E., Dauvin, J., Pezy, J.-P., O’Beirn, F., Janas, U., Rostin, L., & De Mesel, I. (2017). Turning off the DRIP (‘Data-rich, information-poor’) – rationalising monitoring with a focus on marine renewable energy developments and the benthos. Renewable and Sustainable Energy Reviews, 74, 848–859. https://doi.org/10.1016/j.rser.2017.03.013

Attachment to DMF Comment Letter to "South Fork Wind Fisheries Research and Monitoring Plan May 2020."

Recommendations for what to include in a Fisheries Monitoring Plan

Mass DMF, June 2020

Disclaimer: what follows below is a draft example of how a fishery monitoring plan could be organized to better address DMF's concerns of fish resource, habitat, and fisheries impacts from offshore wind developments. It is not meant to be prescriptive, nor is it final guidance for regulatory purposes. Instead, it is intended to start a conversation about how to improve the plans being developed in order to ensure critical site characterization and impact assessment questions are adequately being identified and addressed by offshore wind developers. Furthermore, this document does not identify all questions a developer could potentially address. It relies on DMF's experience authoring research priorities documents but is not intended to replace those documents or determine which questions are most relevant for any individual project.

The monitoring plans should **identify the questions being asked** for any purpose – to satisfy regulatory requirements such as the EIS and CZM requirements or questions related to construction and operations. Then for each question **describe the method and anticipated effect size** for measurement.

Monitoring plans should be clear when methods are relying on existing studies and results, existing data that will be analyzed by the developer for new purposes, or developer-sponsored studies. Studies should identify the spatial and temporal extent and utilize standardized monitoring protocols when appropriate. Leveraging existing regional monitoring programs, procedures, protocols, and time series is encouraged.

1. **Site characterization** –
    - 1.1. Fishing Industries
        - 1.1.1. What fisheries occur in the wind farm and cable route and when. What gear types are used? What is the catch composition and seasonality? Describe methods to address this question.
        - 1.1.2. What ports do those fisheries come from? What is port infrastructure that fishery supports? Describe methods to address this question.
        - 1.1.3. What is the current economic value of the area by state and port? Describe methods to address this question.
    - 1.2. Fish Resources and Habitat
        - 1.2.1. What are the species/communities of concern, where do they exist in the project site, and when? Describe resident species and seasonal migrations (what species are moving through and when). If existing information is not sufficient, what additional studies will be done?
        - 1.2.2. What are the benthic habitats in the area, how do they connect to EFH? What are the pelagic environments (upwelling, fronts), what are key patterns? Describe methods to address these questions.
    - 1.3. Fisheries Management

1.3.1. What are existing fisheries regulations in the area and how does that affect interpretation of important resources? Describe methods to address this question.

2. **Impact monitoring** -- For each stressor, address which variables in your area are affected and how the impact will be measured. What are the monitoring and mitigation approaches? What LOAs will be needed? What are fish collection restrictions that need to be adhered to? What are the endpoints being tested? Need to identify effect sizes.

2.1. Fishing Industries

2.1.1. Spacing -- Does array design adversely affect fishing? What is the amount of displacement, and where does that displaced effort go? Describe methods to address these questions.

2.1.2. Seafloor disturbance -- Do cables and/or cable mattressing adversely affect those gear types? Describe methods to address these questions.

2.1.3. Changes in dominant gear type (i.e. trawl gear being outcompeted by fixed gear) or changes in fishing or transit patterns -- How does economic value of the area change by state and port? Describe methods to address these questions.

2.2. Fish Resources and Habitat (stressor-response approach: for each section (stressor) below, describe how the response will be measured; the stressors are the same as those defined by the OES State of the Science Report)

2.2.1. Collision

2.2.2. Noise – BOEM has fish guidelines, NOAA has marine mammal guidelines

2.2.2.1. Pile driving

2.2.2.2. Operational

2.2.3. EMF – what species in the project area are sensitive to EMF? How are cables expected to impact EMF? What are existing EMF fields?

2.2.3.1. Lab and field studies have been done, how do methods compare to methods being used in this plan?

2.2.3.2. How will burial be monitored?

2.2.4. Habitat changes

2.2.4.1. Benthic: How are vulnerable habitats being identified and avoided?

2.2.4.1.1. Mattress options and consideration to fishability, habitat value, size of seafloor impact

2.2.4.1.2. Sediment transport impacts/scour protection options

2.2.4.2. Pelagic: Will the array change pelagic patterns/hydrodynamics? Will the reefing effect increase predation from marine mammals or change distribution of HMS species?

2.2.4.2.1. Plankton

2.2.4.2.2. Biofouling

2.2.4.2.3. Stomach contents/isotopes

2.2.4.2.4. Water quality (stratification, DO)

2.2.4.2.5. Fish abundance and species composition: does fish abundance, species composition, or spatial distribution change after construction – do the black

DRAFT

sea bass move in and take over? Distribution of scallops/surf clams/ocean quahogs

2.2.4.3. Seasonal migrations: how will project monitor migrations?

2.2.4.4. Assessing regional scale changes – how will monitoring efforts for the individual site be nested within regional assessments?

2.3. Fisheries Management

2.3.1. Spacing -- what long term monitoring is currently underway in the area and how will it be impacted by the wind farm layout?

2.3.2. Displacement – if fisheries change, are there impacts to existing fisheries regulations that can be anticipated

3. **Adaptive Management** –How will company interact with regulatory community and fisheries stakeholders to address concerns? What is the adaptive management process?

3.1. Data management and reports

3.2. Interactions with BOEM Task Forces, Councils, ASMFC, ROSA, RODA, and state fisheries working groups.

3.3. Fisheries Communication Plan

3.4. Management – if certain events occur or thresholds are reached, what actions are taken

3.4.1. Collision

3.4.2. Noise

3.4.3. EMF/cable exposure

3.4.4. Habitat impact

3.4.4.1. Assessment of better/worse mattress and scour protection options

3.4.5. Existing surveys

3.4.6. Existing fisheries

Other notes:

- OES has no standard monitoring requirements/recommendations yet. Some projects are trying to work on techniques but some level of flexibility will be needed so different regulators can develop requirements that meet their regulatory needs.
- Environmental monitoring should focus on good, comprehensive, representative ecosystem endpoints, potentially based on an understanding of where the "bottlenecks" for biological populations or ecosystem function occur. (https://www.hydro.org/wp-content/uploads/2017/08/EMTSSummit4.pdf)
- "Current monitoring programmes are extensive and costly yet provide little useful data in relation to ecosystem-scale-related changes, a situation called 'data-rich, information-poor' (DRIP). MRED – benthic interactions may cause changes that are of a sufficient scale to change ecosystem services provision, particularly in terms of fisheries and biodiversity and, via trophic linkages, change the distribution of fish, birds and mammals. The production of DRIPy data should be eliminated and the resources used instead to address relevant questions that are logically bounded in time and space. Efforts should target identifying metrics of change that can be linked to ecosystem function or

service provision, particularly where those metrics show strongly non-linear effects in relation to the stressor” (Wilding et al 2017).

DRAFT

From: Bauer, Cassandra L (DEC)
To: Melanie Gearon
Cc: "Engler, Lisa " (ENV); "Boeri, Robert " (ENV); Callaghan, Todd (EEA); Pol, Mike (FWE); annie@rodafisheries.org; lyndie@rosascience.org; andrew.lipsky@noaa.gov; "Susan Tuxbury - NOAA Federal"; "Sharon Benjamin - NOAA Affiliate"; "Julie Crocker - NOAA Federal"; ursula.howson@boem.gov; "Ryan Silva"; douglas.christel@noaa.gov; nick.sisson@noaa.gov; Christopher.Boelke@noaa.gov; wendy.gabriel@noaa.gov; Lampman, Gregory G (NYSERDA); mbachman@nefmc.org; "David Beutel"; gfugate@crmc.ri.gov; "James Boyd"; Jeff Willis; McLean, Laura (DOS); Maraglio, Matthew (DOS); Gaidasz, Karen M (DEC); Maniscalco, John D (DEC); Davis, Andrew (DPS); jason.mcnamee@dem.ri.gov; Livermore, Julia (DEM); "Brian Hooker"; "Boatman, Mary"; Stromberg, Jessica; Peter.Aarrestad@ct.gov; "Handell, Naomi J CIV USARMY CENAN " (US); Stephanie Wilson; Liz Gowell; Sophie Hartfield Lewis; John O"Keeffe; Rodney Avila; Ross Pearsall; Robert Soden; Robert Mastria; Main, Robin L.; Brian Gervelis; Drew Carey; Gregory DeCelles; Jennifer Garvey; Julia Prince; Berg, James; Mark Gardella, external user; Ford, Kathryn (FWE); Matthew.Gates@ct.gov; Colleen.Brust@dep.nj.gov; Bozzi, Rhianna A (DEC); McKown, Kim (DEC); Covert, Lisa A (DEC); Brunbauer, Morgan A (NYSERDA)
Subject: SFW - 2020 Fisheries Monitoring Plan
Date: Monday, July 13, 2020 10:15:39 AM
Attachments: image001.gif
image002.gif
NYSDEC DMR comments on SFW Fisheries Survey_7.13.20.pdf

Melanie,

Thank you for the opportunity to provide feedback on the South Fork Wind Fisheries Research and Monitoring Plan. Attached, please find NYSDEC's comments.

Regards,
Cassie

--

Cassie Bauer
Marine Habitat Management Unit Leader, Division of Marine Resources

New York State Department of Environmental Conservation
205 N Belle Mead Road, Suite 1 East Setauket, NY 11733
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July 13, 2020

VIA EMAIL

Ms. Melanie Gearon
Manager, Permitting and Environmental Affairs South Fork Wind Farm
56 Exchange Terrace
Providence, RI 02903

RE: **NYSDEC Marine Resources Comments**
South Fork Wind Farm
Fisheries Research and Monitoring Plan

Dear Ms. Gearon,

Thank you for hosting the webinar on May 22nd, 2020 providing federal and state agencies with an overview of the revised South Fork Wind (SFW) Fisheries Research and Monitoring Plan. The New York State Department of Environmental Conservation's (NYSDEC) Division of Marine Resources has reviewed the revised plan and has the following comments:

General Comments

1. It is unclear how similar the species assemblages are in the impact and reference areas. Large differences in pre-construction communities will make it very difficult to detect a post-construction impact. A gradient design will help to alleviate the uncertainty associated with selecting appropriate reference areas.
2. Construction of a turbine field on the SFW site could potentially impact the species composition of the project area through a number of mechanisms (boat traffic, vibration, habitat change, electromagnetic fields (EMF), mobile gear exclusion, recreational fishing attractant) on different spatial and temporal scales. This plan proposes to collect data in a varied manner but may have difficulty addressing questions regarding specific impacts.
3. Cox Ledge has an abundance of natural hard bottom, some of which may be disturbed by installation of turbines, cables, scour protection, concrete mattresses, and anchoring. The encrusting organisms that develop on disturbed hard bottom may change over a 5-10 year (or more) period resulting in changes in benthic communities and dependent fish/invertebrates that will occur well into the operational life span of this project. More years of post-construction monitoring is recommended.
4. Raw data from each survey should be available in addition to summaries in written reports. Also, the reports should be released on an annual basis rather

than piecemeal depending on the timing of each survey. This will aid in the comparison of data collected from each study and help give a better overall picture of fisheries being studied.

5. It is unclear how this plan will fit into other fisheries monitoring plans that will be conducted in the region by Orsted or other project developers. It is also unclear how this study will work to fill gaps in regional studies that are being disrupted by the construction or operation of the wind farm. This data is more valuable if it is comparable to other studies in the area.
6. It is unclear how the effects on commercial, recreational, and for-hire fisheries will be addressed (i.e. shifts in species assemblages, shifts in gear used in project area, shifts in fishing locations, effects on popular fishing ports). Surveys should be conducted within the fishing community to get a broader understanding of fishing activity in the Cox Ledge area as well as an analysis of Vessel Trip Reports (VTR), Vessel Monitoring System (VMS), and Observer data to quantify fishing effort. This should be done in collaboration with a regional fishing body such as the Responsible Offshore Development Alliance or the Responsible Offshore Science Alliance.
7. Studies should be made comparable across gear types potentially by using paired gears. Timing should also coincide with historical surveys in the area to make data more valuable.
8. It is unclear how the surveys will address the presence of juvenile and young-of-year stock specifically. These fish will most likely be affected differently than their adult counterparts by the presence of structures and benthic disturbances.
9. Studies should also be expanded to include fisheries monitoring around the cable corridor in addition to the benthic survey. The cable also poses the risk of creating a change in fisheries presence (i.e., due to EMF, heat, etc.).
10. It is unclear what actions will be taken to mitigate any impacts to fisheries resources due to the project.
11. Temperature should be measured throughout the water column not just at the surface and bottom to account for mixing. If temperature probes could be attached to the survey gear itself, that would provide a more accurate depiction of temperature.
12. The sex should be recorded for all lobsters and for the subsample of crabs, horseshoe crabs, sharks and skates that are measured.
13. Any overlap with ongoing geological and geophysical studies in the area should be discussed in terms of effects these studies may have on fisheries monitoring activities and what actions will be taken to mitigate these effects.

Gillnet Survey

1. It is unclear what the sampling effort will actually be (number of gillnet lines/strings per survey).
2. The power analysis on the first year's data could lead to unusable data if the sampling effort is too low in the first year, unless the first year sampling is being

treated as a pilot and additional years of pre-construction sampling will be conducted to adequately establish a baseline.
    a. If additional pre-construction monitoring cannot be done, NYSDEC recommends oversampling the pre-construction year to ensure adequate power to detect changes.
3. It is unclear how many years of pre-and post-construction sampling are proposed.
4. A 12-inch mesh size will eliminate the ability to study other important fish species in the area that may be missed by trawl or pot studies (i.e., adult and juvenile cod). Creating a more diverse gillnet survey would allow for better capture of fisheries data.

Beam Trawl

1. Survey design implies multiple vessels could be involved adding another variable to account for when trying to detect project impacts.
2. The power analysis on the first year's data could lead to unusable data if the sampling effort is too low in the first year, unless the first year sampling is being treated as a pilot and additional years of pre-construction sampling will be conducted to adequately establish a baseline.
    a. If additional pre-construction monitoring cannot be done, NYSDEC recommends oversampling the pre-construction year to ensure adequate power to detect changes.
3. It is unclear how many years of pre-and post-construction sampling are proposed.

Ventless Trap- Lobster

1. Current survey design, while intending to minimize gear conflict, could be biasing survey by excluding areas from sampling.
2. It is unclear how the survey area is being stratified. The Atlantic States Marine Fisheries Commission coastwide survey that Rhode Island and Massachusetts participate in are stratified by depth. It is also unclear how the target sample size will be determined. A power analysis should be conducted using pre-construction data for lobster in the SFW site from previous surveys (cited on page 12 of the monitoring plan) to determine appropriate sample size. The power analysis should be conducted again using year 1 of pre-construction data from this survey to confirm that sample size is adequate.
3. Trap gear is subject to rules and regulations outlined under the Marine Mammal Protection Act and the Endangered Species Act. All gear restrictions, closures, and other regulations set forth by take reduction plans must be adhered to.
4. Bait used should be recorded since a specific bait is not specified. This may affect catchability.
5. It is unclear why other fish species, particularly tautog and scup, are not being measured.

6. It is unclear how many years of pre-and post-construction sampling are proposed.

Ventless Fish Pot

1. The power analysis on the first year's data could lead to unusable data if the sampling effort is too low in the first year, unless the first year sampling is being treated as a pilot and additional years of pre-construction sampling will be conducted to adequately establish a baseline.
    a. If additional pre-construction monitoring can't be done, NYSDEC recommends oversampling the pre-construction year to ensure adequate power to detect changes.
2. BAG design will allow for interesting comparisons. It is unclear if the fish pot trawls will extend in a direction that is absent of any other turbines so that the turbine of origin is always the closest turbine. Depending upon the questions being asked, the survey may need to quantify distances from all proximate turbines and any scour protection (will scour protection be uniform?). Despite best efforts, pots may not be laid out in a straight line with no slack in between.
3. It is unclear if a survey site would change in the middle of a survey year due to gear conflict and how that will impact the BAG analysis.
4. It is unclear how many years of sampling post-construction, are being proposed.

Acoustic Telemetry

1. Acoustic telemetry study goals/objectives are not well defined and no discussion of post-construction monitoring is mentioned.
2. Where possible, incorporating data from ongoing and existing studies can be beneficial to further understanding the marine species in the project areas as well as on a regional scale. Since ongoing studies often meet a specific need, the project could make use of valuable resources (such as ship time and sample design) while still helping to address project-specific data gaps and needs of the state. Capturing the potential value added to studies by SFW would strengthen the benefits of the usage of these studies and helps to increase not only site knowledge but regional knowledge as well.

Benthic Survey

1. The current plan proposes conducting two benthic surveys, one "not more than six months before construction and not more than six months after operation has begun, providing neither period is during the winter." All benthic surveys should be conducted within a similar time of year, preferably August 1st through October 31st, in order to accurately compare results between different years. In addition, multiple post-construction surveys should be conducted to account for inter-annual variability and potential long-term impacts to benthic community structure.
2. The current plan proposes to use Sediment Profile and Plan View Imaging (SPI/PV). NYSDEC suggests that the SPI/PV imagery be supplemented with benthic grab samples in order for identification and enumeration of the benthic infauna community.

3. NYSDEC suggests that temperature and salinity data from the surface to the sediment-water interface be collected at each benthic sampling station.

NYSDEC appreciates the opportunity to provide feedback on South Fork Wind Farm's Fisheries Research and Monitoring Plan. Please feel free to contact me at cassandra.bauer@dec.ny.gov or Rhianna Bozzi at rhianna.bozzi@dec.ny.gov if you have any questions.

Sincerely,

Cassandra Bauer

Cassandra Bauer
Biologist II (Marine)
Marine Habitat Management Unit Leader

ecc: DEC Review Team
Laura Mclean, NYSDOS
Kathryn Ford, MADMF
Julia Livermore, RIDEM
Morgan Brunbauer, NYSERDA
Susan Tuxbury, NOAA
Matthew Gates, CTDEEP
Colleen Brust, NJDEP
Brian Hooker, BOEM

From: Livermore, Julia (DEM)
To: Melanie Gearon; Gregory DeCelles; Brian Gervelis
Cc: McNamee, Jason (DEM); Mcmanus, Conor (DEM); Andy Lipsky (Andrew.Lipsky@noaa.gov); Susan Tuxbury - NOAA Federal; Elizabeth Methratta - NOAA Affiliate; Kathryn Ford; Morgan Brunbauer
Subject: RIDEM DMF Comments on SFWF Fisheries Monitoring Protocol
Date: Wednesday, June 10, 2020 2:57:43 PM
Attachments: image003.png
RIDEM_Comments_Survey_Protocol_SFWF_6-9-20.pdf

Hi Melanie, Greg and Brian,

Attached are some additional comments from RIDEM DMF on the proposed survey protocol. I don't believe any will come as a surprise based on our recent discussions, but please don't hesitate to reach out if you have any questions for me.

Best wishes,
Julia

Julia Livermore, Supervising Marine Biologist
Rhode Island Department of Environmental Management
Division of Marine Fisheries
3 Ft. Wetherill Rd.
Jamestown, RI 02835
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RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF MARINE FISHERIES
3 Fort Wetherill Road
Jamestown, RI 02835

June 9, 2020

Melanie Gearon
Project Manager
Permitting - Offshore
Ørsted

Re: Comments on the Revised South Fork Wind Farm Fisheries Research and Monitoring Plan

Dear Ms. Gearon,

The Rhode Island Department of Environmental Management's Division of Marine Fisheries (DMF) has reviewed the revised South Fork Wind Farm Fisheries Research and Monitoring Plan as of the May 23, 2020 federal and state agencies meeting and offers the following comments:

- Additional information on power analyses is still necessary.
    - Within the revised protocol in both the beam trawl and gillnet survey sections, an adaptive approach to survey design is referenced. We support the concept of an adaptive approach, taking year one's data to conduct a power analysis to determine whether the survey should be modified. However, target power levels and effect sizes are never identified, and it is therefore unclear that year one of data will achieve adequate power levels and effect sizes.
        - If year one data reveal that targets were not reached, a portion of the baseline on which comparisons will be made will be inadequate to detect possible changes. Sampling can be reduced in subsequent years, but increased sampling in year one is not possible retroactively.
        - As such, more comprehensive power analysis may be necessary to demonstrate that the proposed survey designs are more than adequate for year one of sampling. There are approaches available to expand the data or develop an approximating distribution for more rigorous preliminary analysis (e.g., bootstrapping).
    - Study designs should have at minimum 80% statistical power, or more simply, each test of significance should have at least an 80% probability of detecting an effect that is present (avoiding a type II statistical error).
        - 80% is an acceptable power level within the scientific community (Cohen 1988). However, a power of 80% means that there is a 20% chance that a present effect may go undetected. Power levels >80% should be targeted. Nonetheless, given

the high variance in fisheries data, creating sampling designs with higher power can be unachievable given time and monetary constraints.

  - Furthermore, in the power analyses provided by Ørsted on December 12, 2019, only total fish abundance was assessed. Additional analysis should be conducted to determine if changes in abundance, biomass or condition of species of interest could be detected.
    - Recreational and party/charter fishers have noted a very recent increase in Atlantic cod in and around the SFWF project area. Both juvenile and adult cod have been noted in the area in June 2020 in larger numbers than previous years. How does Ørsted's survey protocol address assessment of changes in abundance of cod (i.e., will any of the surveys be able to detect this change).
    - Assessment of changes in individual species' abundance, biomass, and condition will be very important to understand whether wind development has affected populations, and how development may interact with past and ongoing fisheries management efforts (e.g., rebuilding timelines).
  - It may be most effective to develop specific hypotheses to be addressed using the surveys, and conduct power analyses to answer these more targeted questions.
    - Taking a broad approach without a hypothesis in mind may lead to data-rich, information-poor survey designs. Past monitoring programs in Europe were extensive and costly yet provided little useful data in relation to ecosystem-scale-related changes (DRIPy data; Wilding et al. 2017).
    - To avoid this issue, efforts should target metrics that can be bounded in space and time (Wilding et al. 2017).
- Related to the previous point about Atlantic cod, none of the proposed surveys will effectively capture adult and juvenile cod.
  - A beam trawl is unlikely to capture cod in hardbottom, complex habitat; most cod will swim through a gillnet with 12" mesh; and only juveniles will be captured using fish pots.
  - How will Ørsted's surveys address this species given the importance of Cox Ledge habitat to Atlantic cod and long-term efforts to rebuild the Cod population?
  - This will be especially important as NOAA's trawl surveying of the area will be interrupted by the presence of offshore wind farms.
- It should be noted within the protocol that lobster trap trawls from the ventless lobster survey will not be set near gillnets.
  - Dead fish from gillnets may attract lobsters away from baited lobster pots and affect the survey results.
- The Rhode Island Fishermen's Advisory Board has expressed concerns regarding fisheries monitoring work occurring simultaneously with geophysical and geotechnical work in the wind farm area.
  - Data on this topic are extremely limited. However, Kikuchi (2010) suggest that cod may be affected by boomers and sparkers, as their auditory threshold is below the noise created by the geotechnical gear described.
  - Nedwell and Howell (2004) discuss the issue in greater detail and outline the large amount of uncertainty associated with the sound estimates for boomers and sparkers.
  - "There are no independent measurements or animal reaction studies available of geophysical survey sources, such as boomers and sparkers, used in windfarm development." … "While this data may not be used to assess the environmental effect of windfarm geophysical surveys, it suggests that windfarm related geophysical surveys are an area for concern and research should be conducted." (Nedwell and Howell 2004, page 21).

    - Therefore, understanding of the potential effects of boomers and sparkers is limited due to uncertainty. However, Nedwell and Howell (2004) recommend that this topic be studied in greater detail, not ignored.
    - If Ørsted feels that no issues should arise from temporally overlapping surveys, detailed justification and supporting data (e.g., frequencies and intensities of specific geotechnical/geophysical equipment being used compared with thresholds of a variety of species of interest) should be provided to support this argument.
- Based on discussion during the March 11th, 2020 Fisheries Monitoring Planning Session organized by the Commercial Fisheries Center of Rhode Island, it was inferred that experimental gillnets (with multiple mesh sizes) were ruled out due to protected species concerns.
    - If this is the case, please discuss this within the protocol. If the use of only 12” mesh was selected for other reasons, please explain within the protocol.
    - The use of only 12” mesh will target monkfish and skates.
        - The fish collected will not be representative of the fish community or of individual species’ size distributions.
        - Only a representation of the commercial monkfish and skate harvest in the area will be assessed using the proposed design.
- A data release plan should be provided within the protocol.
    - The suggested release plan would clearly state who will have access to the raw data.
    - Each survey protocol mentions sharing annual and project completion reports with fisheries management agencies, but there is no mention of raw data sharing.
    - Some of these data may be of value to stock assessment, and more generally, fisheries management, by way of supplementing existing sampling. DMF would support the implementation of standard data delivery dates to fishery management agencies.
    - Groups involving fishing industry representation (e.g., the Responsible Offshore Science Alliance, the Rhode Island Fishermen’s Advisory Board) should also have access to the data to ensure for complete transparency.

References:

Cohen, J (1988). Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Lawrence Erlbaum Associates. https://doi.org/10.1016/C2013-0-10517-X

Kikuchi, R. (2010). Risk formulation for the sonic effects of offshore wind farms on fish in the EU region. *Marine Pollution Bulletin*, *60*(2), 172–177. https://doi.org/10.1016/j.marpolbul.2009.09.023

Nedwell, J. and Howell, D. (2004). A review of offshore windfarm related underwater noise sources. Report No. 544 R 0308. Collaborative Offshore Wind Energy Research Into the Environment. https://tethys.pnnl.gov/sites/default/files/publications/Nedwell-Howell-2004.pdf

Wilding, T. A., Gill, A. B., Boon, A., Sheehan, E., Dauvin, J., Pezy, J.-P., O’Beirn, F., Janas, U., Rostin, L., & De Mesel, I. (2017). Turning off the DRIP (‘Data-rich, information-poor’) – rationalising monitoring with a focus on marine renewable energy developments and the benthos. Renewable and Sustainable Energy Reviews, 74, 848–859. https://doi.org/10.1016/j.rser.2017.03.013

EXHIBIT 6

Date	Organizations/Individuals Contacted[6]	Location/Form of Contact and Response	Purpose of Contact
5/22/20	BOEM, CT DEEP, MA CZM, MA DMF, NOAA/NMFS, NYS DEC, NYS DOS, RIDEM	Webinar; See Exhibit 6 to Appendix A	Updated Final Fisheries Monitoring Plan

[6] BOEM – Bureau of Ocean Energy Management; CFCRI – Commercial Fisheries Center of Rhode Island; CFRF – Commercial Fisheries Research Foundation; CT DEEP – Connecticut Department of Energy and Environmental Protection; MA DMF- Massachusetts Division of Marine Fisheries; MA CZM – Massachusetts Center of Coastal Zone Management; MA FWG – Massachusetts Offshore Wind Fisheries Working Group; NEFMC – New England Fisheries Management Council; NOAA/GARFO - National Oceanic and Atmospheric Administration's Greater Atlantic Regional Fisheries Office; NOAA/NMFS – National Oceanic and Atmospheric Administration's National Marine Fisheries Service; NYS DEC – New York State Department of Environmental Conservation; NYS DOS – New York Department of State; NYS DPS – New York State Department of Public Service; NYSERDA – New York State Energy and Research Development Authority; RI CRMC – Rhode Island Coastal Resources Management Council; RI DEM – Rhode Island Department of Environmental Management; RISAA – Rhode Island Saltwater Angler's Association; RODA – Responsible Offshore Development Alliance; ROSA – Responsible Offshore science Alliance; USACE – United States Army Corps of Engineers

South Fork Wind

A Joint Venture of Ørsted and Eversource

05.22.2020

SFW Fisheries Monitoring Plan

South Fork Wind | Powered by Ørsted & Eversource

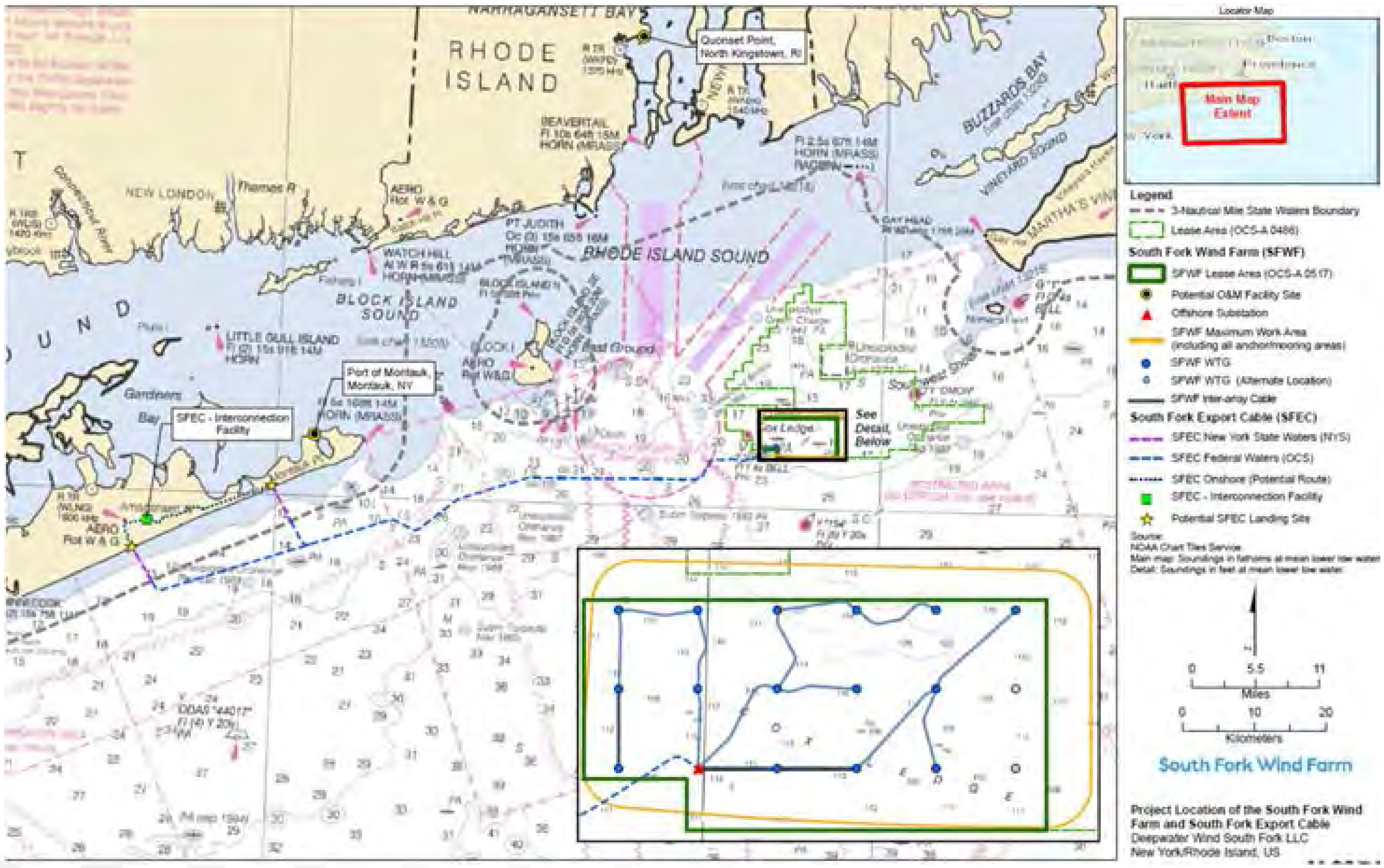
Agenda

01 Project Updates

02 Fisheries Monitoring Plan

03 Next Steps

Project Location



Project Components and Envelope

SFWF

Up to 15 Wind Turbine Generators (WTGs)

1 Offshore Substation (OSS)

Inter-array cable

Onshore O&M Facility

SFEC

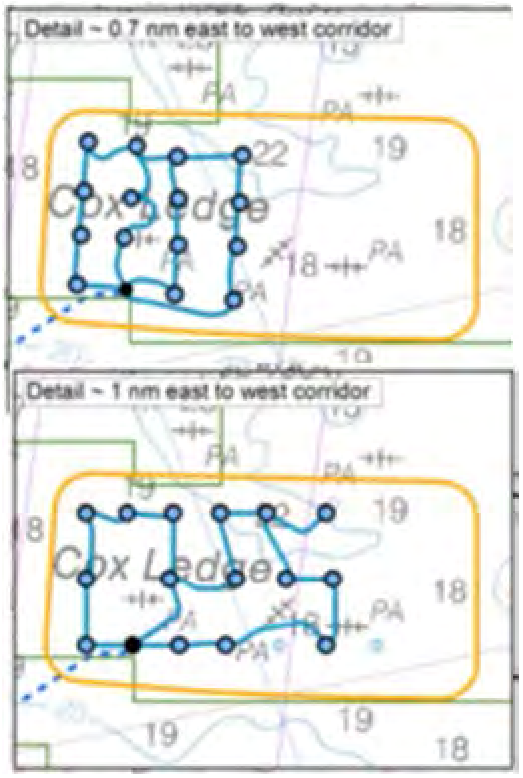
Export cable (offshore & onshore)

Sea-to-Shore Transition

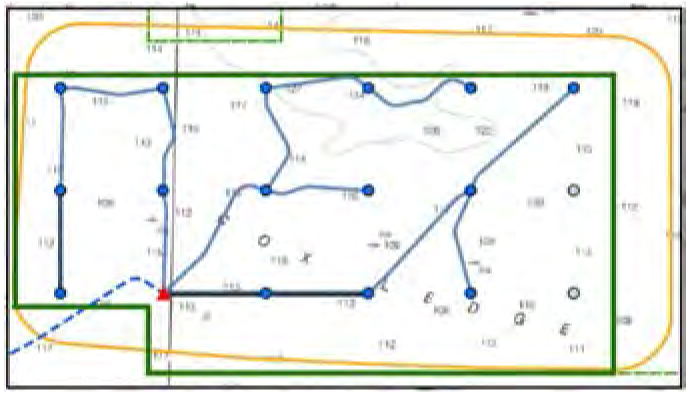
Onshore interconnection facility to existing East Hampton Substation

Progression of Layouts

Former Layouts



2020 Layout



Now 1 nautical mile by 1 nautical mile grid layout

Monitoring Plan Development: Guiding Principles

- Getting input from the fishing industry and other stakeholders
- Working collaboratively with the fishing industry
- Collecting thorough and credible science
- Obtaining unbiased clear results
- Standardizing monitoring protocols to build on and support existing fisheries research
- Sharing data while maintaining confidentiality about sensitive fishing areas
- Supporting regional science efforts

How did we get here?
Direct Feedback on Fisheries Research & Monitoring Plans

- **Attended fisheries-related meetings beginning in 2017 to answer questions and seek input**
- **Questionnaire to solicit fishermen's priorities**
  - Distributed January 2019
- **One-on-one outreach through FRs/FLs and project team**
  - RIDEM – Oct., Nov. 2019; Jan. 2020
  - MA DMF – Nov. 2019
  - NOAA – Apr. 2020
  - Numerous interactions with stakeholders through FRs/FLs since in 2017
- **Circulation and comments on draft plans**
  - Originally distributed Nov. 2018, Revised plans distributed June and Sept. 2019
- **Agency webinars**
  - Two sessions held March 2019
- **Vetting at state fisheries working group and advisory board meetings**
  - RI FAB – March 2017; Apr., Aug. 2018; Sept. 2019
  - MA FWG – Sept., Nov. 2019
  - RI Fisheries Working Group – March 2020

Updates and Revisions Based on Feedback

Examples

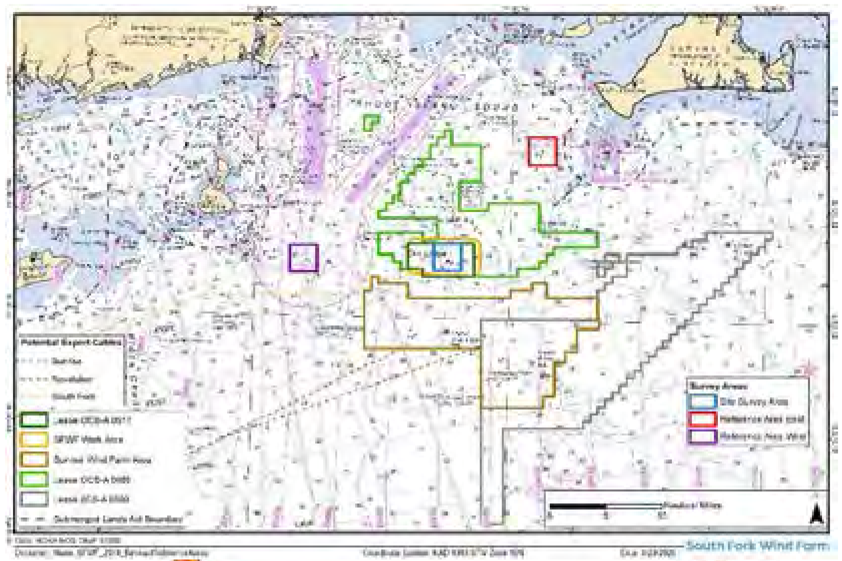
- Single mesh size and survey timing for gillnet to limit protected species interactions based on feedback from federal agencies and industry
- Control sites for gillnet and beam trawl determined through extensive discussions with agencies (e.g., RI DEM and MA DMF) and industry members
- Adaptive sampling (power analysis after Year 1 data collection) used to determine if adjustments to sampling intensity need to be made in subsequent years
- Surveys and gear types added throughout the development of the plan based on industry and agency feedback (e.g.,ventless trap, fish pot, support for telemetry projects)
- Support for telemetry projects added in response to comments from recreational fishing community in particular
- BAG design incorporated into fish pot survey based on feedback from agencies

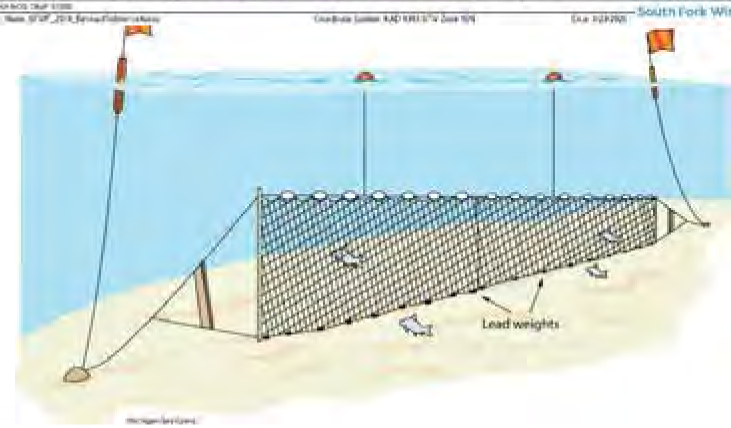
Elements and Timeline of the Monitoring Plan

- Gillnet Survey
- Beam Trawl Survey
- Ventless Trap Survey for lobster and crabs
- Fish Pot Survey
- Acoustic telemetry
- Benthic monitoring – will begin within 6 months of start of construction

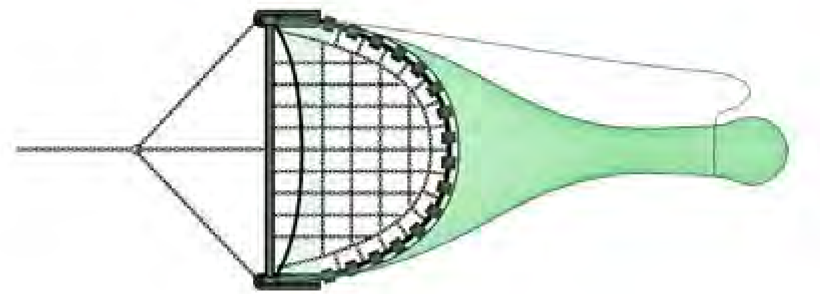
Gillnet Survey

- **Objectives – collect information on the relative abundance, demographics and distribution of demersal fish in the area. Use asymmetrical BACI design to identify changes in relative abundance.**
- **Sample twice monthly in the impact area and two control areas from April through June, and October through December.**
- **Year 1: set up to five gillnet strings in each area**
  - Adaptive sampling approach: Use Year 1 data to conduct power analysis and modify sampling intensity if needed.

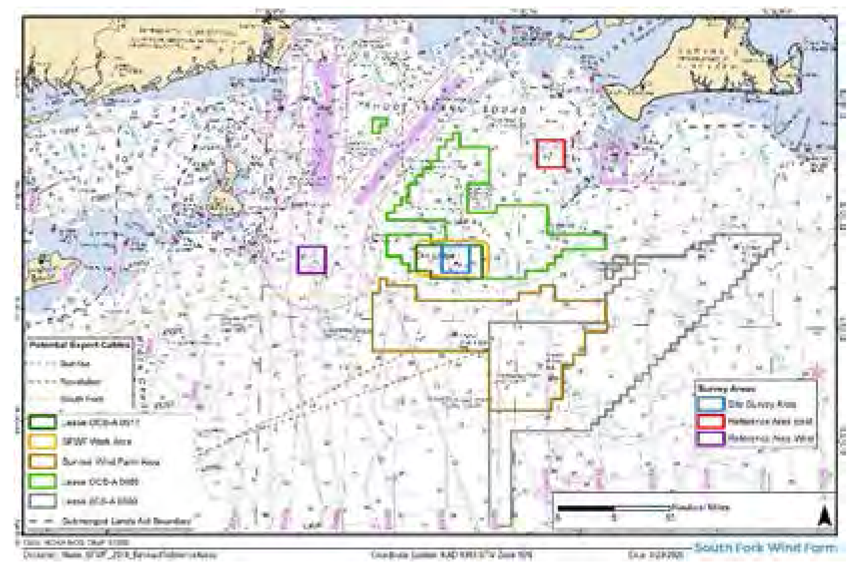




Beam Trawl Survey

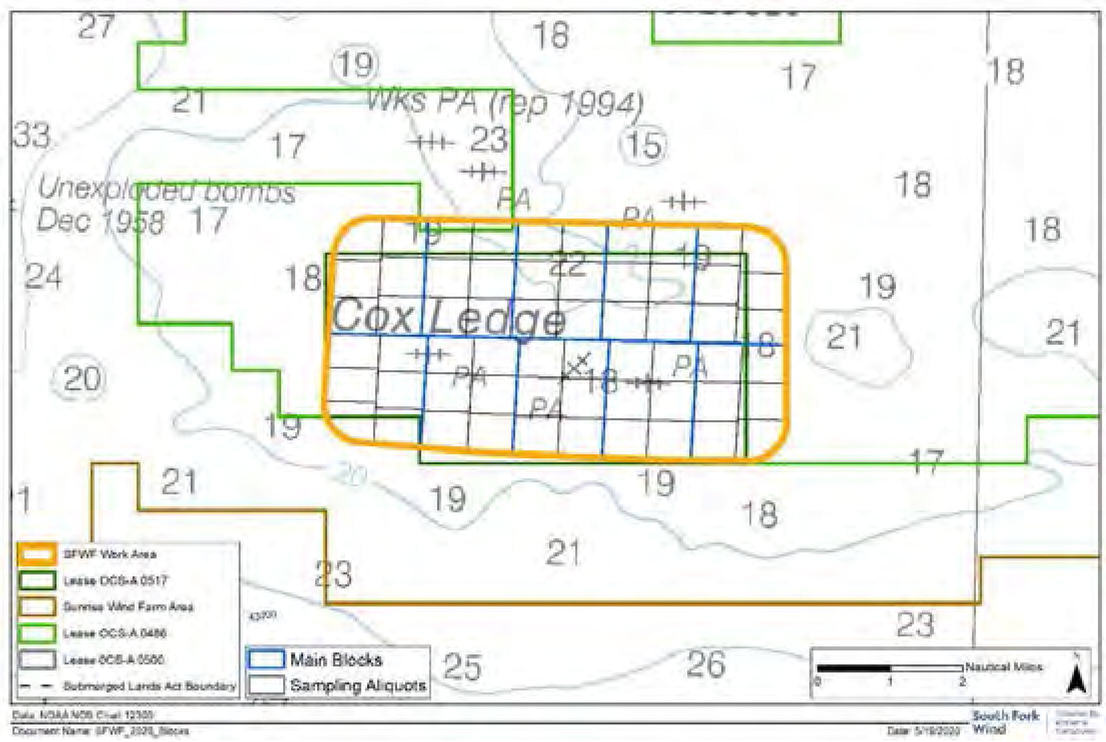


- **Objectives – collect information on the relative abundance, demographics, and distribution of demersal fish and benthic invertebrates in the area. Use asymmetrical BACI design to identify changes in relative abundance.**
- **Monthly sampling at one impact location and two reference locations with three replicate tows per area (nine total tows per month).**
  - 3m beam trawl with 4.5” mesh and a 1” codend liner towed at 4 knots for 20 minutes.
  - Adaptive sampling approach: use Year 1 data to conduct power analysis and modify sampling intensity if needed.



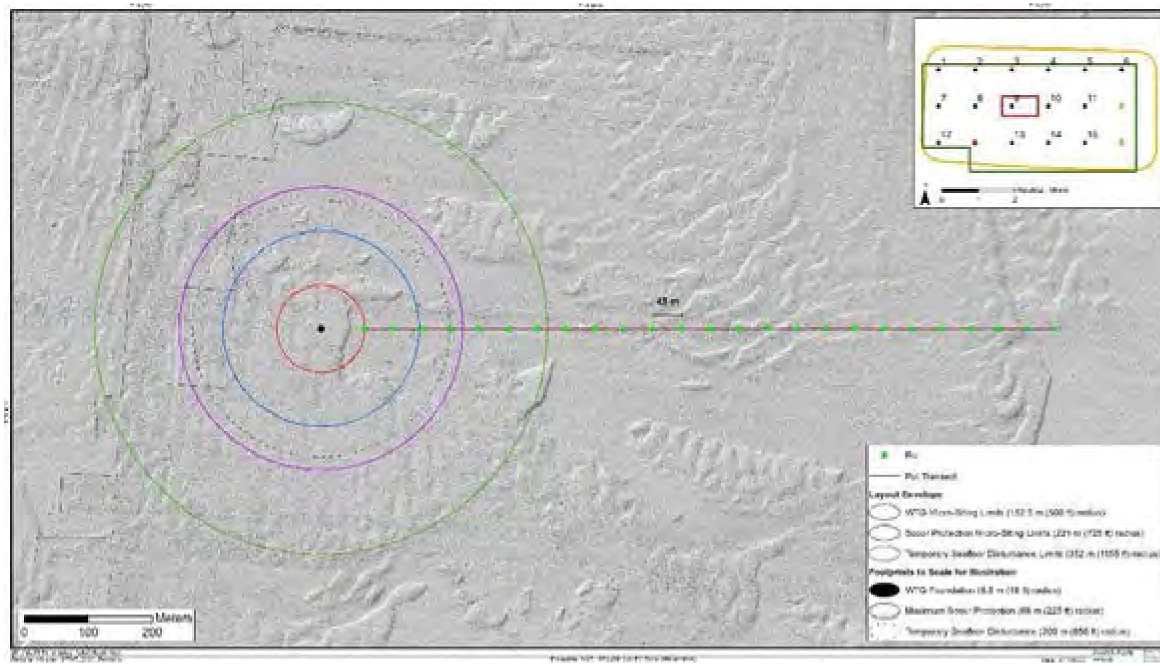
Ventless Lobster Trap Survey

- **BACI design following SNECVTS conducted in 2014, 2015, 2018.**
- **Random stratified sample allocation.**
- **10 trap trawls (6 ventless, 4 vented) will be fished on a 5-night soak**
- **Sampling to occur twice per month May-Nov.**
- **Biological sampling will be consistent with ASMFC protocols.**



Fish Pot Survey

- **Monitor species associated with complex bottom habitats (black sea bass, tautog, and scup) that may not be well sampled by the other gear types.**
- **Before-After Gradient Design (BAG)**
- **25 pot strings will be set at 6 randomly selected turbine locations with a 24-hour soak time.**
    - Adaptive sampling will be used.
- **Sampling to occur monthly from Apr-Oct.**



BAG design added through suggestion from agencies

Acoustic Telemetry - Cod

Purpose

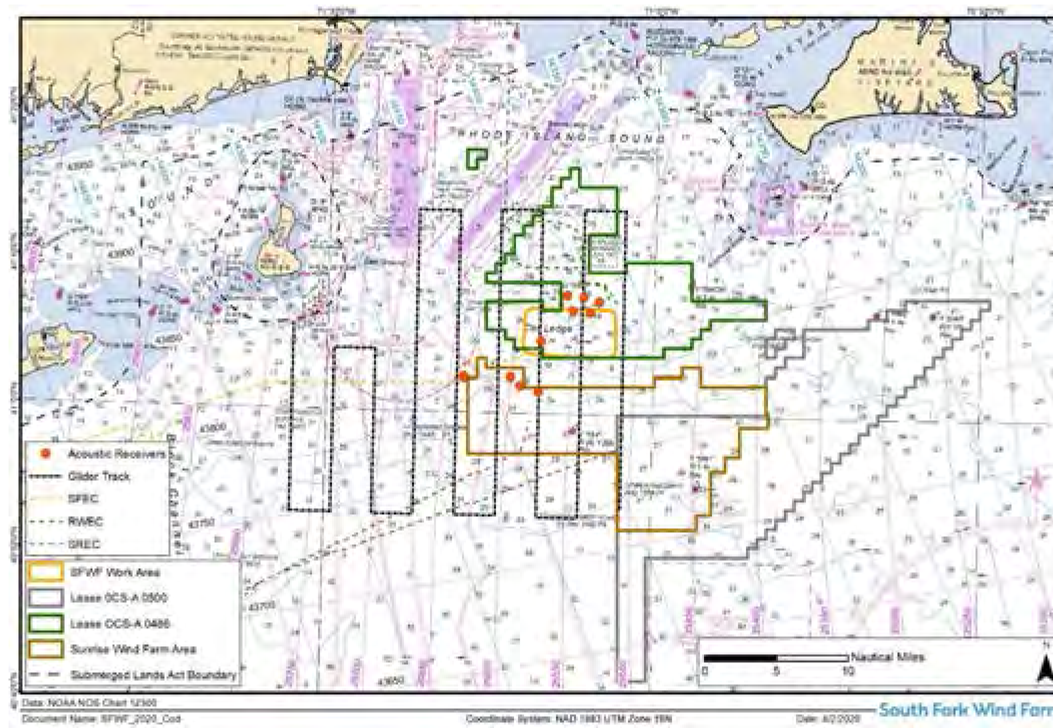
- Collect baseline data on the distribution, habitat use, and behavior of spawning cod on and near Cox Ledge.
- Biological sampling to fill data gaps
- Environmental data

Methods

- Tag up to 100 spawning cod with acoustic transmitters.
- Track cod movements with fixed receivers and a mobile glider.

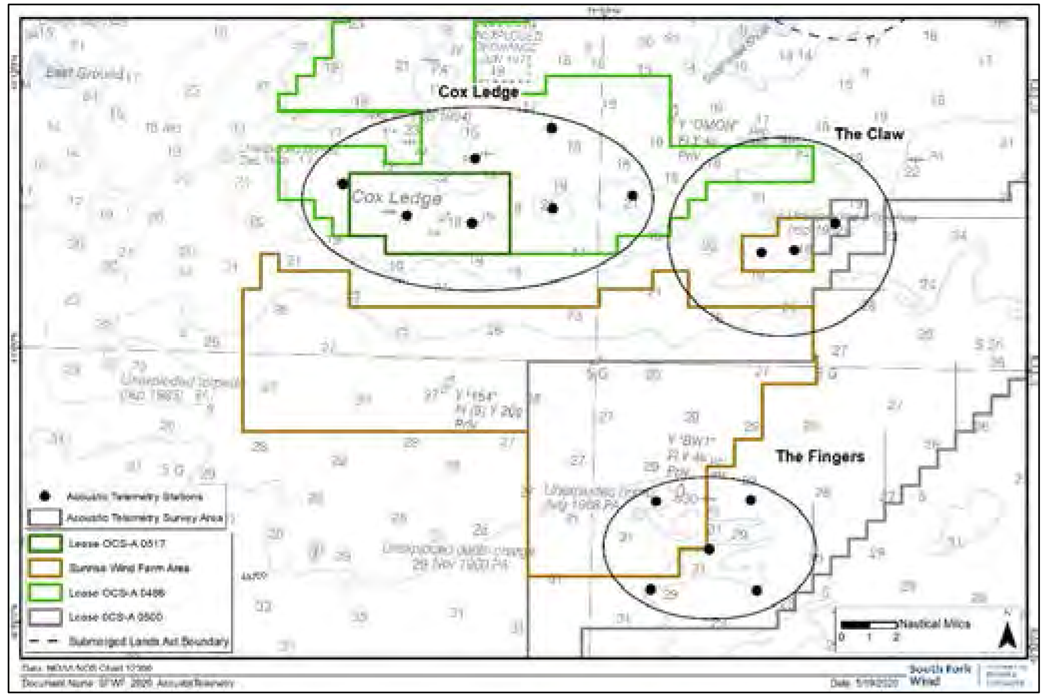
Collaborators

- TNC, BOEM, SMAST, WHOI, Rutgers, NOAA



Acoustic Telemetry – Highly Migratory Species

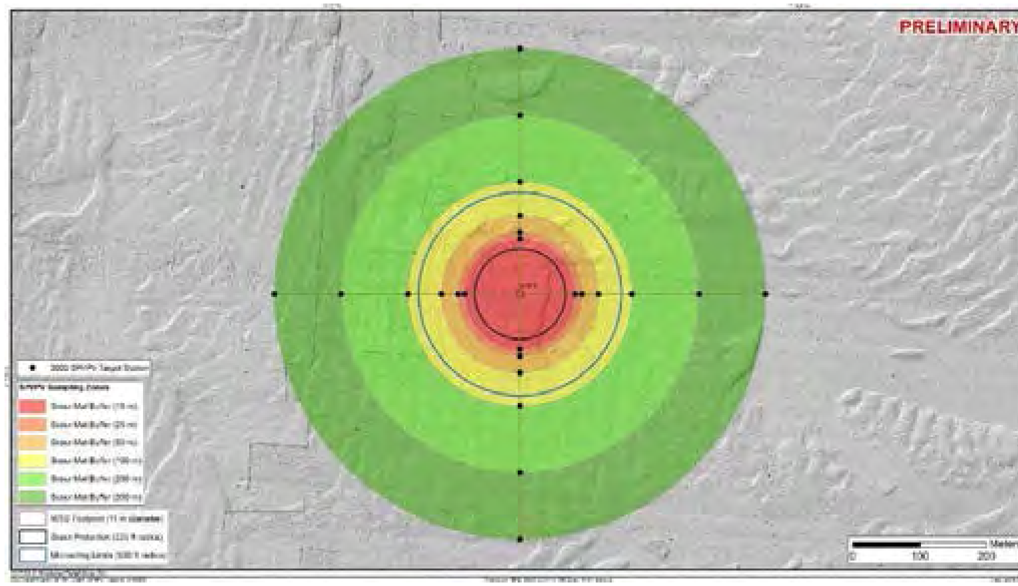
- Joint project between INSPIRE and Anderson Cabot Center for Marine Life at NEAQ funded through MA CEC
- Monitor presence and persistence of 3 HMS species at popular recreational fishing sites within WEA's
- Tag 20 individuals each of blue sharks, shortfin mako sharks, and bluefin tuna
- Up to 15 receivers will be deployed at 3 sites identified by recreational fishing community
- Receivers deployed strategically with MA DMF cod study
- Data shared between projects as well as regional telemetry data sharing networks

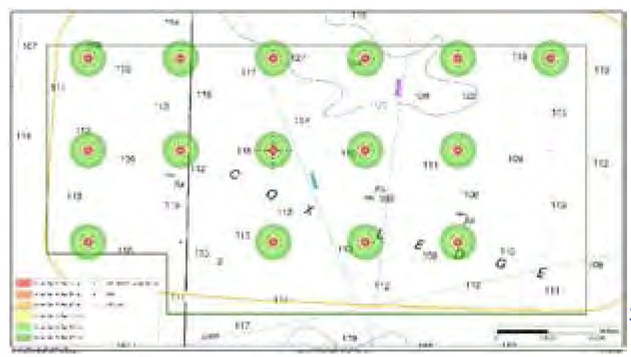


https://www.projectaware.org/news/success-mako-sharks-cites-cop18

Benthic Monitoring – Turbine Foundations

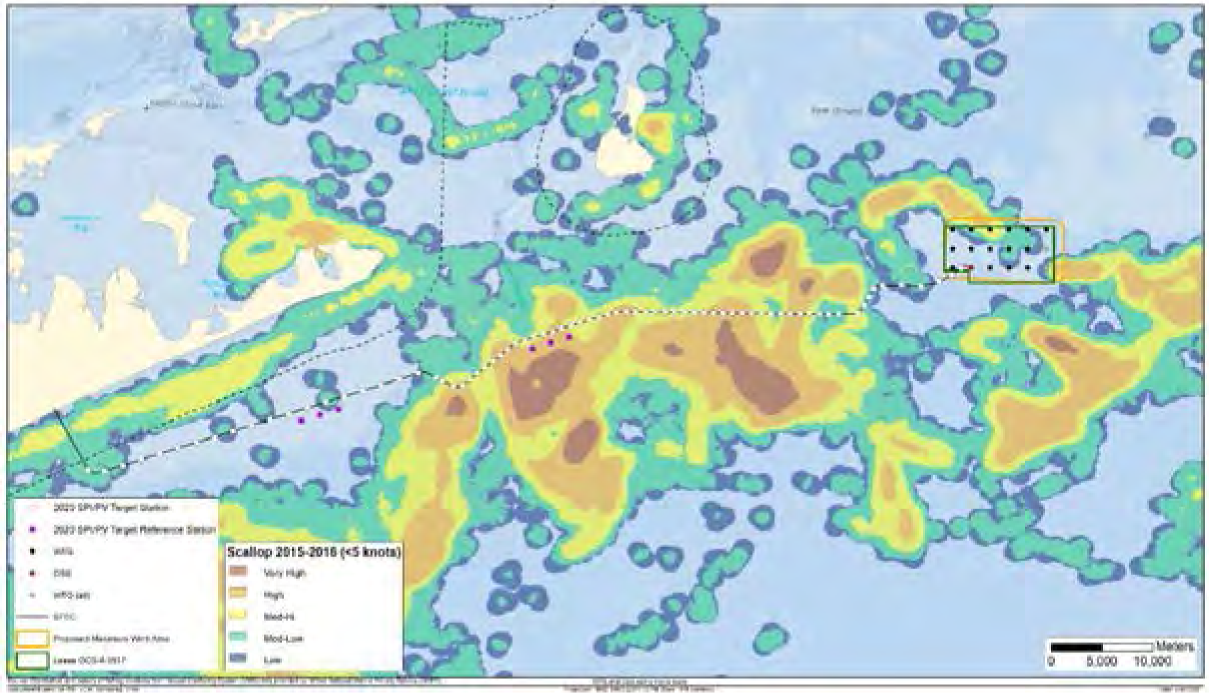
- Conducted to monitor spatial scale of potential impacts to benthic habitats and biological communities within SFW site
- SPI/PV sampling using BAG design
- 4 transects in each direction from foundation site
- 6 sampling stations in each transect extending to max planned extent of scour protection





Benthic Monitoring – Export cable (SFEC)

- **Examine the effects of installation and operation of the export cable on the benthic habitat and scallop abundance**
- **SPI/PV sampling using BACI design**
- **Sampling density doubled in areas of higher scallop abundance**



Request for Proposals

- **Requests for Interest was issued to local universities and research institutions on April 22nd**

- **Request for Proposals was sent on May 5th**
  - Gillnet, Beam Trawl, Ventless Trap, Fish Pot surveys
- **Proposal submission deadline is May 26th**

- **Applicants will be selected, and contracts will be awarded in late June**
  - Applications will be evaluated based on technical solutions and experience, economics, and health and safety management.

Next Steps

Pre-construction fish and lobster surveys anticipated to begin in August or September 2020

- Ørsted HSE requirements and vessel inspections
- Covid-19 and associated regulations on field work

THANK YOU

Contact Us

Melanie Gearon

1-857-348-3261

melge@orsted.com

Greg DeCelles

1-857-408-4497

grede@orsted.com

www.southforkwind.com

info@southforkwind.com

South Fork Wind | Powered by Ørsted & Eversource

State of Rhode Island and Providence Plantations

Department of Environmental Management
Division of Marine Fisheries
3 Fort Wetherill Road
Jamestown, RI 02835

Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, RI 02879-1900

August 14, 2019

John O'Keeffe
Director of Marine Affairs
Ørsted US
56 Exchange Terrace
Providence, RI 02903

The Rhode Island Department of Environmental Management's Division of Marine Fisheries (DEM DMF) and the Coastal Resources Management Council (CRMC) have reviewed Ørsted's Bay State Wind Fisheries Communication Plan dated July 1, 2019 and contained in the Bay State Wind Construction and Operations Plan in Appendix Q2. After careful review of the plan and given the ongoing conflicts between wind energy research and survey vessels with the Rhode Island commercial fishing industry, DEM DMF and CRMC recommend the following to improve the communications plan and expected outcomes. We appreciate your consideration of these recommendations and your continued collaboration with the Rhode Island commercial fishing industry.

1. The Fisheries Communication Plan should be appended with a section specifically for communication during survey operations, as this activity is the current source of conflict and gear loss/damage with the commercial fishing industry. Accordingly, a robust communication plan to include daily information of survey vessels and survey locations is necessary for Ørsted to provide to commercial fishing vessel operators.

2. The communication measures described in the Fishing Gear Conflict Prevention and Claim Procedure on page Q2-2-1 should be applied to <u>all</u> project phases involving work aboard research or construction vessels, including all surveying, construction and decommissioning activities.
   a) At present, only certain measures are being taken during the survey phase.

   b) It should be clearly stated within the plan on what timeframe, by construction phase, these measures will be implemented.

3. Increase the frequency of Notices to Mariners.
   a) Prior to the August 8, 2019 and August 12, 2019 Mariners Briefings, the most recent briefing was dated July 8, 2019, and did not include all research/survey vessels operating in the offshore areas.
      - The Kommandor Iona was not listed.
   b) The Ørsted website should be updated to include the most recent Mariners Briefings. Prior to the posting of the August 12, 2019 briefing the most recent briefing on the website for the Revolution Wind project was dated June 17, 2019.
      - There was no mention of survey activities in Rhode Island Sound or the Sakonnet River in the June briefing. It appears that survey operations are taking place, despite that transit and surveying within the lease area only are described.
   c) Within 24 hours of their issuance, send all briefings and Notice to Mariners bulletins to the DEM Division of Marine Fisheries for distribution on the state's commercial fishing listserv.
      - Given the large number of separate wind energy projects in the region, it is beneficial for fishermen to have a centralized location to obtain survey and research vessel activity information, rather than having to check with each individual wind energy developer for their respective activities. State and federal listservs are an easy method for fishermen to stay up to date on regulatory changes (e.g., changes in possession limits, fishery closures), and would be an invaluable tool for the wind energy industry to distribute information to a majority of the commercial fishing industry.
      - These strategies were most effective during the construction phase of the Block Island Wind Farm.

4. At least one wind energy developer fisheries representative should be on board all research and construction vessels during all construction phases. Survey activities at night and during low visibility conditions (e.g., fog) will result in losses of fixed gear, which would require compensation by Ørsted to fishermen for damaged/lost gear provided they meet the documentation requirements under the Fishing Gear Conflict Prevention and Claim Procedure. In addition, we would recommend that the Claim Procedure also provide compensation for lost fishing time and catch.
   a) Avoidance of fixed commercial fishing gear may require advanced fishing expertise that may only be acquired by having an experienced commercial fisherman on board.

b) The recent gear conflicts, which include lost and damaged commercial fishing gear, in the Rhode Island Sound demonstrate that the current wind energy survey vessel operators are not able to effectively avoid fixed commercial fishing gear (e.g., gillnets and lobster/crab pots).

The DEM DMF and CRMC staff are in ongoing discussions with the Rhode Island commercial fishing industry and may have additional recommendations to further improve upon Ørsted's Bay State Wind Fisheries Communication Plan.

Thank you for your consideration. If you have any questions or concerns about these recommended changes, please to do not hesitate to reach out to David Beutel (dbeutel@crmc.ri.gov) or Julia Livermore (julia.livermore@dem.ri.gov).

Janet Coit, Director
RI Dept. of Environmental Management

Grover Fugate, Executive Director
RI Coastal Resources Management Council

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (this "MOU") is entered into as of October_, 2019, by and between the Rhode Island Coastal Resources Management Council ("CRMC") and Orsted Wind Power North America LLC ("Orsted") (each a "Party" and collectively, the "Parties"). As part of the Bay State Wind and Revolution Wind projects (collectively, the "Projects") currently under development by Orsted and its affiliates, certain vessels have been engaging in, and will continue to engage, in survey activities in support of the Projects in waters in which CRMC has jurisdiction as described below.

WHEREAS, Orsted's survey activities for the Projects must continue in a timely fashion.

WHEREAS, CRMC has jurisdiction from the mean high water mark to 3 nautical miles from land pursuant to R.I. Gen. Laws § 46-23 ("Rhode Island waters"); and the offshore waters included within the CRMC Ocean Special Area Management Plan boundary.

WHEREAS, the Parties desire to ensure survey vessel activities that take place in Rhode Island waters co-exist in a coordinated fashion with other activities taking place in Rhode Island waters.

NOW THEREFORE, the Parties agree that the following outlines the Parties' understanding of Orsted's future conduct concerning the Projects' survey activities.

1. **Background and Overview.**

   (a) Vessels engaged in the Projects' survey activities have been operating in Rhode Island waters and are expected to continue surveying in Rhode Island waters through the remainder of 2019 and into 2020. Vessels expected to engage in surveying include, for example, M/V Discovery, M/V Kommandor Iona, and M/V Conti. Orsted also has obtained approval for its Revolution Wind COP Survey Plan Amendment (dated April 16, 2019) from the U.S. Bureau of Ocean Energy Management ("BOEM") in accordance with the Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf No. OCS-A 0486 (the "Survey Plan"). The Survey Plan describes in greater detail Orsted's survey activities for the Revolution Wind Project, including survey activities that will take place in Rhode Island waters.

2. **Coordination of Survey Activities.**

   (a) Orsted shall implement the communications measures described in Section 3 and instruct its contractors to also implement these measures to provide commercial fishermen and others operating in Rhode Island waters with sufficient information to have notice of survey activities so that those survey activities can be de-conflicted from other activities.

(b) Orsted has created "Survey Zones" for planned survey activities near and into Rhode Island waters. A chart overlay depicting those zones and coordinates for each zone is attached as Exhibit A.

(c) These Survey Zones will be published in each Orsted New England Mariner Notice and posted at https://us.orsted.com/Mariners. To the extent possible, CRMC will assist and make reasonable efforts, through its Fishermen's Advisory Board ("FAB"), to ensure that Rhode Island commercial fishermen have access to and are familiar with the Survey Zones.

3. **Communications to Mariners in Rhode Island waters.**

(a) Radio Communications.

(i) Each day at 0600 and 1800 local time, vessels engaged in Project survey activities in Rhode Island waters will designate a working frequency on VHF Channel 16. Project survey vessels will use this working channel to communicate with vessels in the vicinity and to broadcast the time, location, and nature of their present survey activities.

(ii) While engaged in Project survey activities in Rhode Island waters, survey vessels will continuously monitor VHF Channel 16 and their designated working channels.

(b) Written Communications.

(i) Orsted will update its "Mariner Briefings" found at https://us.orsted.com/Mariners twice a week (Mondays and Thursdays) to provide more specific information as follows:

(A) Which survey vessels will be operating in the relevant time period;

(B) Expected operating periods per day;

(C) Which Survey Zone(s) each vessel expects to operate in during the relevant time period;

(D) Which survey vessels have a fisheries representative aboard; and

(E) Email the Orsted New England Mariner Notice twice a week (Mondays and Thursdays) to those requesting notice.

(c) Telephone Communications.

(i) Orsted's fisheries liaison team of Rodney Avila and Julia Prince, and RI Fisheries Representative Rodman Sykes, will remain available for direct questions/inquiries concerning the status of Project survey activities and to assist in vessel coordination. If these points of contact change, or their contact information changes, Orsted will provide updates through its Mariner Briefings. They may be contacted as follows:

(A) Rodney Avila- 857-332-4479

(B) Julia Prince - 857-348-3263

(C) Rodman Sykes -401-225-9985

(d) Face-to-Face Communications.

(i) Orsted will implement open port hours starting September 30, 2019. These open port hours will be at Point Judith and Newport, RI, and New Bedford, MA and will provide an opportunity for local commercial fishermen and mariners to speak with Orsted's fisheries liaison regarding Project survey activities. Orsted will seek to establish a specified location at each port for the designated open port hours.

(ii) Orsted expects that open port hours will be: Mondays from 0800-1200 for Point Judith, Wednesdays from 0800-1200 for Newport, and Fridays from 0800-1200 for New Bedford. These times are subject to change, and any changes will be announced at least one week in advance at: https://us.orsted.com/Mariners.

(iii) Open port hours will continue through the end of calendar year 2019. If Orsted observes that fishermen are not taking advantage of open port hours, then Orsted may discontinue open port hours sooner and provide notice to CRMC of that discontinuation at least 10 days prior to discontinuation of open port hours.

(e) Stipulations.

(i) As stated above, Orsted shall instruct its contractors operating survey vessels to advise by VHF radio (via the daily working channel) all nearby fishing vessels of a geophysical survey to avoid potential entanglement in fishing gear. Orsted will also instruct contractors operating survey vessels to respond, as is customary, to any incoming VHF calls from fishing vessels.

4. Other Agreements of the Parties.

(a) Good Faith. The Parties agree that they will act in good faith concerning the implementation of activities identified in this MOU.

(b) Multiple Parts. This MOU may be executed in counterparts, each of which shall be deemed an original for all purposes, but all such counterparts shall, collectively, constitute one document. Delivery of electronic signatures (e.g., PDF) on this MOU shall be treated for all purposes in the same manner as delivery of original signatures.

(c) No Third Party Beneficiaries. This MOU shall be solely for the benefit of the Parties, and their successors, assigns and legal representatives and there shall be no third party beneficiaries hereof.

(d) Retained Rights and Obligations. This MOU shall not operate as a waiver of any Party's rights at law, nor shall it relieve either Party of any legal obligation. CRMC expressly retains all of its regulatory and enforcement authority over any Project activities that are within its jurisdiction.

(e) Controlling Law. The validity, construction and enforcement of this MOU shall be governed by the laws of the State of Rhode Island, without giving effects to the principles of conflicts of law. In the event that Orsted violates any of the terms and conditions of this MOU, CRMC shall immediately notify Orsted of the violation and the particulars thereof. If the violation is not corrected within seven (7) days to the satisfaction of CRMC, all survey operations by Orsted covered by the MOU shall cease until such time as the violation is cured to the satisfaction of CRMC.

5. **Gear Loss Compensation.**

(a) Orsted will implement a gear loss compensation plan in accordance with Exhibit B.

6. **Additional Coordination.**

(a) The Council and Orsted shall as to issues not covered specifically in this agreement meet and address concerns as they arise relative to survey work in state waters.

(The signature page is next.)

IN WITNESS WHEREOF, the parties have executed this Memorandum of Understanding as of the date first above written.

RHODE ISLAND COASTAL RESOURCES MANAGEMENT COUNCIL

By: ______________________
Grover Fugate
Its Executive Director

Orsted Wind Power North America LLC

By: ______________________

Its Authorized Person

By: ______________________

Its Authorized Person

EXHIBIT A – Survey Zones

Survey zones

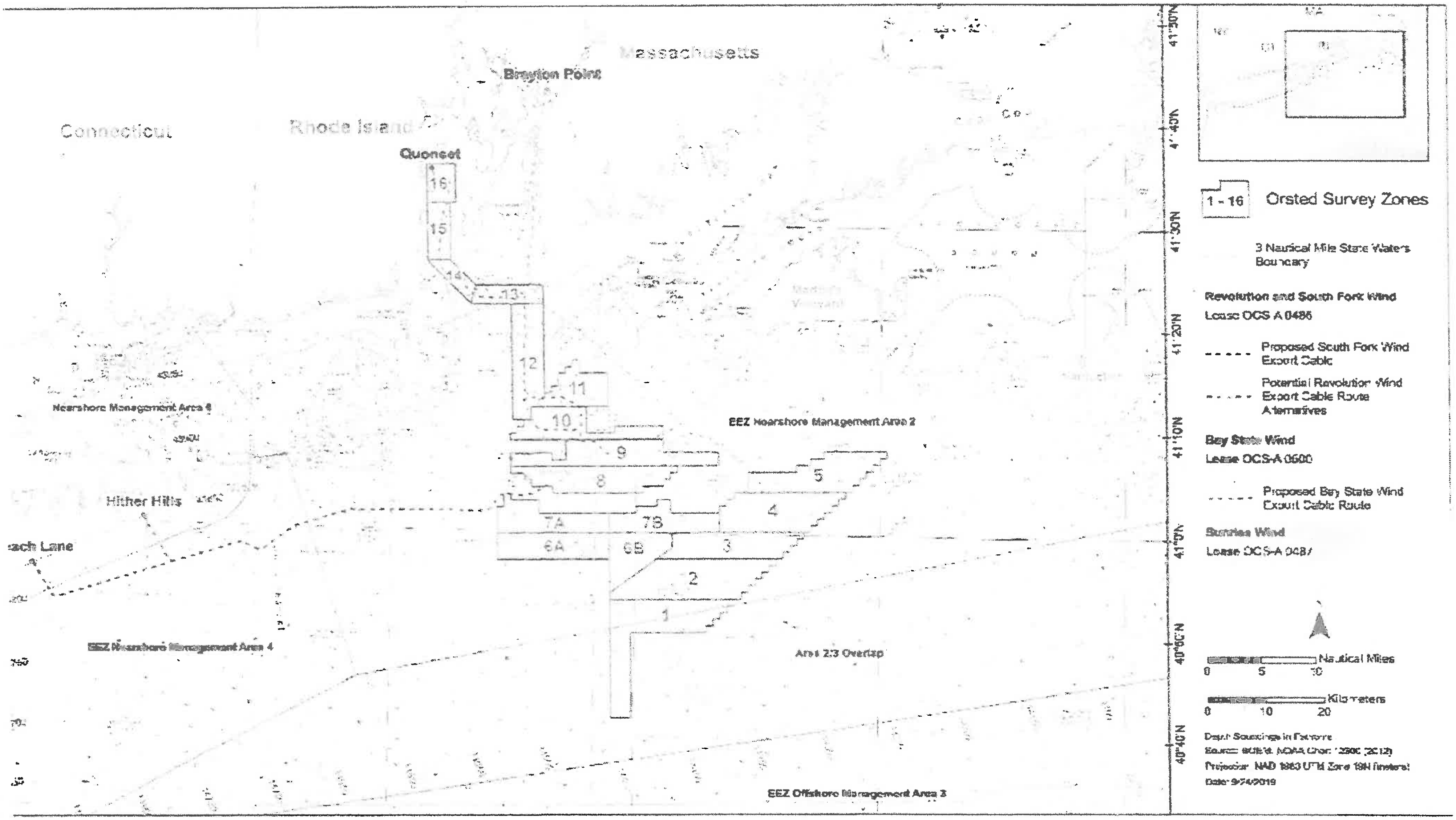


EXHIBIT B – Gear Plan

Fishing Gear Conflict Prevention and Claim Procedure During Surveys Only As of October 2019

Overview

As good neighbors and fellow ocean users, Ørsted U.S. Offshore Wind (Ørsted) recognizes the possibility of offshore wind activity and commercial fishing gear encounters. We believe that with proper communication and training, there will be limited gear interactions, if any, in connection with the installation and operation of our offshore wind farms. In the event that there is a gear loss caused by or resulting from Ørsted's activities, we have provided a claim/damage procedure below. The prevention procedures are by no means exhaustive and will continue to be modified and improved.

Measures to Prevent Gear Loss

1) **Communication: What's happening, where, when?**
   - Dockside: Ørsted Fisheries Liaisons work with port Fisheries Representatives to identify mariners that fish in areas where on-water work is planned and communicate to those fishermen directly. Ørsted has implemented port hours at several ports in New York and New England to provide an opportunity for fishermen and mariners to speak with Ørsted's fisheries liaison regarding Project survey activities and other questions that they have
   - Survey Zones: Ørsted has divided its lease areas in the northeast United States into "Survey Zones" with boundary coordinates to better describe areas of survey activities
   - Website: Mariners page on us.orsted.com/mariners will include project specific information and details for on-water activities including vessel names and location and which Survey Zones vessels may be operating in
   - Mariner Briefings: Briefings will be distributed every Monday and Thursday with a projected 3 and 4 day outlook, respectively
   - Fisheries liaisons: Ørsted's fisheries liaison team of Rodney Avila and Julia Prince will remain available for direct telephone questions/inquiries and to assist in vessel coordination

2) **Training:**
   - All personnel working offshore for Ørsted will be trained on these procedures and on how to identify/avoid fishing gear and what to do in case of a snag with fishing gear
   - All contractors working for Ørsted will be given a briefing on the importance of the local fishing communities and instructed to communicate early and often with fishing vessels while always following USCG Rules of the Road

3) **Lessons Learned:**
   - Make best efforts to gather feedback and continually improve communication on vessel activities
   - Incorporate lessons learned from previous interactions with local vessels
   - All vessels including Ørsted project vessels and individual fishing vessels should make best efforts to avoid gear loss and follow prevention best practices

Ørsted

Filing a Claim

A fisherman who has experienced a gear loss or damage that they believe was caused by or the result of Ørsted's activities should complete the attached application fully and submit it to their home port or closest port Fisheries Representative or to Rodney Avila, Fisheries Liaison, via email at rodav@orsted.com.

To have a claim reviewed, applicants must:

1) Contact the Fisheries Liaison Rodney Avila as soon as safe and practical to notify him of incident via cell phone (provided below).

2) Provide a complete, legible, executed application form. Incomplete applications will not be accepted.

3) Submit the completed application within 30 days of incident.

4) Include the following with application form:

- Copy of a valid fishing permit
- Proof that the vessel was fishing in the area with a VTR report for the trip when gear was lost or sales slip for fish landings for period of gear loss/damage
- Sales slip or gear invoice for replacement or repair gear (must be substantially similar to gear that was lost/damaged)
- A slip receipt for proposed replacement tag
- Location of gear loss/damage – either GPS coordinates and/or photo of chart plotter
- Lobster and gill net only: must produce original/replacement receipt for lost gear if requested by Fisheries Liaison

Process for claim review:

- Claims will be reviewed by Fisheries Representative from the Applicant's home port or closest port and Ørsted
- Applicants will be notified of the result, in writing, within 60 days of Ørsted's receipt of a complete Application
- If the claim is found to be valid, a check will be provided to the Applicant
- If the claim is denied, a written explanation will be provided to the Applicant
- Applicants who disagree with the decision or part of a decision may file a written notice of appeal with Ørsted, which Ørsted will provide to a Third Party for review. The Third Party's decision will be final and not subject to any further right of appeal

Prevention methods should be followed by all parties. Ørsted reserves the right to request additional information to support review of claim.

Application

Name ____________________

Address ____________________

Phone number ____________________

Email ____________________

Vessel name ____________________

Home port ____________________

Gear type ____________________

State license # ____________________

Federal permit # ____________________

Vessel documentation number/registration number# ____________________

Claim amount ____________________

Claim description

Included with this Application is:

- Copy of a valid fishing permit
- Proof of fish landings (VTR report) for the trip when gear was lost or sales slips for fish landings during period of gear loss/damage
- Sales slip or gear invoice for replacement or gear repair (must be substantially similar to gear that was lost/damaged)
- A slip receipt for proposed replacement tag
- Location of gear loss/damage – either GPS coordinate and/or photo of chart plotter
- Lobster and gill net only: must produce original/replacement receipt for lost gear if requested by Fisheries Liaison

By submitting this Application, Applicant authorizes Ørsted U.S. Offshore Wind to make whatever reasonable inquiries and investigations it deems necessary to verify my Application and request for compensation.

Ørsted

Applicant understands that submitting this Application does not guaranty payment. Applicant further agrees that if this claim is accepted and paid in its entirety, that acceptance of such payment constitutes full, final and complete payment for this particular claim and that neither Ørsted U.S. Offshore Wind, nor any of its affiliates shall have any further outstanding or ongoing obligation with respect to this particular claim and Applicant shall not, directly or indirectly, assert any claim, or commence, join in, prosecute, participate in, or fund any part of, any suit or other proceeding of any kind against Ørsted U.S. Offshore Wind, or any of its affiliates, based upon this particular claim. If a claim is denied in part, Applicant may accept payment for the undisputed part without waiving Applicant's right to appeal the disputed part of the claim. Applicant recognize that submission of this Application does not affect Applicant's rights concerning matters other than those specifically identified in this particular Application.

I attest, under penalty of perjury, that to the best of my knowledge the information in this Application is true and correct.

Signature______________________________ Date ______________________________

Contact

Corporate Fisheries Liaison
Rodney Avila
rodav@orsted.com
857-332-4479

NY/CT Fisheries Liaison
Julia Prince
julpr@orsted.com
631-662-3775

State of Rhode Island and Providence Plantations
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, RI 02879-1900

(401) 783-3370
Fax (401) 783-2069

September 8, 2017

Bureau of Ocean Energy Management
Office of Renewable Energy Programs
45600 Woodland Road, VAM-OREP
Sterling, VA 20166

Dear Sirs/Madam:

RE: CRMC File No. 2017-09-034 - installation of offshore meteorological data collection system for lease number OCS-A 0486 (Met Buoy).

Dear Sirs/Madam:

The Rhode Island Coastal Resources Management Council (CRMC) is in receipt of a written request (via email) from your office requesting CRMC concurrence that the proposed Site Assessment Plan (SAP) and Consistency Certification (CC) prepared by Deepwater Wind New England, LLC for the proposed installation of a meteorological buoy offshore the State of Rhode Island is consistent to the maximum extent practicable with the State's coastal zone management program, including the enforceable polices of the Ocean Special Area Management Plan. The CRMC has review authority in this matter pursuant to the federal Coastal Zone Management Act (CZMA), 16 USC §§ 1451-1464, and the CZMA's implementing regulations at 15 CFR Part 930 Subpart C - Consistency for Federal Agency Activities.

Pursuant to 15 CFR § 930.41, the CRMC hereby concurs that the proposed Site Assessment Plan (SAP) and Consistency Certification (CC) prepared by Deepwater Wind New England, LLC for the proposed installation of a meteorological buoy offshore the State of Rhode Island to be consistent to the maximum extent practicable with the federally approved RI Coastal Resources Management Program, and the enforceable policies and regulations therein.

Please contact this office upon initiation of construction, or if you should have any questions regarding this project.

Sincerely,

Jeffrey M. Willis, Deputy Director
Coastal Resources Management Council

/ajt
cc: Grover J. Fugate, Executive Director
Anthony DeSisto, Esq.
David Beutel, CRMC
James Boyd, CRMC
Danni Goulet, CRMC
David Reis, CRMC

State of Rhode Island and Providence Plantations
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, RI 02879-1900

(401) 783-3370
Fax (401) 783-2069

March 3, 2020

Marisa A. Desautel, Esq.
Desautel Law
55 Pine Street, 4th Floor
Providence, RI 02903

RE: Ørsted South Fork Wind Farm Project Application Deficiency

Dear Ms. Desautel,

I am in receipt of your second letter dated February 12, 2020 concerning the above referenced matter. In both your January 6 and February 12 letters you assert that the Coastal Resources Management Council (CRMC) was not provided with certain information to commence federal consistency review of the Site Assessment Plan (SAP) for the pending South Fork Wind Farm (SFWF) offshore wind energy project.

As I explained in my January 10, 2020 response to your earlier letter, the CRMC did not need the information you claim is required for the CRMC 2017 consistency concurrence for the SFWF SAP, as the SAP activity was only for the installation of an offshore meteorological data collection buoy, not for construction activity, and all necessary data and information was submitted to the CRMC for the proposed activity.

Sincerely,

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/ajt

cc: CRMC Members
David Kaiser, NOAA (via email)
James Bennett, BOEM (via email)
Jeffrey Willis, CRMC Deputy Director
James Boyd, CRMC Coastal Policy Analyst

DESAUTEL LAW

Marisa A. Desautel
marisa@desautelesq.com
401.477.0023

Rhode Island Coastal Resources Management Council
Stedman Government Center, Suite 3
4808 Tower Hill Road
Wakefield, RI 02879-1900

February 12, 2020

RE: ORSTED SOUTH FORK WIND FARM PROJECT APPLICATION DEFICIENCY

Members of the Coastal Resources Management Council,

As you may be aware, this office represents the Fishermen's Advisory Board (FAB) with respect to the above-referenced matter. This correspondence is sent in response to Mr. Fugate's reply letter dated January 10, 2020. The FAB is compelled to issue this response to preserve the record in this matter. As such, the FAB provides the following advisory concerns:

I. The CRMC Should have Required a Site Assessment Plan Already

Mr. Fugate's January 10th letter contends that the CRMC received all Necessary Data and Information (NDI) for the proposed activity. This conclusion is not true. Regardless of any explanation proffered, the state enforceable policies that currently exist, and were approved by NOAA, require very specific reports through the SAP process. These reports relate to fish habitat and commercial/recreational fishing data. As stated in the FAB's first letter to CRMC, these reports are required NDI under the state's enforceable policies located at 650 RICR 20-05-

11.10.5(3)(C)(1). The SAP reports were never submitted by the applicant to the CRMC. As a result, the CRMC still does not have all of the NDI required by the Ocean SAMP enforceable policies.

Despite the now-streamlined process implemented by BOEM, the state's enforceable policies require a SAP for the South Fork project. The state enforceable policies and NDI need not mirror the federal requirements, and here they do not. In fact, NOAA's Office of Coastal Management states that "[NDI] will usually be contained in the application to the federal agency, but may include other information described by a state CMP, if the information is *specifically included in the state's federally approved CMP document and identified as "necessary data and information.*"[1]

Under the Ocean SAMP's enforceable policies, a SAP is a pre-construction requirement that includes data from physical characterization surveys and baseline environmental surveys. These surveys "shall demonstrate that the applicant has planned and is prepared to conduct the proposed site assessment activities in a manner that conforms to the applicant's responsibilities…and:

1. Conforms to all applicable laws, regulations;
2. Is safe;
3. Does not unreasonably interfere with other existing uses of the state waters,
4. Does not cause undue harm or damage to natural resources; life (including human and wildlife); the marine, coastal, or human environment; or sites, structures, or direct harm to objects of historical or archaeological significance;
5. Uses best available and safest technology;
6. Uses best management practices; and
7. Uses properly trained personnel." 650 RICR-20-05-11.10.5(C)(1).

[1] NOAA Office of Coastal Management, "CZMA Federal Consistency Overview," 13 (January 4, 2016)(emphasis added), available at https://coast.noaa.gov/data/czm/consistency/media/federal-consistency-overview.pdf.

The SAP reports must include biological as well as fish and fisheries surveys, among a host of other items. 650 RICR-20-05-11.10.5(C)(1)(e)(1). The material submitted to CRMC by the applicant, to date, does *not* contain these *required* surveys.

II. All Outstanding NDI Must Be Received Before the Six-Month Consistency Review Can Commence

Mr. Fugate's January 10th letter states that the CRMC is in the process of reviewing the South Fork COP, which supplants the SAP process. The FAB again asserts that the COP is a separate and distinct set of materials from the requirements of a state-required SAP. The January 10th letter from Mr. Fugate does not address the reason(s) why a SAP was not requested. This is especially troubling, given that it is necessary under the CRMC's own enforceable policies which the CRMC should not be ignoring. As the CRMC is aware, the Ocean SAMP's enforceable policies were approved by NOAA and are an essential part of the state's review process.

Mr. Fugate's letter also states that "the state cannot re-open or rescind its previous consistency concurrence…" However, the FAB is not asking that the state re-open or rescind any previous concurrence. Instead, the FAB asks that the CRMC request the SAP from the applicant before the six-month review period commences under the CZMA. 16 U.S.C. §1456(c)(3)(A), 30 C.F.R. § 930.58, and 650 RICR-20-05-11.10.5(A).

CRMC must request the missing SAP information under its own regulations as well as the federal regulations governing consistency review. The SAP information is NDI, as "**[i]nformation specifically identified in the management program as required necessary data and information for an applicant's consistency certification.**" 15 C.F.R. §930.58(a)(emphasis added).

The CRMC's 6-month review period commences only when the CRMC receives both the consistency certification and "all the necessary data and information required by §930.58(a)." 15

C.F.R. §930.60. "If an applicant fails to submit all necessary data and information required by § 930.58(a), the State agency "**shall notify the applicant and the Federal agency, within 30 days of receipt of the incomplete submission, that necessary data and information described in § 930.58(a) was not received and that the State agency's six-month review period will commence on the date of receipt of the missing necessary data and information**..." 15 C.F.R. §930.60(a)(2) (emphasis added).

If, as CRMC states, the timeline for the six-month review process is controlled by the submission of a COP, then the CRMC still has time to require the missing SAP information.

Because of the foregoing reasons, the FAB again respectfully requests that the CRMC require a SAP from the project applicant before more time is lost.

Please do not hesitate to contact me with any questions. Thank you for your anticipated consideration in this regard.

Sincerely,

Marisa Desautel, Esq.

cc: David Kaiser, Esq., NOAA
James Benett, BOEM

ec: Grover Fugate, CRMC
David Beutel, CRMC
Robin Main, Esq.

State of Rhode Island and Providence Plantations
Coastal Resources Management Council
Oliver H. Stedman Government Center
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January 10, 2020

Marisa A. Desautel, Esq.
Desautel Law
55 Pine Street, 4th Floor
Providence, RI 02903

RE: Ørsted South Fork Wind Farm Project Application Deficiency

Dear Ms. Desautel:

I am in receipt of your January 6, 2020 letter received via email concerning the above referenced matter. Your letter asserts that the Coastal Resources Management Council (CRMC) was not provided with certain information to commence federal consistency review of the Site Assessment Plan (SAP) for the pending South Fork Wind Farm (SFWF) offshore wind energy project.

The proposed activity under the SFWF SAP was only for the installation of an offshore meteorological data collection buoy. The CRMC received a consistency certification and all necessary data and information (NDI) for the proposed activity as required pursuant to 15 CFR § 930.76(b), via the U.S. Department of the Interior Bureau of Ocean Energy Management (BOEM) on July 10, 2017, and was assigned CRMC file number 2017-09-034. In accordance with the Coastal Zone Management Act (CZMA) federal consistency regulations (15 CFR Part 930), the CRMC issued its concurrence for the activity on September 8, 2017.

Please be advised that when the CRMC's Ocean Special Area Management Plan (SAMP) was adopted by the Council in 2010, the enforceable policies specified in Chapter 11, now codified as 650-RICR-20-05-11, for a SAP were developed to be consistent with the BOEM federal review process for offshore wind energy projects under 30 CFR § 585. Initially, BOEM intended to have a sequential submittal of an all-encompassing SAP followed by the applicant's construction and operation plan (COP). The Ocean SAMP enforceable policies were developed to be reflective of BOEM's sequential process at that time. More recently, however, BOEM is only using SAPs for meteorological and limited geophysical and geological surveying activities, with the detailed biological assessments being required as part of an applicant's COP. In fact, BOEM now allows a concurrent submission of the SAP and COP and processed at the same time. In this situation all the NDI would be part of the COP submittal.

The CRMC is presently reviewing the SFWF COP, which was filed in October 2018 and assigned CRMC file 2018-10-082. The CRMC is working with Ørsted, with advice from the CRMC Fishermen's Advisory Board, on the commercial fisheries assessment methodologies that will be conducted by Ørsted for the SFWF project to provide the information necessary for the CRMC to make a consistency decision on the SFWF COP.

In regard to the CRMC 2017 concurrence for the SFWF SAP, the CRMC did not need, at that time, the information you claim is required, as the SAP activity was only for the installation of an offshore meteorological data collection buoy, not for construction activity, and all NDI was submitted to the CRMC for the proposed activity. Moreover, once a state coastal program issues a concurrence for a specific activity, there is no provision within the CZMA federal consistency regulations to require subsequent additional information related to the activity that the state concurred with, and the state cannot re-open or rescind its previous consistency concurrence.

Sincerely,

Grover J. Fugate

Grover J. Fugate, Executive Director
Coastal Resources Management Council

/lat

cc: CRMC Members
David Kaiser, NOAA (via email)
James Bennett, BOEM (via email)
Jeffrey Willis, CRMC Deputy Director
James Boyd, CRMC Coastal Policy Analyst

DESAUTEL LAW

Marisa A. Desautel
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Rhode Island Coastal Resources Management Council
Stedman Government Center, Suite 3
4808 Tower Hill Road
Wakefield, RI 02879-1900

January 6, 2019

RE: ORSTED SOUTH FORK WIND FARM PROJECT APPLICATION DEFICIENCY

Members of the Coastal Resources Management Council,

As you may be aware, this office represents the Fishermen's Advisory Board with respect to the above-referenced matter. Through the scope of this office's representation, it became clear that the CRMC was never provided with certain required information to commence review of the pending South Fork Wind Farm project. The Coastal Zone Management Act ("CZMA") provides that state review for consistency certification commences only after the state has received all of the "necessary information and data" [hereinafter referred to as NDI] required to review and decide on an application. 16 U.S.C. § 1456(c)(3)(A).

By way of background, the South Fork Wind Farm Site Assessment Plan ("SAP") was approved by BOEM on October 12, 2017. The CRMC issued a federal consistency certification for the SAP on September 8, 2017, despite the deficiencies in the information contained in the SAP from the perspective of the state requirements detailed below. NDI is described in the CZMA as follows:

> "Information specifically identified in the [state coastal] management program as required necessary data and information for an applicant's consistency certification. The management program as originally approved or amended (pursuant to 15 CFR part 923, subpart H) may describe data and information necessary to assess the consistency of federal license or permit activities." 30 C.F.R. § 930.58.

Private developer activities, unlike federal agency activities, must be conducted in compliance ". . . with the enforceable policies of such state's ***approved management program*** and will be carried out in a manner consistent with such program." 16 U.S.C. § 1456(c)(3)(B) (emphasis added). *See also* Linda Krop, *Defending State's Rights Under the Coastal Zone Management Act-State of California v. Norton*, 8 Sustainable Dev. L. & Pol'y 54, 55 (2007).

At the time of CRMC's consistency review for the SAP, Rhode Island's coastal management program, specifically the enforceable policies contained within the codified version of the Ocean Special Area Management Plan ("O-SAMP") **as approved by NOAA**, required a SAP containing information that exceed the federal requirements. 650 R.I. Code R. §20-05-11.10.5(C)(1) (2018)[1]. The long list of NDI for the state-required SAP includes reports and results from geotechnical, geological, and biological surveys with supporting data; and results from a fish and fisheries survey with supporting data. The fish and fisheries survey requires, at the state SAP level:

> "A report that describes the results of:
> (i) A biological assessment of commercially and recreationally targeted species. This assessment shall assess the relative abundance, distribution, and different life stages of these species at all four seasons of the year. This assessment shall comprise a series of surveys, employing survey equipment and methods that are appropriate for sampling finfish, shellfish, and

[1] While the Ocean SAMP may be undergoing revision, these revisions have not yet been approved by NOAA and are not considered enforceable until such approval is granted.

> crustacean species at the project's proposed location. This assessment may include evaluation of survey data collected through an existing survey program, if data are available for the proposed site.
>
> (ii) An assessment of commercial and recreational fisheries effort, landings, and landings value. Assessment shall focus on the proposed project area and alternatives across all four seasons of the year must. Assessment may use existing fisheries monitoring data but shall be supplemented by interviews with commercial and recreational fishermen.
>
> (iii) For more information on these assessments see § 11.10.9(C) of this Part." 650 R.I. Code R. § 11.10.5(3)(C)(1) as written in (e)(1)(6) a/k/a Table 2. *See generally* 650 R.I. Code R. § 11.10.5(3)(C); *see also* 650 R.I. Code R. § 11.10.5(3)(C)(1) (2018) (emphasis added).

Neither of these required reports were ever submitted to CRMC.

Additionally, the studies relied upon by the applicant for assessing the various other requirements in the applicant's SAP are inadequate: many date from 2010 or earlier, do not fully address the requirements presented by the CRMC in its enforceable policies, and cannot "demonstrate that the applicant has planned and is prepared to conduct the proposed site assessment activities in a manner that conforms to the applicant's responsibilities listed above in § 11.10.1(E) of this Part" (namely that the applicant uses best available science and technology and best management practices). *See* 650 R.I. Code R. 20-05-11.10.5(C)(1)(b)(5)-(6) (2018).

The information provided by the applicant does not allow CRMC to make an informed determination as to whether the activity is consistent with the policies set forth in 11.10.1 of the Ocean SAMP, particularly those related to fish habitat. *See* 650 R.I. Code R. 20-05-11.10.1(J) (2018).

CRMC cannot find that the applicant submitted all necessary data and information required under the CZMA for consistency review, nor can it offer/deny a consistency certification without having reviewed all of the necessary data and information now that the Construction and

Operations Plan has been submitted. CRMC must require the information that is missing, as well as insist upon more recent data, if such exists.

As a result, my client formally requests that the CRMC require the above-described information immediately. Otherwise, the CRMC will be operating in violation of its own federally approved Ocean SAMP.

Please do not hesitate to contact me if you have any questions in this regard.

Sincerely,

Marisa Desautel

cc: David Kaiser, Esq., NOAA
James Benett, BOEM

ec: Grover Fugate, CRMC
David Beutel, CRMC
Robin Main, Esq.

April 15, 2021
VIA ELECTRONIC MAIL ONLY

Jeff Willis, CRMC Executive Director
Jim Boyd, CRMC Assistant Executive Director
CRMC
Oliver Stedman Government Complex
4808 Tower Hill Road, Suite 3
Wakefield, RI 02879

Re: South Fork Wind (SFW) estimated economic impact to RI

Dear Jeff and Jim,

The South Fork Wind project's impact on RI economic development is estimated to be approximately $33 million in local investment and approximately 134 local jobs. These projections are based upon progressed economic development plans that include development and procurement efforts to date as well as committed and planned investments. Economic development plans span the projects within Orsted and Eversource's North East Program that consists of the SFW, Revolution Wind, and the Sunrise Wind projects. Such plans have been regularly reviewed with your RI Commerce.

This presentation includes a breakdown of economic development into categories or scopes of work. The figures included herein show the portion of investment and jobs attributed to SFW. Please see more context on the categories below:

Foundations: RI's ProvPort facility will host the foundation scope including advanced foundation component fabrication and assembly. This scope includes welding of components, pre-assembly work, and preparation of components to be loaded onto vessels. Foundations are a core component of an offshore wind turbine. SFW foundations' scope is projected to provide approximately $11 million in local investment and 45 jobs.

Project Management: As you may know, significant development efforts go into planning and executing an offshore wind farm. RI is home to Orsted's Headquarters and Innovation Hub that provide local resources toward project management and development efforts. SFW's Project Management scope is projected to provide approximately $2 million in local investment and 24 jobs.

ProvPort facilities: As mentioned above, Orsted and Eversource are investing in the upgrade of the ProvPort facility to serve as a key supply chain port. SFW's attributed portion of the direct investment and port upgrade construction provide approximately $3 million in local investment and 4 jobs.

Quonset facilities and Construction Management: The Port of Quonset is intended to serve as a project management and helicopter hub during the construction phase, followed by an Operations and Maintenance facility that will home several Crew Transfer Vessels (CTV) and will be the strategic location for crew changes. This category includes the development and lease costs for the facility and helicopter services, the costs associated with the Construction Management team, and the maintenance of the CTVs. SFW's attributed economic development associated with this scope is approximately $2 million in local investment and 13 jobs.

CTV build: The North East Program will require several CTVs to be built to support the program during the construction and operations phases. The figures provided for this category capture the SFW portion of the investment to have a secure number of CTVs built in the state of Rhode Island and the associated jobs. SFW's attributed economic development associated with this scope is approximately $2 million in local investment and 11 jobs.

Operations: Quonset will host at least 32 full time jobs during the operations phase of the North East Program and will serve as the home of several CTVs and crew changes. SFW's attributed economic development associated with this scope is approximately $7 million in local investment and 3 jobs.

Other Opportunities: There are additional economic development opportunities being discussed with RI Commerce that have a medium to high likelihood of success such as building additional CTVs, increased number of jobs for technical scopes (e.g. cable supply and installation), Tier 2 contracting opportunities, and purchase of fuel. SFW's attributed economic development associated with this scope is approximately $3 million in local investment and 10 jobs.

Please see the accompanying graphics on the next page.

I am happy to discuss any of these categories in more depth with you and am available to answer any of your questions. On behalf of SFW, Orsted and Eversource remain dedicated to RI economic development and will continue to progress the detailed plans as outlined.

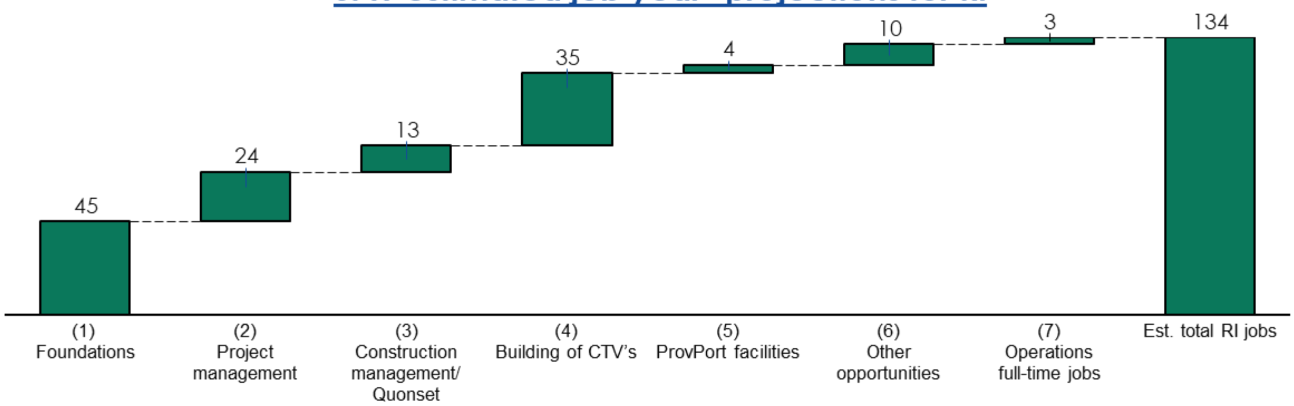
Ørsted | EVERSOURCE

Best regards,

Olivia Larson Tesse

Lead Commercial Manager

SFW estimated job year* projections for RI



(1) Jobs for advanced foundation components assembly and foundation installation

(2) Project Management during development & execution including jobs in the Ørsted Providence office and the Innovation Hub

(3) Construction management jobs includes port upgrades in Port of Quonset, helicopter usage/infrastructure, operation & maintenance of CTV's during construction

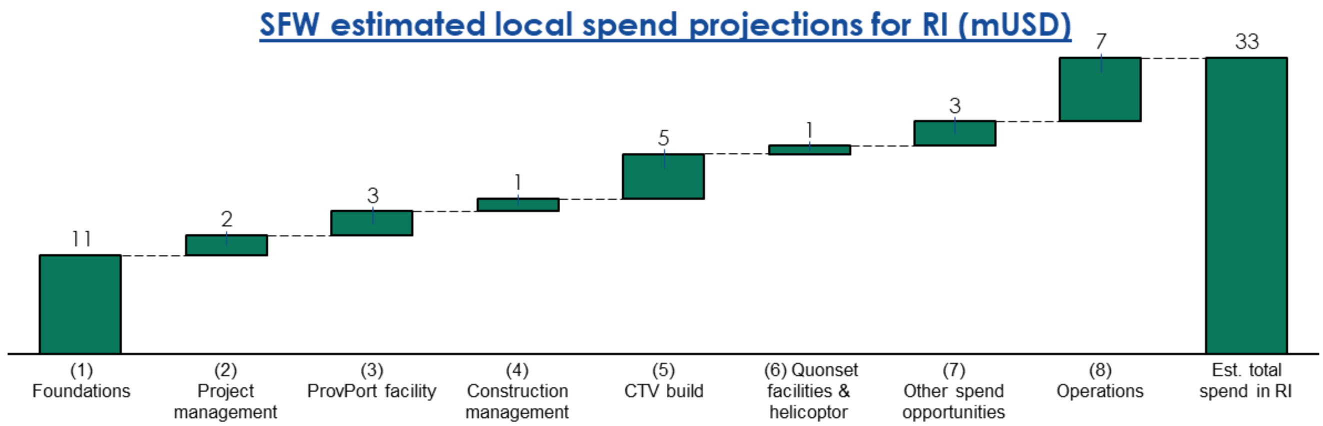
(4) Building of CTV's

(5) ProvPort facility for advanced foundation components, port upgrade jobs

(6) Opportunities with medium to high certainty including jobs for offshore export cable and array cable supply & installation, WTG (offices), and additional CTVs

(7) Operations jobs for 20 years

*FTE based on 2080 hours per year



(1) Advanced foundation components assembly and foundation installation incl. contractor build cost and lease cost

(2) Project Management during development & execution including Ørsted Providence office and the Innovation Hub

(3) Port upgrades in ProvPort, facility for advanced foundation components and lease costs

(4) Construction management incl. port upgrades in Port of Quonset, helicopter usage/infrastructure, O&M of CTV's during construction

(5) Building of CTV's

(6) Upgrades for EPC / SGRE usage incl. quay side infrastructure and Construction phase Helicopter usage/infrastructure, contractor build costs

(7) Opportunities including fuel for installation vessels, offshore cable supply & installation, additional CTVs, etc.

(8) Spend on operations jobs for 20 years plus $5m in further opportunities (e.g. cable storage)

South Fork Wind
Fisheries Value and Potential Economic Exposure

Category	Data Source	Average Annual Value $	30-year Value $	Shoreside Multiplier	Total 30-Year Economic Exposure $	FAB Loss Factor %	Potential 30-year Economic Loss $
Commercial	WHOI	145,016	6,366,593	0.942	12,363,924	50	6,181,962
						80	9,891,139
	FAB	277,957	11,634,255	0.942	22,593,723	50	11,296,862
						80	18,074,978
Commercial (SFEC)	WHOI	51,031	2,239,608	0.942	4,349,319	10	1,957,194
Charter	WHOI	112,341	5,344,671	0.6	8,551,474	50	4,275,737
						80	6,841,179
Charter	FAB	129,700	6,170,531	0.6	9,872,850	50	4,936,425
						80	7,898,280
Recreational (non-charter)	WHOI/IE	231,000	9,225,860	0	9,225,860	50	4,612,930
						80	7,380,688
Recreational (non-charter)	FAB	450,744	18,007,162	0	18,007,162	50	9,003,581
						80	14,405,730

Notes:

FAB - CRMC Fishermen's Advisory Board

WHOI - Woods Hole Oceanographic Institute - consultant to Ørsted

IE - Industrial Economics - consultant to Ørsted

SFWF - South Fork Wind Farm

SFEC - South Fork Export Cable

Commercial 30-year project value obtained using Vineyard Wind methodology 2.5% annual growth multiplier.

Charter boat 30-year project value obtained using WHOI 3% annual growth multiplier.

Recreational (non-charter) 30-year project value obtained using CPI 1.9% multiplier.

All amounts are in 2019 dollars and would need to be adjusted for the planned SFW project start in 2023. Using a 1.9% CPI increase, the adjustment is equivalent to increasing all amounts in the table by 7.8%

Cataegories	WHOI/IE	FAB
Commercial	12,363,924	22,593,723
Charter	8,551,474	9,872,850
Recreational	9,225,860	18,007,162
Total 30-year Economic Exposure	**30,141,258**	**50,473,735**
50% Loss	15,070,629	25,236,868
80% Loss	24,113,006	40,378,988

March 11, 2021
Re: South Fork Wind, LLC's Comprehensive Mitigation Proposal

Jeffrey Willis, Executive Director
Rhode Island Coastal Resources Management Council
Stedman Government Center
Suite 116, 4808 Tower Hill Road
Wakefield, RI 02879-1900
jwillis@crmc.ri.gov

Dear Mr. Willis,

The Coastal Resources Management Council (CRMC), South Fork Wind, LLC (SFW), and the Fishermen's Advisory Board (FAB) have engaged in mitigation negotiations pursuant to the enforceable policies of the Rhode Island Ocean Special Area Management Plan (Ocean SAMP) for approximately six months. As CRMC finalizes its mitigation recommendation and prepares its recommendation to the Council for public hearings in April, SFW provides this memorandum to summarize (1) the numerous modifications made to the SFW Project to avoid and/or minimize any potential adverse impacts to commercial and recreational fisheries and (2) the comprehensive mitigation package SFW has proposed to address any potential impacts. SFW has met with the FAB and CRMC for the past four years to discuss the proposed SFW Project. During that time, SFW has listened to the concerns of the fishing community and addressed them through meaningful modifications to the SFW Project. The SFW Project before CRMC represents the culmination of years of engagement with federal and state agencies, the FAB and greater fishing community, and other stakeholders and incorporates the work of countless subject matter experts relying on the best available science. For the reasons detailed below, SFW respectfully submits that it has demonstrated that the proposed SFW Project is consistent with the Ocean SAMP's enforceable policies, including on mitigation.

I. REGULATORY FRAMEWORK

The federal Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.* (the CZMA) requires that, where a state has a coastal management program approved by the U.S. Secretary of Commerce through authority delegated to the National Oceanic and Atmospheric Administration (NOAA), the state has the opportunity to review proposed projects for consistency with the enforceable policies of the state's coastal management program. Applicants proposing activities within the coastal management program's scope must certify that the proposed activity "complies with the enforceable policies of such state's approved management program and will be carried out in a manner consistent with such program." 16 U.S.C. § 1456(c)(3). The trigger for federal consistency review applicability is "reasonably foreseeable effects": federal actions that have reasonably foreseeable effects on land or waters uses within the state's coastal zone, including actions in an approved geographic location description, must be consistent with the state's enforceable policies. *See* 15 C.F.R. § 930.11. The state's role is limited to reviewing the applicant's consistency certification. *See* 15 C.F.R. § 930.78.

The CZMA regulations direct the state and applicant to "cooperate" "to develop conditions that, if agreed to" by each "would allow the State agency to concur" with the consistency certification. 15 C.F.R. § 930.4. But while the CZMA allows for and indeed encourages cooperation and collaboration between the state and applicant, the CZMA does not permit states to demand compensation as a condition of concurrence. NOAA has stated this plainly. In its February 2020 letter to CRMC, NOAA stated the following with respect to compensation in the context of federal consistency review:

> [N]ote that for purposes of determining consistency with mitigation requirements and monetary compensation in section 11.10.1(G) [of the Ocean SAMP], the CRMC cannot compel monetary compensation as a form of mitigation through the CZMA federal consistency process, but the Council and applicant can agree to compensation as one means to meet the mitigation policy of this part. . . . [T]he state must only apply its CZMA federal consistency review authority in a manner that conforms to these comments.

Letter from NOAA to CRMC 4 (Feb. 12, 2020) [hereinafter NOAA Letter].

Section 11.10 of the Ocean SAMP includes the enforceable policies for purposes of CZMA federal consistency review. *See* 650-RICR-20-05-11.10 [hereinafter § [xx.xx]].[1] Among other policies,[2] the Ocean SAMP requires that, if the Council determines that a proposed project may have potential adverse effects, it shall require an applicant to "modify the proposal to avoid and/or mitigate the impacts." § 11.10.1(C). The Ocean SAMP calls for modification first. Then, to the extent the project cannot be modified to fully avoid potential adverse effects, the applicant must work to mitigate them. This is critical: an applicant is not required to both modify a proposal and mitigate. If modification of the project removes the potential impact, there is nothing left to mitigate. In this context, the Ocean SAMP also requires that "potential adverse impacts of offshore developments and other uses on commercial or recreational fisheries be evaluated, considered and mitigated." § 11.10.1(G). Mitigation negotiations must occur among CRMC staff, the applicant, and the advisory FAB, with final approval by the Council. *See* § 11.10.1(H).

While the FAB participates in these negotiations and provides advice to CRMC staff pursuant to its advisory role, it does not have veto authority over these negotiations, nor does it serve as a signatory to any agreement reached. *See Lapp v. Fishermen's Advisory Board*, OM 19-23, 5 (Attorney General Opinion Sept. 26, 2019) (distinguishing the FAB from the public body in *Solas v. Emergency Hiring Council*, 774 A.2d 820 (R.I. 2001) and noting that "the FAB is expressly intended to be an advisory-only body"). NOAA has described the FAB's limited role as follows:

> While the FAB may have valuable information and insights to provide as the CRMC determines the consistency of projects, the CZMA does not confer authority on entities other than the state in making CZMA federal consistency decisions. Opposition to a project by the FAB cannot be a basis for a CZMA objection; objections must be based on the CRMC's determination of consistency with NOAA-approved enforceable policies.

[1] CRMC undertook a substantial revision of § 11.10 in October 2019, which NOAA approved in February 2020. Because SFW filed its Construction and Operations Plan in June 2018, the earlier version of § 11.10 applies to the extent consistent with the CZMA.

[2] SFW reserves the right to provide additional argument with respect to other enforceable policies.

NOAA Letter 3. Further, while the Ocean SAMP requires "negotiation" among CRMC staff, the applicant, and the advisory FAB, it does not require that the three reach a final agreement with respect to mitigation. *See* § 11.10.1(H).
The Ocean SAMP adopts a rigorous science-based approach to decision-making. It requires the Council to "work to the maximum extent practicable . . . to make sure it is using the best available science and modeling tools to inform the decision making process." § 11.8(A)(5). In fact, the Ocean SAMP identifies as one of its core principles to "[b]ase all decisions on the best available science." *Id.* § 11.6(C)(4).

SFW has adhered to this type of data-driven and evidence-based approach throughout these mitigation negotiations. As described below, SFW has engaged numerous subject-matter experts to evaluate potential impacts from the SFW Project, implement project modifications, and develop a robust mitigation proposal to address any remaining potential effects not completely eliminated through modification. SFW has compiled extensive written documentation summarizing the bases for its mitigation proposal and also has made its subject matter experts available for extensive questioning by and dialogue with CRMC staff. SFW believes its mitigation proposal follows the letter and spirit of the Ocean SAMP to rely on the best available science.

II. SFW PROJECT MODIFICATIONS

SFW has taken significant steps to modify the SFW Project to avoid and/or mitigate any potential impacts to fisheries. SFW prioritizes coexistence with the fishing community as an important step in developing a sustainable offshore wind industry. Consistent with the Ocean SAMP, SFW has sought to avoid potential impacts first and, if full avoidance cannot be achieved, then mitigate. Throughout the SFW Project's development and permitting process, SFW has assessed and responded to feedback from numerous stakeholders, including the advisory FAB. This feedback has resulted in substantial project modifications, including with respect to the overall project layout.

A. <u>WTG Layout</u>

The Ocean SAMP recognizes the importance to commercial and recreational fishing of "access around and through offshore structures and developments and along cable routes" and notes that such access "is a critical means of mitigating the potential adverse impacts of offshore structures on commercial and recreational fisheries." § 5.3.1(F). Accordingly, CRMC and the FAB lobbied heavily for the offshore wind industry's adoption of 1 x 1 nautical mile (NM) grid spacing between wind turbine generators (WTGs) to permit commercial and recreational fishing to continue safely within the wind lease areas. The historical record is replete with instances of such statements. For example, in its Consistency Concurrence for the Vineyard Wind project, CRMC called for the adoption of the 1 x 1 NM grid: "CRMC staff find that offshore wind farms should be developed in a grid pattern with east-west orientation of rows and 1 nm spacing between all turbines and turbine rows . . . in order to avoid significant adverse impacts to Rhode Island commercial fishing operations and be consistent [with] the CRMC's enforceable policies." Vineyard Wind Consistency Concurrence, CRMC Staff Project Review & Federal Consistency Analysis, CRMC File 2018-04-055, at 57 (CRMC Feb. 28, 2019) [hereinafter Vineyard Wind Concurrence]; *see also* CRMC Letter to BOEM, Vineyard Wind COP Supplement to the Draft EIS; BOEM-2020-0005, at 1 (July 9, 2020) ("The RICRMC believes it is imperative that BOEM condition all COP approvals [on adoption of the 1 x 1 NM grid] so that there is regulatory certainty for the offshore wind industry and stakeholders with assurance that there will be a predictable and uniform wind farm pattern that accommodates and facilitates safe navigation, commercial and recreational fishing activities, and USCG search and rescue operations."). Indeed, in that same concurrence, CRMC commended SFW's predecessor entity for listening to the concerns of Rhode Island-based fishermen by committing to the 1 x 1 NM grid:

> [E]xtensive discussions regarding WTG layout have continued between the CRMC, Rhode Island-based commercial fishermen and Vineyard Wind since the April 11, 2018 FAB meeting. During this period two other wind developers that have secured BOEM leases, Deepwater Wind (OCS-A 0486 and 0487) and Bay State Wind (OCS-A 0500), have been listening to the Rhode Island-based fishermen concerns and have responded by committing to an east-west orientation for their proposed wind farm project layouts. This commitment *serves to address the concerns of the Rhode Island commercial fishing industry* by accommodating existing, well established commercial fishing practices and by supporting safe navigation throughout the entire southern New England wind energy area.

Vineyard Wind Concurrence 45 (emphasis added).

The FAB stated repeatedly that its constituents required the 1 x 1 NM grid to continue operating within the wind lease areas. For example, at a 2019 Fisheries Advisory Meeting, one fishermen indicated that, "Fishermen have been saying for years . . . one nautical mile east-west and north-south squared. . . . [A]s a fisherman, it's just for safety to get home." Fisheries Advisory Meeting, Tr. at 90:16-19 (Sept. 9, 2019). Another echoed this position: "[E]very single meeting we attended, we all said we need one nautical mile east-west and north-south . . . . We need the one nautical mile, . . . the checkerboard square[.]" *Id.* at 97:18-24; *see also id.* at 91:22-24 ("[W]e said one nautical mile, east-west, north-south. . . . Nothing has changed.").

In its original Construction and Operations Plan (COP), SFW incorporated 0.8 statute mile spacing between WTGs arranged in a grid-like pattern. SFW adopted this layout to balance stakeholder input with a goal of maximizing the amount of clean, renewable energy SFW could bring to the area based on the number of WTGs that could fit within the finite wind lease area. Based on feedback from the FAB and the greater fishing community, along with repeated statements from CRMC, SFW invested significantly to modify the SFW Project layout in response to feedback. In late 2019, SFW, in concert with the larger offshore wind industry in New England, committed to designing its layout in a 1 x 1 NM grid that aligns across wind farms. In other words, the grid points in the SFW Project will align with adjacent WTG points so that all of the Orsted/Eversource Joint Venture (Orsted/Eversource JV) offshore wind installations in the Massachusetts/Rhode Island Wind Energy Area (MA/RI WEA) will create a continuous east-west/north-south grid layout with 1 x 1 NM spacing. SFW incorporated this modified layout into its February 2020 revised COP.

The adoption of the 1 x 1 NM grid represented a substantial concession by the offshore wind industry. The final designation of the MA/RI WEA, and subsequent bidding process to acquire leases within it, was the result of a robust public involvement process that accounted for the concerns of many stakeholders, including fishermen. Ultimately, BOEM reduced the size of the MA/RI WEA from the original proposal to address many of these concerns. Lessees, including SFW, who bid on and procured leases had the expectation that they would have the opportunity to use the area granted in the lease. Adopting the 1 x1 NM grid, reduces the total number of WTG locations available.

CRMC, the FAB, the greater fishing community, and the U.S. Coast Guard[3] all concluded that adopting the 1 x 1 NM grid would permit the continuation of commercial and recreational fishing within the wind lease areas. By doing so, SFW substantially modified the SFW Project to avoid or minimize any potential adverse impacts to commercial and recreational fisheries. This modification reduces significantly any remaining potential adverse impacts that SFW must mitigate.

B. <u>Gear Loss Claim Process</u>

SFW also has implemented a first-in-the-industry gear loss claim process to compensate fishermen fairly in the event of lost or damaged gear. SFW uses fishing gear avoidance tactics such as onboard gear observers, avoidance training, and/or the use of a scout vessel. Accordingly, SFW expects limited gear interactions, if any, in connection with the installation and operation of the SFW Project. Nevertheless, SFW's gear loss claim process addresses those few instances in which accidental gear loss occurs.

SFW recently amended its gear loss claim process to include a business interruption component.[4] SFW modeled it after the NOAA Fishermen's Contingency Fund Program, established to compensate fishermen for losses in connection with oil and gas structures on the Outer Continental Shelf. The NOAA program provides compensation for economic loss based on 50 percent of gross income lost, rather than lost profits.

The gear loss claim process allows affected fishers to claim both gear loss and business interruption, and it provides for evaluation of claims by a three-member panel. Claimants who dispute the panel's decision may appeal to an independent third-party reviewer and simultaneously receive payment for any undisputed portion of the claim. By implementing this robust and industry-leading process, SFW has mitigated potential adverse impacts resulting from gear loss caused by the SFW Project.

C. <u>Additional Modifications</u>

Adoption of the 1 x 1 NM grid and implementation of the gear loss claim process represent only two of the modifications SFW has made. SFW also developed a comprehensive fisheries communication plan that incorporates input from CRMC and the fishing community. The communication plan gives fishers advance notice of where and when survey and construction activities will occur so as to minimize adverse interactions. SFW also employs fisheries liaisons to assist with these communication efforts.

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[3] *See* U.S. Coast Guard, Final Report, The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study, No. USCG-2019-0131 (May 14, 2020); *see also* U.S. Coast Guard Letter to Responsible Offshore Development Alliance re Request for Correction Pursuant to Information Quality Act Guidelines (Oct. 27, 2020), which is attached hereto.

[4] As CRMC is aware, SFW spent considerable time in 2020 waiting for a proposal from the FAB on gear claim and then attempting to reach agreement with the FAB on a business interruption component. SFW invested significant time and money trying to work with the FAB's consultant on an agreed-upon, standardized framework. Even though SFW agreed to adopt the FAB's proposal in nearly every respect, the FAB refused to reach agreement.

SFW developed a robust Fisheries Monitoring Plan that incorporated months of feedback from CRMC, other federal and state agencies, the FAB, and other fishers and users of the SFW Project area. SFW also incorporated input from mobile gear fishermen to adjust the export cable route to avoid areas of concern. In response to concerns about navigation, SFW will incorporate automatic identification system (AIS), enhanced cellular, and very-high frequency coverage into the WTGs. Finally, SFW will target sufficient burial cable depth and microsite the WTGs to minimize impacts to sensitive benthic habitats.

These project modifications are substantial. They demonstrate SFW's responsiveness to the commercial and recreational fishing communities and ensure the continued long-term use of the project area by fishers. By working with CRMC, SFW has eliminated or minimized significantly any potential adverse impacts of the project to commercial and recreational fisheries.

III. SFW'S MITIGATION PROPOSAL

SFW nevertheless has recognized throughout that aspects of the project, particularly construction and decommissioning, may present some potential impacts that require mitigation. Accordingly, and in keeping with the Ocean SAMP's emphasis on using the best available science and modeling tools, SFW engaged Woods Hole, one of the world's leading organizations dedicated to ocean research, to examine impacts to fisheries from the SFW Project and provide an economic assessment of such impacts. SFW has incorporated this assessment into its compensatory mitigation proposal described below. In response to questions from the FAB, SFW also has reiterated its commitment to certain impact mitigation strategies, such as noise attenuation. Finally, SFW proposed another industry-leading program, the Rhode Island Navigational Enhancement and Training Program, which proposes an approximately $1 million investment to enable Rhode Island commercial fishers and for-hire (charter) vessels to obtain pulse compression radar systems and AIS transceivers. With this comprehensive mitigation proposal, along with the project modifications, SFW respectfully submits that it has met the Ocean SAMP's requirement to "modify the proposal to avoid and/or mitigate" any "potential adverse impacts." *See* §§ 11.10.1(C), 11.10.1(G).

A. Rhode Island Navigational Enhancement and Training Program

SFW created the Rhode Island Navigational Enhancement and Training Program to provide training and experiential learning opportunities to those navigating within the Orsted/Eversource JV wind lease areas in the MA/RI WEA. The program furthers positive co-existence between offshore wind and the fishing community and advances CRMC's commitment to mariner education regarding safe navigation. *See* § 5.3.1(E) ("The Council will promote and support the education of all mariners regarding safe navigation around offshore structures and developments and along cable routes.").

Pursuant to the program, fishers eligible for SFW's Commercial Fisheries Compensation Fund, described below, will be eligible through a voucher program to receive pulse compression radar systems and AIS transceivers, if they do not already possess them. The Orsted/Eversource JV will pre-approve at least two Rhode Island marine electronics retailers to sell and install the electronic equipment. Thus, both Rhode Island fishers and Rhode Island marine retailers will benefit from this program.

In addition to the radar equipment, the program will include professional training and experiential learning components. Fishers eligible for the Commercial Fisheries Compensation Fund may attend a professional training program of their choice, including but not limited to a captain's course, license upgrade, radar course, or rules of the road refresher. Private anglers, charter captains, and commercial fishing industry members with a valid saltwater fishing license, in addition to fishers eligible for the Fund, will have the opportunity to participate in a simulator session. During the session, they will have the opportunity to navigate a vessel through a windfarm during different scenarios, including night conditions, adverse weather, and vessel crossings.

SFW developed this program in direct response to advice from the FAB. FAB members expressed concerns about navigating through the wind farm at night or during inclement weather. They expressed concerns about having enough crew members sufficiently licensed to operate in the wind farms. And they expressed concerns about radar interference from the WTGs. *But see* § 8.4.11(H) ("The installation of offshore renewable energy facilities may cause either minimal impacts or possible enhancements to navigation and communication tools and systems, including global positioning systems, magnetic compasses, cellular phone communications, very-high frequency (VHF) communications, ultra-high frequency (UHF) and other microwave systems, and automatic identification systems (AIS). [BOEM's Programmatic Environmental Impact Statement for Alternative Energy Development and Production] indicates that any impacts are likely to be negligible to minor, and cites a number of studies in which no negative impacts were found." (internal citations omitted)). The Rhode Island Navigational Enhancement and Training Program provides direct, tangible solutions to those concerns in a manner that will benefit the entire Rhode Island fishing community.

B. <u>Mitigation Strategies</u>

The FAB also requested certain specific mitigation actions in its November 19, 2020 presentation to CRMC and SFW. SFW addressed these requested mitigation actions in a memorandum to CRMC dated December 15, 2020. In brief, SFW agreed to the following additional mitigation measures.

First, SFW reaffirmed its commitments with respect to pile-driving noise attenuation and sound verification. SFW has committed to monitoring and exclusion zones based on modeled 10dB broadband underwater noise reduction levels during foundation pile driving. SFW also has committed to taking sound source verification measurements during foundation pile driving to verify in situ underwater noise levels.

Second, SFW committed to avoiding temporal and most spatial overlap between the low frequency high-resolution geophysical (HRG) surveys and the SFW fisheries monitoring surveys prior to construction. HRG surveys are required by BOEM for offshore wind development activities. They inform engineering and design, archaeological assessments, and benthic habitat mapping. HRG surveys for offshore wind development do not use seismic air guns, which studies have shown can influence the distribution and catch rates of commercially important marine fish. SFW has not used seismic air guns and does not intend to use seismic air guns in the future. While BOEM has concluded that non-airgun HRG equipment will have little to no measureable impacts on fisheries resources, essential fish habitat, commercial and recreational fisheries, and benthic communities, SFW has nevertheless made this additional commitment to minimize overlap between HRG surveys and SFW fisheries monitoring surveys prior to construction to address the FAB's stated concerns.

Third, SFW has committed to conducting a post-construction researched radar analysis for submission to the U.S. Coast Guard. The analysis will aim to determine the extent, if any, to which SFW WTGs and offshore substation may produce radar reflections, blind spots, shadow areas, or other radar effects that may have adverse impacts on navigation safety. This analysis will consider specifically the types of vessels that regularly navigate the wind lease area, taking into account the navigation, communications, and collision avoidance equipment typically used on those vessels. In concert with the Rhode Island Navigational Enhancement and Training Program, this analysis will further the state of navigational technology and understanding within the Orsted/Eversource JV wind lease areas and provide a significant benefit to Rhode Island commercial and recreational fisheries.

C. Woods Hole Report

Recognizing the need to evaluate fairly and quantitatively the scope of financial mitigation, SFW engaged Woods Hole to assess the economic value of reasonably foreseeable impacts to commercial fisheries during the project's life. Woods Hole brought decades of experience and a rigorous, data-driven focus to the question of impacts and economic value.

Woods Hole examined the level of existing fishing operations that intersect with the SFW lease area and two alternative export cable route areas to determine the landings and landed value attributable to those areas. Woods Hole obtained and used NOAA data spanning from 2008 to 2018. This NOAA data is considered the best fisheries data in the world and has been used nationally for decades for research and fisheries management. It indisputably represents the best available science and incorporates the most advanced modeling for the spatial distribution of landings. The data uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data matched with NOAA fishery observer data, including geocoordinates of detailed fishing locations, to improve the spatial resolution of VTR within the wind lease and cable route areas. Further, because not everyone in the federally permitted lobster or Jonah crab fisheries provides VTR data, Woods Hole applied an upward adjustment on the reported VTR data for these fisheries to account for the additional landings.

Woods Hole used IMPLAN model software and data to estimate the average total economic impact to Rhode Island from commercial fishing activity in the project area. IMPLAN is a widely accepted, peer-reviewed model that incorporates data from over 500 industry sectors, including seafood processors and other sectors subject to the downstream impacts of the commercial fishing industry. Using this model, Woods Hole arrived at an output multiplier that reflects the linkages between economic activity in different sectors of the economy. Incorporating this multiplier captured indirect economic impacts attributable to commercial fishing activity.

Using these baseline values, Woods Hole analyzed five categories of possible impacts to commercial fishing: (1) transient impacts due to constrained access to certain areas during construction; (2) transient impacts on fish stocks due to construction activities and noise; (3) impacts to fishing in the wind lease area during operations; (4) transient impacts due to constrained access to certain areas during decommissioning; and (5) transient impacts on fish stocks due to decommissioning activities.

The Woods Hole report incorporates numerous conservative elements. For example, Woods Hole used the average of eleven years of data and assumed that average would continue for the next thirty years, even though landings vary from year to year and have trended downward most recently. Woods Hole also made no adjustment for the effects of climate change. Nor did Woods Hole quantify the potential positive impacts accruing from the well-documented reef effect (see below). Woods Hole also assumed that any affected landings are foregone, rather than incorporating the realistic assumption that some fishing simply will shift to other nearby locations. Likewise, Woods Hole based its estimate on gross values—not net profits—making no reduction for costs regularly incurred in connection with commercial fishing.

Woods Hole presented its report to CRMC and the FAB and answered extensive questions from the FAB's consultant. Based on specific feedback from the FAB, Woods Hole then made additional upward adjustments to its initial calculation. Woods Hole incorporated the FAB's proposed 15 percent premium for dockside sales of lobster and Jonah crab. Woods Hole also increased the IMPLAN multiplier at the FAB's suggestion to account more fully for both upstream and downstream effects to seafood processors. Woods Hole modified its assumptions for the stock effects resulting from construction pile-driving, incorporating the conservative criterion that all mobile species will leave the wind lease area and a 5 km zone around the wind lease area for four months in connection with pile-driving. Finally, Woods Hole added an impacts assessment for the for-hire (charter) fishing boat industry based on the research study suggested by the FAB's expert.[5]

Between the original report and update, the Woods Hole analysis identifies and assesses the reasonably foreseeable potential adverse impacts from the project.

D. <u>SFW's Comprehensive Compensatory Mitigation Proposal</u>

Using Woods Hole's conservative assessment, SFW developed a fisheries mitigation framework to compensate fishermen and support coastal communities. SFW sought to achieve a fair and transparent process. SFW's proposed framework is divided into two components: a Commercial Fisheries Compensation Fund to provide direct financial mitigation to Rhode Island fishers operating in the SFW lease area and export cable areas; and a Coastal Community Fund to benefit the fishing industry and its communities through grants.

Over the past six months, SFW has increased its initial compensatory offer substantially based on feedback received from CRMC and the FAB:

- Because SFW tied its proposal to the Woods Hole analysis, the compensation proposed necessarily increased when Woods Hole incorporated the upward adjustments described above.

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[5] Note that the Draft Environmental Impact Statement for the SFW Project states that "the number of charter fishing trips is fairly low in the RI-MA WEAs." BOEM 2020-057, South Fork Wind Farm and South Fork Export Cable Project, Draft Environmental Impact Statement, 3-88 (Jan. 2021) [hereinafter DEIS]. The DEIS also notes that the 70 square miles of Cox Ledge excluded from the lease area and therefore the SFW Project are "important to for-hire recreational fishing." *Id.* But even in this "important" area, NOAA data indicates only six average annual permit holders from 2012 to 2014, each generating less than $10,000 per year. *Id.*

- SFW added a component to account for rerouting costs during construction and decommissioning.
- Based on the FAB's and CRMC's repeated statements that a purely quantitative approach fails to capture adequately the FAB's experiential concerns and worries about the future, SFW added a contingency percentage on top of the conservatively calculated value of reasonably foreseeable potential impacts.
- SFW developed the Rhode Island Navigational Enhancement and Training Program, to which it expects the Orsted/Eversource JV to contribute approximately $1 million for its three lease areas within the MA/RI WEA.
- Finally, as a showing of good faith and recognizing that the SFW Project is the first of the Orsted/Eversource JV projects to move forward, SFW topped off its proposal with a non-scalable lump sum payable over the SFW Project's life.

Consequently, during these negotiations, SFW has increased its compensatory offer more than six-fold, not including the Rhode Island Navigational Enhancement and Training Program. SFW respectfully suggests that this substantial compensatory offer sufficiently offsets any reasonably foreseeable potential impacts that the SFW Project could not otherwise eliminate or mitigate through the extensive measures described above.

E. Speculative Concerns Raised by the FAB

During mitigation negotiations, the FAB has raised a litany of speculative concerns about the SFW Project, too numerous to recount here. When the FAB has raised specific supported concerns about the SFW Project based on their experiences, SFW has carefully considered these and adjusted its mitigation proposal to account for the members' experiences. Many of the concerns raised, however, lack support in science or evidence. CRMC has rejected many of them previously. While SFW cannot recount its responses to all such comments here, the following examples bear repeating.

First, the FAB has suggested that the introduction of WTG foundations will permanently alter large swaths of underwater habitat. No evidence supports this. To the contrary, the Ocean SAMP states that, "The direct effects of these hard structures to the seabed are likely to be limited to within one or two hundred meters of the turbines." § 8.5.3(C)(4) (citations omitted). The Ocean SAMP further notes that, "The total area of seabed disturbed by wind turbine foundations is relatively small compared to the total facility footprint." *Id.* This is true for the SFW project. The total area of temporary and permanent seabed disturbance within the wind lease area within Cox's Ledge is just 8.80 percent. *See* SFW Seabed Disturbance Estimates (Dec. 17, 2020). During operations, 99.76 percent of the wind lease area will remain undisturbed.

Second, the FAB has dismissed the reef effect and argued further that any such effect would have negative impacts to the Atlantic cod population. But the Ocean SAMP presents a different outlook.[6] The Ocean SAMP cites several studies suggesting that WTG foundations may attract cod. *See* § 8.4.7(I)(4) (discussing United Kingdom study finding that "many of the juvenile fish found around the turbines are small Gadoid species such as cod."); § 8.4.7(I)(5) ("A study of decommissioned oil rigs in the North Sea off Norway found aggregations of cod, mackerel, and

[6] As does the DEIS, which states that "foundation piles and associated scour protection would create an artificial reef effect, which could result in minor beneficial effects to species distribution, community composition, and predator-prey interactions in the vicinity." DEIS 2-17.

other species around the structures." (citation omitted)); § 8.4.7(I)(6) ("Another study found an increased number of cod in the area surrounding wind turbines at the Vindeby Offshore Wind Farm in Denmark." (citation omitted)). The Ocean SAMP also states that, "In addition to fish, these structures may also provide important habitat for lobsters and crabs. Young, newly-settled individuals of these species typically seek out refuge to avoid predation, including hiding among stones and cobbles, or burying in sediments. Wind turbines and scour protection may provide suitable hiding places for these individuals, and may enhance the lobster fishery in cases where habitat is a limiting factor." § 8.4.7(I)(4) (citation omitted).

Further, based on the 2019 stock assessment of cod by the NOAA Northeast Fisheries Science Center, the stock is overfished, its condition "remains poor," and the stock shows a truncated age structure. *See* Black Sea Bass & Cod Presentation (Dec. 17, 2020). Further, cod have a high exposure to climate change, which is anticipated to have a negative impact on cod. The distribution of cod is expected to continue shifting northward from Cox's Ledge as a result of warming temperatures, and climate change is anticipated to result in a loss of thermal habitat for cod on Georges Bank and in southern New England. *Id.* In other words, the Atlantic cod populations are depleted, and climate change is expected to have further negative impacts on cod recruitment. The impacts of climate change on cod populations far outweigh any speculative impacts from the SFW Project.

Finally, the FAB has stated repeatedly that the introduction of WTGs will result in loss of insurance, creating de facto "exclusion zones." This concern is not new, and CRMC previously has considered and rejected it:

> Some fishermen have expressed the concern that marine insurance companies might increase their insurance premiums or prohibit insured fishing vessels from operating within the vicinity of offshore wind farms (e.g. Ichthys Marine 2009). However, it should be noted that at the time of this writing, Sunderland Marine does not currently impose restrictions or higher premiums on their members, nor have they heard of other insurance companies issuing such demands (McBurnie, pers. comm.). Sunderland Marine is the world's largest insurer of fishing vessels, and insures The Point Club, a fishing vessel insurance and safety club that insures many of the fishing vessels operating out of Point Judith and Newport (Nixon, pers. comm.).

§ 8.4.8(D)(8). SFW's own recent investigation of this concern has led to the same conclusion.

* * *

SFW has followed the evidence-based decision-making approach of the Ocean SAMP using best available science and modeling tools. CRMC must reach its consistency concurrence, including any proposed conditions for mitigation, pursuant to the Ocean SAMP by employing an evidence-based approach that relies on the best available science and modeling tools. CRMC cannot just provide a compensation "number" to SFW without linking it to specific potential impacts backed by science and evidence. SFW has submitted extensive documentation, much of it attached here, demonstrating its data-driven, evidence-based commitment to project design, modification, and mitigation that should be followed for mitigation. This evidence supports clearly that SFW has modified and/or mitigated any potential adverse effects to the Rhode Island commercial and recreational fisheries from the SFW Project. SFW has shown that its Project is consistent with CRMC's applicable enforceable policies.

Thank you,

/s/ Olivia Larson Tesse
Olivia Larson Tesse
Lead Commercial Manager

/s/ Melanie Gearon
Melanie Gearon
Permitting Manager

Cc: James Boyd, Coastal Policy Analyst, CRMC
Liz Gowell, Orsted
Robin Main, Esq., Hinckley Allen
Marvin Bellis, Esq, Eversource

FAB Concerns Regarding the South Fork Wind Farm (SFWF) Project on Cox's Ledge
Attn: Jeff Willis, CRMC Staff

RI Fishermen's Advisory Board
Lanny Dellinger (Chair, Lobster), Rick Bellavance (Charter), Rich Hittinger (Anglers), Chris Lee (Processors), Mike Marchetti (Scallop), Greg Mataronas (Gillnet), Brian Thibeault (Lobster)

January 29, 2021

Dear Mr. Willis and CRMC Staff:

We are writing to share our consolidated expertise with CRMC regarding the SFWF project, and to supplement the concerns we have already submitted via our attorney, Marisa Desautel, and our economist, Tom Sproul. Overall, it is our conclusion that the SFWF project developer has failed to comply with the enforceable policies of the Ocean SAMP. The developer has failed to provide necessary data and information, and the information that has been provided shows a pattern of systematically understating harmful impacts to the resource and to commercial and recreational fishing in the state. The developer has relied on this same flawed information to justify their proposals for mitigation, which are wholly inadequate as a result. **It is therefore our recommendation that CRMC must deny this project.**

In the event that CRMC wishes to consider mitigation rather than denial of the project, we will use the remainder of this letter to highlight some omissions of necessary information by the developer. We will attempt to fill those gaps using our combined experience of over 200,000 hours at sea. Nonetheless, many of the impacts of offshore wind development are complex and are difficult to quantify regardless of the level of expertise. Since the developer has failed to provide the necessary information, we advise CRMC that any such missing information must be viewed in the light most favorable to the FAB stakeholders. If CRMC does not insist on full compliance or this standard of review in this case, it sets a precedent for all future reviews that is adverse to the state's interests.

Information Provided by the Developer

The developer has still not provided adequate baseline studies for the Fish and Fisheries Survey requirement for the Site Assessment Plan under the Ocean SAMP, and the latest iteration of the Fisheries Monitoring Plan submitted by the developer will not adequately fill these gaps. The Ocean SAMP states that the required assessment of commercial and recreational fisheries effort, landings and values must be supplemented by interviews with commercial and recreational fishermen, but this did not occur. If it had, the developer would already have been able to report all of the information contained below surrounding potential impacts to commercial and recreational fishing. Instead, the developer learned of this information for the first time from the FAB members during the mitigation process.

Since their first proposal, the developer's Fisheries Monitoring Plan has improved. However, it retains several key weaknesses, mostly with respect to pelagic species and/or species that are abundant in very close proximity to the lease area (this information was given by NOAA as written feedback with respect to Atlantic herring, but it was ignored). The gillnet survey is inadequate because it includes only sink gillnets with 12” mesh, which are suitable only for catching monkfish and skates. We continue to recommend that 5.25”, 6.5” and 8” gillnets be used to monitor Atlantic cod, Atlantic bonito, false albacore, fluke and weakfish. In addition, the Fisheries Monitoring Plan neglects rod-and-reel surveys altogether, consistent with the developer’s complete disregard for Cox’s Ledge as the highest valued recreational fishing area in Rhode Island Sound. Finally, the acoustic telemetry study for Atlantic cod is marred by the fact that it includes ongoing research conducted during and in close proximity to geophysical surveys that likely disrupted cod spawning, but with no funding for the researchers to identify or evaluate those effects.

In addition to these deficiencies, and the many other deficiencies we have identified in past written correspondence, we would like to reiterate that the impact producing factors framework in the SFWF Construction and Operations Plan (COP) and its component definitions are completely arbitrary and serve only to minimize the appearance of impacts on the fishing community. It is incredible to believe that for almost every category of potential effects, the developer believes there will be no, negligible, or minimal impacts. For example, they neglect to consider the long-term presence of the turbines and cable themselves as being problematic and only considers “severe” that which would lead to complete and unrecoverable destruction of a given resource. This method of assessment is not a good faith effort to evaluate fisheries impacts and it deliberately conceals the fact that this project will result in numerous significant long-term (affecting more than one or two seasons) negative impacts to commercial and recreational fishing. The Ocean SAMP states that the Council shall prohibit such uses.

Commercial Fishing Impacts

One of the most glaring errors by the developer is their assertion of negligible impacts to commercial fishing during the operations period of the project lease. This is untrue and it is incredibly damaging to any efforts to calculate appropriate mitigation for this project.

The presence of turbines (and possibly unburied cables) will create navigational challenges that will limit the ability of mobile gear (trawls and dredges) to fish the SFWF and immediately surrounding area at the same level of effort. A large share of mobile gear fishing activity (getting gear in the water, hauling in the catch) is done with the vessel adrift and the captain not at the wheel. These practices will no longer be possible within any wind energy area. In addition, with gear in the water, trawlers or dredgers may be towing gear 500 feet or more behind them, creating additional navigational challenges. It will be very difficult for mobile gear fishermen to safely manage towing gear, tracking other vessels nearby and also avoiding turbines, especially during bad weather or limited visibility, which occurs often in prime fishing season. There will also be conflicts with fixed gear if they need to maneuver into one of the “columns” of the turbine grid after dragging East-West along the “rows.” Critically, it doesn’t take a 100% loss of productivity to displace vessels from a wind area – only enough to drive profits down is required.

The proposed 1x1-nm grid layout creates additional challenges in space-sharing between commercial fixed gear and mobile gear, which is currently managed through a "gentlemen's agreement" where fixed gear can be placed East-West along the Loran lines ending in 0's and 5's, and the mobile gear vessels try to tow between these lines whenever possible. Those of us representing fixed gear fishermen expect to only have available the space between turbines along the East-West rows, corresponding to a loss of half the current capacity (it varies, but 0's and 5's correspond roughly to 0.5-nm spacing from North to South). All fixed gear fishermen also face the issue of weather unpredictability and inability to retrieve gear within a wind array in bad visibility, such as "black fog," that commonly occurs during the summer months. This is especially a problem for lobster, in which the summer months are prime fishing season.

There are additional problems specific to gillnetters, who string together 300-foot nets up to 20 at a time, resulting in a single connected piece of gear up to about 1 nm in length. Given the need to avoid the turbines themselves, the gear "sets" will likely need to be shortened within the wind area. Unfortunately, the current trend in regulations (to prevent bycatch) is to require a smaller number of increasingly long sets in the water, to limit the number of ends. This does not bode well for the possibility of productive gillnetting within wind areas.

Overall, it is our expert opinion these conflicts will most likely restrict commercial fishing effort by 50-80% during operations. The presence of turbines and cables may restrict effort by more than 80% depending on cascading effects discussed below, like the risk of a de facto ban due to unavailability of insurance within the wind area.

Recreational Fishing Impacts

The SFWF area (Cox's Ledge) is a key fishing area for both charter and party boats and for private recreational anglers, and is arguably the most important such area in all of Rhode Island Sound. People travel from all over to fish this particular area for Atlantic cod and other bottom fish, and to engage in sport-fishing of highly migratory predator species such as sharks, tuna and mahi-mahi). Charter companies advertise this particular area to attract customers, and there is a 60-year history of charter fishing here. The area is fished year-round by charter boats, but with approximately 75% of trips occurring between Memorial Day and Labor Day, and an even higher percentage of summer trips for private anglers. Just because records of private recreational fishing in the area of SFWF are not available is no reason to totally eliminate this fishing community from consideration. The developer needs to include an evaluation of this very significant existing use of the area.

The New England Fisheries Management Council (NEFMC) has recently concluded that there is a distinct New England stock of cod that has essential habitat and spawning grounds on Cox's Ledge and aggressive management efforts from the early 2000's are causing a resurgence of cod. The most productive way to fish for Atlantic cod is to drift across the area picking fish from the various bottom structure in this area. Charter vessels range in size from 30 to 110 feet and the presence of WTG structures will impede the ability to drift through the area. This is especially true for the 100-foot party vessels that do the majority of fishing on Cox's. Drift-style fishing cannot likely co-exist with the presence of wind turbines, and this extends not only to the immediate project lease area but to a number of productive fishing areas surrounding the SFWF lease.

As an alternative to drifting, when the weather is more severe, charter boats will anchor up on a particular spot and try to draw the fish to our boats. This is an exact science and a slight miss will result in low catches. Trying to navigate around large structures to find the right place to anchor will be difficult. It is not clear we will even be able to anchor charter boats close to the structures which means that we will be losing some ground permanently.

In addition to navigation issues preventing productive cod fishing, there is also a concern about structural habitat changes induced by the turbines. Recent academic articles have stated that recreational fishing has benefited on Block Island due to artificial reef structures forming on the turbine foundations and increased colonization of the area by blue mussels and black sea bass. Those articles' findings do not extend to Cox's because black sea bass is an inshore fishery. Recreational anglers and charters go far offshore to Cox's because of cod, and no one is willing to make the trip for black sea bass, which can be caught much more cheaply and much closer to home. In the case of recreational anglers, this has substantial implications for shoreside gear expenditures, because a sea-worthy vessel is not needed to catch black sea bass the way it is for cod. Colonization by black sea bass would destroy recreational fishing in the area.

Outside of Atlantic cod, one of the primary reasons Cox's Ledge is so important for fishing is that it attracts and feeds many baitfish. This occurs because Cox's rises up from about 160 feet in the surrounding area to about 110 feet on top. Since the tidal currents run primarily east and west, when they hit the Ledge, nutrient rich bottom water is pushed up closer to the surface where phytoplankton grow from these nutrients and the food chain starts to "bloom." The baitfish eat the plankton and the highly migratory predator species then move into the area to eat the bait. This cycle occurs all season long but disturbance of the ecosystem on Cox's Ledge will change this balance, at least based on observations from the area around the BIWF during their 2-year construction period. It is not known when or if this natural balance will return once construction is complete.

Like cod fishing, sport-fishing for predator species relies on drifting, but it relies on even longer uninterrupted drifts with a scent trail lasting for miles. Once a fish is hooked, substantial maneuvering room is required to chase and fight the fish without obstructions. It is very common to end up 3 to 5 miles or more from the point where you hooked a tuna before it is brought to the boat to be gaffed. The presence of a grid of wind turbines will prevent this type of fishing entirely.

The Ocean SAMP states that in the presence of a significant conflict with season-limited commercial or recreational fishing activities, the Council shall modify or deny activities to minimize conflict with these uses. This project will preclude all manner of summer recreational and charter fishing from the lease area for the duration of the project. Failing that, we think it is impossible to modify this project to minimize conflict, so we recommend that the Council deny the project.

Gear Conflicts and Gear Losses
Gear losses have already been incurred by our stakeholders and some of us individually, due to conflicts with SFWF survey vessels. The majority of these claims remain unresolved. Our proposal for a gear claims compensation framework is being sent to you as a separate attachment. In addition to the gear losses that have occurred, the risk of gear loss represents a spatial conflict that has already displaced fishing effort from the lease area.

During the project lease, the displacement of fishing vessels from SFWF and immediately surrounding areas is expected to result in gear conflicts due to crowding, including increased conflicts between fixed-gear and mobile-gear commercial fishing, between vessels of the same gear type, between recreational and party/charter vessels, and between commercial and recreational vessels. To the extent that some vessels are able to continue fishing in the lease area during the operations stage of the project, the turbine platforms and cables (which may not stay buried) create increased risk of gear loss for mobile-gear commercial fishing, including scallop and clam dredges, trawls and longlines. As mentioned above, gear loss and gear conflict risk also exists for party/charter and recreational sport fishing, which rely heavily on techniques involving drifting the vessel with the engine off for extended periods.

Navigation Safety
BOEM has identified major cumulative impacts to navigation safety from offshore wind development, “due to increased accident frequency and loss of life.” Accident risks that will be made worse by the presence of turbines include vessels striking the turbines themselves or vessels striking one another due to increased navigational complexity within the turbine array. Accidents will also increase due to crowding that can result from vessel displacement.

Wind turbines are expected to disrupt marine radar, contributing to increased navigation complexity and reduced reaction times available for accident avoidance. This is a concern not only for the FAB but for radar operators, generally. These radar effects and resulting navigation safety impacts are expected to be compounded by weather (especially “black fog” during summer peak fishing months) and also by the micro-siting allowance for turbine placement which allows substantial deviations from the 1x1-nm grid. Turbines existing in a non-uniform array will be more difficult to distinguish from radar clutter and false targets, and will increase the risks of nearby vessels going undetected.

Operating Costs
The chief concerns of the FAB with respect to operating costs are additional transit costs associated with changing navigation patterns (oil, fuel, maintenance, time at sea), potential lost profits due to navigation time for “days-at-sea” regulated fisheries, decreased catch per unit effort arising from crowding due to vessel displacement from wind areas, and increasing costs of insurance. The insurance question is particularly worrisome because at least one marine insurer has decided to exit the market and insurance costs have started to increase rapidly. The FAB is also concerned that once a navigation accident takes place that fishing within a wind area may be excluded from insurance coverage, resulting in a de facto ban.

Fisheries Management and Quota
BOEM's Draft Environmental Impact Statement (DEIS) for SFWF (released January 4, 2021), indicates major cumulative effects on NMFS research vessels, and NOAA has made public comments indicating these vessels will not be able to conduct trawl surveys within the WEA. Due to the precautionary principle in fisheries management, it is likely that that missing survey information will lead to increased uncertainty in fishing/biomass estimates, thus leading to reduced quota and ultimately lost revenues for the fishing industry. Quota effects can also compound if there is additional stress on managed stocks from displacement of vessels outside the WEA. The FAB estimates impacts on quota to start harming the broader fishing industry by 2028, with substantial impacts expected by 2030.

Long-Term Risks
The stakeholders we represent face a number of risks with respect to project duration and decommissioning. According to BOEM's Draft Environmental Impact Statement for SFWF (released January 4, 2021), the SFWF lease may be extended. This creates a risk that fishing stakeholders' losses during operations are extended further into the future. In addition, the decommissioning process is subject to required NEPA application and review, which is costly and time consuming, and which implies a risk that decommissioning never takes place, or that it is altered from the full remediation considered in the SFWF COP. Finally, the SFWF project is structured as an LLC, creating the risk of abandonment of the project without consequence for the parent developers. To our knowledge, no bond has been posted or required to ensure that decommissioning will take place as planned.

We are also concerned about long-term risks to species of interest as a cumulative effect of offshore wind development throughout the entire MA/RI Wind Energy Area (WEA). The cumulative effects of pile driving over ten years of WEA buildout are unknown and may lead to disruption of spawning that extends over multiple year classes, up to and including collapse or complete displacement of populations of key species. Even a small percentage chance of a loss of this scale is worth millions of dollars. We believe that complete and adequate mitigation must include a contribution from each project to cover their proportional share of these substantial future risks.

Compounding Risks and Impacts
One of the biggest challenges in assessing potential losses from offshore wind development is the interacting and cascading nature of disruptions as they work their way through the system. For example, loss of year-classes due to pile driving may have multi-year effects and may have effects on species that spawn in the vicinity of Cox's but are harvested further away. It is impossible to forecast to what extent these losses will be detected in fisheries management research and thus, to what extent these losses will be magnified by quota reductions in future years. As another example, BOEM notes that fishing vessels forced to find new grounds may not easily be able to do so. This applies both to commercial harvesters and to party and charter operations. In the process of searching for new grounds, those vessels are likely to contribute to increased conflict and competition in other established fishing grounds. This in turn can lead

to increased navigation safety issues, decreased trip values and decreased catch per unit effort in affected commercial fisheries. Some vessels will be forced into retirement by offshore wind development and will be forced to sell their accumulated capital investment at a steep loss.

In the face of these complexities, we propose that if mitigation is considered instead of denying the project, then potential losses should be assessed according to the share of the fleet that would need to be retired in order to maintain existing levels of productivity and profitability in the remainder of the fleet. Put another way, given the total landings and trip values in a lease area, what is the percentage of a permanent total loss attributed to offshore wind development? This recommendation is consistent with the Ocean SAMP, which states that effort reduction is one means of mitigation.

Conclusion

We greatly appreciate CRMC's thorough review of the materials submitted by the developer to ensure that the materials comply with the requirements set out in the state's enforceable policies. We also appreciate the time spent by CRMC staff to meet with us and hear our testimony regarding the myriad negative and long-term impacts we face from the SFWF development. We hope that this letter can help to consolidate some of our experience into a format that helps the Council reach the best decision for Rhode Island. **It is our recommendation that this project be denied, but we remain ready to assist CRMC staff and the Council if our expertise is needed to help determine appropriate mitigation instead.**

Memo

Subject	Mitigation Actions
To	Jeffrey Willis, Executive Director; James Boyd, Coastal Policy Analyst (CRMC)
Copy	Rhode Island Fishermen's Advisory Board (FAB) Robin Main (Hinckley Allen), Liz Gowell, Olivia Larsen Tesse (Orsted)
From	Melanie Gearon (Orsted)
Date	December 15, 2020
Regarding	South Fork Wind Project, Mitigation Settlement RI CRMC

As part of the mitigation negotiations with the Coastal Resources Management Council (CRMC) and its Fishermen's Advisory Board (FAB), South Fork Wind, LLC (SFW) provides this memo with information on certain requested mitigation actions that the FAB raised in its proposal made on November 19, 2020. This memorandum addresses: SFW's commitment in the federal permitting process to pile-driving noise attenuation and sound verification; SFW's commitment to no temporal overlap and minimal spatial overlap between the low frequency High Resolution Geophysical surveys and the SFW fisheries monitoring surveys conducted prior to construction; SFW's supporting information on HRG survey equipment and lack of impacts to fish and invertebrates; details on the gillnet survey for the SFW fisheries monitoring plan; and post-construction radar study that SFW will provide to the US Coast Guard.

Pile-driving Noise Attenuation and Sound Verification

This issue is regulated under NOAA. In its Application submitted to NOAA for an Incidental Harassment Authorization (IHA), SFW has committed to monitoring and exclusion zones that are based on modelled 10 dB broadband underwater noise reduction levels during pile driving of foundations. Under the current federal permitting schedule, the IHA application will be published in the Federal Register on February 8, 2021.

SFW will take sound source verification measurements during pile driving of foundations to verify in situ underwater noise levels. A sound source measurement plan is included in the IHA application.

High-Resolution Geophysical (HRG) Surveys and Fisheries Monitoring Surveys

HRG Survey Equipment Overview

HRG surveys are conducted by wind energy developers for site investigation to inform engineering and design, to conduct archaeological assessments, and to perform benthic habitat mapping. These surveys are also required by the

Bureau of Ocean Energy Management (BOEM) for offshore wind development activities.

HRG surveys for offshore wind development do not use seismic air guns, which studies have shown can influence the distribution and catch rates of commercially important marine fish (e.g., Lokkeborg and Soldal, 1993; Engas et al., 1996). SFW has not used seismic air guns and does not intend to utilize seismic air guns during future site investigations surveys in the wind energy lease areas on the Atlantic seaboard. Offshore wind HRG surveys employ a variety of equipment types, other than seismic air guns, as summarized in Table 1.

The acoustic characteristics of HRG survey equipment used during offshore wind development are well known. Table 1 includes all equipment authorized for use under the approved 2019 Ørsted HRG IHA application and incorporates data from a recent study funded by BOEM to independently measure and verify the noise levels and frequencies of HRG equipment (Crocker and Fratantonio, 2016). Additional field studies have been conducted and are in review. Offshore wind HRG equipment operate at a range of frequencies. Well established audiograms have been used to understand the hearing sensitivities for a number of species of fish (Table 2). Fish have been classified into four groupings based on their physiology and their presumed hearing sensitivity (Hawkins et al., 2020). Of the HRG equipment that is commonly employed in offshore wind HRG surveys, non-airgun sub bottom profilers known as ‘sparkers’ and ‘boomers’ operate at the lowest frequency range, and thus are most relevant to assess further for any potential to impact the distribution and behavior of fish in the region, based on their hearing sensitivity. For this reason, HRG equipment commonly used in offshore wind surveys have been studied by BOEM.

In the BOEM Final Programmatic Environmental Impact Statement (EIS) for Geological and Geophysical Surveys in the Gulf of Mexico, several alternatives were considered, which included >180,000 km of non-airgun HRG surveys using equipment such as boomers, sparkers, CHIRP sub-bottom profilers, side-scan sonars and multibeam echosounders. For all alternatives, the EIS concluded that non-airgun HRG equipment would have little to no measurable impacts on fisheries resources, Essential Fish Habitat, commercial and recreational fisheries, and benthic communities (BOEM, 2017). The Vineyard Wind Supplemental EIS also concluded that impacts of HRG survey noise to finfish, invertebrates and Essential Fish Habitat were negligible (BOEM, 2020).

Table 1. Summary of the operating frequencies and source levels of HRG equipment authorized for use under the approved 2019 Ørsted IHA application.

Representative HRG Survey Equipment	Range of Operating Frequencies (kHz)	Baseline Source Level a/	Representative RMS90 Pulse Duration (millisec)	Pulse Repetition Rate (Hz)	Primary Operating Frequency (kHz)
USBL & Global Acoustic Positioning System (GAPS) Transceiver					
Sonardyne Ranger 2 transponder b/	19-34	200 dBRMS	300	1	26
Sonardyne Ranger 2 USBL HPT 5/7000 transceiver b/	19 to 34	200 dBRMS	300	1	26
Sonardyne Ranger 2 USBL HPT 3000 transceiver b/	19 to 34	194 dBRMS	300	3	26.5
Sonardyne Scout Pro transponder b/	35 to 50	188 dBRMS	300	1	42.5
Easytrak Nexus 2 USBL transceiver b/	18 to 32	192 dBRMS	300	1	26
IxSea GAPS transponder b/	20 to 32	188 dBRMS	20	10	26
Kongsberg HiPAP 501/502 USBL transceiver b/	21 to 31	190 dBRMS	300	1	26
Edgetech BATS II transponder b/	17 to30	204 dBRMS	300	3	23.5
Shallow Sub-Bottom Profiler (Chirp)					
Edgetech 3200 c/	2 to 16	212 dBRMS	150	5	9
EdgeTech 216 b/	2 to 16	174 dBRMS	22	2	6
EdgeTech 424 b/	4 to 24	176 dBRMS	3.4	2	12
EdgeTech 512 b/	0.5 to 12	177 dBRMS	2.2	2	3
Teledyne Benthos Chirp III - TTV 170 b/	2 to 7	197 dBRMS	5 to 60	4	3.5
GeoPulse 5430 A Sub-bottom Profiler b/, e/	1.5 to 18	214 dBRMS	25	10	4.5
PanGeo LF Chirp b/	2 to 6.5	195 dBRMS	481.5	0.06	3
PanGeo HF Chirp b/	4.5 to 12.5	190 dBRMS	481.5	0.06	5
Parametric Sub-Bottom Profiler					
Innomar SES-2000 Medium 100 c/	85 to 115	247 dBRMS	0.07 to 2	40	85
Innomar SES-2000 Standard & Plus b/	85 to 115	236 dBRMS	0.07 to 2	60	85
Innomar SES-2000 Medium 70 b/	60 to 80	241 dBRMS	0.1 to 2.5	40	70
Innomar SES-2000 Quattro b/	85 to 115	245 dBRMS	0.07 to 1	60	85
PanGeo 2i Parametric b/	90-115	239 dBRMS	0.33	40	102
Medium Penetration Sub-Bottom Profiler (Sparker)					
GeoMarine Geo-Source 400J d/	0.2 to 5	212 dBPeak 201 dBRMS	55	2	2
GeoMarine Geo-Source 600J d/	0.2 to 5	215 dBPeak 205 dBRMS	55	2	2
GeoMarine Geo-Source 800J d/	0.2 to 5	215 dBPeak 206 dBRMS	55	2	2
Applied Acoustics Dura-Spark 400 System d/	0.3 to 1.2	225 dBPeak 214 dBRMS	1.1	0.4	1
GeoResources Sparker 800 System d/	0.05 to 5	215 dBPeak 206 dBRMS	55	2.5	1.9

Table 1 continued.

Representative HRG Survey Equipment	Range of Operating Frequencies (kHz)	Baseline Source Level a/	Representative RMS_{90} Pulse Duration (millisec)	Pulse Repetition Rate (Hz)	Primary Operating Frequency (kHz)
Medium Penetration Sub-Bottom Profiler (Boomer)					
Applied Acoustics S-Boom 1000J b/	0.250 to 8	228 dB_{Peak} 208 dB_{RMS}	0.6	3	0.6
Applied Acoustics S-Boom 700J b/	0.1 to 5	211 dB_{Peak} 205 dB_{RMS}	5	3	0.6

Notes:

a/ Baseline source levels were derived from manufacturer-reported source levels (SL) when available either in the manufacturer specification sheet or from the SSV report. When manufacturer specifications were unavailable or unclear, Crocker and Fratantonio (2016) SLs were utilized as the baseline:

b/ source level obtained from manufacturer specifications

c/ source level obtained from SSV-reported manufacturer SL

d/ source level obtained from Crocker and Fratantonio (2016)

e/ unclear from manufacturer specifications and SSV whether SL is reported in peak or rms; however, based on SLpk source level reported in SSV, assumption is SLrms is reported in specifications.

The transmit frequencies of sidescan and multibeam sonars for the 2019 marine site characterization surveys operate outside of marine mammal functional hearing frequency range.

It is important to note that neither Crocker and Farantino (2016), nor HRG manufacturer technical specifications report source levels in terms of the RMS_{90}, which is the metric required in assessment to the distance of NOAA Fisheries Level B harassment thresholds. Therefore, careful consideration should be made when attempting to make such direct comparisons. As shown in Crocker and Farantino, the pulse duration may also be a function of HRG operator settings.

Table 2. Summary of available information regarding the hearing sensitivities for fish species that are commonly encountered in the northwest Atlantic.

Species/Species Group	Family	Order	Sound Detection	Sensitivity
American eel	Anguillidae	Anguilliformes	Swim bladder close but not connecting to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 3 Up to 1-2 kHz
Alewife/herring/menhaden	Clupeidae	Clupeiformes (includes anchovies)	Weberian ossicles connecting swim bladder to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 4 Up to 3-4 kHz Alosinae detect to over 100 kHz
Cod/Pollock/Haddock/Hake	Gadidae	Gadiformes	Swim bladder close but not connecting to ear; Hearing by particle motion and pressure	Hawkins et al. 2020 Group 3 Up to 1-2 kHz
Mako sharks/mackerel sharks	Lamnidae	Lamniformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Monkfish/goosefish	Lophiidae	Lophiiformes		unknown
Bluefish	Pomatomidae	Perciformes		unknown
Sea bass/groupers	Serranidae			unknown
Striped bass	Moronidae			unknown
Sand lance	Ammodytidae			unknown

Species/Species Group	Family	Order	Sound Detection	Sensitivity
Tautog	Labridae			unknown
Tunas/mackerels/albacores	Scombrinae		Swim bladder far from ear; Particle motion only	Hawkins et al. 2020 Group 2 Up to 1 kHz
Billfish/swordfish	Xiphiidae			unknown
Flounders/flatfish/sole/halibut	Pleuronectidae	Pleuronectiformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Skates/rays	Rajidae	Rajiformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz
Spiny dogfish	Squalidae	Squaliformes	No air bubble; Particle motion only	Hawkins et al. 2020 Group 1 Well below 1 kHz

Schedules for SFW Fisheries Monitoring Survey and HRG Surveys

The FAB has raised the question about whether any spatial and temporal overlap of HRG surveys with fisheries monitoring surveys could bias the results of the pre-construction fisheries monitoring.

SFW commits to no temporal overlap and minimal spatial overlap between the low frequency HRG Surveys (e.g., boomers and sparkers) and the SFW fisheries monitoring surveys prior to construction.

Fisheries monitoring surveys began at SFW in October 2020, when the first beam trawl survey trip was completed (Figure 1). SFW concluded HRG surveys at the SFW lease area in June 2020, prior to the start of the beam trawl survey, and no additional HRG surveys using this equipment are planned at the SFW lease site in 2020. Monthly sampling trips are scheduled to continue for the beam trawl survey through October of 2022. The SFW gillnet and fish pot surveys are scheduled to begin in April 2021, and the ventless trap survey will begin in May of 2021. Those pre-construction fisheries surveys will also continue through 2022. SFW does not plan to use ‘sparkers’ and/or ‘boomers’ in the SFW lease areas in 2021 when all four of the SFW fisheries monitoring surveys will be sampling. Sparkers and boomers are also not planned for use in SFW in 2022.

In addition, the reference areas for the SFW gillnet, beam trawl, and ventless trap fisheries monitoring studies are located well outside of the SFW lease area in areas that have not been directly surveyed using HRG equipment (Figures 2-4).

Figure 1. Planned timeline for pre-construction fisheries monitoring surveys at SFW from 2020 through 2022. Note that the beam trawl and fish pot surveys will sample once per month, while the gillnet and ventless trap surveys will sample twice per month. NOTE: SFW concluded HRG surveys at the SFW lease area in June 2020.

	2020			2021												2022										
Survey	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Gillnet							X	X	X				X	X	X				X	X	X				X	X	X
Beam Trawl	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Ventless								X	X	X	X	X	X	X						X	X	X	X	X	X	X	
Fish Pot							X	X	X	X	X	X	X						X	X	X	X	X	X	X		

Figure 2. SFW gillnet survey area, along with the two reference areas that will be sampled during the survey.

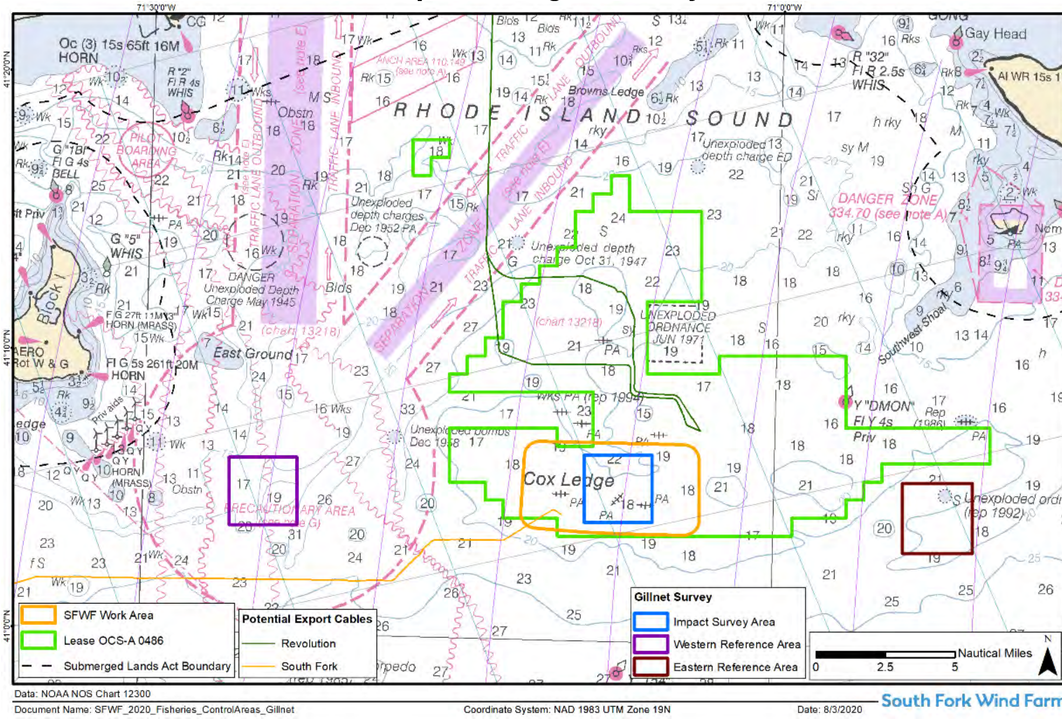


Figure 3. SFW beam trawl survey area, along with the two reference areas that will be sampled during the survey.

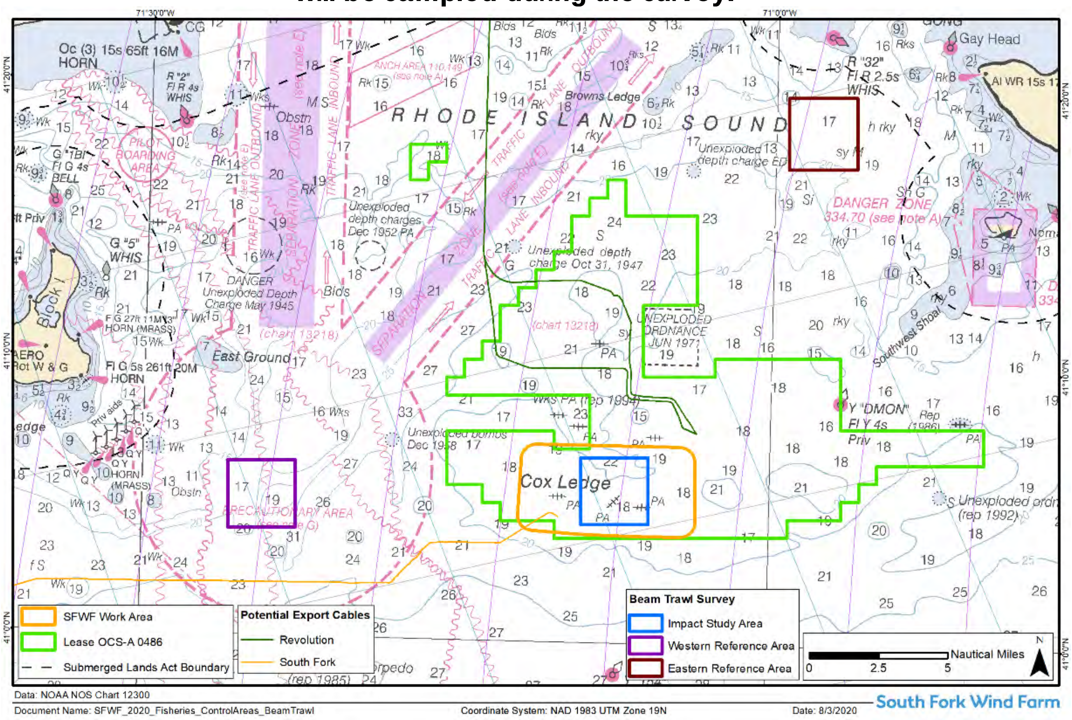
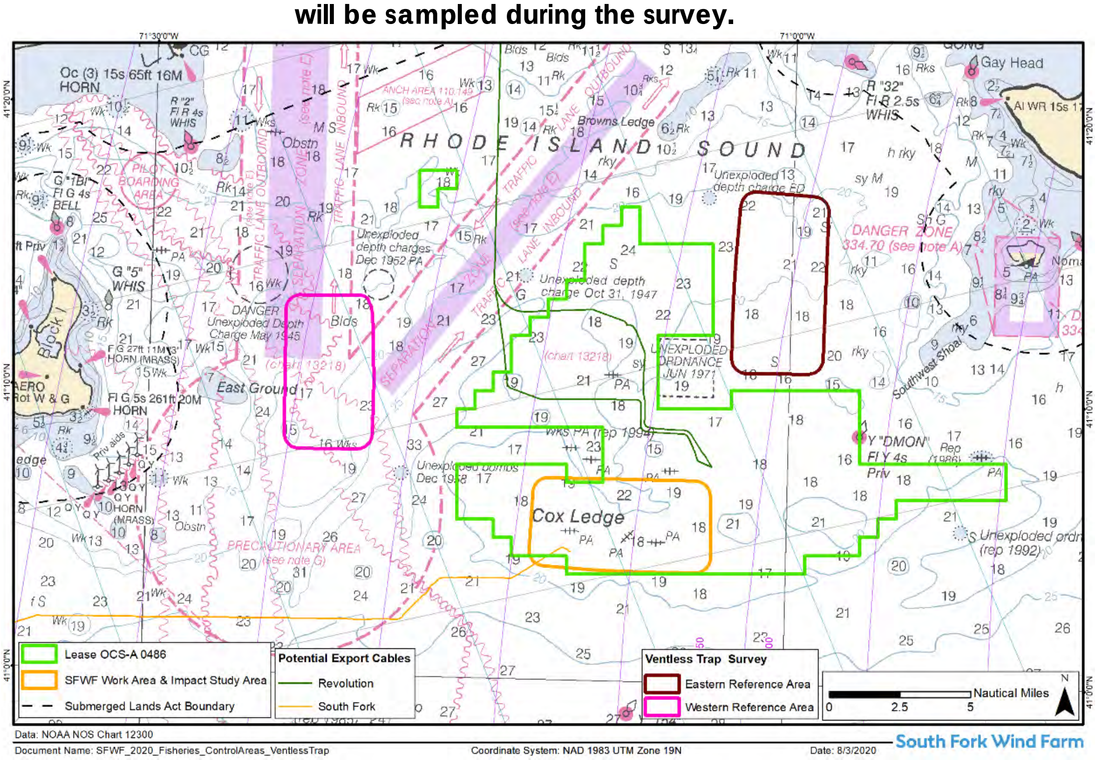


Figure 4. SFW ventless trap survey location, and the two reference areas that will be sampled during the survey.



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Fisheries Monitoring Plan (FMP), Gillnet Survey

The gillnet survey to be conducted at the SFW lease area has been in development since 2018 and was initiated following stakeholder input on the importance of the demersal monkfish and winter skate gillnet fishery in and around Cox Ledge. The survey design has undergone extensive revisions based on feedback from a variety of stakeholder groups including state and federal agencies and the commercial and recreational fishing industries. Due to the reasons explained below, at this time SFW is unable to modify the gillnet methodology to accommodate the FAB's request to expand the survey to include 6.5-inch and 8-inch mesh sizes.

The initial survey design considered multiple mesh sizes in a gillnet panel to target a range of species and size classes at the site, however this approach was deemed problematic by reviewers. The use of multi-mesh gillnet panels creates challenges for statistical analysis. When panels with varying mesh sizes are randomly placed within the same string, the panels influence each other's catchability, which violates the independence assumptions of parametric statistical analyses (van Hal et al. 2017). Ideally, if multiple mesh sizes are to be considered, a string of gillnets should contain only one mesh size, and strings of different mesh sizes should be set in proximity at each sampling location. However, this would lead to more gear set in the area which would increase potential for protected species interactions (see below). Increased gear deployment in the SFWF could lead to saturation in the area and conflict with existing uses (e.g. existing commercial and recreational fishing interests).

Gillnets also present a significant entanglement risk to protected species in the region. Several meetings and conversations were conducted with the Greater Atlantic Regional Fisheries Office (GARFO) Protected Species Division to discuss potential impacts of a gillnet survey on protected resources. GARFO reviewers who ultimately permit the survey were not in favour of having more gillnet gear in the water. Vertical buoy lines on the ends of gillnet strings, along with the nets themselves can lead to interactions with large whales, including the North Atlantic Right Whale, small cetaceans like dolphins and the Harbor Porpoise, sea turtles, and Atlantic sturgeon. Stand-up gear can lead to a higher incidence of interactions, when compared to tie-down gear (Fox et al. 2011).

The seasonality of sampling also influences the likelihood of interactions with protected species. The monkfish gillnet fishery in the region typically occurs in spring (Apr-Jun) and fall (Oct.-Dec) when the monkfish migrate on and offshore. Large mesh (12 in) is typically used along with tie downs creating a lower profile of the net in the water column. The area off southern New England is closed to all gillnetting in March in accordance with the Harbor Porpoise Take Reduction Plan. Feedback from the industry, including a member of the FAB, indicated that monkfish gillnetting in summer does not occur in the area because it would lead to a higher incidence of interaction with sea turtles and large sharks (which would collapse or damage the gear).

The design of the gillnet survey balances feedback received from multiple stakeholder groups including fishermen and regulatory agencies. The gillnet survey is intended to representatively sample demersal winter skate and monkfish in a manner consistent with the practices of the commercial fishery, while also minimizing the potential risks to protected species in the area. This gillnet survey is not meant to sample the entire species assemblage at the site, but will complement the beam trawl (currently underway), ventless trap, ventless fish pot, acoustic telemetry, and benthic monitoring surveys planned for the SFW (SFW Fisheries Research and Monitoring Plan, Sept 2020). Ultimately, SFW added more gear types to the monitoring survey (e.g. fish pots, beam trawl) when the issue of other species was brought up in the review. For more information regarding feedback and changes made to the survey design please see Appendix A to the monitoring plan.

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Radar Study

SFW will conduct a post construction researched radar analysis that will be submitted to the U.S. Coast Guard. The purpose of the analysis will be to determine the extent, if any, that SFW WTGs and OSS may produce radar reflections, blind spots, shadow areas, or other radar effects that may have a significant adverse impact on the safety of navigation. This analysis shall specifically consider the types of vessels that regularly navigate in the area of the SFW installation, taking into account the navigation, communications and collision avoidance equipment typically in use on those vessels.

The U.S. Coast Guard has stated that the potential for wind turbine generator (WTG) and offshore substation (OSS) interference with marine radar is site specific and a function of many factors including turbine size, layout of the SFW array, number of turbines, construction material(s), topographical features, and the types of vessels impacted. It is further understood that different vessels or classes of vessels will have various types of electronic equipment.

The final analysis and recommended mitigation measures will be submitted to the U.S. Coast Guard for its approval.

To the extent that its analysis identifies any significant adverse impacts to navigation, SFW will develop recommended mitigation measures to minimize such impacts. Both a draft of the analysis and any recommended mitigation measures will be shared with the maritime community via the U.S. Coast Guard Southeastern New England Port Safety Forum and Orsted's "Information for Mariners" web page.

Rhode Island Navigational Enhancement and Training Program

Objectives:

- Enable commercial fishermen and for-hire vessels to acquire Navigation Equipment, as defined below, through a grant – or in other words, voucher – system; and
- Provide training and experiential learning opportunities to those navigating within the Orsted/Eversource Joint Venture Wind Lease Areas in the Massachusetts/Rhode Island Wind Energy Area ("WEA").
- Further positive co-existence between offshore wind and fishing community

Approach and Eligibility:

- Navigation Equipment for Fishers Eligible for Commercial Fisheries Compensation Fund
    - Fishers eligible for the Commercial Fisheries Compensation Fund that do not already possess Navigation Equipment will automatically be eligible for a voucher to purchase Navigation Equipment. Navigation Equipment is defined as pulse compression radar systems and AIS transceivers (for AIS, further defined below);
    - One-time grants for vessels that do not already have Navigation Equipment will be available as follows: up to $10,000 will be available for each eligible fisher with a commercial vessel or with an inspected for-hire vessel; and up to $5,000 will be available for each eligible fisher with an uninspected for-hire vessel;
    - Vouchers may only be used to purchase and install pre-approved Navigation Equipment;
    - For those without AIS receivers the following will be provided: for vessels over 65 feet, which are required to carry AIS, vouchers will be for Class A AIS; and for smaller vessels, vouchers will be for Class B;
    - Each fisher/vessel operating within the Orsted/Eversource Joint Venture Lease Areas in the WEA is eligible for only one grant from the Navigational Enhancement and Training Program to upgrade navigational equipment; and
    - The process will be administered by the Technical Administration Provider (TAP) selected to manage the Commercial Fisheries Compensation Fund.
- Professional Training & Experiential Learning for Fishers with Valid Saltwater Fishing License (Federal or Rhode Island)
    - Fishers eligible for the Commercial Fisheries Compensation Fund may attend one professional training of their choice up to a value $1,000 per person. Eligible trainings include but are not limited to a captain's course, license upgrade, radar course, or rules of the road refresher.
    - In addition, the following categories of fishers who have a valid saltwater fishing license (federal or Rhode Island) will be eligible (capped at 300) to attend one group simulator session held at USMRC in Middletown, RI or similar simulation

facility within a reasonable commuting area: Private anglers; charter captain; and commercial fishing industry members. Up to 300 attendees will have the opportunity to navigate a vessel through a windfarm and experience various scenarios such as night conditions, adverse weather, and vessel crossings.

Funding/Cap:

- Orsted/Eversource intends to provide $1,000,000 over three payments conditioned as described below into an escrow account for Navigation Equipment and Professional Training. Orsted/Eversource will make a payment of $333,333.33 within thirty days of the final permits and approvals for each of the following projects: South Fork; Revolution Wind; and Sunrise. In other words and by way of example, within thirty days of South Fork receiving final federal, state and local permits and approvals with any appeals exhausted, Orsted/Eversource shall provide $333,333.33 into the escrow. The same process will be followed for Revolution Wind and Sunrise. The escrow account will be used solely for approved Navigation Equipment and Professional Training courses.
- Unused funds will remain in the escrow to be used for a similar purpose on future projects.
- Orsted/Eversource will book half-day simulator sessions at USMRC or similar simulation facility within a reasonable commuting area to accommodate demand of up to 300 potential participants as defined above. There will be no tuition or training cost to attendees. Attendees will be limited to one visit.
- Once the funding and space at the simulators are exhausted, the program will end.

Administration:

- Navigation Equipment
    - The TAP will manage the eligibility process.
    - Orsted/Eversource will approve at least 2 Rhode Island marine electronics retailers capable of installing electronic equipment.
    - Retailers may source and install navigation equipment up to the vessel's approved limit. The cost of installation counts towards the grant limit per fisher. Retailers will invoice the escrow account for the cost of navigational equipment and installation.
- Professional Training
    - The TAP will manage eligibility process.
    - Orsted/Eversource will approve training facilities capable of providing professional maritime courses including but not limited to OUPV courses ("Six pack" captain's course/national operator of uninspected passenger vessel), 100 ton upgrades, radar course, and rules of the road refreshers.

    - Training facilities will allow eligible participants the opportunity to attend regularly scheduled classes and invoice the fund for tuition up to $1,000.
- Experiential Learning
    - Orsted/Eversource will manage reservation process and make simulator available.

Redemption Process

- Navigation Equipment
    - Applicants holding an approved voucher will contact pre-selected marine electronics installers to select Navigation Equipment.
    - Marine electronics retailers will work directly with the applicants to install Navigation Equipment.
    - After installation, retailers will bill the escrow account directly
- Professional Training
    - Interested eligible applicants will sign up for courses at approved facilities.
    - Facilities will work directly with applicants for course scheduling
    - Facilities will bill training account escrow up to $1000 for each approved applicant.
- Experiential Learning
    - Scheduling of navigation simulator will be managed by Orsted Marine Affairs Department.

March 11, 2021
Re: South Fork Wind, LLC's Comprehensive Mitigation Proposal

Jeffrey Willis, Executive Director
Rhode Island Coastal Resources Management Council
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Dear Mr. Willis,

The Coastal Resources Management Council (CRMC), South Fork Wind, LLC (SFW), and the Fishermen's Advisory Board (FAB) have engaged in mitigation negotiations pursuant to the enforceable policies of the Rhode Island Ocean Special Area Management Plan (Ocean SAMP) for approximately six months. As CRMC finalizes its mitigation recommendation and prepares its recommendation to the Council for public hearings in April, SFW provides this memorandum to summarize (1) the numerous modifications made to the SFW Project to avoid and/or minimize any potential adverse impacts to commercial and recreational fisheries and (2) the comprehensive mitigation package SFW has proposed to address any potential impacts. SFW has met with the FAB and CRMC for the past four years to discuss the proposed SFW Project. During that time, SFW has listened to the concerns of the fishing community and addressed them through meaningful modifications to the SFW Project. The SFW Project before CRMC represents the culmination of years of engagement with federal and state agencies, the FAB and greater fishing community, and other stakeholders and incorporates the work of countless subject matter experts relying on the best available science. For the reasons detailed below, SFW respectfully submits that it has demonstrated that the proposed SFW Project is consistent with the Ocean SAMP's enforceable policies, including on mitigation.

I. REGULATORY FRAMEWORK

The federal Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.* (the CZMA) requires that, where a state has a coastal management program approved by the U.S. Secretary of Commerce through authority delegated to the National Oceanic and Atmospheric Administration (NOAA), the state has the opportunity to review proposed projects for consistency with the enforceable policies of the state's coastal management program. Applicants proposing activities within the coastal management program's scope must certify that the proposed activity "complies with the enforceable policies of such state's approved management program and will be carried out in a manner consistent with such program." 16 U.S.C. § 1456(c)(3). The trigger for federal consistency review applicability is "reasonably foreseeable effects": federal actions that have reasonably foreseeable effects on land or waters uses within the state's coastal zone, including actions in an approved geographic location description, must be consistent with the state's enforceable policies. *See* 15 C.F.R. § 930.11. The state's role is limited to reviewing the applicant's consistency certification. *See* 15 C.F.R. § 930.78.

The CZMA regulations direct the state and applicant to "cooperate" "to develop conditions that, if agreed to" by each "would allow the State agency to concur" with the consistency certification. 15 C.F.R. § 930.4. But while the CZMA allows for and indeed encourages cooperation and collaboration between the state and applicant, the CZMA does not permit states to demand compensation as a condition of concurrence. NOAA has stated this plainly. In its February 2020 letter to CRMC, NOAA stated the following with respect to compensation in the context of federal consistency review:

> [N]ote that for purposes of determining consistency with mitigation requirements and monetary compensation in section 11.10.1(G) [of the Ocean SAMP], the CRMC cannot compel monetary compensation as a form of mitigation through the CZMA federal consistency process, but the Council and applicant can agree to compensation as one means to meet the mitigation policy of this part. . . . [T]he state must only apply its CZMA federal consistency review authority in a manner that conforms to these comments.

Letter from NOAA to CRMC 4 (Feb. 12, 2020) [hereinafter NOAA Letter].

Section 11.10 of the Ocean SAMP includes the enforceable policies for purposes of CZMA federal consistency review. *See* 650-RICR-20-05-11.10 [hereinafter § [xx.xx]].[1] Among other policies,[2] the Ocean SAMP requires that, if the Council determines that a proposed project may have potential adverse effects, it shall require an applicant to "modify the proposal to avoid and/or mitigate the impacts." § 11.10.1(C). The Ocean SAMP calls for modification first. Then, to the extent the project cannot be modified to fully avoid potential adverse effects, the applicant must work to mitigate them. This is critical: an applicant is not required to both modify a proposal and mitigate. If modification of the project removes the potential impact, there is nothing left to mitigate. In this context, the Ocean SAMP also requires that "potential adverse impacts of offshore developments and other uses on commercial or recreational fisheries be evaluated, considered and mitigated." § 11.10.1(G). Mitigation negotiations must occur among CRMC staff, the applicant, and the advisory FAB, with final approval by the Council. *See* § 11.10.1(H).

While the FAB participates in these negotiations and provides advice to CRMC staff pursuant to its advisory role, it does not have veto authority over these negotiations, nor does it serve as a signatory to any agreement reached. *See Lapp v. Fishermen's Advisory Board*, OM 19-23, 5 (Attorney General Opinion Sept. 26, 2019) (distinguishing the FAB from the public body in *Solas v. Emergency Hiring Council*, 774 A.2d 820 (R.I. 2001) and noting that "the FAB is expressly intended to be an advisory-only body"). NOAA has described the FAB's limited role as follows:

> While the FAB may have valuable information and insights to provide as the CRMC determines the consistency of projects, the CZMA does not confer authority on entities other than the state in making CZMA federal consistency decisions. Opposition to a project by the FAB cannot be a basis for a CZMA objection; objections must be based on the CRMC's determination of consistency with NOAA-approved enforceable policies.

[1] CRMC undertook a substantial revision of § 11.10 in October 2019, which NOAA approved in February 2020. Because SFW filed its Construction and Operations Plan in June 2018, the earlier version of § 11.10 applies to the extent consistent with the CZMA.

[2] SFW reserves the right to provide additional argument with respect to other enforceable policies.

NOAA Letter 3. Further, while the Ocean SAMP requires "negotiation" among CRMC staff, the applicant, and the advisory FAB, it does not require that the three reach a final agreement with respect to mitigation. *See* § 11.10.1(H).
The Ocean SAMP adopts a rigorous science-based approach to decision-making. It requires the Council to "work to the maximum extent practicable . . . to make sure it is using the best available science and modeling tools to inform the decision making process." § 11.8(A)(5). In fact, the Ocean SAMP identifies as one of its core principles to "[b]ase all decisions on the best available science." *Id.* § 11.6(C)(4).

SFW has adhered to this type of data-driven and evidence-based approach throughout these mitigation negotiations. As described below, SFW has engaged numerous subject-matter experts to evaluate potential impacts from the SFW Project, implement project modifications, and develop a robust mitigation proposal to address any remaining potential effects not completely eliminated through modification. SFW has compiled extensive written documentation summarizing the bases for its mitigation proposal and also has made its subject matter experts available for extensive questioning by and dialogue with CRMC staff. SFW believes its mitigation proposal follows the letter and spirit of the Ocean SAMP to rely on the best available science.

II. SFW PROJECT MODIFICATIONS

SFW has taken significant steps to modify the SFW Project to avoid and/or mitigate any potential impacts to fisheries. SFW prioritizes coexistence with the fishing community as an important step in developing a sustainable offshore wind industry. Consistent with the Ocean SAMP, SFW has sought to avoid potential impacts first and, if full avoidance cannot be achieved, then mitigate. Throughout the SFW Project's development and permitting process, SFW has assessed and responded to feedback from numerous stakeholders, including the advisory FAB. This feedback has resulted in substantial project modifications, including with respect to the overall project layout.

A. <u>WTG Layout</u>

The Ocean SAMP recognizes the importance to commercial and recreational fishing of "access around and through offshore structures and developments and along cable routes" and notes that such access "is a critical means of mitigating the potential adverse impacts of offshore structures on commercial and recreational fisheries." § 5.3.1(F). Accordingly, CRMC and the FAB lobbied heavily for the offshore wind industry's adoption of 1 x 1 nautical mile (NM) grid spacing between wind turbine generators (WTGs) to permit commercial and recreational fishing to continue safely within the wind lease areas. The historical record is replete with instances of such statements. For example, in its Consistency Concurrence for the Vineyard Wind project, CRMC called for the adoption of the 1 x 1 NM grid: "CRMC staff find that offshore wind farms should be developed in a grid pattern with east-west orientation of rows and 1 nm spacing between all turbines and turbine rows . . . in order to avoid significant adverse impacts to Rhode Island commercial fishing operations and be consistent [with] the CRMC's enforceable policies." Vineyard Wind Consistency Concurrence, CRMC Staff Project Review & Federal Consistency Analysis, CRMC File 2018-04-055, at 57 (CRMC Feb. 28, 2019) [hereinafter Vineyard Wind Concurrence]; *see also* CRMC Letter to BOEM, Vineyard Wind COP Supplement to the Draft EIS; BOEM-2020-0005, at 1 (July 9, 2020) ("The RICRMC believes it is imperative that BOEM condition all COP approvals [on adoption of the 1 x 1 NM grid] so that there is regulatory certainty for the offshore wind industry and stakeholders with assurance that there will be a predictable and uniform wind farm pattern that accommodates and facilitates safe navigation, commercial and recreational fishing activities, and USCG search and rescue operations."). Indeed, in that same concurrence, CRMC commended SFW's predecessor entity for listening to the concerns of Rhode Island-based fishermen by committing to the 1 x 1 NM grid:

> [E]xtensive discussions regarding WTG layout have continued between the CRMC, Rhode Island-based commercial fishermen and Vineyard Wind since the April 11, 2018 FAB meeting. During this period two other wind developers that have secured BOEM leases, Deepwater Wind (OCS-A 0486 and 0487) and Bay State Wind (OCS-A 0500), have been listening to the Rhode Island-based fishermen concerns and have responded by committing to an east-west orientation for their proposed wind farm project layouts. This commitment _serves to address the concerns of the Rhode Island commercial fishing industry_ by accommodating existing, well established commercial fishing practices and by supporting safe navigation throughout the entire southern New England wind energy area.

Vineyard Wind Concurrence 45 (emphasis added).

The FAB stated repeatedly that its constituents required the 1 x 1 NM grid to continue operating within the wind lease areas. For example, at a 2019 Fisheries Advisory Meeting, one fishermen indicated that, "Fishermen have been saying for years . . . one nautical mile east-west and north-south squared. . . . [A]s a fisherman, it's just for safety to get home." Fisheries Advisory Meeting, Tr. at 90:16-19 (Sept. 9, 2019). Another echoed this position: "[E]very single meeting we attended, we all said we need one nautical mile east-west and north-south . . . . We need the one nautical mile, . . . the checkerboard square[.]" *Id.* at 97:18-24; *see also id.* at 91:22-24 ("[W]e said one nautical mile, east-west, north-south. . . . Nothing has changed.").

In its original Construction and Operations Plan (COP), SFW incorporated 0.8 statute mile spacing between WTGs arranged in a grid-like pattern. SFW adopted this layout to balance stakeholder input with a goal of maximizing the amount of clean, renewable energy SFW could bring to the area based on the number of WTGs that could fit within the finite wind lease area. Based on feedback from the FAB and the greater fishing community, along with repeated statements from CRMC, SFW invested significantly to modify the SFW Project layout in response to feedback. In late 2019, SFW, in concert with the larger offshore wind industry in New England, committed to designing its layout in a 1 x 1 NM grid that aligns across wind farms. In other words, the grid points in the SFW Project will align with adjacent WTG points so that all of the Orsted/Eversource Joint Venture (Orsted/Eversource JV) offshore wind installations in the Massachusetts/Rhode Island Wind Energy Area (MA/RI WEA) will create a continuous east-west/north-south grid layout with 1 x 1 NM spacing. SFW incorporated this modified layout into its February 2020 revised COP.

The adoption of the 1 x 1 NM grid represented a substantial concession by the offshore wind industry. The final designation of the MA/RI WEA, and subsequent bidding process to acquire leases within it, was the result of a robust public involvement process that accounted for the concerns of many stakeholders, including fishermen. Ultimately, BOEM reduced the size of the MA/RI WEA from the original proposal to address many of these concerns. Lessees, including SFW, who bid on and procured leases had the expectation that they would have the opportunity to use the area granted in the lease. Adopting the 1 x1 NM grid, reduces the total number of WTG locations available.

CRMC, the FAB, the greater fishing community, and the U.S. Coast Guard[3] all concluded that adopting the 1 x 1 NM grid would permit the continuation of commercial and recreational fishing within the wind lease areas. By doing so, SFW substantially modified the SFW Project to avoid or minimize any potential adverse impacts to commercial and recreational fisheries. This modification reduces significantly any remaining potential adverse impacts that SFW must mitigate.

B. <u>Gear Loss Claim Process</u>

SFW also has implemented a first-in-the-industry gear loss claim process to compensate fishermen fairly in the event of lost or damaged gear. SFW uses fishing gear avoidance tactics such as onboard gear observers, avoidance training, and/or the use of a scout vessel. Accordingly, SFW expects limited gear interactions, if any, in connection with the installation and operation of the SFW Project. Nevertheless, SFW's gear loss claim process addresses those few instances in which accidental gear loss occurs.

SFW recently amended its gear loss claim process to include a business interruption component.[4] SFW modeled it after the NOAA Fishermen's Contingency Fund Program, established to compensate fishermen for losses in connection with oil and gas structures on the Outer Continental Shelf. The NOAA program provides compensation for economic loss based on 50 percent of gross income lost, rather than lost profits.

The gear loss claim process allows affected fishers to claim both gear loss and business interruption, and it provides for evaluation of claims by a three-member panel. Claimants who dispute the panel's decision may appeal to an independent third-party reviewer and simultaneously receive payment for any undisputed portion of the claim. By implementing this robust and industry-leading process, SFW has mitigated potential adverse impacts resulting from gear loss caused by the SFW Project.

C. <u>Additional Modifications</u>

Adoption of the 1 x 1 NM grid and implementation of the gear loss claim process represent only two of the modifications SFW has made. SFW also developed a comprehensive fisheries communication plan that incorporates input from CRMC and the fishing community. The communication plan gives fishers advance notice of where and when survey and construction activities will occur so as to minimize adverse interactions. SFW also employs fisheries liaisons to assist with these communication efforts.

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[3] *See* U.S. Coast Guard, Final Report, The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study, No. USCG-2019-0131 (May 14, 2020); *see also* U.S. Coast Guard Letter to Responsible Offshore Development Alliance re Request for Correction Pursuant to Information Quality Act Guidelines (Oct. 27, 2020), which is attached hereto.

[4] As CRMC is aware, SFW spent considerable time in 2020 waiting for a proposal from the FAB on gear claim and then attempting to reach agreement with the FAB on a business interruption component. SFW invested significant time and money trying to work with the FAB's consultant on an agreed-upon, standardized framework. Even though SFW agreed to adopt the FAB's proposal in nearly every respect, the FAB refused to reach agreement.

SFW developed a robust Fisheries Monitoring Plan that incorporated months of feedback from CRMC, other federal and state agencies, the FAB, and other fishers and users of the SFW Project area. SFW also incorporated input from mobile gear fishermen to adjust the export cable route to avoid areas of concern. In response to concerns about navigation, SFW will incorporate automatic identification system (AIS), enhanced cellular, and very-high frequency coverage into the WTGs. Finally, SFW will target sufficient burial cable depth and microsite the WTGs to minimize impacts to sensitive benthic habitats.

These project modifications are substantial. They demonstrate SFW's responsiveness to the commercial and recreational fishing communities and ensure the continued long-term use of the project area by fishers. By working with CRMC, SFW has eliminated or minimized significantly any potential adverse impacts of the project to commercial and recreational fisheries.

III. SFW'S MITIGATION PROPOSAL

SFW nevertheless has recognized throughout that aspects of the project, particularly construction and decommissioning, may present some potential impacts that require mitigation. Accordingly, and in keeping with the Ocean SAMP's emphasis on using the best available science and modeling tools, SFW engaged Woods Hole, one of the world's leading organizations dedicated to ocean research, to examine impacts to fisheries from the SFW Project and provide an economic assessment of such impacts. SFW has incorporated this assessment into its compensatory mitigation proposal described below. In response to questions from the FAB, SFW also has reiterated its commitment to certain impact mitigation strategies, such as noise attenuation. Finally, SFW proposed another industry-leading program, the Rhode Island Navigational Enhancement and Training Program, which proposes an approximately $1 million investment to enable Rhode Island commercial fishers and for-hire (charter) vessels to obtain pulse compression radar systems and AIS transceivers. With this comprehensive mitigation proposal, along with the project modifications, SFW respectfully submits that it has met the Ocean SAMP's requirement to "modify the proposal to avoid and/or mitigate" any "potential adverse impacts." *See* §§ 11.10.1(C), 11.10.1(G).

A. Rhode Island Navigational Enhancement and Training Program

SFW created the Rhode Island Navigational Enhancement and Training Program to provide training and experiential learning opportunities to those navigating within the Orsted/Eversource JV wind lease areas in the MA/RI WEA. The program furthers positive co-existence between offshore wind and the fishing community and advances CRMC's commitment to mariner education regarding safe navigation. *See* § 5.3.1(E) ("The Council will promote and support the education of all mariners regarding safe navigation around offshore structures and developments and along cable routes.").

Pursuant to the program, fishers eligible for SFW's Commercial Fisheries Compensation Fund, described below, will be eligible through a voucher program to receive pulse compression radar systems and AIS transceivers, if they do not already possess them. The Orsted/Eversource JV will pre-approve at least two Rhode Island marine electronics retailers to sell and install the electronic equipment. Thus, both Rhode Island fishers and Rhode Island marine retailers will benefit from this program.

In addition to the radar equipment, the program will include professional training and experiential learning components. Fishers eligible for the Commercial Fisheries Compensation Fund may attend a professional training program of their choice, including but not limited to a captain's course, license upgrade, radar course, or rules of the road refresher. Private anglers, charter captains, and commercial fishing industry members with a valid saltwater fishing license, in addition to fishers eligible for the Fund, will have the opportunity to participate in a simulator session. During the session, they will have the opportunity to navigate a vessel through a windfarm during different scenarios, including night conditions, adverse weather, and vessel crossings.

SFW developed this program in direct response to advice from the FAB. FAB members expressed concerns about navigating through the wind farm at night or during inclement weather. They expressed concerns about having enough crew members sufficiently licensed to operate in the wind farms. And they expressed concerns about radar interference from the WTGs. *But see* § 8.4.11(H) ("The installation of offshore renewable energy facilities may cause either minimal impacts or possible enhancements to navigation and communication tools and systems, including global positioning systems, magnetic compasses, cellular phone communications, very-high frequency (VHF) communications, ultra-high frequency (UHF) and other microwave systems, and automatic identification systems (AIS). [BOEM's Programmatic Environmental Impact Statement for Alternative Energy Development and Production] indicates that any impacts are likely to be negligible to minor, and cites a number of studies in which no negative impacts were found." (internal citations omitted)). The Rhode Island Navigational Enhancement and Training Program provides direct, tangible solutions to those concerns in a manner that will benefit the entire Rhode Island fishing community.

B. <u>Mitigation Strategies</u>

The FAB also requested certain specific mitigation actions in its November 19, 2020 presentation to CRMC and SFW. SFW addressed these requested mitigation actions in a memorandum to CRMC dated December 15, 2020. In brief, SFW agreed to the following additional mitigation measures.

First, SFW reaffirmed its commitments with respect to pile-driving noise attenuation and sound verification. SFW has committed to monitoring and exclusion zones based on modeled 10dB broadband underwater noise reduction levels during foundation pile driving. SFW also has committed to taking sound source verification measurements during foundation pile driving to verify in situ underwater noise levels.

Second, SFW committed to avoiding temporal and most spatial overlap between the low frequency high-resolution geophysical (HRG) surveys and the SFW fisheries monitoring surveys prior to construction. HRG surveys are required by BOEM for offshore wind development activities. They inform engineering and design, archaeological assessments, and benthic habitat mapping. HRG surveys for offshore wind development do not use seismic air guns, which studies have shown can influence the distribution and catch rates of commercially important marine fish. SFW has not used seismic air guns and does not intend to use seismic air guns in the future. While BOEM has concluded that non-airgun HRG equipment will have little to no measureable impacts on fisheries resources, essential fish habitat, commercial and recreational fisheries, and benthic communities, SFW has nevertheless made this additional commitment to minimize overlap between HRG surveys and SFW fisheries monitoring surveys prior to construction to address the FAB's stated concerns.

Third, SFW has committed to conducting a post-construction researched radar analysis for submission to the U.S. Coast Guard. The analysis will aim to determine the extent, if any, to which SFW WTGs and offshore substation may produce radar reflections, blind spots, shadow areas, or other radar effects that may have adverse impacts on navigation safety. This analysis will consider specifically the types of vessels that regularly navigate the wind lease area, taking into account the navigation, communications, and collision avoidance equipment typically used on those vessels. In concert with the Rhode Island Navigational Enhancement and Training Program, this analysis will further the state of navigational technology and understanding within the Orsted/Eversource JV wind lease areas and provide a significant benefit to Rhode Island commercial and recreational fisheries.

C. Woods Hole Report

Recognizing the need to evaluate fairly and quantitatively the scope of financial mitigation, SFW engaged Woods Hole to assess the economic value of reasonably foreseeable impacts to commercial fisheries during the project's life. Woods Hole brought decades of experience and a rigorous, data-driven focus to the question of impacts and economic value.

Woods Hole examined the level of existing fishing operations that intersect with the SFW lease area and two alternative export cable route areas to determine the landings and landed value attributable to those areas. Woods Hole obtained and used NOAA data spanning from 2008 to 2018. This NOAA data is considered the best fisheries data in the world and has been used nationally for decades for research and fisheries management. It indisputably represents the best available science and incorporates the most advanced modeling for the spatial distribution of landings. The data uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data matched with NOAA fishery observer data, including geocoordinates of detailed fishing locations, to improve the spatial resolution of VTR within the wind lease and cable route areas. Further, because not everyone in the federally permitted lobster or Jonah crab fisheries provides VTR data, Woods Hole applied an upward adjustment on the reported VTR data for these fisheries to account for the additional landings.

Woods Hole used IMPLAN model software and data to estimate the average total economic impact to Rhode Island from commercial fishing activity in the project area. IMPLAN is a widely accepted, peer-reviewed model that incorporates data from over 500 industry sectors, including seafood processors and other sectors subject to the downstream impacts of the commercial fishing industry. Using this model, Woods Hole arrived at an output multiplier that reflects the linkages between economic activity in different sectors of the economy. Incorporating this multiplier captured indirect economic impacts attributable to commercial fishing activity.

Using these baseline values, Woods Hole analyzed five categories of possible impacts to commercial fishing: (1) transient impacts due to constrained access to certain areas during construction; (2) transient impacts on fish stocks due to construction activities and noise; (3) impacts to fishing in the wind lease area during operations; (4) transient impacts due to constrained access to certain areas during decommissioning; and (5) transient impacts on fish stocks due to decommissioning activities.

The Woods Hole report incorporates numerous conservative elements. For example, Woods Hole used the average of eleven years of data and assumed that average would continue for the next thirty years, even though landings vary from year to year and have trended downward most recently. Woods Hole also made no adjustment for the effects of climate change. Nor did Woods Hole quantify the potential positive impacts accruing from the well-documented reef effect (see below). Woods Hole also assumed that any affected landings are foregone, rather than incorporating the realistic assumption that some fishing simply will shift to other nearby locations. Likewise, Woods Hole based its estimate on gross values—not net profits—making no reduction for costs regularly incurred in connection with commercial fishing.

Woods Hole presented its report to CRMC and the FAB and answered extensive questions from the FAB's consultant. Based on specific feedback from the FAB, Woods Hole then made additional upward adjustments to its initial calculation. Woods Hole incorporated the FAB's proposed 15 percent premium for dockside sales of lobster and Jonah crab. Woods Hole also increased the IMPLAN multiplier at the FAB's suggestion to account more fully for both upstream and downstream effects to seafood processors. Woods Hole modified its assumptions for the stock effects resulting from construction pile-driving, incorporating the conservative criterion that all mobile species will leave the wind lease area and a 5 km zone around the wind lease area for four months in connection with pile-driving. Finally, Woods Hole added an impacts assessment for the for-hire (charter) fishing boat industry based on the research study suggested by the FAB's expert.[5]

Between the original report and update, the Woods Hole analysis identifies and assesses the reasonably foreseeable potential adverse impacts from the project.

D. SFW's Comprehensive Compensatory Mitigation Proposal

Using Woods Hole's conservative assessment, SFW developed a fisheries mitigation framework to compensate fishermen and support coastal communities. SFW sought to achieve a fair and transparent process. SFW's proposed framework is divided into two components: a Commercial Fisheries Compensation Fund to provide direct financial mitigation to Rhode Island fishers operating in the SFW lease area and export cable areas; and a Coastal Community Fund to benefit the fishing industry and its communities through grants.

Over the past six months, SFW has increased its initial compensatory offer substantially based on feedback received from CRMC and the FAB:

- Because SFW tied its proposal to the Woods Hole analysis, the compensation proposed necessarily increased when Woods Hole incorporated the upward adjustments described above.

[5] Note that the Draft Environmental Impact Statement for the SFW Project states that "the number of charter fishing trips is fairly low in the RI-MA WEAs." BOEM 2020-057, South Fork Wind Farm and South Fork Export Cable Project, Draft Environmental Impact Statement, 3-88 (Jan. 2021) [hereinafter DEIS]. The DEIS also notes that the 70 square miles of Cox Ledge excluded from the lease area and therefore the SFW Project are "important to for-hire recreational fishing." *Id.* But even in this "important" area, NOAA data indicates only six average annual permit holders from 2012 to 2014, each generating less than $10,000 per year. *Id.*

- SFW added a component to account for rerouting costs during construction and decommissioning.
- Based on the FAB's and CRMC's repeated statements that a purely quantitative approach fails to capture adequately the FAB's experiential concerns and worries about the future, SFW added a contingency percentage on top of the conservatively calculated value of reasonably foreseeable potential impacts.
- SFW developed the Rhode Island Navigational Enhancement and Training Program, to which it expects the Orsted/Eversource JV to contribute approximately $1 million for its three lease areas within the MA/RI WEA.
- Finally, as a showing of good faith and recognizing that the SFW Project is the first of the Orsted/Eversource JV projects to move forward, SFW topped off its proposal with a non-scalable lump sum payable over the SFW Project's life.

Consequently, during these negotiations, SFW has increased its compensatory offer more than six-fold, not including the Rhode Island Navigational Enhancement and Training Program. SFW respectfully suggests that this substantial compensatory offer sufficiently offsets any reasonably foreseeable potential impacts that the SFW Project could not otherwise eliminate or mitigate through the extensive measures described above.

E. Speculative Concerns Raised by the FAB

During mitigation negotiations, the FAB has raised a litany of speculative concerns about the SFW Project, too numerous to recount here. When the FAB has raised specific supported concerns about the SFW Project based on their experiences, SFW has carefully considered these and adjusted its mitigation proposal to account for the members' experiences. Many of the concerns raised, however, lack support in science or evidence. CRMC has rejected many of them previously. While SFW cannot recount its responses to all such comments here, the following examples bear repeating.

First, the FAB has suggested that the introduction of WTG foundations will permanently alter large swaths of underwater habitat. No evidence supports this. To the contrary, the Ocean SAMP states that, "The direct effects of these hard structures to the seabed are likely to be limited to within one or two hundred meters of the turbines." § 8.5.3(C)(4) (citations omitted). The Ocean SAMP further notes that, "The total area of seabed disturbed by wind turbine foundations is relatively small compared to the total facility footprint." *Id.* This is true for the SFW project. The total area of temporary and permanent seabed disturbance within the wind lease area within Cox's Ledge is just 8.80 percent. *See* SFW Seabed Disturbance Estimates (Dec. 17, 2020). During operations, 99.76 percent of the wind lease area will remain undisturbed.

Second, the FAB has dismissed the reef effect and argued further that any such effect would have negative impacts to the Atlantic cod population. But the Ocean SAMP presents a different outlook.[6] The Ocean SAMP cites several studies suggesting that WTG foundations may attract cod. *See* § 8.4.7(I)(4) (discussing United Kingdom study finding that "many of the juvenile fish found around the turbines are small Gadoid species such as cod."); § 8.4.7(I)(5) ("A study of decommissioned oil rigs in the North Sea off Norway found aggregations of cod, mackerel, and

[6] As does the DEIS, which states that "foundation piles and associated scour protection would create an artificial reef effect, which could result in minor beneficial effects to species distribution, community composition, and predator-prey interactions in the vicinity." DEIS 2-17.

other species around the structures." (citation omitted)); § 8.4.7(I)(6) ("Another study found an increased number of cod in the area surrounding wind turbines at the Vindeby Offshore Wind Farm in Denmark." (citation omitted)). The Ocean SAMP also states that, "In addition to fish, these structures may also provide important habitat for lobsters and crabs. Young, newly-settled individuals of these species typically seek out refuge to avoid predation, including hiding among stones and cobbles, or burying in sediments. Wind turbines and scour protection may provide suitable hiding places for these individuals, and may enhance the lobster fishery in cases where habitat is a limiting factor." § 8.4.7(I)(4) (citation omitted).

Further, based on the 2019 stock assessment of cod by the NOAA Northeast Fisheries Science Center, the stock is overfished, its condition "remains poor," and the stock shows a truncated age structure. *See* Black Sea Bass & Cod Presentation (Dec. 17, 2020). Further, cod have a high exposure to climate change, which is anticipated to have a negative impact on cod. The distribution of cod is expected to continue shifting northward from Cox's Ledge as a result of warming temperatures, and climate change is anticipated to result in a loss of thermal habitat for cod on Georges Bank and in southern New England. *Id.* In other words, the Atlantic cod populations are depleted, and climate change is expected to have further negative impacts on cod recruitment. The impacts of climate change on cod populations far outweigh any speculative impacts from the SFW Project.

Finally, the FAB has stated repeatedly that the introduction of WTGs will result in loss of insurance, creating de facto "exclusion zones." This concern is not new, and CRMC previously has considered and rejected it:

> Some fishermen have expressed the concern that marine insurance companies might increase their insurance premiums or prohibit insured fishing vessels from operating within the vicinity of offshore wind farms (e.g. Ichthys Marine 2009). However, it should be noted that at the time of this writing, Sunderland Marine does not currently impose restrictions or higher premiums on their members, nor have they heard of other insurance companies issuing such demands (McBurnie, pers. comm.). Sunderland Marine is the world's largest insurer of fishing vessels, and insures The Point Club, a fishing vessel insurance and safety club that insures many of the fishing vessels operating out of Point Judith and Newport (Nixon, pers. comm.).

§ 8.4.8(D)(8). SFW's own recent investigation of this concern has led to the same conclusion.

* * *

SFW has followed the evidence-based decision-making approach of the Ocean SAMP using best available science and modeling tools. CRMC must reach its consistency concurrence, including any proposed conditions for mitigation, pursuant to the Ocean SAMP by employing an evidence-based approach that relies on the best available science and modeling tools. CRMC cannot just provide a compensation "number" to SFW without linking it to specific potential impacts backed by science and evidence. SFW has submitted extensive documentation, much of it attached here, demonstrating its data-driven, evidence-based commitment to project design, modification, and mitigation that should be followed for mitigation. This evidence supports clearly that SFW has modified and/or mitigated any potential adverse effects to the Rhode Island commercial and recreational fisheries from the SFW Project. SFW has shown that its Project is consistent with CRMC's applicable enforceable policies.

Thank you,

/s/ Olivia Larson Tesse
Olivia Larson Tesse
Lead Commercial Manager

/s/ Melanie Gearon
Melanie Gearon
Permitting Manager

Cc: James Boyd, Coastal Policy Analyst, CRMC
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Fishermen’s Advisory Board Response to Orsted Submissions

March 25, 2021

Summary

The Fishermen’s Advisory Board (FAB) received a number of documents from Orsted via CRMC staff in February and early March. This letter is a response to those documents, itemized below. An additional response is pending to Orsted’s letter of March 11, 2021 Re: South Fork Wind, LLC’s Comprehensive Mitigation Proposal.

Overall, the FAB’s assessment is that Orsted’s current offer of compensatory mitigation and current plan for non-compensatory mitigation do not meet the enforceable policies under the Ocean SAMP. Orsted has consistently taken an approach of imposing their desired mitigation on fisheries user groups, while picking and choosing which groups and which significant adverse impacts can even be considered. None of this is supported by either the Ocean SAMP or the Coastal Zone Management Act (CZMA). They have refused to engage meaningfully with the FAB and have even refused to attend necessary mitigation negotiations under the Ocean SAMP. Instead, they have filed a battery of documents replete with errors, misstatements, and mischaracterizations of the factual record. Since they have not made a sincere attempt to identify and resolve the adverse impacts of offshore wind development, it is not surprising that their current proposal for mitigation is insufficient.

Overview of this Document

This document was prepared in conjunction with the RI Fishermen’s Advisory Board members by Marisa Desautel, Esq., and Thomas Sproul, Ph.D., to provide feedback to RI CRMC staff regarding these recently received submissions from Orsted during mitigation:

1. The Woods Hole Update dated 12-15-2020 (“WHU”),
2. Orsted Responses to FAB Questions dated 02-18-2021 (“RESPONSES”),
3. SFW Letter Re FAB Mitigation Counterproposal dated 02-25-2021 (“LETTER”), and
4. SFW Memo Re Stakeholder Comments on 1x1 Spacing dated 03-09-2021 (“MEMO”).

Detailed responses are included for each document in turn below. Prior to addressing the details of each document, there are a number of points that have and continue to come up repeatedly that the FAB hereby addresses.

1. Orsted’s emphasis on mitigation being “data driven” or “based on scientific evidence” is merely a negotiating tactic to assign zero value to harms that are difficult to quantify.

2. Orsted has oversold the expertise of Woods Hole and the guidance they’ve provided in an attempt to bolster Orsted’s own positions.

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3. Orsted has made inconsistent statements about the scope of work contracted with Woods Hole; the true scope of that work must be disclosed.

4. Orsted has misrepresented both the quality of the landings estimates provided by NOAA, and the quality of landings estimates provided by the FAB.

5. Orsted has misrepresented the language of the Ocean SAMP in an attempt to exclude whole classes of adverse impacts to fisheries user groups from mitigation.

6. Orsted has misrepresented the statements of fisheries representatives with respect to the desirability of the 1 x 1 grid.

7. Orsted is mistaken in asserting that Federal studies and findings pertaining to other wind projects cannot be considered; the differences in harms incurred by fisheries user groups across wind projects are mostly differences in degree, not differences in kind.

8. Orsted has not submitted a Fisheries Monitoring Plan that meets the requirements of the Ocean SAMP's enforceable policies.

1. Orsted's emphasis on mitigation being "data driven" or "based on scientific evidence" is merely a negotiating tactic to assign zero value to harms that are difficult to quantify.

The FAB objects to Orsted's premise that they are only required to mitigate based on their data or scientific evidence. It is quite clear this is merely a strategy to lower any compensatory mitigation amount by arguing that anything without hard numbers cannot be considered, or can be considered only to the extent that Orsted decides.

For a company that cares only about data and facts, the provided descriptions of that data have been incredibly sloppy: for example, even after the Woods Hole experts conceded there was no VMS data included in their analysis, the writer(s) of Orsted's RESPONSES in February doubled down on the incorrect VMS assertion (RESPONSES page 9, item 6).

The FAB also points out that the strategy of requiring everything to be supported by primary data is being deployed by Orsted uniquely in this negotiation. The FAB challenges Orsted to provide the mutually agreed data frameworks that support their settlements with cities and towns.

A further example comes from the history of our gear claims negotiations failing. The FAB provided estimates of economic losses to Orsted based on annual landings of commercial fishing vessels. After repeated inadequate counter offers, Woods Hole recommended and Orsted agreed to consult NOAA to obtain data. When NOAA came back with annual per vessel landings estimates that were *higher* than the FAB estimates for lobster, Orsted did not insist on the most accurate data – they instead tried to agree at the FAB's original proposal. Similarly, when Orsted proposed extremely short turnaround times for gear replacement, FAB representatives contacted suppliers and collected data on turnaround times. Overwhelmingly, they came back longer than the times proposed by Orsted and in many cases longer than the times proposed by the FAB. Confronted with evidence that their low-ball offer attempts had failed, Orsted refused to budge and abandoned all efforts to negotiate on gear claims. Despite Orsted's contention that "the FAB refused to reach agreement," it was Orsted who made that decision. Thus, it is clear that Orsted's entire data-driven focus only exists when it financially benefits them.

2. Orsted has oversold the expertise of Woods Hole and the guidance they've provided in an attempt to bolster Orsted's own positions.

The FAB objects to Orsted's attempts to oversell the expertise of Woods Hole and to oversell the extent to which that expertise has bearing on the quality of the information and estimates provided. For example, the 90 years of experience of Woods Hole is claimed (RESPONSES page 2, item 3.a) in support of the decision to exclude charter and recreational fishing from the initial mitigation offer, but clearly the entire institutional experience of Woods Hole was not distilled into the Woods Hole Report.

In addition, there are times when a plausible explanation for omitting direct primary-data driven estimates (like for recreational or charter fishing) would be that these estimates were outside the scope of work or too difficult given the limited funding available, but instead Orsted claims Woods Hole "made all decisions regarding what impacts to consider and how to quantify them based on the available research and their decades of experience" (RESPONSES page 3, item 5). Also, this particular explanation was offered in reference to transit costs from re-routing, which were then allocated estimated funding in the Woods Hole Update. What happened to the decades of experience and careful evaluation done by Woods Hole experts that caused this determination to be reversed inside of three months? The FAB thinks the most likely explanation is that many classes of significant adverse impacts to fisheries users were simply not considered, either through direct influence from Orsted about the scope of work, or through carelessness on the part of Woods Hole.

This explanation also applies to the questions posed by the FAB in relation to the unique and sensitive nature of Cox's Ledge. Specifically, Orsted indicates in its RESPONSES that "Woods Hole considered the location of the Project, including the alternative cable routes." (RESPONSES page 2, item 3b). If Woods Hole considered the unique and sensitive value of the project area, discussion of that consideration would be included in the materials submitted by Woods Hole. Instead, the record is currently devoid of any attention paid by Woods Hole to the unique value of Cox's Ledge.

It is also quite clear that the expertise of the Woods Hole experts does not extend to legal expertise on the matter of what harms to fisheries user groups might need to be mitigated. For example, the explanation for navigation safety risks being excluded did not mention decision-making by Woods Hole (RESPONSES page 3, item 4), only an assertion by Orsted that this class of harms does not need to be made whole under the Ocean SAMP. Orsted must disclose exactly which classes of harms they instructed Woods Hole not to consider, and they must also disclose which classes were directly evaluated by Woods Hole and discarded based on their expertise.

Finally, the most critical remaining matters of disagreement between the FAB and Orsted regarding mitigation are concerning the effects on fishing activity during the operations phase of the project and the potential for losses to recreational and charter fishing. Both of these areas are completely outside the expertise of the Woods Hole experts who wrote the report. With respect to the operations phase, they simply assumed the scenarios. In all of the documents submitted by Woods Hole and Orsted, not once is mentioned any interview with an actual fisherman about what might take place during operations. The claims of zero or minimal impacts are supported only by the words “we assume” in both the initial Woods Hole Report (top of page 21) and also in the Woods Hole Update (top of page 3).

Yet another oversight is evident with respect to recreational and charter fishing. Not having spoken with any recreational or charter fishermen, Orsted and Woods Hole were apparently completely unaware of the need for drifting during sportfishing for highly migratory species and Atlantic cod, and how this would be rendered unsafe by the presence of turbines. The FAB again issues its concern that Orsted has not submitted Necessary Data and Information (NDI) as required by the Ocean SAMP, which “must include interviews with fishermen.” This oversight has now given rise to a critical disagreement in which Orsted’s only recourse is to misrepresent the expertise of Woods Hole in order to support their argument.

In addition, while Woods Hole reversed course with respect to evaluating losses to the charter industry, they have consistently asserted that there are zero harms to recreational anglers. This defies even basic economic logic: the FAB’s economist knows that when anglers visit Cox’s they have chosen to do so over another location, meaning that it offers more value than a second-choice location that they might be displaced to. Coupled with the need for seaworthy vessels to visit Cox’s, it is clear that recreational anglers pay substantial amounts in order to fish the area. While the FAB agrees that assessing the exact amount is difficult, it is abundantly clear that losses are not zero if they are displaced. Since the Woods Hole experts are trained economists, the logical conclusion is that they simply didn’t have the resources or scope of work to allow evaluation of impacts on recreational anglers (or the charter industry, until it was raised during negotiations and subsequently included in the Woods Hole Update).

3. Orsted has made inconsistent statements about the scope of work contracted with Woods Hole; the true scope of that work must be disclosed.

As described above, Orsted has claimed certain reasonably foreseeable adverse impacts are outside the scope of the enforceable policies in the Ocean SAMP, but have not offered an explanation of how Woods Hole came to that determination in their own evaluation. The only explanation that has been offered is that Orsted asked Woods Hole to consider "economic impacts to commercial fishing." Since it is likely that Orsted directly influenced the scope of work conducted by Woods Hole for their own financial benefit, the FAB again insists on reviewing the agreed scope of work between Orsted and Woods Hole.

For every case in which Orsted indicates Woods Hole has evaluated a cause of loss to fisheries user groups and assessed it to be zero, the FAB insists that Woods Hole must release the scope of that analysis and its findings in writing. Those causes of loss include:

1. Charter fishing: what analysis caused it to be excluded and then later included in mitigation? Orsted's explanation thus far is transparently false. Charter fishing economic impacts are clearly not the shoreside economic impacts from commercial fishing that would be estimated by IMPLAN, and yet they claim those shoreside numbers were set aside for charter fishing: "South Fork's Mitigation Proposal initially incorporated potential impacts to the charter and recreational fishing communities through its proposed Coastal Community Fund" (RESPONSES page 2, item 3.a).
2. Recreational fishing.
3. Navigation safety.
4. Vessel transit costs from re-routing: what analysis caused it to be excluded and then later included in mitigation?
5. Space conflicts and gear conflicts.
6. Cumulative effects of offshore wind development. By cumulative effects the FAB means those harms from the full buildout of the WEA that exceed the harms from the individual developments. These harms include cumulative effects on insurance, navigation safety, fisheries science, fisheries management and quota, and more.

4. Orsted has misrepresented both the quality of the landings estimates provided by NOAA, and the quality of landings estimates provided by the FAB.

It was revealed during mitigation discussions that the analysis of Vessel Trip Reports (VTRs) to estimate landings over space was done entirely by NOAA who then provided the post-modeling estimates to Woods Hole. It was further revealed that there was no VMS modeling used, despite the fact that this was initially stated in the initial Woods Hole report. Furthermore, the data analysis provided by NOAA is based on non-peer-reviewed "grey literature" published by NOAA analysts (DePiper, 2014; Benjamin et al., 2018). The only estimation is done in the DePiper (2014) research brief; Benjamin et al. (2018) simply describe extending those modeling results in a 500m x 500m raster across the ocean. The resulting estimates have been filtered through that model without regard for model quality. The model includes no allowance for whether bottom features would influence where fishing might occur relative to the single reported LAT/LON pair on the VTR (even if Cox's Ledge is nearby), nor does it address the apparent poor ability of the model to fit some fisheries: less than 0.5% of the data used to fit the model were for lobster.

Orsted states, “Woods Hole’s analysis relies on NOAA data, which is the best in the world, and aligns almost perfectly with NOAA’s October 2020 report on offshore wind values in the Northeast” (LETTER, page 2). This statement is misleading because while NOAA has access to the best data in the world, the data reported do not represent the use of all that data. NOAA has access to detailed spatial data for vessels using both VMS and AIS data, but none of the information in those data sets is included here. Further, since there has been no disclosure of what was actually provided, it is not clear whether Woods Hole simply obtained a rough draft of the data outputs that eventually were shared on the NOAA Fisheries “Fishing Footprints” website in October, 2020, or if they obtained some independently generated data set.

The implied characterization that the VTR data are the best available is only true because there is no other systematic data available – higher precision methods have not yet been mapped across the ocean. Orsted has gone on to celebrate the quality of these data and to use that quality as a means to impeach testimony from the FAB members, who draw on cumulative experience consisting of hundreds of thousands of hours at sea. It is important to recognize that the NOAA landings estimates are not objectively of a high quality. The FAB reiterates: the estimates are based on the model of a single NOAA researcher, and that model is not peer-reviewed, nor has the use of that model for this purpose been peer-reviewed. The peer review issue is fatal to Orsted’s mitigation plans. The foundation of any expert opinion is whether the basis for the opinion has been tested and approved by other experts in the field. In this case, the standard relied on by Woods Hole is unreliable.

The data used to validate the model are confidential and have not been shared, meaning that the process of outside validation of the code and/or results is permanently blocked by NOAA. The model also contains a number of statistical shortcomings which directly apply to this lease area and to Cox’s Ledge.

First, the model is based on observer data and as a result contains essentially no information about lobster landings. In fact, exploring DePiper’s original paper indicates that so little lobster data was included that the model was unable to statistically differentiate lobster VTRs from other gear types that fish in a completely different manner. Second, the model presumes that landings are spread out radially from the point reported on the VTR and that all directions are equally likely at each distance. This means that the model does not account for bathymetric features (such as Cox’s Ledge) in assessing whether certain areas nearby to a VTR point may be represented by more intensive fishing activity. The FAB’s chief concern is that these model shortcomings may lead to landings being incorrectly attributed to areas of the ocean outside the wind area, thus understating the basis for mitigation.

Orsted goes on to state that “Woods Hole also performed a sensitivity analysis on the landings values from the wind lease area by examining NOAA data for a 5 km buffer surrounding the South Fork wind lease area. This analysis confirmed that the commercial landings values within the buffer are roughly equivalent to those within the wind lease area” (LETTER, page 2). The FAB received these data only in the last two weeks. There is not enough information disclosed to determine comparisons exactly, but the FAB does concede that the buffer data are not grossly misaligned with the previous analysis in terms of landings value per unit area. The two values being close does not confirm validity of the model, however, as there may still be problems of excessive “smoothing” of landings that fails to recognize the unique nature of Cox’s Ledge.

The FAB believes that the NOAA estimates reported by Woods Hole contain errors that understate the value of annual landings. The FAB members have raised concerns of data errors in the NOAA data provided to Woods Hole that have not been addressed. In particular, the “All Other” category of landings for the SFW lease is given as 180,000 pounds annually at a price of $0.101 per pound (RESPONSES page 8, item 4). The FAB members immediately identified this value as too low, and according to annual landings prices published by NMFS, the value is actually impossibly low, because there are no species included with a low enough price per pound. Orsted’s response was that this is explained by reporting of live weight (including shells) versus landed weight for surf clams and ocean quahogs. Ocean quahogs are reported separately as zero pounds/dollars by Woods Hole, so that leaves surf clams. Even after accounting for the live weight conversion factor, surf clams have an average price of $0.172 per pound over 2008-2018, and the lowest value observed was $0.159 in 2010. This means live weight versus landed weight is not the explanation. The FAB reasserts its claim that the most likely explanation for the impossible prices is that the landings estimates contain errors understating the true values.

Orsted has also misrepresented the quality of the landings estimates supplied by the FAB. Faced with no access to the raw VTR data used by NOAA and provided to Woods Hole, the FAB used what resources it had available to come up with rigorous estimates of landings values. These estimates include estimates of lobster and Jonah Crab landings indexed by Loran lines overlapping the lease area, and VMS-based estimates of fishing frequency overlapping the lease area and area immediately surrounding. The FAB members have also drawn on their expertise, gained from hundreds of thousands of hours at sea, to quantify how the Woods Hole annual landings estimates might break down into actual trip values. The FAB continues to assert that the NOAA/ Woods Hole estimates are problematic. For the highest-valued species in and around Cox’s (scallop and lobster), the NOAA/ Woods Hole estimates simply add up to too few trips per year at a reasonable value of landings per trip.

Finally, Orsted has been inconsistent with respect to their attitude towards data quality. While they have characterized NOAA’s VTR estimates based on grey literature as “the best in the world” they have treated with disregard our estimates on the value of recreational and charter fishing in the area. Those estimates are also based on non-peer-reviewed Federal reports from NOAA and BOEM, both of whom undertake fundamentally the same process as NOAA did with the VTRs: they start with imprecise primary data and perform statistical aggregation on top of it to come up with estimates. The FAB argues that it cannot be had both ways.

5. Orsted has misrepresented the language of the Ocean SAMP in an attempt to exclude whole classes of adverse impacts to fisheries user groups from mitigation.

Orsted has repeatedly asserted that the Ocean SAMP precludes consideration for mitigation of any classes of harms to fisheries user groups that they do not wish to discuss. These classes of harms include navigation safety risks (RESPONSES page 3, item 4), transit costs due to re-routing (RESPONSES page 4, item 5; though they later reversed course on this), space conflicts and gear conflicts (RESPONSES page 5, item 10), impacts on fisheries scientific research and impacts on fisheries management and quota (RESPONSES page 6, item 11), fisheries management impacts of wind development (RESPONSES page 6, item 12) and cumulative impacts of offshore wind development (RESPONSES page 7, item 13).

However, the Ocean SAMP's enforceable policies (11.10.1.G) define mitigation simply:

> "…mitigation is defined as a process to make whole those fisheries user groups, including related shore-side seafood processing facilities, that are adversely affected by offshore development proposals or projects."

Nowhere in this definition is it stated that fisheries user groups cannot be made whole with respect to the causes of loss listed above. In fact, nowhere in the enforceable policies are these classes of impacts excluded. Orsted's claim here is, to quote their own correspondence, "not credible as a matter of fact or logic."

By its RESPONSES document, Orsted attempts to define CRMC jurisdiction. This attempt has been repeated by Orsted representatives throughout the FAB's review process and must be rejected. The enforceable policies of the Ocean SAMP include the requirement that a project's "significant adverse impact" must be avoided and/or mitigated. §1160.1.3. The definition of "significant adverse impact" is not limited in the manner demanded by Orsted. It must be that the developer understands that its project will have significant adverse impact and contesting CRMC jurisdiction is its ploy to disregard the state's enforceable policies.

Orsted's attempts to exclude classes of coastal effects are also inconsistent with the CZMA. 15 CFR §930.11(g) states:

> "The term 'effect on any coastal use or resource' means any reasonably foreseeable effect on any coastal use or resource resulting from a Federal agency activity or federal license or permit activity… Effects include both direct effects which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects which result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects are effects resulting from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable actions, regardless of what person(s) undertake(s) such actions."

The above language makes plain that reasonably foreseeable navigation safety impacts, transit cost impacts, and cumulative effects and regulatory impacts are all contemplated as coastal effects under CZMA.

With specific respect to cumulative impacts, Orsted picks and chooses when and how it will address them, depending on each element of its project and in which document. For example, its FMP indicates that "Our monitoring will be executed with an emphasis on detecting changes in relative abundance, rather than attempting to assess the ecological response to a single impact associated with the construction of an offshore wind farm." FMP, p. 12. This statement appears to be an attempt to address cumulative impacts. Changes monitored as relative abundance is an holistic measure and captures impacts from all activity. In other words, Orsted proposes a cumulative impact assessment for its FMP because it suits them.

6. Orsted has misrepresented the statements of fisheries representatives with respect to the desirability of the 1 x 1 grid.

The FAB objects to Orsted's interpretation of the 1 x 1 nm grid as absolving them of all harms to commercial and recreational fishing during operations. No reasonable party has ever thought this to be the case. At the time when these statements were made, the fishermen were arguing both for the grid and for transit lanes. The developers colluding to present a 1 x 1 grid without transit lanes as if it solved all of the fishing industry's problems involved a deceptive misrepresentation of the information shared by fisheries user groups.

More troubling is why Orsted bothered to submit so many quotes that directly contradict their own claims. No reasonable reader of these quotes would conclude that all harms would be completely mitigated by moving to the 1 x 1 grid. Instead, fishermen have simply been fighting to minimize those harms according to a compromise that they thought was in reach. It has been made abundantly clear that the 1 nm spacing is a compromise and that harms to fisheries user groups will not be fully mitigated until the turbines are removed, unless other necessary mitigation also takes place.

7. Orsted is mistaken in asserting that Federal studies and findings pertaining to other wind projects cannot be considered; the differences in harms incurred by fisheries user groups across wind projects are mostly differences in degree, not differences in kind.

In its RESPONSES document, Orsted states repeatedly that the CRMC must "evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer." However, it is unclear how the questions posed by the FAB are not covered by the Ocean SAMP's enforceable policies, as discussed above.

There are two other important misstatements made by Orsted on this topic. First, that no Federal studies or evaluations of other wind projects can be used to inform about similar considerations for SFW, and second, that the FAB settlement with Vineyard Wind and the discussion components thereof are in no way relevant to SFW. Ultimately, both assertions are incorrect for the same reason: differences between distinct offshore wind projects in the MA/RI WEA are largely differences in degree and not differences in kind.

While it is true that CRMC must evaluate the SFW project under only its enforceable policies, it is not true that there may be no reference to information obtained through careful analysis of other projects when that information is directly relevant to evaluation of the current project. Furthermore, Orsted's position that Vineyard Wind not be considered conflicts with Orsted's own repeated references to documents and meetings surrounding the Vineyard Wind project in recent submissions (e.g., MEMO).

At the time our initial comments were written, the VW SEIS was the most recent, most relevant and best available Federal evaluation of the many risks associated with offshore wind development. None of our references to that SEIS were to items specific to Vineyard Wind – all of them refer to features that are reasonably expected to apply to all offshore wind development in the MA/RI WEA. On its face, this claim by Orsted is a disingenuous attempt to disqualify information that Orsted finds unfavorable when trying to minimize mitigation to Rhode Island fisheries user groups that are harmed by offshore wind development.

The FAB also disagrees with Orsted's claim that the South Fork and Vineyard Wind projects are not comparable for purposes of establishing a mitigation framework. Orsted stated "The FAB premised its Counterproposal entirely on the Vineyard Wind Farm settlement numbers and continues to rely on the Vineyard Wind settlement in discussions with SFW. SFW consistently has maintained that such an approach is untenable. The Vineyard Wind and South Fork projects are entirely separate and distinguishable" (LETTER, page 1). However, this statement stands in direct opposition to Orsted's own initial mitigation proposal, which was comprised only of commercial landings and shoreside impacts. If both projects defy comparison, how can mitigation be based only on commercial landings and a shoreside multiplier? Orsted's proposal is a *de facto* admission that they consider the projects to be directly directly comparable through the NOAA landings estimates, except with respect to the dollar amount involved. In other words, the harms caused by the distinct projects differ primarily in degree, not in kind.

To claim that SFW and Vineyard Wind are not comparable based on project size and location is misleading. While it is true that the projects are found in different locations and are of different scale, the component factors that are relevant to mitigation are virtually identical (differing only in magnitude) and are common to all wind energy development in MA/RI wind lease areas. Even as the FAB rejects the narrow view that each project's impacts can be reduced to a multiplier on commercial landings, the other factors differ only in degree but not in kind. Concerns for recreational and charter are not materially different, they are just exacerbated by the intensity of recreational and charter fishing in the area. The environmental habitat concerns are the same, just made worse by the sensitive and critical habitat on Cox's Ledge.

The navigation safety concerns are also the same, it is only up for debate what severity was included in Vineyard Wind versus SFW. On this point specifically, the Vineyard Wind settlement considered closer than 1 nm spacing on one dimension, but the total number of turbines did not vary and there were still transit lanes being considered at that point. In addition, Vineyard Wind contemplated only two substations for all 84 turbines, while SFW has one substation for only 15. The substations are enormous reflective surfaces that are likely to have outside impacts on radar. These impacts are not even evaluated in the Navigation Safety Risk Assessment (SFW COP Appendix X).

Ultimately all New England offshore wind projects will be part of an enormous contiguous field of turbines in the most likely outcome of full development of the wind area, so project scale matters little except with respect to that lease's share of the total harm. Since the projects differ primarily in the degree of impacts on various fisheries user groups, it is clear that there is information to be gained both from the Vineyard Wind mitigation process and from BOEM's evaluation of the Vineyard Wind project, including cumulative impacts scenarios.

Finally, current negotiating positions of both Orsted and the FAB with respect to SFW mitigation are *hypothetical* values. They are what each side would like to have as an outcome, but not what they will accept. In contrast, the VW settlement represents an agreed price that is not hypothetical. There is a long tradition in economics of preferring observed willingness-to-pay or willingness-to-accept measures over hypothetical ones (see, e.g., Loomis et al., *Land Economics*, 1996, among many) because of "hypothetical bias." As a simple example, the FAB considers the value of a house to be the actual sale price, not the seller's listing price or the buyer's first offer. The same logic holds here. The VW settlement thus represents the only available non-hypothetical data, so it should be considered. The FAB can further consider the VW settlement in Massachusetts as another data point, though this is clearly not an independent data point.

Nonetheless, just as home appraisers can utilize comps that don't exactly match the number of bedrooms and bathrooms by making a formulaic adjustment, so too can a reasonable party grasp the similarities across offshore wind projects and adjust accordingly.

8. Orsted has not submitted a Fisheries Monitoring Plan that meets the requirements of the Ocean SAMP's enforceable policies.

Orsted's Fisheries Monitoring Plan ("FMP"), which Orsted certifies as meeting "the requirement of biological assessment under the OSAMP" (RESPONSES, Question D.10), is wildly deficient. FMP Section 1.1 "Monitoring Plan Development" states that the FMP was developed in accordance with recommendations made by BOEM's "Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf" (BOEM, 2013; BOEM, 2019) and by state agencies (RICRMC, 2018; NYSERDA, 2017; MADMF, 2018). However, the most recent BOEM Guidance document (May 27, 2020) supersedes any previous versions: "This guidance document cancels and supersedes the previous guidance entitled, "Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585," dated October 20, 2015, and will remain in effect until cancelled." p. 1. The two

BOEM guidance documents cited by Orsted in its FMP (the 2013 and 2019 versions) are not cited in the 2020 document. It is unclear why the Plan cites these documents, as there was a 2020 version in effect prior to the FMP's submittal.

The FMP indicates that the survey protocols have been designed to address requirements and guidelines outlined in the Federal Register (30 CFR 585.626), BOEM fishery guidelines, and RICRMC policies (11.10.9 C). The Ocean SAMP states that the Site Assessment Plan must include a very detailed assessment of commercially and recreationally targeted species. However, the FMP does not meet this standard.

The FMP includes the following two statements that are red flags:
"However, it is acknowledged that the monitoring tools proposed herein may not sample for all of the species present within SFWF, particularly some of the smaller pelagic fauna (e.g., Atlantic herring, squid, and butterfish) that are too small to be retained in the gillnet gear, and are unlikely to be captured in substantial quantities by the beam trawls or fish pots." FMP, p. 12.

"The proposed survey designs in this Plan are not exhaustive but will form a basis for fisheries monitoring in the SFWF site. In particular, it is noted that additional fisheries monitoring will be performed along the route of the South Fork Export Cable (SFEC). Those studies are currently being Planned in collaboration with local academic researchers and Subject Matter Experts. However, the details and methodologies associated with that monitoring effort are not included in this Plan." FMP, p. 12.

The FAB is concerned that the plan to address these issues has never been shared. The FAB is also concerned that any non-binding regulatory review will be ignored as suggestions, similar to the advice from both NOAA and Massachusetts DMF regarding the need for monitoring pelagic species (FMP, pp.157-160, pp.222-225). Given that the current FMP is deficient, the FAB fully anticipates that these issues will never be adequately addressed. Any outstanding terms for fisheries monitoring must be disclosed.

The FMP also states that "the submarine power cables (inter-array and export cables) will emit electric and magnetic fields (EMF) while the wind farm is operational. These impacts will persist over a relatively long temporal scale while the wind farm is operational, but the EMF decays very quickly with distance from the cable and is anticipated to have a negligible impact on fish species (Snyder et al., 2019). Therefore, EMF from the project will not affect the Reference Areas." FMP, p. 15. This conclusion is not accurate; negligible impact is not the same as having no affect.

This concludes the summary points identified in the Overview. Below are respones to specific misstatements in each document, in turn.

For clarity, all quoted text by Orsted and related parties is presented in Times font.
All text containing FAB responses and questions is presented in Calibri font, as above.

Comments Regarding: Woods Hole Update (WHU)

1. "This assessment is based on the most likely pile driving scenario for the South Fork Wind project: 11 m monopiles, each installed within 24 hours, using a 4,000 kJ hammer, and 10 dB of noise attenuation." – WHU, bottom of page 1.

This assessment is not consistent with the statement that "In the COP Volume I, Table 3.1-8 indicates the duration of foundation installation may be 2-4 days per foundation" (RESPONSES page 11, item 2). Which schedule is correct and why is Woods Hole using different information than Orsted?

2. "We assume conservatively that 10% of the lobster and scallop populations within the WLA are adversely affected by pile driving noise during construction time only, and thus lost to fishing. This is based on the "mortality and potential mortal injury" 24-hour exposure threshold of 219 dB for "fish without swim bladders," the closest approximation to lobster/scallops (Popper *et al.* 2014; Denes *et al.* (JASCO) 2018, p. F-39). This level of exposure will extend no more than 120 m from tower locations, a radius that covers about 1% of the WLA footprint. To be conservative, we increase the estimate of the effect by a factor of ten, to 10%." – WHU, bottom of page 1, top of page 2.

This is not conservative as it misses one of the primary concerns of the FAB. SFW COP Appendix J1 (2020-02-05) page G-54 gives modeled noise impacts for difficult pile driving *after including* 10 dB of noise attenuation. The mortality threshold for eggs and larvae of 210 dB has a radius of approximately 710 meters from the pile. This radius represents a kill circle with an area of 0.46 nm^2 *per platform*, of 7.39 nm^2 for all 16 platforms. This means the Woods Hole Update is omitting the potential for pile driving to kill year-classes of eggs and larvae covering over 45% of the SFW lease area.

3. "To estimate the value associated with this effect, we obtained data from NOAA on average annual landings from a region enclosed by a 5 km buffer around the South Fork WLA. (The value of landings reported by NOAA for this buffer area is similar, in per-unit-area terms, to that of the WLA itself.)" – WHU, middle of page 2.

The 5 km buffer is inadequate for this purpose because Appendix J1 of the COP (p.G-54) indicates that the 186 dB Temporary Threshold Shift (TTS) effect can extend between 9 – 11 km from the pile, even after accounting for 10 dB of noise attenuation.

4. "We assume no net adverse impact on charter fishing during the operations phase of the project." – WHU, top of page 3.

What information or research is this assumption based on? The FAB is concerned that Woods Hole will so freely conjecture outside their area of expertise.

5. “The South Fork WLA accounts for about 6.75% of the MA/RI wind energy area modeled by the BOEM study; so we estimate the 2010 exposed value as approximately $70,246. We allow for 3% annual growth in this industry and apply a CPI inflator to estimate $112,341 (2019$) in RI charter boat revenue exposed to the South Fork Wind area.” – WHU, top of page 3.

In 2018, Dr. Sproul estimated the size of the RI charter fishing fleet by hand-counting businesses and estimating their revenues. He estimated $19.99 million gross revenues in 2016. The FAB believes this estimate to be both more precise and more recent than BOEM’s. It was also referenced by CRMC in their federal consistency concurrence for Vineyard Wind. As stated previously, the recreational importance of Cox’s Ledge is better represented by the commercial intensity, representing an 8.32% share of MA/RI WEA landings, rather than a raw average based only on area. Applying these figures to the Woods Hole estimates and backing out their average annual inflator of 5.36% (3% growth and the remainder inflation), the FAB proposes revised estimates of $129,700 per year in 2019 dollars. More importantly, given that construction is due to start in 2023 with settlements to be paid at that time, the appropriate figure is $159,800. Applying shoreside impacts with a 0.6 multiplier yields annual exposure figures of $207,500 and $255,700, in 2019 and 2023 dollars, respectively.

6. “The net effect of this adjustment is a $221,335 (2019$) increase in RI exposed value.” – WHU, middle of page 3.

This figure assumes impacts last only a single year from construction and decommissioning, it assumes that decommissioning occurs as planned, and it assumes no extension of the lease at the end of the current term. All of these things are subject to risk that they do not go as planned, causing further suffering to charter fishing. The Woods Hole estimate also assumes an artificially high discount rate to lower the value of future losses. Perhaps most importantly, the Woods Hole estimate includes an assumption that all losses are zero during operations, despite no apparent expertise and not a single interview with charter fishermen. It is the FAB’s expert opinion that the total harms to the RI charter industry are expected to be 15 – 20x the annual exposure values. Including shoreside impacts, this implies a net present value of $3.8 – $5.1 million (2023 dollars) over the life of the lease.

Comments Regarding: Orsted Responses to FAB Questions (RESPONSES)

The FAB questions initially appeared in five (5) sections:

A. Questions Regarding the Scope of the Woods Hole Analysis
B. Questions Regarding the Content of the Woods Hole Analysis
C. Mitigation-Specific Questions Regarding the SFWF COP
D. Questions Regarding the SFWF Fisheries Monitoring Plan
E. Questions Regarding the Mitigation Proposal

For brevity, the FAB includes follow-up only for selected questions here, but reserve the right to make further comments on these and other questions at a future time.

Original FAB questions are presented in Times font, Orsted response in **Times** bold font beneath, and new FAB responses in Calibri font beneath the Orsted response.

Part A. Questions Regarding the Scope of the Woods Hole Analysis

Question A.1

What was the contracted scope of the Woods Hole analysis?

South Fork asked the Woods Hole Oceanographic Institution ("Woods Hole") to assess any economic impacts to commercial fisheries from South Fork's proposed offshore wind farm, including the export cable corridor (the "Project" or "SFW Project"). Woods Hole also provided an assessment of any economic impacts to Rhode Island charter fishing.

This response indicates that the analysis was restricted by Orsted to include only commercial fishing. It is unclear whether "economic impacts" was a further restriction imposed by Orsted, given the many claims below arguing to restrict the scope of impacts eligible to be considered. No such restriction exists in the Ocean SAMP. Furthermore, the FAB notes that Orsted initially attempted to include charter fishing as shoreside impacts without any such indication from Woods Hole. Then, once the issue was raised, the Woods Hole Update estimated charter fishing to represent an additional 75% of the exposure of commercial landings on an annual basis.

Question A.2

Was Woods Hole instructed to consider, include or otherwise evaluate information from the SFWF Construction and Operations Plan (COP) and its appendices?

Woods Hole considered, included, and evaluated information contained in the COP. The COP is listed in the References section of the Woods Hole report entitled "Economic Impact of South Fork Wind on Rhode Island Commercial Fisheries written by Di Jin,

Ph.D., and Hauke Kite-Powell, Ph.D., and dated September 28, 2020, (the "Woods Hole Report").

The COP certainly indicates activity of recreational and charter vessels. This was not included in the initial Woods Hole Report. This response also doesn't answer the question – it says they considered information contained in the COP but not whether or not they were instructed to do so. It is also not clear what the structure of this review was. For example, the Woods Hole Update gives a conflicting timeline for pile-driving (24 hours) compared to your response below in item C.2. (2-4 days).

<u>Question A.3</u>

The location and unique characteristics of Cox's Ledge cannot be overstated – it is the most ecologically important area in the Ocean SAMP, and its proximity to Point Judith, RI means it is critically important for recreational and charter fishing in addition to commercial harvesters. Cox's Ledge is also home to very sensitive habitat.

a) Who made the determination that evaluation of charter and recreational fishing value would be excluded from the Woods Hole analysis, and on what basis?

   Woods Hole made all decisions regarding what data to rely on for economic value calculations based on the available research and their decades of experience. Woods Hole has conducted ocean research for 90 years. The authors of the Woods Hole Report together have over six decades of experience in resource and ocean economics and have co-authored more than 100 peer-reviewed publications. Federal VTR data does not include party/charter fishing revenue values or private fishing data. South Fork's Mitigation Proposal initially incorporated potential impacts to the charter and recreational fishing communities through its proposed Coastal Community Fund. Based on feedback from the FAB and CRMC, SFW revised its mitigation proposal to provide direct financial mitigation to the Rhode Island charter fishing industry. Please also see the December 15, 2020 Update to "Economic Impact of South Fork Wind to Rhode Island Commercial Fisheries" authored by Di Jin and Hauke Kite-Powell of Woods Hole (the "Woods Hole Update").

   It is hard to believe Orsted is claiming that all 90 years of ocean research experience by the entire Woods Hole Oceanographic Institute was brought to bear on this report. The FAB recognizes the experience of the authors, but is concerned about cases where the authors make impactful assumptions outside their expertise.

   In what sense does Federal VTR data not including party/charter revenues have any bearing on whether the Woods Hole experts should have known to evaluate it or been able to do so? The FAB believes that this was simply an oversight, but the FAB recognizes the attempt to correct it in the Woods Hole Update.

The statement about initial incorporation of charter and recreational impacts is patently false. Charter and recreational were proposed to be funded through the Coastal Community Fund, whose funding amount exactly matched the shoreside impacts estimate for commercial landings. It has since become clear that charter was not explicitly considered until later (and recreational still has not been considered). The new charter evaluation was disclosed in the Woods Hole Update on December 15, 2020, so why in February 2021 is Orsted offering denials of observable facts?

b) Why is the unique and sensitive value of Cox's Ledge not considered by Woods Hole?

This question makes an incorrect assumption that Cox's Ledge was not considered by Woods Hole. Woods Hole considered the location of the Project, including the alternative cable routes.

This question was plainly asking whether the uniqueness of Cox's Ledge was considered, rather than whether Cox's Ledge was considered at all. The FAB restates the question: why is the unique value and sensitive habitat of Cox's not considered? The NOAA model used is an off-the-shelf model and in no way assesses unique features of Cox's. For example, the NOAA model of spreading VTR landings over the ocean is non-directional, but this ignores the very real possibility that VTR coordinates near Cox's likely involve landings more concentrated in the direction towards Cox's rather than in the opposite direction. The sensitive habitat of Cox's is critical because of included spawning grounds supporting populations outside of the lease area, thus creating the potential for broader geographical impacts on fisheries from wind development.

Question A.4

Navigation safety risks are indicated as having a major adverse impact on fishing in the BOEM Vineyard Wind Supplement to the Draft EIS (SEIS). Who made the determination that navigation safety risks would be excluded from the Woods Hole analysis, and on what basis?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the Coastal Zone Management Act, 16 U.S.C. §§ 1451- 1466, ("CZMA"), allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the Ocean Special Area Management Plan ("OSAMP" or "Ocean SAMP"). ***See generally*** **650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the Supplement to the Draft Environmental Impact Statement ("SEIS") of a wholly separate project of another developer. Navigational safety risks are not within CRMC's enforceable policies.**

As discussed above, this is not a settled legal question. The Ocean SAMP states that harms to commercial and recreational fisheries user groups must be evaluated and mitigated. Expected losses of life, property and income arising from navigation safety risks are reasonably foreseeable harms to those user groups. Since there is no actual answer to the question here, the FAB concludes that Orsted excluded navigation safety in their definition of "economic impacts to commercial fishing" to be evaluated by Woods Hole.

Question A.5

Additional transit costs for re-routing are indicated as a moderate adverse impact in the SEIS. Who made the determination that additional transit costs imposed on the fishing industry from re-routing would be excluded from the Woods Hole analysis, and on what basis?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

SFW notes that Woods Hole made all decisions regarding what impacts to consider and how to quantify them based on the available research and their decades of experience. SFW notes further that, based on feedback from the FAB and CRMC, SFW incorporated into its mitigation proposal an additional adjustment to account for potential vessel rerouting during construction and decommissioning.

The FAB has refuted above both the characterization that transit costs as a class of harms are excluded from consideration and the characterization that Federal analysis of the Vineyard Wind project cannot even be considered.

However, this response is different from the previous ones, because it implies that Woods Hole decided not to address transit costs. Since later this was reversed by SFW, what is the explanation? The FAB sees only four possible explanations, and none of them are favorable to how Orsted has conducted itself during mitigation proceedings:

1. Orsted's position that transit costs are not allowable as a class of harms was initially imposed by them, but then invalidated; or
2. Woods Hole initially determined these costs to be zero, and then later discovered new information; or
3. Woods Hole and/or Orsted overlooked the existence of these costs and was/were first made aware of them by the FAB; or
4. Orsted was aware of these costs and their need to be mitigated but allocated zero mitigation effort as a negotiating tactic in order to later appear they were giving ground.

Question A.7

Who made the determination that underwater noise effects from construction would be only transient effects on populations of species of interest in the SFWF area, and on what basis? This determination seems to directly contradict mortality effects reported in Appendix J1 of the COP and the SEIS.

The Woods Hole Report and Woods Hole Update made no such determination. They explicitly account for mortality effects for non-mobile species in the immediate vicinity of pile driving, where noise level modeling suggests that mortal injury thresholds may be reached. Woods Hole made all decisions regarding what impacts to consider and how to quantify them based on the available research, their decades of experience, and the information contained in the COP. Please also see the Mitigation Actions Memorandum submitted to CRMC on December 15, 2020 ("Mitigation Actions Memo"), regarding pile-driving noise attenuation and sound verification.

As stated above, CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

The initial Woods Hole Report contained no estimation of mortality from pile-driving, and that omission generated this question. Only the Woods Hole Update addressed mortality and it did so in an unsatisfactory manner, only considering scallops and lobsters.

Page G-54 of COP Appendix J1 (2020-02-05) gives the "difficult pile-driving" scenario after accounting for 10 dB of sound attenuation. This page indicates a kill radius of approximately 710 meters (average across scenarios) for all eggs and larvae and also all finfish with swim bladders not used for hearing. Apparently, the Woods Hole "decades of experience" do not extend to recognizing that a large number of commercially and recreationally important species on Cox's Ledge have swim bladders. These species include Atlantic cod, black sea bass, haddock, hakes/whiting, herring, monkfish, pollock, scup, tautog and bluefin/yellowfin tuna. If these animals do not vacate the area due to soft-start policies for pile-driving, and it is not known that they will, then there will be significant mortality. The 710 meter radius corresponds to approximately 0.46 nm^2 per foundation, or approximately 45% of the total lease area. This represents an enormous kill zone for adults of these species with swim bladders, as well as for year-classes of eggs and larvae for all species spawning on Cox's Ledge.

Finally, at the time these questions were submitted, the Draft SEIS for Vineyard Wind was the latest BOEM environmental impact assessment with respect to offshore wind. None of the items that the FAB referenced from the Draft VW SEIS were specific to Vineyard Wind, they are obvious attributes of offshore wind development that reasonably apply to all projects. As the FAB has stated repeatedly above, the differences between VW and SFW harms that need to be made whole are differences in degree, not differences in kind. Referencing available Federal information does not constitute evaluation outside of the enforceable policies.

Question A.8

Who made the determination that adverse impacts on landings would be confined to the lease area, and on what basis? Appendix J1 of the COP indicates large radiuses of noise impacts that can extend well beyond the lease boundaries. See also the question below about space conflicts detailed in the SEIS.

The Woods Hole Report and Woods Hole Update made no such determination. They explicitly include stock effects in an area outside the wind lease area, where noise modeling suggests that mobile species may temporarily leave the area. Woods Hole made all decisions regarding what impacts to consider and how to quantify them based on the available research, their decades of experience, and the information contained in the COP. Please also see the Mitigation Actions Memo regarding pile-driving noise attenuation and sound verification. Further, research has found only temporary behavioral disturbances resulting from noise. As distance from the noise source increases, the intensity of the noise decreases.

As stated above, CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

See responses above to Questions A.5 and A.7. This is yet another case of an apparent oversight that was later corrected. The FAB insists that CRMC require disclosure of the scope of Woods Hole's engagement, so it can be determined whether Orsted influenced what was to evaluated. Orsted must also provide the documentation of which potential impacts were considered by Woods Hole and selected to be omitted from their report.

Question A.9

Who determined the parameters and assumptions corresponding to Scenarios 1 and 2, and on what basis? Was anyone with fishing experience consulted? If so, who was consulted, and what are their qualifications?

Woods Hole developed the assumptions and parameters corresponding to Scenarios 1 and 2 based on the available research, their decades of experience, and information provided by SFW regarding construction methods and timetable.

The items omitted here are informative – there was no discussion with fishermen (not even Orsted's fisheries liaisons). The scenario development really calls into question how valid the expertise of Woods Hole really is outside their core competencies. At the very least, the Woods Hole experts are not experts with respect to how fishing might continue within a wind area during the operations period of the project. The FAB reiterates that this is the exact area where the FAB is best suited to advise CRMC.

Question A.10

The SEIS indicates moderate to major adverse impacts due to space conflicts, including temporary or permanent reduction of fishing activities, increased gear conflicts between recreational and commercial fishing, and increased conflict and competition due to relocation of fishing activity outside wind development areas. Who determined that these considerations would be excluded from the Woods Hole analysis, and on what basis?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

As discussed above, this is not a response to the question. The FAB insists that CRMC require disclosure of whether Orsted or Woods Hole determined, and on what basis, that space and gear conflicts be excluded from "economic impacts to commercial fishing." The FAB notes that space and gear conflicts also apply to recreational and charter fishing, but do not emphasize that here as the incomplete consideration of those user groups has already been repeatedly identified.

Question A.11

The SEIS indicates major adverse impacts on scientific research and surveys, consistent with public statements by NOAA representatives that "fisheries independent" research vessels would not be entering the WEA once it was built out. The SEIS indicates a likely result of these limitations is lower commercial quotas corresponding to lower fishing revenues. Who determined that these considerations would be excluded from the Woods Hole analysis, and on what basis?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

This is not an answer to the question, though it is implied by the disclosed restriction on Woods Hole above if not seen as an "economic impact." See previous responses regarding the validity of this argument that has been repeatedly copy-pasted throughout these responses.

Question A.12

The FAB is concerned that future policies restricting fishermen are bound to occur throughout the construction and operation process. These economic harms were not considered when estimating the overall economic impact on fishermen. Why?

This is a speculative question. The U.S. Coast Guard has sole authority to control vessel traffic on the Outer Continental Shelf, and neither SFW nor CRMC has authority to do so. The U.S. Coast Guard's authority is limited to establishing limited access areas with a maximum radius of 500 meters from a center point or the outer edges of a structure. Any controls considered by the U.S. Coast Guard in the future would require a Federal rulemaking with opportunity for public comment.

Further, no portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies.

This is not an answer to the question, though some response is provided by the disclosure above that Woods Hole was instructed only to consider "economic impacts," indicating it is possible that Orsted determined this was outside Woods Hole's scope.

The FAB objects to the characterization of this question as speculative. Orsted's own filings for incidental harassment authorizations (IHA) with NOAA suggest there will be incidental take of marine mammals. The FAB has consistently stated that NOAA does not regulate fish, rather they regulate fishermen. The reasonably foreseeable effect of incidental take is harsher regulation of the fishing industry, as has occurred consistently in the past. Critically, this increased regulation does not need to be a response to incidental take caused by fishing – see for example the case of whale fatalities in Canada affecting quota in the United States.

Further, even if the question were speculative that does not make it invalid. All of these questions are about reasonably foreseeable harms to fisheries stakeholders that need to be mitigated in order for them to be made whole, as described in the Ocean SAMP enforceable policies. Reasonably foreseeable effects are also laid out clearly in the CZMA (15 CFR 930.11g).

Question A.13

BOEM's SEIS exists because of the importance of cumulative impacts that could result from the incremental impact of this project when combined with past, present, or reasonably foreseeable activities, including other future offshore wind activities. Who determined that these considerations would be excluded from the Woods Hole analysis, and on what basis?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies and not under or in reference to the SEIS of a wholly separate project of another developer.

Further, any cumulative impacts of wind lease areas are being addressed at the federal level by BOEM and in connection with the Environmental Impact Statements for offshore wind projects.

This is stated above, but the argument bears repeating. The Ocean SAMP clearly states "mitigation is defined as a process to make whole those fisheries user groups… that are adversely affected by offshore development proposals or projects." Cumulative impacts are a category of harms that need to be made whole. The FAB defines cumulative impacts as those reasonably foreseeable impacts that arise as a result of cumulative wind development of the MA/RI WEA, in excess of the impacts of individual developments in isolation. For example, a single small project like SFW would have virtually no impact on NMFS scientific surveys, but the accumulation of all wind projects will have a dramatic effect that will likely decrease overall industry quotas.

This effect is reasonably foreseeable, as indicated by BOEM in the SEIS for Vineyard Wind. Critically, the FAB is not asking Orsted to mitigate the total cumulative impacts of all wind projects – the FAB is asking only that they mitigate with respect to a pro-rata share. That is, if there are 975 platforms anticipated then this project is responsible for a 16/975 = 1.64% share of the total cumulative impacts (in excess of individual project impacts already identified). the FAB also objects to the claim that these cumulative impacts are "being addressed at the federal level" – they have been identified at the federal level but the FAB is unaware of any sense in which the impacts are being addressed.

<u>Part B. Questions Regarding the Content of the Woods Hole Analysis</u>

<u>Question B.1</u>

The characterization of the IMPLAN multiplier as including downstream impacts is incorrect. Indirect impacts are impacts on suppliers to the fishing industry, and induced impacts are economy- wide impacts from expenditures of labor income and proprietor profits. Will this be corrected? What method will be used to estimate downstream impacts?

This question is premised on inaccurate assumptions. The IMPLAN model is a widely accepted, peer-reviewed model that allows comparison between analyses. It incorporates data from over 500 industry sectors, including seafood processors and other sectors subject to the downstream impacts of the commercial fishing industry, with data updated annually. Please also see the Woods Hole Update.

Wrong. IMPLAN does not include downstream impacts. See the definition of indirect and induced effects on this page: https://blog.implan.com/understanding-implan-effects. Furthermore, the author of this response is apparently unaware that this point was conceded by the Woods Hole experts during mitigation discussions and was also conceded in the Woods Hole Update. As with many responses here, the FAB is concerned about Orsted's willingness to double down on obviously false statements.

Question B.2

IMPLAN was the only software used to determine economic impact. Other economic impact software should be used to compare the different results because different multipliers arise from different input- output models (e.g., RIMS II). Why was IMPLAN the only software used?

The IMPLAN model is a widely accepted, peer-reviewed model that allows easy comparison between analyses. It incorporates data from over 500 industry sectors, including seafood processors and other sectors subject to the downstream impacts of the commercial fishing industry, with data updated annually. In light of this, the IMPLAN model provides a sufficient basis to assess indirect and induced economic impacts.

That doesn't mean it is the only such model. The FAB is unaware of peer-reviewed research indicating that the IMPLAN estimates are probably better than those provided by other available models.

Question B.3

Will the data used in the Woods Hole analysis be disclosed for audit by the FAB?

The Woods Hole Report contains and explains all the data relied upon. Woods Hole received this data directly from NOAA fisheries for the SFW Project area. Further, on October 15, 2020, NOAA Fisheries released a report entitled Socioeconomic Impacts of Atlantic Offshore Wind Development, which summarized previous fishing activity within each offshore wind lease or project area, including the SFW Project, and reported annualized landings and revenue by species, gear type, and fishery management plan. This publicly available data aligns with the data contained in the Woods Hole Report.

The FAB was unaware at the time of this question that Woods Hole was simply reporting on data analysis already conducted by NOAA by summarizing NOAA's post-modeled data. Nonetheless, the FAB believes these data should be disclosed and references RODA's public comment letter regarding the SFWF DEIS, in regards to inequity of research and data access afforded to fisheries stakeholders.

Question B.4

The FAB is concerned that the "All Others" category (WH Table A1, p.26) is reported with a landings value of approximately $0.101 per pound for a large number of pounds, and thus may contain errors. An average necessarily includes values above and below the average, and there are only three species with annual average prices below this value reported for RI in any year from 2008-2018 by NMFS: Little Skate, Menhaden and Sea Mussel. Menhaden is individually reported in the same Table, and Little Skate and Sea Mussel do not appear in the complete species list (WH Table A4, pp. 32-33). Please provide information sufficient to determine the correct landings value for All Others.

The data from NOAA does not contain an error. Ocean quahog and surf clams landings were both reported by NMFS in the underlying data set as pounds of live weight (including shells), while all other species were reported as landed weight. This does not affect dollar values reported. The Woods Hole Report provided the NMFS landed weight conversion factors on page 11.

The concerns identified in this question have not been answered. Data from NMFS Fisheries landings over 2008-2018 suggest that after accounting for live weight vs. meat weight conversion for surf clams, the RI/MA annual average price per pound of those clams was a minimum of $0.159/lb. in 2010 and average of $0.172/lb. over the time period. The fact remains that the average price reported for All Others remains **impossibly low** according to the publicly available NMFS value and landings data available to the FAB.

In addition, on review of the Woods Hole Update, the average price per pound reported for All Others was $0.668 over 2008-2018. The data provided in the Woods Hole Update also gives no evidence of prices below $0.101 as would be required for there to be no error.

If the FAB assumes that the correct price per pound is disclosed in the Woods Hole Update, the correction to the landings value is as follows. All Others annual value is given as $18,855, which would increase to $124,928 at a price of $0.668/lb. The baseline NOAA landings value for RI (before adjustments for lobster/Jonah Crab) is $117,844 and $75,348 for MA, meaning that 61.0% of landings are attributed to RI. **The resulting adjustment to estimated commercial landings for RI is an additional $64,684 annually.**

Question B.5

The Woods Hole description of the data analysis is unclear because of the statement, "VMS information has been integrated into the current version of the VTR data" (WH, p.8). The VTR models cited are DePiper (2014) and Benjamin et al. (2018), both of which are "raster" models in which the landings value matched to a single LAT/LON pair reported in a VTR is smoothed over space according to a statistical model of how nearby to that point the fishing activity tends to occur (based on observer data). In contrast, the standard VMS-based modeling will match VTR landings with VMS trips, and allocate the landings over the vessel track based on speed, as is described on p.8 of the Woods Hole analysis. The VMS-based approach can be smoothed over space as well, but that is not stated here. If not smoothed, the VMS-based approach is highly sensitive to the exact location of boundary lines, such as those of the OCS-A 0517 lease area. Please provide information sufficient to determine the actual analysis procedure that took place.

NOAA, not Woods Hole, performed the data analysis described in this question. NOAA compared the VTR and VMS data to develop a standardized approach for modeling the data for use across offshore wind lease areas that distributes landings along the vessel track.

Orsted indicated in their response to Question A.6 that "the NOAA report [the Fisheries Footprints data release] applied an identical methodology to that used by Woods Hole." Both Woods Hole's citations of NOAA modeling and the citations from the NOAA webpage agree, and both refer to the VTR-only model of DePiper (2014). The citation of Benjamin et al. (2018) is a derivative work explaining how that model was translated to a raster in order to extend the modeling results over space. It has become abundantly clear that NOAA did not analyze VMS and the Woods Hole experts admitted to this fact during mitigation discussions. These inaccurate statements should be retracted from the written record. The FAB is concerned both with Orsted's inability to understand the analysis (especially given their argument for scientific evidence as a guiding principle), and with Orsted's willingness to repeatedly deny observable facts during this mitigation process.

Question B.10

What exactly is the "general framework" used from the reports by BOEM (2017a and 2017b), as referenced on p.6 of the Woods Hole analysis? Also, these references include an assessment of exposure of recreational fishing to offshore wind development. Why was no such exposure evaluated?

BOEM's general framework is ascertainable in the reports cited in the Woods Hole Report, full citations for which are included in the References section at pages 23 – 24. Notwithstanding the foregoing, the general framework used in the Woods Hole analysis was to determine the proposed project area, obtain VTR data from NOAA for that area, and calculate the total gross revenues potentially lost as a result of the proposed project. Please also see the Woods Hole Update for Woods Hole's assessment of potential impacts to the Rhode Island charter fishing industry.

There is no answer here. Impacts to recreational anglers remain unconsidered and unevaluated by Orsted. An impact that is not considered or evaluated cannot be expected to be mitigated either. Refusal to consider recreational anglers or mitigate the harms they face is one reason why the SFW project fails to meet the enforceable policies of the Ocean SAMP. The FAB urges CRMC to prohibit the project in accordance with the enforceable policies.

Part D: Questions Regarding the SFWF Fisheries Monitoring Plan

Question D.3

Will a final power analysis for the Fisheries Monitoring Plan be released before the conclusion of the mitigation process?

Appendices B and D of the FMP contain the final power analyses for the beam trawl and lobster ventless trap surveys. As outlined in the FMP, SFW plans to conduct power analyses after the first year of sampling for the gillnet and fish pot surveys.

The statistical standards applied to the trawl survey in Appendix B fall far below the standards applied to the ventless trap survey in Appendix D. In particular, the trawl survey as designed allows substantial probability of finding no effect, even when it is there. The potential for release of this bad science to be used as future "evidence" against fisheries user groups is another harm that must be mitigated. In a marginal case where mitigation efficacy is uncertain, the FAB urges CRMC to consider this defect as the deciding factor.

Question D.8

How will the Fisheries Monitoring Plan determine total and cumulative impact of the wind turbines on species diversity and ecosystems in the wind lease areas?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies. Cumulative impact analysis is not within CRMC's enforceable policies.

Further, any cumulative impacts of wind lease areas are being addressed at the federal level by BOEM and in connection with the Environmental Impact Statements for offshore wind projects.

This copy-pasted argument is incorrect as discussed above. Further, extent to which cumulative impacts "are being addressed at the federal level" quite clearly does not include mitigation of significant harms to fisheries user groups.

Question D.9

Are there any plans in place in the event that the wind lease areas cause population declines that put a species at risk of becoming classified as vulnerable or worse?

No portion of the SFW Project is located within Rhode Island territorial waters. Rather, portions of the SFW Project fall within Rhode Island's designated Geographic Location Description for purposes of the CZMA, allowing CRMC to conduct a federal consistency review of the proposed SFW Project under the enforceable policies of Rhode Island's federally approved coastal management program found in the OSAMP. *See generally* 650 R.I. Code R. 20-05-11.10. CRMC must evaluate the SFW Project under only its enforceable policies. Consideration of population-level impacts is not within CRMC's enforceable policies.

Further, any population-level impacts of wind lease areas are being addressed at the federal level by BOEM and in connection with the Environmental Impact Statements for offshore wind projects.

See response above to Question D.8.

Question D.10

Will a commercial fisheries Biological Assessment monitoring plan summary be submitted, as required by Rhode Island enforceable policies in the Ocean SAMP?

The FMP meets the requirement of a biological assessment under the OSAMP.

See discussion in our cover letter above. This is not the case.

Part E: Questions Regarding the Mitigation Proposal

Question E.1

The funding structure described in the proposal appears to treat recreational and charter fishing as shoreside impacts. What was the basis for this decision?

Recreational and charter fishing are not treated as shoreside impacts. SFW recognizes the importance of these fishing communities. Because Federal VTR data does not include party/charter fishing revenue values or private fishing data, SFW initially included these fishing communities within the benefits of the Coastal Community Fund. Based on feedback from the FAB and CRMC, SFW revised its mitigation proposal to provide direct financial mitigation to the Rhode Island charter fishing industry. Please also see the Woods Hole Update.

See discussion above for Question A.3.a. The FAB reiterates our concern that Orsted continues to deny observable facts.

Question E.3

Orsted has indicated in the past to the FAB that any issues with information deficiencies in the COP would need to be resolved during mitigation. What is Orsted's plan for addressing these unresolved issues in the mitigation proposal?

SFW has evaluated the alleged information deficiencies raised by the FAB and does not find that there are deficiencies in the COP. The COP will not be revised.

SFW has provided CRMC with supplemental information as requested under its authority to conduct a CZMA consistency review.

The FAB remains concerned about the lack of fisheries mortality modeling in the COP. As mentioned above, Appendix J1 indicates kill zones are possible from pile-driving covering 45% of the lease area, affecting eggs and larvae of all species as Tll as important species with swim bladders. The navigation safety risk assessment (Appendix X) also does not address radar impacts of the substation. The FAB does not believe these concerns, or those raised in our previous submissions have been addressed.

Question E.6

Cox's Ledge is a unique, sensitive and critical habitat, identified in the COP as Essential Fish Habitat for 37 species. There is no demonstration by Orsted that turbines will not cause serious damage to Cox's Ledge habitat and the resources that exist there. Will such information be forthcoming before conclusion of the mitigation process?

SFW has sited the turbines to avoid damage to the habitat on Cox's Ledge. SFW refers the FAB to its COP, FMP and other documentation submitted to CRMC for its consistency review.

It is the collective opinion of the FAB members that the micro-siting of the turbines is not sufficient to avoid sensitive habitat. Despite the claims advanced by Orsted, essentially the entire area is high quality habitat for one species or another. There is the added consideration that the exact character of the bottom varies over time due to shifting sands. The FAB has requested further review of this claim from RI DEM and the FAB will follow up with that information.

Question E.7

Why isn't Orsted offering anything other than money? There appears to be no consideration of ongoing monitoring of impacts to habitat, efforts for habitat restoration during the operations period and following decommissioning, or mitigation of impacts on pelagic fisheries, both commercial rod & reel and recreational?

SFW disagrees with the premise of this question. SFW has invested heavily in Project modifications to avoid or mitigation impacts to commercial and recreational fisheries, including but not limited to modifications to the turbine layout, increased cable burial depth, and efforts to avoid or minimize gear conflicts. In addition, the FMP includes an extensive benthic habitat monitoring plan and acoustic telemetry plan.

Notwithstanding these extensive Project modifications, many of which began in response to input from the FAB and the wider commercial fishing community, SFW recognizes that the SFW Project may cause temporary impacts to fisheries requiring mitigation pursuant to the Ocean SAMP. SFW engaged Woods Hole to quantify these potential impacts. Based on the assessment contained in the Woods Hole Report, SFW developed a comprehensive Mitigation Proposal. SFW has also proposed the Rhode Island Navigational Enhancement and Training Program, which would enable commercial fishermen and for-hire vessels to acquire certain approved navigation equipment through a grant system and would provide training and experiential learning opportunities to those navigating within the Orsted/Eversource Joint Venture Wind Lease Areas in the Massachusetts/Rhode Island Wind Energy Area.

The FAB has evaluated non-compensatory mitigation initiated thus far by SFW and found it lacking. There are myriad unaddressed issues, due in part to Orsted's refusal to consider whole class of harms to fisheries user groups, or to engage with those user groups to determine what harms need to be mitigated. The "Navigational Enhancement and Training Program" is a top-down policy that exemplifies Orsted's failure to engage – it is the expert opinion of the FAB that anyone who might benefit from this training is so ill equipped to operate radar that they do not belong operating a fishing vessel anyway. It is quite clear that this Program only exists as window dressing to give the illusion of mitigation without actually attempting to solve the real-world problems arising from offshore wind development.

Question E.11

From October 2019 until 2022, BOEM is conducting a study in the Orsted lease areas in Cox's Ledge.[1] As a result of this study, it is clear that cod study is important in this area, as it's the southern-most range of spawning for cod. Spawning dynamics in this area are poorly understood. BOEM's study is meant to serve as a "baseline study" to address any future effects of offshore wind; cod spawning stocks are sensitive/vulnerable to disturbance since they form in large, dense areas over multiple weeks in predictable locations. If disturbed, it is very unlikely they will come back and spawn that season. Why were these impacts not considered in the mitigation proposal?

Underwater noise generated from pile driving of monopile foundations is identified in the SFW COP as an impact producing factor (IPF) having negligible to moderate impacts on finfish and essential fish habitat (Table 4.7-1, COP Section 4.7). The timeframe within which pile driving will occur (May – December, COP Table ES-1) does not greatly overlap with the known cod spawning season on Cox's Ledge (primarily December – March;

Kovach et al., 2010; Loehrke, JL, 2014; Langan et al., 2020; Dean et al., 2020; Cadrin et al., 2020), largely mitigating and minimizing impacts to spawning cod stocks.

This question was not confined to impacts of pile-driving. The FAB is concerned that the many geophysical survey passes using boomers and sparkers have already interfered with cod spawning. Can Orsted show that no boomers or sparkers were used on Cox's Ledge during cod spawning season?

In addition, the FAB continues to object to the definitions of impact severity used in the COP. Based on how major impacts are defined in the COP, they could only be revealed to apply in cases like nuclear weapons testing or paving over Cox's Ledge. The FAB objects to this definition as the FAB has done previously. Further, the range of negligible to moderate is so wide as to be completely uninformative. This is like saying that the range is somewhere short of nuclear weapons testing, and it is simply not informative in a practical sense.

Question E.12

The Ocean SAMP states that the "Council shall protect sensitive habitat areas where they have been identified through the Site Assessment Plan or Construction and Operation Plan review processes for Offshore Developments as described in section 160.5.3 (i)." §1160.1.10. In the webinar cited above, BOEM states that "[o]bviously Cox Ledge is a known feature in Southern New England. It is important habitat for many commercial and recreational fish..." Why has Orsted not identified any sensitive habitat areas on Cox's Ledge?

This question is based on an incorrect assumption. SFW has sited the turbines to avoid damage to the habitat on Cox's Ledge. SFW refers the FAB to its COP and other documentation submitted to CRMC for its consistency review. Appendix N2 of the COP mapped, delineated, and identified the habitats within the Project area.

See response above to Question E.6. It is the collective opinion of the FAB members that the micro-siting of the turbines is not sufficient to avoid sensitive habitat.

Question E.13

The Ocean SAMP states that "Offshore Developments shall not have a significant adverse impact on the natural resources or existing human uses of the Rhode Island coastal zone, as described in the Ocean SAMP. In making the evaluation of the effect on human uses, the Council will determine, for example, if there is an overall net benefit to the Rhode Island marine economic sector from the development of the project or if there is an overall net loss." The mitigation proposal does not discuss this requirement; what is Orsted's position on it?

The quoted language falls within the "Overall Regulatory Standards" section of the OSAMP by which the Council must review SFW's consistency certification. The assessment of overall net benefit to the Rhode Island marine economic sector lies solely with the Council after its review of the complete Project submission. SFW states that the

COP, FMP, Mitigation Proposal and all additional documentation or data submitted to CRMC in support of the Project demonstrate that development of the SFW Project will create an overall net benefit to the Rhode Island marine economic sector.

The FAB disputes the claim of an overall net benefit without any formal cost-benefit analysis. Further, since these comments have shown Orsted's opposition to a fair accounting of the many downsides of offshore wind development for commercial and recreational fisheries user groups, the FAB opposes any such claim until those harms are properly considered, evaluated and mitigated.

Comments Regarding: SFW Letter Re FAB Mitigation Proposal (LETTER)

1. "For example, the SFW project will contain no more than 15 wind turbine generators, compared to Vineyard Wind's 84 turbines." – LETTER, page 1

SFW contains 1 substation per 16 platforms whereas Vineyard Wind was only planned to contain 2 substations out of the 84 platforms. To the extent that these create increased radar impacts, construction complexity, offshore support vessel traffic, etc., it seems that SFW is more hazardous on a per platform basis. In addition, radar impacts of the planned substation are not evaluated in COP Appendix X: SFWF Navigational Risk Assessment.

2. "Further, SFW modified its proposed project to adopt a uniform grid layout for wind turbine foundations of 1 x 1 nautical mile (NM). SFW made this substantial modification after listening to feedback from the commercial fishing industry including the FAB, federal and state agencies, and other stakeholders." – LETTER, page 1.

This statement is misleading. The 1 x 1 grid layout was a joint proposal of the developers that was apparently led by Vineyard Wind with Orsted signing on. In addition, the claim that this proposal is based on fishing industry feedback is misleading since it was repeatedly stated that the 1 x 1 grid needs to include transit lanes for navigation safety. The proposal was advanced in suspicious circumstances that were further complicated when Orsted hired away Ed LeBlanc while he oversaw the USCG evaluation of that proposal in the MARIPARS.

3. "At the time of Vineyard Wind's mitigation negotiations with CRMC and the FAB, Vineyard Wind had not committed to a 1x1 NM grid layout." – LETTER, page 1.

Vineyard Wind had not committed to the 1 x 1 grid, but the Vineyard Wind settlement was pre-MARIPARS, in which the fishermen expected that they would get transit lanes through the project areas. The 1 x 1 grid is not some grand concession, the fishing industry was advocating for 1 x 1 with transit lanes. The removal of transit lanes dramatically increases harms to the fishing industry, so it goes both ways.

4. "FAB members, commercial fishing interest groups, and CRMC staff all have stated repeatedly that adopting the 1x1 NM grid would facilitate commercial fishing within the turbines and mitigate substantially any potentially adverse impacts." – LETTER, page 1.

No, they did not. They argued for this position as a compromise because they thought it was an achievable compromise and it would limit the harms to fisheries user groups. See Town Dock letter from 2018 as evidence that 1 x 1 does not replace mitigation (https://www.savingseafood.org/wp-content/uploads/2019/08/Town-Dock-letter-to-CRMC.pdf). Substantially or not is a separate question. The FAB has advised CRMC staff that the FAB expects losses of 50-80% during operations with the 1 x 1 grid, as opposed to 100% loss.

5. "Simply put, the South Fork and Vineyard Wind projects are not comparable for purposes of establishing a mitigation framework." – LETTER, page 1.

The projects are comparable across many avenues, and the differences are *differences in degree, not differences in kind*. Both are offshore wind developments that will be constructed, operated and (hopefully) decommissioned in materially the same fashion. Many of the risks will translate once accounting for the intensity of fishing displacement by each wind area. One of the biggest reasons why VW is not comparable is because of the recreational importance of Cox's, but this is again a matter of degree. Furthermore, as mentioned above, Orsted's own mitigation proposal reduces the projects to maximum comparability by assessing mitigation only as commercial landings displaced plus shoreside impacts. Also, see below regarding Orsted's repeated references to Vineyard Wind proceedings with respect to 1 x 1 spacing.

6. "The FAB appears to accept the federal NOAA Vessel Trip Report (VTR) data and spatial distribution for the Vineyard Wind project but reject it with respect to the South Fork project." – LETTER, page 2.

This is untrue. The FAB simply used the VTR data as the only readily available data for comparison because spatial fisheries data are scarce.

7. "Instead, the FAB's proposed annual landings value for the South Fork wind lease area nearly doubles the reported annual NOAA value. The FAB has provided no credible evidence to support this increase." – LETTER, page 2.

The FAB disputes the claim that our evidence is not credible. Dr. Sproul has identified numerous shortcomings of the data and methods used by Woods Hole. The FAB members have testified that individual boats fishing in the area have greater annual landings than what is proposed in the Woods Hole Report. The FAB estimates are detailed in writing, including estimates of lobster landings tied to specific Loran coordinates and estimates of unbalanced VMS activity not captured by the low-resolution VTR model used by NOAA.

8. "SFW, on the other hand, retained independent experts from the renowned Woods Hole Oceanographic Institution (Woods Hole) to perform a detailed analysis of potential economic impacts from the South Fork project. Woods Hole's analysis relies on NOAA data, which is the best in the world, and aligns almost perfectly with NOAA's October 2020 report on offshore wind values in the Northeast." – LETTER, page 2.

As was disclosed during mitigation discussions, Woods Hole did almost none of their own analysis. They took post-modeled data from NOAA and fed it through the IMPLAN software, and were apparently unaware that they were omitting the processors as downstream shoreside impacts until it was raised by Dr. Sproul during mitigation discussions. In addition, the NOAA data being "best in the world" does not mean the objective quality is good. See our previous response above about the limitations of the NOAA data used in this setting.

9. "Woods Hole also performed a sensitivity analysis on the landings values from the wind lease area by examining NOAA data for a 5 km buffer surrounding the South Fork wind lease area. This analysis confirmed that the commercial landings values within the buffer are roughly equivalent to those within the wind lease area." – LETTER, page 2.

The FAB received the data from the Woods Hole Update buffer analysis only recently. At a first pass, these data appear similar in value per unit area to the initial study. However, these data contain a remarkable difference in the price per pound assigned to “All Others” landings. See above notes about our concerns.

10. “SFW is not aware of any scientific basis to support the FAB’s inflated values.” – LETTER, page 2.

This requires a very narrow interpretation of the phrase “scientific basis”. See elsewhere for our comments about Orsted’s strategy of insisting on a “scientific basis” or “evidence-based standard” inconsistently and only as a negotiating tactic.

11. “As SFW has explained previously, the proposed value includes, among other things, purchases of durable goods like boats. Using this value as a baseline therefore incorporates the speculation that the South Fork project will cause recreational boaters in Rhode Island, for example, to change their boat purchase as a result of the wind turbine installation. There is no evidence to support this assertion.” – LETTER, page 2.

Cox’s Ledge is known for sportfishing and Atlantic cod. Anglers content to fish black sea bass can do so much closer to shore but cod needs to be caught offshore. Thus, anglers not hiring charters require seaworthy vessels in order to fish for Atlantic cod on Cox’s Ledge. It is clear that any such angler will need to upgrade their vessel purchase if they desire to fish independently offshore. It stands to reason that if Cox’s Ledge is lost to Atlantic cod due to colonization by blue mussels and black sea bass (see comments elsewhere and immediately below), then some recreational anglers will forego the bigger boat. The FAB members have offered hours of expert testimony to CRMC staff. The FAB exists to provide this expertise and it is disingenuous to characterize FAB testimony as no evidence.

Further, it is obvious that there will be a marginal effect that will include at least some boat purchases. For example, it has been estimated for the Deepwater Horizon oil spill that omission of durable goods purchases from travel cost estimates leads to underestimating the lost consumer surplus (value) for recreational anglers (English et al., *American Journal of Agricultural Economics*, 2019).

12. “To the contrary, studies have found that offshore structures such as wind turbines can serve as a destination for charter and recreational fishing and can offer an enhanced ‘reef effect.’” – LETTER, page 2.

Other than the effect of turbines on drift fishing, the ‘reef effect’ is one of the biggest worries for FAB members. They fear that colonization by blue mussels and black sea bass will displace high-valued species like scallops and Atlantic cod. Further, abundance of black sea bass on Cox’s Ledge will be essentially valueless because of its availability to be caught nearer to shore.

13. "The Woods Hole Update contains an assessment of impacts to the Rhode Island charter fishing industry that more accurately values potential impacts based on the average annual gross revenue from for-hire (charter) fishing boats based in Rhode Island. The Woods Hole Update takes a conservative approach by setting aside any potential benefits to the industry from the South Fork project." – LETTER, page 2.

The FAB members do not anticipate any benefits to recreational or charter fishing arising from this project. Notably absent from this discussion is how Woods Hole came to the economic reasoning that there could be no loss at all to recreational fishing. Any displacement necessarily indicates a loss because fishermen choose the highest-valued location to fish on a given trip. If there were no loss from displacement, then the FAB members would never observe fishing in that location in the first place. See for example Carson, Hanemann and Wegge (*Marine Resource Economics,* 2009) for a detailed exposition on how losses accrue due to fishing area closures.

14. "Finally, the FAB has offered no evidence to support its proposed impact percentages for each project phase. The FAB has suggested a 250 percent loss during construction. In other words, the FAB claims that the commercial fishing industry will lose 2.5 times the total annual value generated by commercial landings within the wind lease area. This assumption is not credible as a matter of fact or logic." – LETTER, page 2.

The FAB members have provided evidence and will reiterate it here. The FAB members expect losses during construction to extend substantially outside the lease area due to the effects of pile driving, seafloor disturbance and vessel traffic. As mentioned elsewhere, the underwater noise modeling in the COP indicates temporary threshold shift effects up to 9 – 11 km from each pile. The FAB also expects the construction schedule to experience unplanned delays, as occurred with the last installation executed by Deepwater, the Block Island Wind Farm. Further, the FAB expects that there may be multi-year impacts depending on the loss of year classes for fish and squid that spawn in the area. Finally, our estimate includes losses due to fishing vessels already abandoning the area because of Orsted's geophysical surveys and resulting gear losses to fishermen. These losses are evident in the decline in landings and values from the lease area during 2017 and 2018 that were provided in the Woods Hole Report. Not counting 2020 for COVID, the FAB expects these losses to apply all the way until construction begins in 2023.

15. "Nor is the FAB's assertion of 80 percent loss to both commercial and recreational fisheries for the next twenty-five years." – LETTER, page 2.

The FAB members provided testimony regarding this point as well. The FAB members estimate 50-80% losses to commercial, charter and recreational fishing during the operations period. Commercial losses for fixed gear will be driven by the 1 x 1 grid, removing approximately half of the area available to set up. Further losses are anticipated due to difficulty setting up gear between turbines and inability to fish during peak season due to safety issues from visibility and uncertainty about whether gear can be retrieved. Commercial losses for mobile gear include anticipation of navigation safety issues and increased conflicts with fixed gear. Mobile gear fishermen have also indicated they expect to encounter additional "hangs" on the bottom due to boulder movement, cables becoming unburied, etc. associated with wind development. For scallops especially, there is the added concern that the 'reef effect' will displace scallops with low value blue mussels. Recreational and charter fishermen anticipate losses due to the 'reef effect' displacing desirable sportfishing species including Atlantic cod, and they anticipate losses due to the impossibility of drift fishing inside a turbine array.

16. "The FAB has made repeated prior statements that adoption of the 1 x 1 NM grid layout would permit them to continue fishing in the wind lease areas with minor modifications to prior practices." – LETTER, page 2.

This statement is taking editorial liberties with the record. The FAB members have not stated that they could continue to fish with minor modifications. The indicated repeatedly that they needed the 1 x 1 spacing in order to continue fishing, and they argued for the 1 x 1 grid in order to avoid a complete loss of the area. They also indicated that they needed transit lanes for navigation safety, a fact that Orsted and other developers have continually ignored.

17. "SFW fully expects commercial and recreational fishing to continue during operations." – LETTER, page 3.

Based on what evidence, research or expertise? As the FAB members have noted in the past, Orsted has failed to interview members of the fishing industry, a required element of Necessary Data and Information (NDI) in the Ocean SAMP. Given the 1 x 1 spacing, the FAB also expects commercial and recreational fishing to continue, but at substantially reduced capacity and facing some risk of a total loss.

18. All quotes found in LETTER are later found in MEMO and addressed below, except:

> "[3] *Id.* at 57 ('CRMC staff find that offshore wind farms should be developed in a grid pattern with east-west orientation of rows and 1 nm spacing between all turbines and turbine rows . . . in order to avoid significant adverse impacts to Rhode Island commercial fishing operations and be consistent [with] the CRMC's enforceable policies.'); *See also* CRMC letter to BOEM dated July 9, 2020 on Vineyard Wind DEIS." – LETTER, bottom of page 3 [previously in this list of footnotes, *Id.* refers to Fisheries Advisory Meeting, Tr. at 90:16-19 (Sept. 9, 2019)].

This quote is actually from page 57 of the CRMC Federal Consistency concurrence for Vineyard Wind of Feb. 28, 2019. It is clear from the remainder of the document that CRMC staff does not consider the 1 nm spacing alone to be sufficient to avoid significant adverse impacts.

Comments Regarding: SFW Memo Re: 1x1 Spacing (MEMO)

As stated above, nowhere have the FAB members or representatives of the fishing industry indicated that all harms would be completely mitigated by moving to the 1 x 1 grid. Instead, they have simply been fighting to minimize those harms according to a compromise that they thought was in reach. The FAB addresses each quote in turn, but it is quite clear from this perspective that Orsted is taking substantial editorial liberties here to misrepresent the statements of fishermen. Within these quotes, the statements of RI regulators have repeatedly emphasized that the 1 nm spacing is a compromise that would allow continued commercial fishing for “most vessels.” The FAB members disagree with this assessment: they believe that the spacing may allow as much as half of the commercial capacity to remain, but also envision the potential for displacement of substantially more than half of this capacity (the FAB members have advised CRMC that they expect a loss in the range of 50-80%). Finally, there is no mention of impacts on drift sportfishing for recreational and charter vessels which are not abundant in the Vineyard Wind lease but are regular users of Cox’s Ledge and SFW lease area.

Quotes below are highlighted portions only from MEMO, using the A-F numbering scheme therein. Highlighted quotes presented in `Courier` font for clarity.

A. Deepwater Wind Farm Presentation Transcript, August 27, 2018:

   `Mr. Mataronas: I’d like to go back to the turbine spacing and just stress the importance of the one nautical mile. I mean, it’s out in the ocean, and everything we do is by the nautical mile out there.`

   There is nothing here stating that harms are fully mitigated by the one nautical mile spacing.

B. Rhode Island Marine Fisheries Council Meeting Summary, October 1, 2018:

   Deepwater/Vineyard Wind offshore wind development: Motion made by *J. Grant* to recommend to the DEM Director and CRMC that all wind power leases off southern New England be required to have turbines aligned in an east-west pattern, with a spacing between turbines of one nautical mile to minimize negative impacts on historical fishing actions, and further require that structures be removed upon termination of the lease to restore fishing access to the entire lease area; 2nd by *A. Dangelo*. The motion passed 6-0. A second motion was made by *A. Dangelo* to recommend that the meeting minutes from the August 30, 2018 special Council meeting (when the windfarm presentations were heard) be submitted to Deepwater and Vineyard Wind; 2nd by *M. Rice*. The motion passed 6-0.

As discussed above, the turbine spacing was requested to minimize impacts on fishing. It is also obvious from the quoted text that the impacts are not zero, hence the focus on removing the structures upon termination of the lease to restore fishing access.

C. Letter from CRMC to Bureau of Ocean Energy Management and Vineyard Wind, LLC, February 28, 2019:

Highlight 1: Vineyard Wind's consistency certification is for a proposed 800 megawatt ("MW") offshore wind farm located within the northern portion of Bureau of Ocean Energy Management ("BOEM") Lease Area OCS-A 0501. The CRMC finds that the proposed activity complies with the enforceable… [SIC – next page and rest of highlight missing]

Highlight 2: [SIC – first page and start of highlight missing] …majority of Rhode Island-based commercial fishing operations would be able to continue harvesting activities with some exceptions and adjustments to fishing gear and methods, and coexist with the offshore wind energy industry. Nevertheless, the alternative east-west layout with 1 nm spacing between all turbines will require Rhode Island commercial fishermen to modify their gear and operations in order that fixed and mobile gear operations can continue to safely harvest fishery resources in an effective and cooperative manner. A combination of Alternatives D1 and D2 as presented in the BOEM Draft Environmental Impact Statement ("DEIS") dated December 2018 would largely achieve the CRMC's proposed alternative layout supported by Rhode Island commercial fishermen. See BOEM DEIS at 2-11.

Highlight 3: The CRMC proposed alternative layout of east-west orientation with minimum 1 nm spacing between turbines is a compromise by Rhode Island-based commercial fishermen that will require modification to their gear and operations, but would allow continued fishing for most commercial fishing operations within the Vineyard Wind lease area and result in both the commercial fishing and offshore wind energy industries to coexist.

Highlight 4: Vineyard Wind acknowledged at the November 18, 2018 CRMC Fishermen's Advisory Board meeting that they erred in not addressing the needs of Rhode Island-based commercial fishermen earlier in the project design process, essentially a declaration against interest, and they have since committed to an east-west orientation with 1 nm spacing between each turbine row for all their future wind farm projects.

Again, there is nothing here stating that harms are fully mitigated by the one nautical mile spacing. What is stated is that it's a compromise, and that CRMC has differed with the opinion of the FAB as to whether the majority of commercial fishing capacity will remain.

D. Fishermen's Advisory Board Meeting Transcript, September 9, 2019:

Highlight 1: MR. DELLINGER: Fishermen have been saying for years, I mean, at least these fishermen, one nautical mile east-west and north-south squared. And you know as a fisherman, it's just for safety to get home. You know, when you are inside one of one of [SIC] these turbine arrays, and there's going to be multiple ones, in bad visibility you can't rely on your radar. Even though you know where the turbine is, you don't know where the other vessels are. It's a big problem. And like Greg said, and Rodney… [SIC – next page and rest of highlight missing]

Highlight 2: MR. EAGLES: You're only listening to half the story. At the meetings every one of these guys, like Katie said, every single meeting we attended we all said we need one nautical mile east-west and north-south, and you eliminated the north-south entirely and just took up the east-west. Maybe you think that would satisfy us. It's not. We need the one nautical mile, like Brian said, the checkerboard square thing. That's what we said… [SIC – next page and rest of highlight missing]

Again, there is nothing here stating that harms are fully mitigated by the one nautical mile spacing.

The second highlighted quote is also taken suspiciously out of context. According to the official minutes, "Mr. Eagles reminded Orsted that the fishing industry was asking for no less than one mile apart between turbines and that a minimum of a four-mile width transit lane should be established." When reviewing the transcript, it is clear that this about the only quote of Mr. Eagles in which he is not also referencing the need for 4 nm transit lanes.

E. Fishermen's Advisory Board Meeting Transcript, September 30, 2019:

MS. ALMEIDA: I apologize if I'm repeating. I walked into here at the beginning of this conversation. To Brian's point of coexistence, since we first started being reach out to from all the wind companies, each of them has said we are not going to make this a nonfishing zone, and that's wonderful. That's great. We want to continue to be able to fish in this. In order to be able to fish in this, you're going to have to listen the industry guys and what it's going to take for them to be able to continue to fish in this. If that's one nautical mile between turbines, and to me – and perhaps I'm naive with this, but when I come to the microphone and I say one nautical mile between turbines, I mean one nautical mile between turbines, not only east-west but north-south. I thought that was obvious. Apparently, it wasn't.

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But if you guys aren't going to be listening to the industry and
what it takes to allow these guys to go there and fish safely and
successfully, they're not going to be able to go there and fish.
It's not going to be the point of we just choose not to. It's
just they're not able to.
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Again, there is nothing here stating that harms are fully mitigated by the one nautical mile spacing. What has been said is that the spacing is needed to allow continued fishing, but not that that spacing solves all problems for fishing in a wind array.

F. Letter from CRMC to Office of Renewable Energy Resources, Bureau of Ocean Energy Management, July 9, 2020:

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The Alternative D2 configuration in a uniform grid of 1 x 1
nautical mile spacing between all turbine foundations (including
the OSS platforms) in an East-West, North-South orientation is
entirely consistent with the MARIPARS recommendation and the
offshore wind industry's November 1, 2019 collaborative proposal
for wind farm layout in the southern New England offshore
renewable energy lease areas. The RICRMC believes it is
imperative that BOEM condition all COP approvals accordingly so
that there is regulatory certainty for the offshore wind industry
and stakeholders with assurance that there will be a predictable
and uniform wind farm pattern that accommodates and facilitates
safe navigation, commercial and recreational fishing activities,
and USCG search and rescue operations. In addition, we are
mindful of federal law that governs development activities on the
outer continental shelf (OCS) that requires "the right to
navigation and fishing therein shall not be affected." See 43
U.S. Code § 1332. We expect BOEM to conduct its NEPA review of
the Vineyard Wind project, and all other southern New England
wind farm projects on the OCS, in accordance with this federal
law.
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There is nothing here stating that harms are fully mitigated by the one nautical mile spacing. The mention of the U.S. Code as a reminder to BOEM of their responsibilities to protect fishing and navigation is not a statement endorsing the 1 x 1 grid as being a complete solution to the problems posed by placing wind turbines in open ocean.

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April 20, 2021

VIA ELECTRONIC MAIL:

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Rhode Island Coastal Resources Management Council
Stedman Government Center
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RE: Response to South Fork Wind, LLC's Comprehensive Mitigation Proposal

Dear Mr. Willis,

Please accept this letter in response to Orsted & Eversource's South Fork Wind, LLC's Comprehensive Mitigation Proposal letter submitted to CRMC and dated March 11th, 2021.

The letter argues that SFW "has demonstrated that the proposed SFW Project is consistent with the Ocean SAMP's enforceable policies, including on mitigation" (p.1). It is the opinion of the FAB that this statement is untrue. Orsted has failed to consider whole classes of adverse impacts to fisheries user groups and has failed to consider recreational users entirely. Rather than embrace fisheries representatives, they have ignored the FAB's many legitimate concerns of significant, long-term adverse impacts. The current project proposal, including proposed compensatory mitigation and planned non-compensatory mitigation, is grossly inadequate to address these impacts. Put simply, how can adverse impacts be mitigated if they are not even acknowledged?

Orsted argues at length that CRMC cannot require compensatory mitigation. The FAB agrees with this reading of NOAA's Feb 2020 letter to CRMC. In fact, the FAB agrees that CRMC may be unable to require any specific mitigation, whether compensatory or not, because there is no jurisdiction over Federal projects. However, Orsted must concede that the NOAA-approved enforceable policies of the Ocean SAMP stipulate that CRMC must prohibit projects that result in significant adverse impacts to the natural resources or existing human uses of the Rhode Island coastal zone. If these impacts are not mitigated, CRMC cannot issue a Federal Consistency concurrence.

Orsted must also concede that the CZMA **does** contemplate the role of CRMC to suggest mitigation that would satisfy the enforceable policies of Ocean SAMP. The role of the FAB has been to assist in identifying the need for such mitigation and to suggest both compensatory and non-compensatory mitigation that would mitigate these adverse impacts. Significant, long-term adverse impacts are currently unmitigated or insufficiently mitigated in the proposed SFW Project. While we recognize that the project was changed to a 1 x 1 nm grid layout in response to concerns from commercial fishermen, this change alone only *reduces* impacts and does not preclude the need for further mitigation. The list of reasonably foreseeable un-mitigated and under-mitigated significant adverse impacts includes, but is not limited to:

1. Lost landings and shoreside impacts for commercial fishing and processing;
2. Lost revenues and shoreside impacts for charter fishing; and
3. Lost consumer surplus and shoreside expenditure impacts for recreational anglers.

In addition, the groups above are reasonably foreseen to experience the below significant adverse impacts from the SFW Project and cumulatively from all MA/RI Wind Energy Area projects in the reasonably foreseeable development scenario. These impacts also remain un-mitigated or under-mitigated in the current proposed SFW Project:

4. Increased transit costs;
5. Increased gear conflicts and space conflicts;
6. Increased navigation safety risks;
7. Increased costs of insurance or unavailability of insurance to operate within a wind area;
8. Quota effects from impacts of offshore wind on fisheries research and management;
9. Regulatory effects on fishing from incidental take of marine mammals due to offshore wind development, and;
10. Risks of delayed and/or incomplete decommissioning of wind projects at lease end.

Further, while these risks and reasonably foreseeable losses remain unmitigated, commercial and charter businesses face capitalized losses of business value and recreational anglers face stark choices between fishing at second-best locations and moving their activities out of state.

Past experience suggests that compensatory mitigation is the most effective way to resolve these issues, while allowing impacted fisheries user groups to work out among themselves the best allocation of funds to minimize or offset adverse impacts. The FAB continues to support this approach as the most efficient and effective resolution to address issues that are un-mitigated or under-mitigated in the currently proposed SFW Project.

However, the FAB also embraces their advisory role to CRMC in identifying non-compensatory mitigation avenues to eliminate significant adverse impacts. As discussed above, the FAB is unaware of CRMC authority to require specific mitigation actions, but is offering suggested actions that could help reduce and/or eliminate the above adverse impacts. Below is an incomplete list of suggestions. We reserve the right to modify this list in the future.

A. Recreate populations of commercially and recreationally important species outside of a leased wind area. Assuming this can be implemented in a manner that does not create additional conflicts for, or costs to, fisheries user groups, the impacts of wind development would be completely mitigated if all fishing could continue elsewhere at 100% of existing capacity. There is some precedent for this type of effort following the North Cape Oil Spill, after which the lobster fishery was "re-seeded" to restore the population. This is a difficult and expensive process since the re-seeding needs to extend to restoring adult populations as well. Nonetheless, this is a non-compensatory policy that avoids Orsted's obvious distaste for compensatory mitigation.

B. Avoid pile-driving during the months of December – March (for Atlantic cod spawning) and May – October for spawning of most other commercially and recreationally important species on Cox's Ledge. SFW COP Appendix J1, page G-54, indicates that after accounting for 10 dB of underwater noise attenuation, there will be a kill radius from pile-driving noise of up to approximately 710 m from each monopile for eggs and larvae. Each kill circle has an area of approximately 0.46 square nm, and the 16 platforms contemplated in the COP would collectively generate kill circles covering 45% of the SFW lease area. Prohibiting the large scale killing off of year classes during spawning would help mitigate the significant impacts from construction. The FAB is aware of the proposed moratorium on pile driving from January – April to protect Atlantic right whales, and considers the additional window of May – October to protect spawning of nearly all species on Cox's Ledge to be similarly reasonable.

C. Avoid pile driving within 9 km (summer) to 11 km (winter) of an active fishing vessel. SFW COP Appendix J1, page G-54, indicates that after accounting for 10 dB of noise attenuation there will be a temporary threshold shift effect on fish species from pile-driving noise up to 9 km from each monopile in summer and up to 11 km from each monopile in winter. Avoiding pile driving when commercial, charter or recreational fishing vessels are nearby would further mitigate adverse impacts from construction.

D. There are many further areas requiring mitigation, so we will provide only a summary of suggestions for each. The FAB remains ready to engage with Orsted and CRMC staff to help plan effective non-compensatory mitigation if that is desired.
    a. For processors, a landings replacement program.
    b. For navigation safety, soft material cladding to be maintained around turbine platforms, a tug vessel stationed within the wind farm and able to reach a vessel in distress within 10 minutes, and placement of a helipad (and no turbine) atop the substation suitable for search-and-rescue (SAR) use by the U.S. Coast Guard.

c. To offset unavailability of insurance or increased pricing thereof, a commitment to provision of marine property and casualty insurance at current rates.
d. To prevent gear conflicts, a program in which fishing vessels are induced to voluntarily vacate areas prior to surveying, construction, or maintenance activities within the wind farm.
e. To prevent quota or regulatory issues, stock re-seeding programs (sufficient to offset the effects) outside the wind farm for any species of commercial or recreational interest who experience reduced quota either due to uncertainty in stock assessments imposed by wind areas or due to incidental take of marine mammals arising from any phase of the wind project.
f. To offset the loss of drift sport fishing within the array and the potential loss of Atlantic cod due to reef effects on platform foundations, marketing programs for the charter industry and for recreational fishing in Rhode Island, as well as vessel buyback programs for recreational anglers no longer needing a seaworthy vessel.

Detailed Responses

Original text from Orsted is presented in Times font.
FAB responses are presented in Calibri font immediately beneath.

1. "SFW respectfully submits that it has demonstrated that the proposed SFW Project is consistent with the Ocean SAMP's enforceable policies, including on mitigation." (p.1)

Response: The FAB disagrees. As has been stated in previous communications, the shortcomings of the planned non-compensatory mitigation and proposed compensatory mitigation arise from Orsted's approach of ignoring and minimizing the many impacts on fisheries user groups. While a few meetings occurred between Orsted, CRMC and FAB members, this alone does not satisfy the requirements of the Ocean SAMP. Mitigation requires that the project applicant must make the fishing industry whole.

2. "The CZMA regulations direct the state and applicant to 'cooperate' 'to develop conditions that, if agreed to' by each 'would allow the State agency to concur' with the consistency certification. 15 C.F.R. §930.4. But while the CZMA allows for and indeed encourages cooperation and collaboration between the state and the applicant, the CZMA does not permit states to demand compensation as a condition of concurrence. NOAA has stated this plainly." (pp.1-2)

Response: The FAB disagrees with this attempt to characterize the mitigation process as the state demanding compensation. Rather, due to the complex nature of the many significant adverse impacts to fisheries user groups, it is the FAB's assessment that compensatory mitigation is the most efficient mechanism for making these groups whole. See discussion above for many potential non-compensatory mitigation actions. The FAB notes that the same logic here also does not permit states to demand specific non-compensatory mitigation, but that the state agency should work with the applicant in order to reach a combined mitigation package supporting concurrence. Thus, whether the suggestions are compensatory or non-compensatory in nature, all suggested mitigation is provided to help inform potential components of an acceptable mitigation package. The focus on compensatory mitigation has been based on the FAB's perception of the most efficient means to mitigate impacts.

While CRMC cannot demand compensation, Orsted's refusal to cooperate make CRMC's ability to approve the consistency certification impossible. In fact, the FAB rapidly responded with counter proposals each time that Orsted updated its proposals. The cumulative delay in this process is almost entirely due to Orsted not cooperating in the same manner. Orsted's refusal to engage in meaningful discussions that advance the concept of Orsted making the fishing industry whole is evidence of Orsted's refusal to "cooperate," as required by the CZMA and the Ocean SAMP.

3. "The Ocean SAMP calls for modification first. Then, to the extent the project cannot be modified to fully avoid potential adverse effects, the applicant must work to mitigate them. This is critical: an applicant is not required to both modify a proposal and mitigate. If modification of the project removes the potential impact, there is nothing left to mitigate." (p.2)

Response: The FAB agrees with the final sentence, but not the penultimate one. The overwhelming likelihood, as in this case, is that the proposal modifications do not remove the potential impacts, only lessen them. If the impacts are not removed, then the applicant is required to both modify a proposal and also mitigate, though that mitigation does not need to be compensatory in nature.

4. "In this context, the Ocean SAMP also requires that 'potential adverse impacts of offshore developments and other uses on commercial or recreational fisheries be evaluated, considered and mitigated." (p.2, immediately following previous)

Response: This quote stands out like a sore thumb. Orsted's repeated efforts to ignore or suppress evaluation and consideration of many adverse impacts, including all potential impacts on recreational anglers as a user group is the principal cause of the inadequacy of their current proposal. Impacts cannot be mitigated if they are not even acknowledged. It is not clear what point is being made here, or how this statement supports the preceding argument.

The CZMA defines "effect on any coastal use or resource" as "any reasonably foreseeable effect on any coastal use or resource...[e]ffects include both direct effects which result from the activity and occur at the same time and place as the activity, and indirect (cumulative and secondary) effects which result from the activity and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects are effects resulting from the incremental impact of the federal action when added to other past, present, and reasonably foreseeable actions, regardless of what person(s) undertake(s) such actions." The FAB points out that Orsted fails to include this full definition in any of the materials filed with the CRMC. Likewise, the analysis required by this definition has not been provided by Orsted.

5. "While the FAB participates in these negotiations and provides advice to CRMC staff pursuant to its advisory role, it does not have veto authority over these negotiations, nor does it serve as a signatory to any agreement reached." (p.2)

Response: The FAB does not dispute this contention, and is unclear as to why Orsted makes this statement. The FAB takes its advisory role seriously and has worked diligently to provide information to the CRMC related to significant long-term negative impacts, making whole fisheries user groups, and the determination of whether there is an overall net benefit or net loss to Rhode Island marine economic sector from the development of the project.

6. "Further, while the Ocean SAMP requires 'negotiation' among CRMC staff, the applicant, and the advisory FAB, it does not require that the three reach a final agreement with respect to mitigation." (p.3)

Response: See previous response. The FAB has never made a representation of the nature suggested by Orsted. The FAB's role is to provide expert advice to CRMC staff regarding the need for mitigation of adverse impacts.

7. "The Ocean SAMP adopts a rigorous science-based approach to decision-making. It requires the Council to 'work to the maximum extent practicable… to make sure it is using the best available science and modeling tools to inform the decision making process.' §11.8(A)(5). In fact, the Ocean SAMP identifies as one of its core principles to '[b]ase all decisions on the best available science.' *Id. §11.6(C)(4).*

   SFW has adhered to this type of data-driven and evidence-based approach throughout these mitigation negotiations. As described below, SFW has engaged numerous subject-matter experts to evaluate potential impacts from the SFW Project, implement project modifications, and develop a robust mitigation proposal to address any remaining potential effects not completely eliminated through modification. SFW has compiled extensive written documentation summarizing the bases for its mitigation proposal and also has made its subject matter experts available for extensive questioning by and dialogue with CRMC staff. SFW believes its mitigation proposal follows the letter and spirit of the Ocean SAMP to rely on the best available science." (p.3)

Response: This is an unreasonably favorable view of Orsted's behavior during the mitigation negotiations. In written correspondence, Orsted disclosed that they asked Woods Hole "to assess any economic impacts to commercial fisheries" (RESPONSES[1] A.1, p.1). In the remainder of that document, it is apparent that Woods Hole was not asked to evaluate impacts to charter or recreational fishing, and it appears that "economic impacts" was interpreted by Woods Hole as excluding evaluation of any impacts other than commercial landings.[2] Charter fishing and transit

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[1] SFW Memo: Responses to FAB Questions 2021-02-18.

[2] We cannot differentiate between obstruction by Orsted and omissions by Woods Hole, because the scope of their engagement has not been disclosed. Orsted makes numerous contradictory statements in the RESPONSES memo that at times imply Orsted decided to exclude impacts from the scope based on questionable assertions about the

costs were later considered in the Woods Hole Update, but there remains no evaluation of recreational fishing by Orsted or Woods Hole to date, nor is there any consideration of impacts from cumulative effects of offshore wind development, navigation safety, insurance, fisheries science and regulatory impacts, or the risks associated with incomplete or delayed decommissioning of the project. In other words, Orsted's engagement of "numerous subject-matter experts" does not appear to have resulted in a comprehensive evaluation of potential impacts. The only available explanations are a lack of competence on the part of Orsted and/or the subject matter experts retained, a deliberate effort to understate adverse impacts in order to reduce needed mitigation, or some combination of the two.

Further, as discussed in the FAB's previous correspondence, Orsted's "data-driven and evidence-based approach" is no more than a negotiating tactic that is being applied uniquely to these mitigation negotiations. As has become clear during negotiations, Orsted embraces this approach as an argument that any impacts, without a government-sanctioned or peer-reviewed tool for estimating their extent, can be considered to merit zero mitigation. This position does not, as Orsted describes it, "rely on the best available science" – it is, in fact, *anti-scientific*. If scientists do not agree on the exact measurement of an adverse impact, that does not mean the best available estimate is zero. Rather, it means expert judgment is required and that there may be unresolved uncertainty about the impact's extent. In this case, the parties are in luck. The entire purpose of the FAB, as Orsted so eloquently points out, is "expressly intended to be an advisory-only body." (p.2) The expert judgment of the FAB members fits squarely and soundly within the substantial gaps in the Woods Hole analysis.

8. "SFW prioritizes coexistence with the fishing community as an important step in developing a sustainable offshore wind industry." (p. 3)

Response: In its March 11th letter, Orsted indicates that it "prioritizes coexistence with the fishing community as an important step in developing a sustainable offshore wind industry." If Orsted's recent behavior with respect to mitigation is any indication of sustainability, the offshore wind industry will crumble. Orsted has not developed "a robust mitigation proposal to address any remaining potential effects not completely eliminated through modification." Rather, they have attempted to exclude whole classes of impacts and fisheries user groups by fabricating restrictions on those impacts that do not exist in the Ocean SAMP and by deliberate ignorance of reasonably foreseeable effects as defined in the CZMA. The most glaring shortcomings of their mitigation proposal are the exclusion of all impacts to recreational anglers and the refusal to consider meaningful impacts to all fisheries user groups during the operations phase of the project. These shortcomings are not apparently on any data or evidence, but only on problematic assumptions of Orsted's subject-matter experts.

9. "Accordingly, CRMC and the FAB lobbied heavily for the offshore wind industry's adoption of 1 x 1 nautical mile (NM) grid spacing between wind turbine generators

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Ocean SAMP, and at other times assert that Woods Hole determined the impacts did not bear evaluation. There has also been no disclosure by Woods Hole of the initial scope of impacts considered for evaluation and then discarded.

(WTGs) to permit commercial and recreational fishing to continue safely within the wind lease areas. The historical record is replete with instances of such statements." (p. 3)

Response: Please see previous correspondence from the FAB. While it is true that CRMC and the FAB advocated for 1 x 1 nm spacing, that advocacy was explicitly a compromise, recognizing that impacts would still remain, requiring mitigation.

10. "As CRMC is aware, SFW spent considerable time in 2020 waiting for a proposal from the FAB on gear claim and then attempting to reach agreement with the FAB on a business interruption component. SFW invested significant time and money trying to work with the FAB's consultant on an agreed-upon, standardized framework. Even though SFW agreed to adopt the FAB's proposal in nearly every respect, the FAB refused to reach agreement. (p.5 FN 4)

Response: Please see previous correspondence from the FAB. This is a misrepresentation of the way in which negotiations broke down over the gear claims process.

11. "SFW also developed a comprehensive fisheries communication plan that incorporates input from CRMC and the fishing community." (p.5, Section C 'Additional Modifications')

Response: Orsted's efforts here are hardly project modifications. A fisheries communication plan and fisheries liaisons are required by BOEM and do not mitigate the adverse impacts from this project. Telling the fishermen that they cannot fish in a certain area for a period of time does not make them whole.

12. "Note that the Draft Environmental Impact Statement for the SFW Project states that "the number of charter fishing trips is fairly low in the RI-MA WEAs." BOEM 2020-057, South Fork Wind Farm and South Fork Export Cable Project, Draft Environmental Impact Statement, 3-88 (Jan. 2021) [hereinafter DEIS]. The DEIS also notes that the 70 square miles of Cox Ledge excluded from the lease area and therefore the SFW Project are "important to for-hire recreational fishing." Id. But even in this "important" area, NOAA data indicates only six average annual permit holders from 2012 to 2014, each generating less than $10,000 per year." *Id.* (p. 9 FN 5)

Response: During 2012-2014 the charter industry was still under the requirement to file paper VTRs, only switching eVTRs in March 2018. A fault of the VTR system is that captains are obligated to enter a single position for the entire trip. This has been discussed repeatedly in past FAB correspondence to CRMC staff and to developers. Specific to charter fishing, it is likely that many trips started outside Cox's Ledge and were attributed in the VTR to that starting location, even if the trip had a significant effort on Cox's Ledge. The paper system was widely considered burdensome and it's likely a charter captain would not spend too much time considering the exact location fished when any LAT/LON pair would meet the requirement. The nature of recreational fishing for Atlantic cod and HMS often necessitate trying many areas until the fish are located. Many charter captains start out as close to the dock as possible and move out as

needed. In general, the better fishing is on Cox's Ledge – if the weather is poor you may try closer first, but end up on Cox's Ledge ultimately.

The FAB is aware of substantially more than 6 members of the RIPCBA who fished on Cox's Ledge during 2012 to 2014. Since those years, Cod has begun a steady rebuild and even more vessels are spending an even great amount of time each year there. The NOAA data cited here is in no way representative of the true for hire effort in the area. The FAB is aware of 22 distinct charter vessels actively fishing in the Cox's Ledge area, and is willing to provide that information confidentially to CRMC staff.

13. "During mitigation negotiations, the FAB has raised a litany of speculative concerns about the SFW Project, too numerous to recount here." (p. 10)

Response: The contention that the FAB's experiential testimony is somehow "speculative" and should therefore be dismissed is false. Orsted cannot even be bothered (in any its myriad documents) to "recount its responses to all such comments." (p. 10). To the contrary, the FAB's concerns have been consistently and repeatedly itemized in written correspondence, including at the top of this letter. To date, those concerns remain unaddressed and outstanding. Orsted then goes on to highlight only three of the FAB's concerns as "speculative." These concerns are: habitat impacts, negative impacts to Atlantic cod, and the prospect for restrictions on insurance coverage. Each is addressed in turn below. Given Orsted's refusal to engage with the FAB on these many legitimate concerns, it is quite obvious that Orsted's mitigation proposal is actually **not** "comprehensive," "fair and transparent," "extensive" and/or "substantial." (pp. 9-10)

14. "First, the FAB has suggested that the introduction of WTG foundations will permanently alter large swaths of underwater habitat. No evidence supports this… The total area of temporary and permanent seabed disturbance within the wind lease area within Cox's Ledge is just 8.80 percent." (p.10)

Response: The FAB's concerns arise from the disclosures in the SFW COP. Taking the above statement at face value, the amount of seabed disturbance from boulder relocation, rock dumping and jet plowing constitutes a high risk of mortality for high value benthic species including scallops, lobster and Jonah Crab, as well as for eggs and larvae of all species found on or near the seabed. It is not clear how "just 8.80 percent" is a small enough proportion not to merit concern. In fact, to the extent that these activities happen separately in time from pile-driving, it is possible that these impacts are cumulative and additional to the 45% of the lease area potentially rendered into a kill zone for eggs and larvae of all species. These adverse impacts alone will last multiple seasons, and they come with the added risk that killing off these animals may increase the chances of recolonization by other, lower-valued species.

There is also a concern of the FAB with respect to mobile gear fishing – if cables cannot be buried to target depth or if they become unburied (as they have off of Block Island), then the cables become "hangs" that can snag mobile gear (trawls and dredges). To the extent this takes place, the affected footprint is hardly relevant, as relatively little unburied cable is required to substantially alter the viability of dragging any path that interacts with the cable (a much larger area than the cable itself).

15. "Further, based on the 2019 stock assessment of cod by the NOAA Northeast Fisheries Science Center, the stock is overfished, its condition "remains poor," and the stock shows a truncated age structure. See Black Sea Bass & Cod Presentation (Dec. 17, 2020). Further, cod have a high exposure to climate change, which is anticipated to have a negative impact on cod. The distribution of cod is expected to continue shifting northward from Cox's Ledge as a result of warming temperatures, and climate change is anticipated to result in a loss of thermal habitat for cod on Georges Bank and in southern New England. *Id.* In other words, the Atlantic cod populations are depleted, and climate change is expected to have further negative impacts on cod recruitment. The impacts of climate change on cod populations far outweigh any speculative impacts from the SFW Project." (p. 11)

Response: The FAB does not dispute the fact that Atlantic cod are overfished, but that status was realized many years ago due to historical activity. Overfishing is not currently occurring. Currently and historically, Atlantic cod stock has been assessed based on two stocks, but new information out of the New England Fisheries Management Council working group on Atlantic cod suggests that Southern New England has a distinct population, and the fish on Cox's Ledge are not actually part of the Georges Bank stock. In fact, it turns out the Southern New England cod stock has a genetic trait that has helped them adapt to warmer water. This is preliminary evidence explaining why we are seeing an increase in the local cod stocks on Cox's Ledge even while other monitored areas are not.

Orsted claims that anthropogenic factors supersede any impacts that the turbine foundations will have on habitat ("stock is overfished," "cod have a high exposure to climate change"). Specifically, Orsted states that "the impacts of climate change on cod populations far outweigh any speculative impacts from the SFW Project." This argument is preposterous. There is no climate change exception to the Ocean SAMP. The FAB has to deal with the impacts from the habitat change as a result of *this project*. Allowing exceptions like climate change would open Pandora's Box in terms of excuses by which project developers can get out of making the fishing industry whole under the Ocean SAMP. Orsted takes the habitat as it finds it.

16. "Finally, the FAB has stated repeatedly that the introduction of WTGs will result in loss of insurance, creating de facto "exclusion zones." This concern is not new, and CRMC previously has considered and rejected it:

> Some fishermen have expressed the concern that marine insurance companies might increase their insurance premiums or prohibit insured fishing vessels from operating within the vicinity of offshore wind farms (e.g. Ichthys Marine 2009). However, it should be noted that at the time of this writing, Sunderland Marine does not currently impose restrictions or higher premiums on their members, nor have they heard of other insurance companies issuing such demands (McBurnie, pers. comm.). Sunderland Marine is the world's largest insurer of fishing vessels, and insures The Point Club, a fishing vessel insurance and safety club that insures many

of the fishing vessels operating out of Point Judith and Newport (Nixon, pers. comm.).

§8.4.8(D)(8). SFW's own recent investigation of this concern has led to the same conclusion." (p.11)

Response: This is yet another case of Orsted mischaracterizing the record. First, the FAB concerns are not speculative as at least one FAB member has already been notified of their insurer exiting the market. Second, the quote above from the Ocean SAMP § 8.4.8(D)(8) was apparently written more than ten years ago when the buildout of the wind areas was beyond the far horizon. Finally, as Orsted has done repeatedly, this quote is selective and taken out of context. Indeed, the immediately following sections of the Ocean SAMP give examples of legitimate concern for fishing industry access to insurance:

> "The presence of wind farms may impede access to fishing grounds for some fishermen; even if fishing within the turbines is not restricted, some fishermen may choose to avoid the wind farms for safety or insurance reasons..." §8.4.8 (F)(1)

> "Fishermen in the UK were concerned about impacts on the availability and cost of insurance for fishing vessels navigating around wind farms, even if fishing within wind farms is legal (Mackinson et al. 2006)." §8.4.8 (F)(3)

*****

Overall, Orsted's contention that it followed "best available science and modeling tools" is not accurate. Instead, Orsted continues to ignore the FAB's legitimate concerns related to reasonably foreseeable effects of this project. As outlined above, the current project proposal, including proposed compensatory mitigation and planned non-compensatory mitigation, fails to make the fisheries user groups whole.

Sincerely,

Marisa A. Desautel, Esq.

May 24, 2021

Jeffrey Willis
Executive Director
RI Coastal Resources Management Council
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879

James Boyd
Coastal Policy Analyst
RI Coastal Resources Management Council
Oliver Stedman Government Center
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Wakefield, RI 02879

Dear Jeff and Jim:

South Fork Wind, LLC ("SFW") submits this amended mitigation proposal to the Rhode Island Coastal Resources Management Council ("CRMC") for the federal consistency review of SFW's proposed offshore wind farm (the "Project" or "SFW Project").

<u>Summary of SFW Compensatory Mitigation for SFW</u>

As you know, SFW has amended its mitigation proposal and has made a total commitment of $12 million nominally for the life of the SFW Project to provide financial compensation to the Rhode Island fishing community for mitigating impacts arising from the construction, operation, and decommissioning of SFW. While we have discussed funding the $12 million in roughly equal annual installments over the anticipated 30-year life of the project, we have also stated that we are willing to discuss the funding schedule and the ways in which compensation will be handled over time. In the spirit of compromise, accounting for contingencies and in recognition that SFW is the first project of Orsted and Eversource, this $12 million offer represents an enormous increase from SFW's initial offer last September based on the Woods Hole estimate of potential impacts from the project. Also please note that we are still committed to providing our RI Navigational Enhancement and Training Program.

<u>Evolution of SFW Mitigation Proposal and "First Project"</u>

SFW has described in numerous meetings and filings with CRMC including in its September 28, 2020 proposal that it has modified its Project to avoid and/or mitigate impacts to fisheries. These modifications have been substantial including from an economic standpoint. One such modification is the revised layout to a 1 nautical mile by 1 nautical mile grid along both the east-west and north-south corridors. SFW recognizes, however, that the construction and decommissioning of SFW, in particular, will present impacts that require mitigation under the OSAMP. South Fork also recognizes that there will be some impacts during operations that will need mitigation.

Because SFW recognized the need to evaluate the scope of financial mitigation, SFW engaged Woods Hole to examine impacts to fisheries during the life of the Project and provide the economic value of such impacts. To do this work, Woods Hole took an evidentiary based approach and included data provided by NOAA's National Marine Fisheries Service ("NMFS") covering a period of ten years, 2008-2018. These NOAA data are the best available data for such analyses. Woods Hole has presented its work to CRMC and described how it analyzed impacts to fishing at the wind farm.

In addition, based on feedback during negotiations with the FAB and CRMC during mitigation discussions, Woods Hole made additional adjustments to its analysis to account for dockside sales of lobster and Jonah crab, construction effects to an extended lease buffer, multiplier for downstream impacts, and direct and indirect impacts to charter fishing. Woods Hole estimates the SFW impact at $1,020,000.

SFW also made additional adjustments over time to account for experiential/uncertainty concerns and potential recreational impacts. In the spirit of compromise, SFW added additional money for it being the "first project" for Orsted and Eversource. The attached chart summarizes the breakdown of this updated proposal as well as the evolution of South Fork's mitigation proposal in greater detail.

Conclusion

As stated previously, the mitigation fund will include a direct compensation fund and a coastal community fund. South Fork also will provide its Navigational Enhancement and Training Program as described previously.

Sincerely,

Olivia Larson Tesse

Break down of the total SFW mitigation compensation:

Evidentiary Based	First project add-on	Navigational Enhancement	Total
$1,700,000	$10,300,000	$1,000,000	**$13,000,000**

Evolution of SFW mitigation proposals:

Date	Increase	Total Amount	Comment
09/28/2020	-	$ 700,000	Based on gross WHOI reported impacts
12/3/2020	$ 318,000	$ 1,018,000	WHOI adjustments including to account for: dockside sales of lobster and JC, construction effects to an extended lease buffer, multiplier for downstream impacts (processors), direct and indirect impacts to charter fishing
12/3/2020	$ 30,000	$ 1,048,000	SFW adjustment for FAB requested SFW rerouting
12/17/2020	$ 419,200	$ 1,467,200	40% contingency to address experiential/ uncertainty concerns.
1/07/2021	$ 1,000,000	$ 2,467,200	Rhode Island Navigational Enhancement and Training Program- provides grants for navigational equipment up to $10k per vessel for impacted Fishers across NEP lease areas as well as $1k grant for professional training
2/11/2021	$ 209,573	$ 2,676,773	Increasing contingency +20% to a total of 60%. This concludes the evidentiary based portion of compensation.
2/11/2021	$ 3,025,000	$ 5,701,773	Non-scalable lump sum for SFW specific perceptions such as SFW being the first project
4/07/2021	$ 3,798,227	$ 9,500,000	Additional non-scalable lump sum for SFW specific perceptions such as SFW being the first project and uncertain recreational impacts
5/13/2021	$3.500,000	$13,000,000	Additional non-scalable lump sum for SFW specific perceptions such as SFW being the first project and uncertain recreational impacts

May 28, 2021

Jeffrey Willis, Executive Director
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Stedman Government Center
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jwillis@crmc.ri.gov

Dear Jeff:

South Fork Wind, LLC (SFW) provided the Coastal Resources Management Council (CRMC) with a description of its mitigation proposal on September 28, 2020, including Proposed Term Sheets for the Direct Compensation Fund for Fishermen and the Coastal Community Fund. SFW summarized its total commitment of $12 million nominally for the life of the SFW Project during negotiations and in its May 24, 2021 letter to CRMC. Through many discussions, SFW also has explained that while it is willing to fund the $12 million in roughly equal installments over the 30-year life of the proposed SFW offshore wind farm (the Project or SFW Project), SFW believes other payment schedules are possible that achieve the same equivalent value.

Below, we provide an overview of SFW's compensatory mitigation, potential funding options, and structure of the Direct Compensation Fund for Fishermen and Coastal Community Fund

Funding Mechanism

SFW previously proposed funding the total commitment of $12 million over the life of the Project in roughly equal annual installments. However, we recognize there may be greater financial flexibility to the fishing community if SFW were to finance a substantial payment up front that, if invested in a diversified investment portfolio mix, can grow over time. Through the growth of these moneys over time, the fishing community can be assured that a portion of funds will remain available for compensation throughout the life of the Project. As we have stated, SFW remains committed to ensuring that a portion of funds remain available in the Direct Compensation Fund throughout the life of the Project including for decommissioning, as discussed further below.

SFW is developing a number of payment scenarios to illustrate how a $12 million total commitment might be financed over time. These scenarios range from a one-time, upfront payment equivalent to the present value of $12 million over the life of the Project to a stream of equal annual payments over a shorter time horizon. We will be ready to discuss the range of possible scenarios at our meeting on Tuesday morning. As we have mentioned previously, we have worked with Industrial Economics, Inc. to design the framework for the funds and assist with the funding mechanism.

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Direct Compensation Fund for Fishermen (Summary of September 28, 2020 Proposal)

As initially outlined in the September 28, 2020 mitigation proposal, the SFW Direct Compensation Fund will provide financial compensation for adverse economic impacts to the fisheries user groups arising from the construction, operation, and decommissioning of the SFW Project. An eligible claimant shall receive a fixed payment for impacts based on the fisherman's baseline historical landings. Eligible claimants will receive the one-time fixed payment upon the close of the eligibility subscription (or "sign in") period, which is suggested to close six months after completion of construction, covering the construction and operations Project phases – so that fishermen are paid promptly. Similarly, and by way of example, upon close of an eligibility subscription period in advance of Project decommissioning, eligible claimants will receive a separate one-time fixed payment.

Please keep in mind that a percentage of the Direct Compensation Fund will be ear-marked up front, so that the moneys may grow over time, specifically to fund claims related to later operations and decommissioning. As we have made clear, SFW wants to ensure that funds remain available throughout the life of the Project for fishermen not operating within the Project area until well after the establishment of the Direct Compensation Fund – some of these people may not even be fishing yet.

SFW will engage an independent Third Party Administrator (TPA) to oversee the eligibility subscription periods and administer claims. SFW will have no involvement whatsoever in the TPA's approval or rejection of requests for eligibility or claims. Eligibility criteria will include basic information such as vessel owner or operators demonstrating that they hold a valid state or federal fishing permit, have a demonstrated history of operation within and landings from the SFW Project area, and have a home port or residency in Rhode Island. The eligibility criteria will be further defined.

In connection with any payments made at any phase of the Project, claimants must execute a release at the time of receipt of payment for that claim.

Coastal Communities Fund (Summary of September 28, 2020)

The September 28, 2020 mitigation proposal also outlined SFW's proposed Coastal Community Fund. To this end, we suggest earmarking a portion of SFW's up-front payment to support a Coastal Community Fund. Investing these moneys in a diversified portfolio mix early in the process will allow the funds to grow over time, and in so doing provide meaningful financial support to the fishing community.

The Coastal Community Fund will provide grants for initiatives supporting the general betterment of fishing communities in Rhode Island. For example, grants from the Coastal Community Fund could go towards support for enhanced opportunities for training, apprenticeship, and employment in the commercial or for-hire charter fishing industries, offshore wind industry, and other sectors of the coastal economy; marketing or promotional support for local seafood products or party or charter boat services; giving individuals who have little experience with recreational fishing the opportunity to learn how to fish; and support for technology development to reduce potential conflicts between Rhode Island fisheries and offshore wind operations.

SFW will have no role in the review of grant applications or disbursement of funds from the Coastal Community Fund. Instead, an Advisory Council will have sole discretion to approve and fund projects that satisfy the Coastal Community Fund's objectives.

* * *

SFW looks forward to implementing this mitigation proposal to further the Ocean SAMP's objectives of co-existence between Rhode Island fisheries and the offshore wind industry. Robin Main and I remain available to explain the proposal further on Tuesday if needed.

Thank you,

/s/ Olivia Larson Tesse
Olivia Larson Tesse
Lead Commercial Manager

Cc: James Boyd, Coastal Policy Analyst, CRMC
Melanie Gearon, Orsted
Liz Gowell, Orsted
Robin Main, Esq., Hinckley Allen
Marvin Bellis, Esq., Eversource

Glacial Moraines and Benthic Habitats: Delineation of Seabed Classification and Benthic Habitats for South Fork Wind Farm and Export Cable

Prepared by:

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513 Broadway, Suite 314
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November 23, 2020

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LIST OF ACRONYMS

APCs	Areas of Particular Concern
BOEM	Bureau of Ocean Energy Management
CMECS	Coastal and Marine Ecological Classification Standard
COP	Construction and Operation Plan
CRMC	Coastal Resources Management Council
EFH	Essential Fish Habitat
INSPIRE	INSPIRE Environmental LLC
NOAA	National Oceanic and Atmospheric Administration
NM	Nautical Mile
OCS	Outer Continental Shelf
OSS	Offshore substation
RIS	Rhode Island Sound
SAMP	Special Area Management Plan
SAP	Site Assessment Plan
SFEC	South Fork Export Cable
SFW	South Fork Wind
SFWF	South Fork Wind Farm
WTG	Wind turbine generator

1.0 INTRODUCTION

South Fork Wind (SFW) has collected extensive data to support the characterization of habitats within the South Fork Wind Farm Maximum Work Area (SFWF; OCS-A 0517) and South Fork Export Cable installation corridor. These data inform the distribution of benthic habitats in the SFW project area including those associated with glacial moraine considered to be Areas of Particular Concern (APC) because of their relative structural permanence and structural complexity[1]. The proposed SFW Offshore Substation (OSS), South Fork Export Cable (SFEC), Inter-array Cables (IAC) and most of the primary Wind Turbine Generator (WTG) foundations and associated scour protection are sited to avoid habitats associated with glacial moraines. As described herein, there are four WTG foundations (1, 8, 9 and 10) and associated scour protection that can be micro-sited to avoid and/or not result in significant alteration to the values and resources of the Areas of Particular Concern (APC) and to avoid damage to the APC resources and values. As requested by the Rhode Island Coastal Resources Management Council (CRMC)[2], two preliminary reports were prepared to provide initial findings to CRMC (INSPIRE 2019, 2020a) on this topic. This report supersedes those preliminary reports and provides final, detailed data on habitat delineation and conclusions on the distribution of habitats associated with glacial moraines.

These data collection efforts were performed in accordance with the Bureau of Ocean Energy Management (BOEM) guidelines (BOEM 2019, 2020a). The interpreted data have been provided in technical reports as part of the Construction and Operations Plan (COP, Deepwater Wind South Fork, LLC 2020a, b, c, d, e). These data were used to produce a seabed classification based on geological interpretation of acoustic data (MBES bathymetry, backscatter, side-scan sonar, and shallow seismic) and visual data obtained with a Sediment Profile Imaging and Plan View (SPI/PV) system as well as direct sampling of sediments (see Appendix A). The results reflect a significant high-resolution data gathering effort that provides a far more detailed understanding of the geological setting of surficial sediments within SFW and SFEC than was previously available.

In comparison, the glacial moraine distribution maps in the Ocean Special Area Management Plan (Ocean SAMP or OSAMP) (Figure 1; SAMP; CRMC 2012) were based on very limited seismic data collected over 40 years ago. CRMC, recognizing that more and better data would be collected after the OSAMP was issued, provided for the supplementation of information on

[1] The Ocean SAMP describes Areas of Particular Concern: (APC): "Glacial moraines are important habitat areas for a diversity of fish and other marine plants and animals because of their relative structural permanence and structural complexity. Glacial moraines create a unique bottom topography that allows for habitat diversity and complexity, which allows for species diversity in these areas and creates environments that exhibit some of the highest biodiversity within the entire Ocean SAMP area. The Council also recognizes that because glacial moraines contain valuable habitats for fish and other marine life, they are also important to commercial and recreational fishermen. Accordingly, the Council shall designate glacial moraines as identified in Figures 11.3 and 11.4 as Areas of Particular Concern." CRMC 1160.2 (CRMC 2012)

[2] January 16, 2019 letter CRMC to Deepwater Wind; March 24, 2020 request to Orsted for revised figures.

glacial moraines so that the understanding of these areas would increase over time. This report provides CRMC with a review of data collected after the publication of the Ocean SAMP.

The WTG foundation locations as presented in this report and figures represent the 1 NM by 1 NM grid layout as presented in the SFW COP. In order to assess any risk of disturbance to habitat, the maximum permanent and temporary disturbance footprints associated with foundation (5.5 m radius), scour protection (28.5 m radius around foundation), and installation activities around each foundation location (166 m radius around maximum scour protection) were examined. In addition, footprints of maximum permanent and temporary disturbance for the IACs were examined: the trench (7.5 m wide strip along length of each segment, which varies), cable protection (12 m wide strip inclusive of trench width), and boulder relocation area for each IAC segment (14 m wide strip extending out from the cable protection on each side). To accomplish this work, each proposed foundation location, OSS and alternate foundation location, and IAC segment were examined in detail and presented in high-resolution maps (Section 3.3 below).

The installation of SFW foundations, which must be within the SFW lease area boundary (BOEM 2020b), was also assessed. The foundation installation involves seabed preparation activities within a 200-m (656.2-ft) radius of the monopile foundation. This area will not have permanent alteration of the habitat but may experience temporary disturbance during construction. After installation of the monopile, a scour protection layer may be placed around the monopile up to a diameter of 68 m (225 ft). As such, scour protection areas were also examined. If the foundation moves for micro-siting, the scour protection necessarily moves in a relative way.

As described below, the SFW OSS and primary WTG foundations and associated scour protection: 1) avoid habitats associated with glacial moraine in either their present location or through limited micro-siting; and/or 2) will not result in significant alteration to the values and resources of the APC and will avoid damage to the APC resources and values[3]. The IAC, which results in only temporary impacts, has been sited in a way to use all feasible efforts to avoid damage to the APC resources and values and there will be no significant alteration of the APC resources or values.

2.0 APPROACH

To provide context for the findings presented in this report, the methods and standards used for data interpretation are provided below. Details of data collection are provided in geophysical reports appended to the SFW COP (Deepwater Wind South Fork, LLC 2020a). Results are presented in a form consistent with the Coastal and Marine Ecological Classification Standard (CMECS) (FGDC 2012), specified by BOEM in their Benthic Habitat Survey Guidelines (BOEM 2019).

[3] The two alternate WTG locations, while in APC, will not result in a significant alteration of the values and resources of the APC as described in this report.

2.1 Geological Seabed Characterization

Orsted developed information on the geological seabed to characterize the geological provenance and stratigraphic conditions of the seafloor inclusive of surface and subsurface features. Methods used to collect this information included multibeam bathymetry and backscatter, side-scan sonar, sub-bottom profiler, magnetometer, and seismic profiler data, along with vibracores, piezocone penetration tests, and grab samples. Detailed descriptions of methodologies and related interpretative results are available in Appendices H1-H4 of the SFW COP (Deepwater Wind South Fork, LLC 2020a).

For the purposes of establishing geological setting, and aligning with the Geoform component of CMECS classification, the entire SFW project area was considered part of one Geoform component: the tectonic setting of a passive continental margin[4], a physiographic setting of a continental shelf[5], and geologic origin of a moraine, Geoform type terminal moraine.[6] In the context of designation of APC, the Geoform type terminal moraine can be considered a large landform with a range of seabed types and benthic habitats. It is generally accepted that Cox Ledge represents part of a terminal, or end, moraine of Late Wisconsinan glaciation, a complex structure of glacial-tectonic origin that may have heterogeneous patterns of seabed types (Oldale and O'Hara 1984).

Glacial moraines are complex landforms associated with deposition of sediment carried by glaciers during advance and retreat. Typically, they consist of unstratified drift (till or diamicton) but may have a complex structure with stratified drift interbedded with till and abundant erratic boulders (Bennet and Glasser 2009). Till is characteristically composed of a poorly sorted mix of pebbles, cobbles and/or boulders within a fine-grained matrix of silt and clay. Till has a wide range of origins including supraglacial and subglacial that affect the nature of the deposits (Bennet and Glasser 2009). It displays distinctive patterns in geophysical data with a wide range of geotechnical properties depending upon the processes that formed it (O´Cofaigh et al. 2007). In southern New England, the glacial moraine landform has a topographic pattern where higher topographic areas can be formed by coarser grained sediment (e.g., cobbles and boulders) derived from patches of basal till deposited when the ice advanced across the moraine prior to retreat (Oldale and O'Hara 1984). The Glacial Moraine / Till seabed type designation reflected definition of a broader characterization of the presence and extent of glacial moraine seabed types recognizing that deposits on the surface of a glacial moraine landform can be a mix of till,

[4] The transition between oceanic and continental crust that is not an active plate margin. This feature was constructed by sedimentation above an ancient rift, now marked by transitional crust. Major tectonic movement is broad, whereas regional vertical adjustment, earthquakes, and volcanic activity are minor and local (FGDC 2012).

[5] That part of the continental margin that is between the shoreline and the continental slope (or a depth or 200 meters when there is no noticeable continental slope); it is characterized by its very gentle slope of 0.1° (FGDC 2012).

[6] A mound, ridge, or other distinct accumulation of unsorted, unstratified, glacial drift (predominantly till) that is deposited chiefly by direct action of glacier ice. An end moraine that marks the farthest advance of a glacier; usually has the form of a massive arcuate or concentric ridge (or complex of ridges) underlain by till and other drift types (FGDC 2012).

stratified drift, and reworked sediments derived from the glacial deposits and subsequent marine transgression.

For the purposes of defining geological seabed types within the terminal moraine Geoform, the Folk classification was used, which aligns with CMECS Substrate component classifications (Figure 2). Seabed types present at SFW and SFEC based solely on this scheme are Mud and Sandy Mud, Sand and Muddy Sand, and Coarse Sediment (i.e., >5 – 80% gravel on a sand matrix). One additional seabed type was defined to support geological characterization: Glacial Moraine / Till, a subset of the Geoform, which is further described below. To delineate Glacial Moraine / Till, boulders of greater than or equal to 0.5 m were individually picked from the multibeam and side-scan sonar data to assess boulder density; moderate to high boulder density was used as a surface expression of glacial moraines identified by surface and subsurface geophysical data. The seabed characterization map was developed using a minimum mapping unit of 4,000 m^2. The Glacial Moraine / Till seabed type was delineated for areas with distinctive features in geophysical data present within the survey area including topographical relief, subsurface features, glacial striations and boulder density.

2.2 Delineation of Benthic Habitat Types

Geological characterizations of seabed conditions are not strictly equivalent to benthic habitats as experienced by benthic biological communities and demersal fish. In order to map these habitats for the purposes of assessing the potential impacts of SFW on these biotic communities, INSPIRE refined the seabed data interpretations to map benthic habitats with a minimum mapping unit of 2,000 m^2 within a buffered area of potential effect in the SFWF and along the SFEC. Multibeam 25-cm resolution bathymetry, 25-cm (SFWF) and 50-cm (SFEC) resolution backscatter, and 10 cm side-scan sonar (SSS) data were examined along with boulder picks and SPI/PV data in order to delineate new habitat polygons and to refine the seabed classifications. For example, surface expressions of areas of Coarse Sediment and Sand and Muddy Sand were identified within geological seabed units of Glacial Moraine and were reclassified as such (Figure 3). Additionally, the geological seabed classification of Coarse Sediment was refined into three benthic habitat types. Coarse Sediment encompasses a broad range of habitats composed of variable mixtures and arrangements of gravel and sand, including gravelly sand composed mostly of small mobile granules and pebbles and sandy gravel with patchy distributions of larger cobbles and boulders. From the habitat perspective, these environments are very different. Therefore, Coarse Sediment was divided into three types based on total percent cover of cobbles and boulders observed in SSS data within each delineated Coarse Sediment habitat polygon: <5 %, 5-30%, and 30-80%.

In addition, boulder density was calculated for each habitat polygon (ranging in size from <0.05 to 984 acres) by dividing the total count of boulder > 0.5 m (those identified in the “boulder picks” data set) within each polygon by the area of the polygon. These calculations resulted in average boulder density values that ranged from 0 to 194 boulders per acre; however, there are areas within these polygons where boulder density per acre is much higher or lower than these values. Areas of increased boulder density correspond to Glacial Moraine habitats and, as expected, decreased along the gradient of habitat types from Glacial Moraine thru Coarse Sediments to Sand and Mud (INSPIRE 2020b). Variability in boulder density per habitat polygon also decreased along the same gradient of habitats (INSPIRE 2020b), indicating the patchy nature of boulder distributions within moraine deposits on Cox Ledge.

Glacial Moraine / Till areas were also subdivided for assessing habitat, based on acoustic geophysical properties. The two resulting benthic habitat types, Glacial Moraine A & Glacial Moraine B) are defined as:

- *Glacial Moraine A* (GM-A): Deposits with low to moderate boulder densities (<100 boulders per acre) on the seabed. The seabed is typically irregular and contains loose mobile sediments near/at the boulders, which can also display morphological features (i.e. ripples). Generally, however, boulders appear chaotic with no apparent structural pattern.

- *Glacial Moraine B* (GM-B): Deposits of complex relief (topography) and striations visible in bathymetric data oriented NNW-SSE. The deposit has a high boulder density (>100 boulders per acre) and commonly lacks loose / mobile cover sediments.

The above division is not intended as a definitive geological interpretation, but rather as a proxy for mapping habitats with distinctive degrees of structural complexity and relative structural permanence that can affect habitat quality.

Sediment profile and plan view images (SPI/PV) were collected at 161 stations in November 2017 (141 stations) and November 2018 (20 stations). A total of 98 stations were collected within the SFWF, 60 stations along the SFEC, and 3 stations within a potential reference area east of the lease area. During the 2017 survey, supplemental grab samples were collected at 16 stations and analyzed for grain size composition. SPI/PV images were used to ground-truth sediment types, bedform dynamics, presence of sensitive habitats and taxa, and to characterize benthic biological communities. SPI/PV were analyzed for a suite of variables (Table 2-1) and were classified using CMECS Substrate and Biotic components (Table 2-2). Detailed descriptions of each variable analyzed can be found in the SPI/PV Geophysical and Benthic Assessment reports (Deepwater Wind South Fork, LLC 2020d, e). Each of the benthic habitat categories mapped were cross-walked to CMECS Substrate and Biotic component classifications based on ground-truth data. A range of substrate and biotic communities are present within each benthic habitat category, as expected given the difference in observation scale of acoustic data and ground-truth point samples (Table 2-3). PV images characteristic of each benthic habitat category are presented in Figure 4. Habitat descriptions were derived from a combination of characteristics interpreted from acoustic data (mega-ripples, ripples, boulder density, etc.) and ground-truth data.

Table 2-1. SPI/PV Survey Parameters with Corresponding BOEM COP Requirements and Guidelines

Equipment	Parameter	BOEM COP Guideline
SPI	Grain Size	• Grain size analysis • Classification of CMECS sediment type • Identification of distinct horizons in subsurface sediment
	Penetration Depth	• Classification of sediment type
	Boundary Roughness	• Identification of rock outcrops and boulders • Identification of bedforms
	Sensitive Taxa	• Identification of potentially sensitive seafloor habitat
	Invasive Taxa	• Identification of invasive taxa
	Soft Sediment Infauna Community	• Characterization of macrofaunal community • Identification of taxa diversity • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Mobile Epifauna	• Characterization of macrofaunal community • Identification of taxa diversity
	Apparent Redox Potential Discontinuity	• Characterization of benthic habitat attributes
	Sediment Oxygen Demand	• Characterization of benthic habitat attributes
	Successional Stage	• Characterization of benthic habitat attributes
	Low Dissolved Oxygen Presence	• Characterization of benthic habitat attributes
	Methane Presence	• Characterization of benthic habitat attributes
PV	Sediment Type	• Identification of rock outcrops and boulders • Classification of CMECS sediment type • Identification of bedforms
	Bedform	• Identification of bedforms
	Boulder Presence	• Identification of rock outcrops and boulders • Identification of bedforms
	CMECS Biotic Subclass	• Identification of potentially sensitive seafloor habitat
	Sensitive Taxa	• Identification of potentially sensitive seafloor habitat
	Invasive Taxa	• Identification of invasive taxa
	Attached Flora/Fauna	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Dominant and Dominant Co-occurring Biotic Group	• Identification of potentially sensitive seafloor habitat • Classification to CMECS Biotic Subclass • Classification to CMECS Biotic Group
	Soft Sediment Infauna Community	• Characterization of macrofaunal community • Identification of potentially sensitive seafloor habitat
	Mobile Epifauna	• Characterization of macrofaunal community
	Fish	• Characterization of macrofaunal community
	Burrows/Tubes/Tracks	• Characterization of macrofaunal community

Table 2-2. CMECS Classification Levels Used in Analysis and Classifications for the SFW Survey

CMECS Term	Scale of Classification	Classifications
	Substrate Component	
Substrate Origin	Site	Geologic Substrate
Substrate Class	SPI/PV	Unconsolidated Mineral Substrate
+Substrate Subclass	SPI/PV	Fine Unconsolidated Substrate; Coarse Unconsolidated Substrate
+Substrate Group	PV	Sandy Mud; Muddy Sand; Sand; Slightly Gravelly; Gravelly Sand; Sandy Gravel; Boulder
+Substrate Subgroup	SPI	Silt-Clay; Very Fine Sand; Fine Sand; Medium Sand; Coarse Sand; Very Coarse Sand; Granule; Pebble; Cobble
	Biotic Component	
Biotic Setting	SPI/PV	Benthic/Attached Biota
Biotic Class	SPI/PV	Faunal Bed
+Biotic Subclass	SPI/PV	**Soft Sediment Fauna**; Attached Fauna; Inferred Fauna
+Biotic Group	SPI/PV	**Small Surface-Burrowing Fauna**; Attached Hydroids; Barnacles; Diverse Colonizers; Egg Masses; Pennatulid Bed; Sand Dollar Bed

+ Indicates variability within the surveyed area at this level of the hierarchy

Bold text indicates an overwhelming dominant classification across the surveyed area

Table 2-3. Benthic Habitats Cross-walked to Observed & Expected CMECS Classifications

Benthic Habitat Category	**CMECS Substrate Groups**	**Predominant CMECS Biotic Subclasses**
Mud and Sandy Mud	Muddy Sand; Sand; Sandy Mud; Very Fine Sand, Mud	Soft Sediment Fauna
Sand and Muddy Sand	Muddy Sand; Sand; Slightly Gravelly Sand; Gravelly Sand	Soft Sediment Fauna
Coarse Sediment (all % cobble/boulder cover categories)	Muddy Sand; Sand; Slightly Gravelly Sand; Gravelly Sand; Sandy Gravel	Soft Sediment Fauna; Attached Fauna
Glacial Moraine A	Muddy Sand; Sand; Slightly Gravelly Sand; Gravelly Sand; Sandy Gravel; Gravel; Cobble; Boulder	Soft Sediment Fauna; Attached Fauna
Glacial Moraine B	Slightly Gravelly Sand; Gravelly Sand; Sandy Gravel; Gravel; Cobble; Boulder	Soft Sediment Fauna; Attached Fauna

3.0 CLASSIFICATIONS

Results presented in previous reports submitted to CRMC (INSPIRE 2019, 2020a) are included here for completeness. Data sources for habitat delineation are presented in Appendix A.

3.1 Prior Geological Work

To provide context, a brief review of prior work is provided here and is similar to information provided in both the July 31, 2019 and the March 20, 2020 preliminary reports (INSPIRE 2019, 2020a).

Glacial moraines defined in the Ocean SAMP in Figures 11.3 and 11.4 (presented here in Figure 1) were based on several sources interpreted by Boothroyd (2009). These were grouped as End Moraine (Blocky), End Moraine (Boulder), and End Moraine (Boulder, Cobble, Sand). Most of the data near the SFW interpreted in the Ocean SAMP were collected by the United States Geological Survey (USGS) in 1980 over very widely spaced seismic lines (USGS SRIS 1980, Figure 5). Because of the paucity of seismic data in the region of Cox Ledge, the areas identified in the Ocean SAMP are very general and do not reflect the distribution of moraine deposits and subsequent erosion and deposition of surficial sediments that affect habitat. The available data in 2010 had only two seismic lines within the SFW and only one of those lines was available during the Ocean SAMP process (Figure 5).

A desktop study in 2010 identified data sources available to Boothroyd and evaluated additional data collected between 1975 and 2010 (Carey et al. 2010). The primary sources were:

- McMullen et al. (2009a, b) scanned seismic data and reconstructed tracklines from three separate USGS surveys, O’Hara (1980), O’Hara and Oldale (1980), and Needell et al. (1983a, b). The data coverage for western and eastern RIS is more extensive but southern RIS (SFW) is very coarse (USGS ERIS, WRIS, SRIS, Figure 5). McMullen et al. (2009c) interpreted side-scan sonar data and produced surficial geology maps for western Rhode Island Sound. Needell and Lewis (1984) produced geological maps of Block Island Sound.

- McMaster et al. (1968) collected seismic data on very wide spacing and published interpretations of the results but the original data were not available for this study (see Figure II-I in LaFrance et al. 2010).

- LaFrance et al. (2010) collected seismic data, multibeam sonar (MBES), and backscatter from a limited area on the edge of the study area as part of the Ocean SAMP process and published small thumbnails of the results from six lines in a preliminary technical appendix (SAMP “Fed” Lines Processed, Figure 5).

- OSI (2010) collected seismic data, MBES and side-scan sonar data from two long reconnaissance lines within the study area. These data were available from scanned high-resolution paper records with beginning-of-line and end-of-line control points and scale points along each line. These data were hand registered on tracklines to identify fluvial channel locations, coarse surface features and suspected sedimentary units, transferred to ArcGIS and included in the desktop interpretation (RISWF West 09, East 09, Figure 5).

3.2 Recent Geological Work

Since the July 2019 preliminary submission and the original Site Investigation Report (INSPIRE 2019, 2020a), Fugro conducted a seabed classification interpretation of all available data at high-resolution including recent surveys. In 2017 and 2018, Fugro Marine Sciences conducted high-resolution MBES and seismic surveys within the SFWF area (30-meter spaced primary lines and 500-meter tie lines, Chart-1_SFWF_Post_Plot_ArchE, Deepwater Wind South Fork, LLC 2020b, c). INSPIRE provided benthic assessments based on Sediment Profile Imaging and Plan View Imaging within the survey area conducted in 2017 and 2018 (Deepwater Wind South Fork, LLC 2020d, e).

These site characterization surveys required by BOEM resulted in a much higher resolution assessment of surficial geology and benthic habitat distribution (Deepwater Wind South Fork, LLC 2020b, c). The BOEM site characterization guidelines do not explicitly address moraine distribution, but the engineering needs associated with construction in or near boulder deposits resulted in a very detailed assessment (Deepwater Wind South Fork, LLC 2020b, c). These survey data have refined the understanding of the distribution of glacial moraine deposits, glacio-fluvial deposits and Holocene transgressive marine deposits within the SFWF and SFEC areas. It is clear from high-resolution data that within the SFWF area Ronkonkoma terminal moraine deposits are overlain by glacio-fluvial deposits and marine deposits (Deepwater Wind South Fork, LLC 2020b, Figure 6).

The result of this recent geological work is an updated map of Glacial moraine / Till deposits at the SFWF, with a minimum mapping unit of 4,000 m^2. These data provide a refined spatial distribution of glacial deposits within the SFWF; however, the overall patterns discernable in the modified O'Hara and Oldale regional data remain the same (Figures 6, 7, 8, 9, 10). The interpretation follows the regional framework established by O'Hara and Oldale (1980) and expanded by Stone and Borns (1986) and Uchupi et al. (2001).

O'Hara and Oldale (1980) and subsequent authors recognized that within the broad distribution of the end moraine identified on Cox Ledge there were deep channels cut into the glacial moraine by meltwaters and subsequent reworking and deposition as the glaciers retreated and transgressive seas flooded the area. As a result of the higher density of seismic and subbottom data collection, we now know that these processes have left patches of exposed glacial moraine across the surface of Cox Ledge interspersed with more modern marine sand deposits (Figure 7). The terminal moraine is formed from dense to very dense sand and gravel with abundant boulders and cobbles (Figure 10; Deepwater Wind South Fork, LLC 2020b). The terminal moraine complex has been interpreted to include a 'moraine flank' that is a transition from the bouldery moraine to the glacial outwash plain to the west (Figure 6). In this area, dense glacial outwash sands thicken from <1 m to 2.5 m and contain boulders. The glacial outwash plain has very few boulders and thickens to the west except for a rocky outcrop of bouldery moraine off the South Fork of Long Island (Figure 6).

The SFEC is located within the glacial outwash plain and crosses several north-south trending paleo-drainages along the eastern and western margins of Block Island. These drainage channels are interpreted as forming during the marine transgression (unlike the Pleistocene channels in the SFWF) and some have been filled with coarse sand and some with finer sediment. The SFEC crosses the moraine flank deposits as it approaches the SFW lease area (Deepwater Wind South Fork, LLC 2020b, Figure 7). The SFEC route has been diverted in two places to avoid bouldery moraine, from the west the reconfigured SFEC was diverted to the south around a patch of moraine and at the eastern terminus the cable route transits the moraine flank deposits through a series of broad bends to minimize contact with boulders (Figure 7).

3.3 Recent Work: Benthic Habitats

After presumptive locations of WTGs, OSS, and the IAC were determined based on a 1NM by 1 NM grid (Figure 11) benthic habitat classification was conducted with the buffered area of potential effect in the SFWF (Figure 12). All seven benthic habitat types defined in Section 2.2 were observed within the buffered area of potential effect in the SFWF where benthic habitat types were mapped (~9,203 acres) (Figure 12). Nearly half of the area was Sand and Muddy Sand. Approximately 30% was Coarse Sediment - <5% Cobble/Boulder; and approximately 20% was Glacial Moraine A. For the remaining categories each occupied less than 1% of the mapped SFWF (Coarse Sediment - 5 to 30% Cobble/Boulder; Coarse Sediment - 30 to 80% Cobble/Boulder; Mud and Sandy Mud, and Glacial Moraine B). Four benthic habitat types were found within the ~8,530 acres mapped along the portion of the SFEC in federal waters (Figure

13). Nearly half of the SFEC area was Sand and Muddy Sand. Approximately 37% was Coarse Sediment - <5% Cobble/Boulder. The remaining habitat types each occupied less than 10% of the area mapped along the portion of the SFEC in federal waters (Coarse Sediment - 5 to 30% Cobble/Boulder; Coarse Sediment - 30 to 80% Cobble/Boulder; and Mud and Sandy Mud). No Glacial Moraine A or Glacial Moraine B habitat was mapped along the SFEC corridor; therefore, this report is focused on the SFWF.

While there are areas within the SFWF with high densities of boulders and cobble, they are rarely continuous (Figure 14). There are extensive areas of fine sand with isolated boulders and sand with mobile gravel and sand waves lacking attached marine organisms (Deepwater Wind South Fork, LLC 2020d). The limited areas of very high boulder density (>100 per acre) within the SFWF correspond to Glacial Moraine B habitats (Figure 14). As expected, boulder density decreased along the gradient of habitat types from Glacial Moraine A and Coarse Sediments to Sand and Mud (Figure 14). Variability in boulder density also decreased along the same gradient of habitats (Figure 14), indicating the patchy nature of boulder distributions within Glacial Moraine A deposits on Cox Ledge. This patchy distribution of cobbles and boulders within the moraine habitat at SFWF is not captured well by point sampling approaches (SPI/PV stations); therefore, a high degree of heterogeneity was present among ground-truth sampling with relative few images capturing features diagnostic of Glacial Moraine B (cobbles, boulder, attached fauna). This patchy distribution of Glacial Moraine B habitat found at SFWF, particularly at Cox Ledge, is markedly different from the continuous cobble/boulder fields found at the glacial moraine located on Southeast Ledge (Figure 15).

3.4 Areas of Particular Concern: Glacial Moraine A and Glacial Moraine B Benthic Habitats

Glacial Moraine A is a complex seabed and habitat classification category composed of unconsolidated geologic debris deposited by glacial migration. Cobbles and boulders are present with a moderate to high density (8-100 boulders per acre) in this category (there are a few small areas with lower density). Due to very coarse and poorly sorted sediment, the seabed of this habitat generally exhibits high reflectance in backscatter data. CMECS Substrate Groups/Subgroups expected within this habitat type are Sand, Slightly Gravelly Sand, Gravelly Sand, Sandy Gravel, Boulder, and Cobble. Large areas of hummocks and some smaller areas of mega-ripples were present along with patchy areas of ripples. The CMECS Biotic Subclass of Soft Sediment Fauna and Attached Fauna are both expected to be dominant, with Attached Fauna dominating patches of stable gravel. Small washed gravel substrates are present and subject to frequent hydrodynamics preventing the establishment of attached fauna. Biotic communities are characterized by small to large burrowing and tube-building fauna with successional stages up to Stage 2. Bivalves such as the ocean quahog and sea scallop are also found in this habitat category. Mobile epifauna such as sand dollars, crabs, lobsters, gastropods, squid, and sea stars and sessile epifauna such as bryozoa, hydroids, barnacles, sea pens, sponges, and non reef-building hard corals are also anticipated within this habitat type. Overall Attached Fauna percent cover is expected to be low to high and proportional to stable gravel cover and aggregation.

Glacial Moraine B was mapped as a subcategory of Glacial Moraine A habitat to distinguish areas with marked topographic relief and evidence of striations oriented NNW-SSE (Figure 16). This sub-habitat is expected to have high structural complexity and structural permanence as well as very high boulder density (>100 boulders per acre). Due to very coarse and poorly sorted sediment, the seabed of this habitat generally exhibits high reflectance in backscatter data. Only one station was collected in this habitat with Sandy Gravel and Gravelly Sand and attached fauna (Figure 4D). CMECS Substrate Groups/Subgroups expected at stations (sampled with SPI/PV and/or grabs, except where high percentage of gravel) within this habitat type are Gravelly Sand, Sandy Gravel, Boulder, and Cobble. These areas have marked topographic relief but are largely devoid of mega-ripples or patchy ripples. The CMECS Biotic Subclass of Soft Sediment Fauna and Attached Fauna are both expected to be dominant, with Attached Fauna dominating patches of stable gravel. Biotic communities are characterized by small patches of sediment with small to large burrowing and tube-building fauna with successional stages up to Stage 2. Mobile epifauna such as sand dollars, crabs, lobsters, gastropods, squid, and sea stars and sessile epifauna such as bryozoa, hydroids, barnacles, sea pens, sponges, and non reef-building hard corals are the most common fauna within this habitat type. Overall attached fauna percent cover is expected to be medium to high and proportional to stable gravel cover and aggregation.

Glacial Moraine B was only present in three small areas within our analysis area on the northern and southern boundaries of SFWF (Figure 12). The surface of Glacial Moraine B deposits appeared poorly sorted and dense with very high boulder densities resulting in greater structural complexity and permanence. By comparison, the surface of Glacial Moraine A units was reworked with sand and gravel deposits resulting in less structural complexity and permanence.

4.0 FINDINGS

With the use of detailed mapping, conducted at a 2,000 m² minimum mapping unit (MMU), vs the 4,000 m² MMU used for geologic mapping, INSPIRE examined the distribution of habitats at and around the proposed SFW foundation locations, scour protection layers and IACs (Figure 12). The consideration of foundation proximity to glacial moraine is important for planning and execution of construction. For habitat mapping, we subdivided seabed geologically classified as Glacial Moraine / Till into two habitat types based on boulder density per acre within the footprint of each defined habitat polygon (INSPIRE 2020b): Glacial Moraine A - areas with moderate density of boulders (8 – 100 boulders/acre, Figure 14); and Glacial Moraine B - areas with high density of boulders (>100 boulders/acre) and topographic relief. Boulder density per acre was calculated within the footprint of each defined habitat polygon to define these glacial moraine areas, whereas initial geological definition of glacial moraine was based on larger areas (INSPIRE 2020b). A comparison of the more refined habitat-based delineation of glacial moraine conducted by INSPIRE at a 2,000 m² MMU compared to the broad geology-based seabed classification conducted by Fugro at a 4,000 m² MMU resulted in a 5.6% reduction in the area geologically classified as Glacial Moraine / Till vs. the area delineated as Glacial Moraine A & B habitat types (Figure 17).

The OSS, primary WTGs, associated scour protection, and most IAC will be located outside of Glacial Moraine habitat. Areas with low density of boulders, particularly those located on mobile sands allow placement of alternative WTGs, associated scour protection, and remaining IAC without permanent change to the habitat properties of glacial moraine habitat (structural complexity and structural permanence). Some boulders within Glacial Moraine A habitats would likely be relocated within the habitat, but not removed, representing a temporary disturbance to the habitat. Glacial Moraine B habitats are located outside the area of potential impact for both permanent and temporary disturbances associated with construction and installation of all of the WTGs, scour protection layers, and the IAC.

Based on our analysis, areas with low density of boulders allow placement of the primary WTGs and scour protection layers without impact to glacial moraine. Specifically, Glacial Moraine A and B habitats are located outside the area of potential impact for both permanent and temporary disturbances associated with construction and installation of the primary WTGs and scour protection layers. In addition, the alternative WTG foundations and IACs are not located in any Glacial Moraine B habitat (Table 4-1).

Specifically, WTG foundations 2, 3, 4, 5, 6, 7, 11, 12, 13, 14, 15, and the OSS are located outside the mapped Glacial Moraine A habitat. WTG foundation locations 1, 8, 9, and 10 are adjacent to, or within, the mapped Glacial Moraine A habitat. However, there is micro-siting flexibility at these WTG locations to allow for avoidance of any Glacial Moraine A habitat and/or not result in significant alteration to the values and resources of the APC and to avoid damage to the APC resources and values. The alternative WTG foundations (16A and 17A) are located within Glacial Moraine A habitat but can be micro-sited into adjacent areas of Glacial Moraine A habitat comprised of lower boulder densities (i.e. 8-14 per acre). With the micro-siting of the alternative WTG foundations (16A and 17A), all feasible efforts have been made to avoid damage to the areas of particular concern (APC) resources and values and there will be no significant alteration of the APC resources or values as they will be in areas of lower boulder densities.

Table 4-1. Habitat Types present within each structure (WTG inclusive of foundation and scour protection layer

Structure (WTG inclusive of foundation and scour protection layer)	Habitat Types	Figure
WTG 1	Glacial Moraine, Sand and Muddy Sand	18
WTG 2	Sandy and Muddy Sand	18
WTG 3	Sandy and Muddy Sand	19
WTG 4	Sandy and Muddy Sand, Mud and Sandy Mud	19, 20
WTG 5	Coarse Sediment (<5% Cobble/Boulder), Sand and Muddy Sand	20, 21
WTG 6	Coarse Sediment (<5% Cobble/Boulder)	21
WTG 7	Sand and Muddy Sand	22
WTG 8	Glacial Moraine, Coarse Sediment (<5% Cobble/Boulder)	22
WTG 9	Glacial Moraine, Sand and Muddy Sand	23
WTG 10	Glacial Moraine, Sand and Muddy Sand	23
WTG 11	Sand and Muddy Sand	24
WTG 12	Coarse Sediment (<5% Cobble/Boulder)	25
OSS	Sand and Muddy Sand	25
WTG 13	Coarse Sediment (<5% Cobble/Boulder)	26
WTG 14	Coarse Sediment (<5% Cobble/Boulder)	26
WTG 15	Sand and Muddy Sand	27
WTG 16A	Glacial Moraine	24
WTG 17A	Glacial Moraine	27

Along the IAC, the following areas, which have the possibility of permanent cable protection use, intersect with Glacial Moraine A habitat (these are 9 of the planned 15 IAC segments): WTG1 – WTG2 (Figure 18), WTG4 – WTG5 (Figure 20), WTG9 – WTG10 (Figure 23), WTG7 – WTG1 (Figures 12, 18), OSS – WTG8 (Figures 12, 25), WTG8 – WTG2 (Figures 12, 22), OSS – WTG9 (Figures 12, 23), WTG 9 – WTG3 (Figures 12, 23), and WTG14 – WTG11 (Figures 12, 26). These routes are optimized to avoid areas of moderate to high boulder density to the maximum extent practicable, with only 12% of the total maximum possible area of cable protection on Glacial Moraine A (INSPIRE 2020b). Boulder relocation will occur along the areas of the IAC where boulders are present, temporarily impacting the habitat but not resulting in permanent alteration. The two hypothetical IAC segments leading to the Alternate WTGs, would also pass through Glacial Moraine habitat. With the micro-siting of the IAC, all feasible efforts have been made to avoid damage to the APC resources and values and there will be no significant alteration of the APC resources or values as they will be in areas of lower boulder densities.

This report shows that the SFW OSS and WTG foundations and associated scour protection: avoid habitats associated with glacial moraine in their present location or through limited micro-siting; and/or will not result in significant alteration to the values and resources of the APC and will avoid damage to the APC resources and values. In addition, the IAC, which results in only temporary impacts, has been sited in a way to use all feasible efforts to avoid damage to the APC resources and values and there will be no significant alteration of the APC resources or values.

5.0 DATA DELIVERABLE

Data sources for habitat delineation are presented in Appendix A. Orsted provided a separate deliverable with the non-confidential geophysical and geotechnical data to aid in determining the distribution of glacial moraines and potential APCs. A detailed file listing is included with the data deliverable.

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Glacial Moraines and Benthic Habitats: Delineation of Seabed Classification and Benthic Habitats for South Fork Wind Farm and Export Cable

FIGURES

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November 23, 2020

LIST OF FIGURES

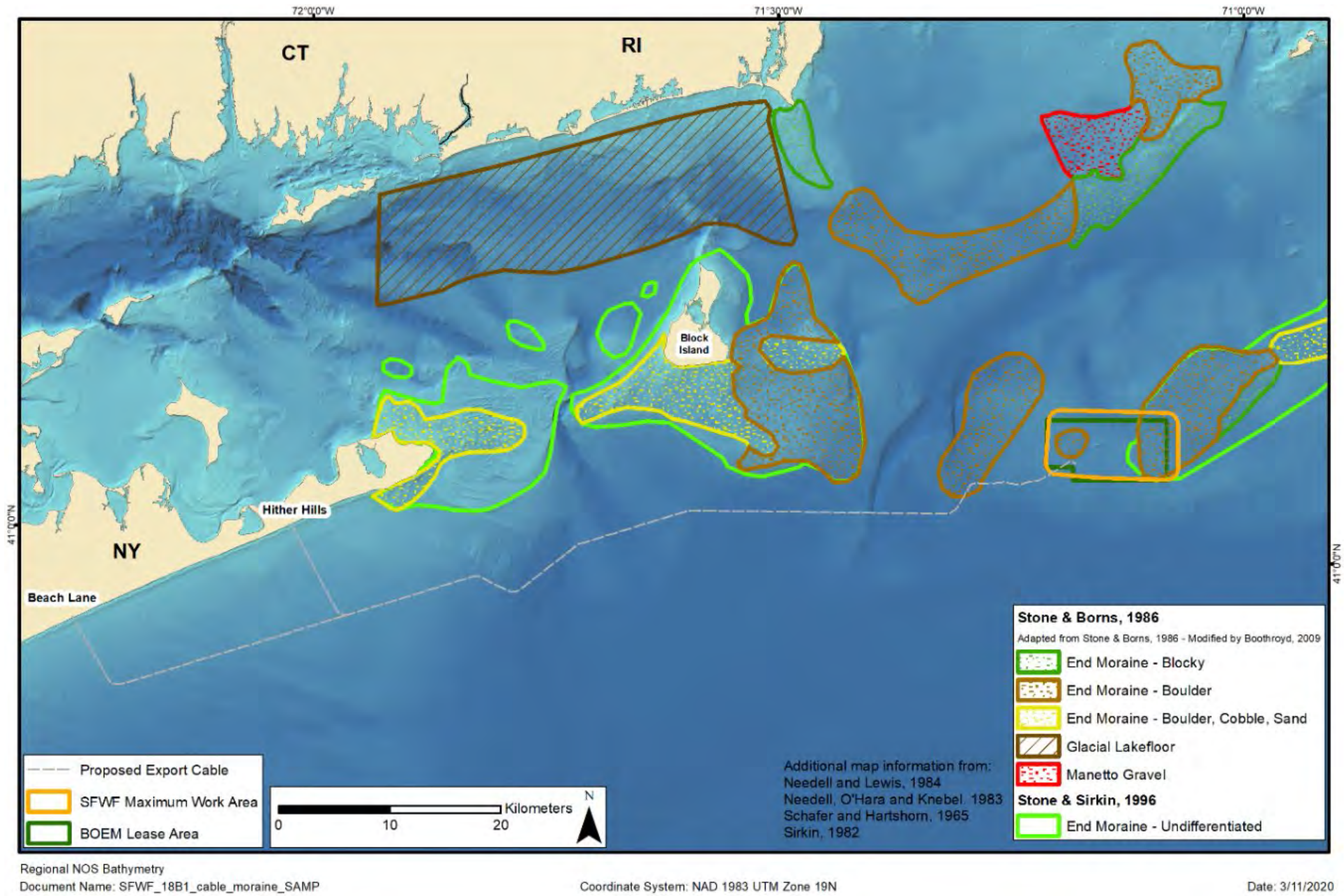


Figure 1. Ocean SAMP Moraine extent in Rhode Island Sound (from Boothroyd 2009)

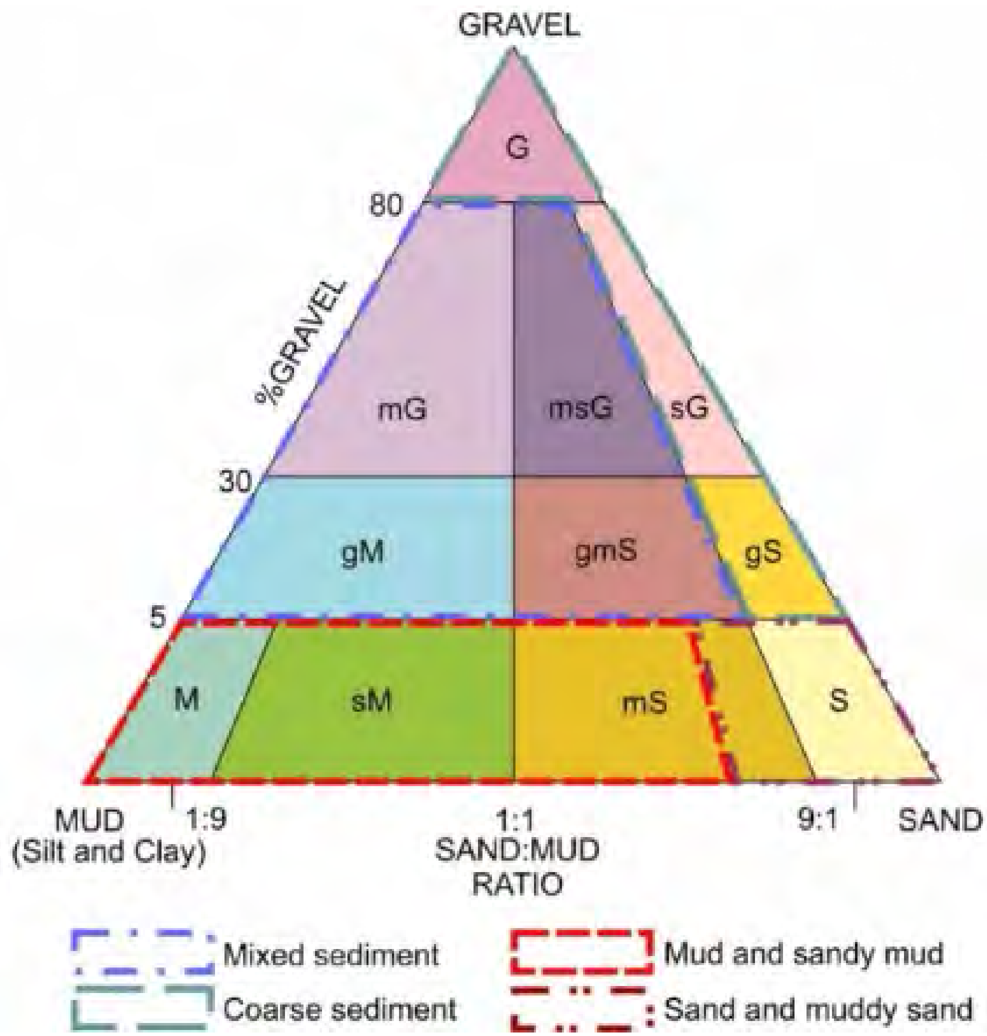


Figure 2. CMECS ternary diagram with Orsted’s geological seabed interpretation categories

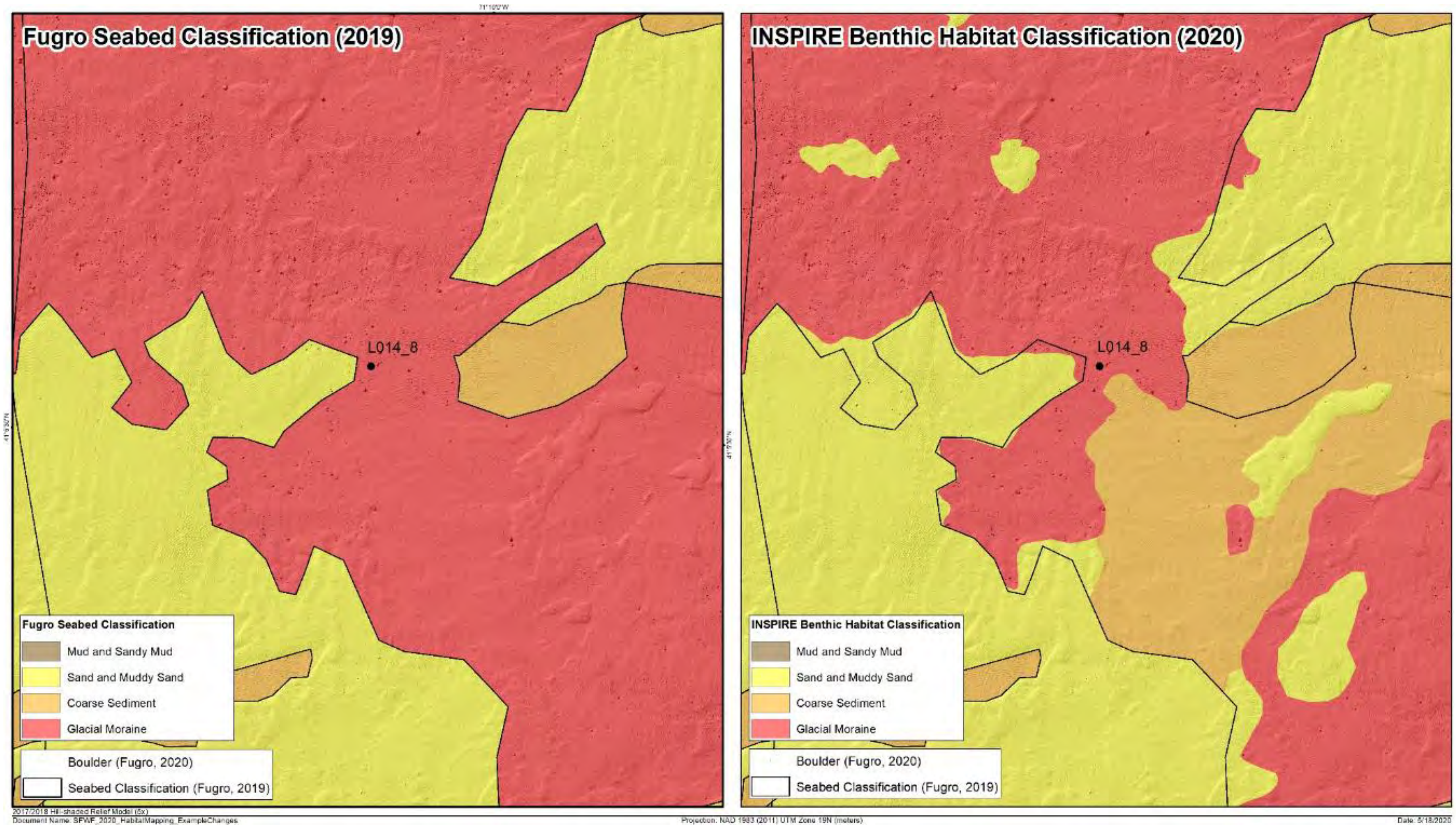
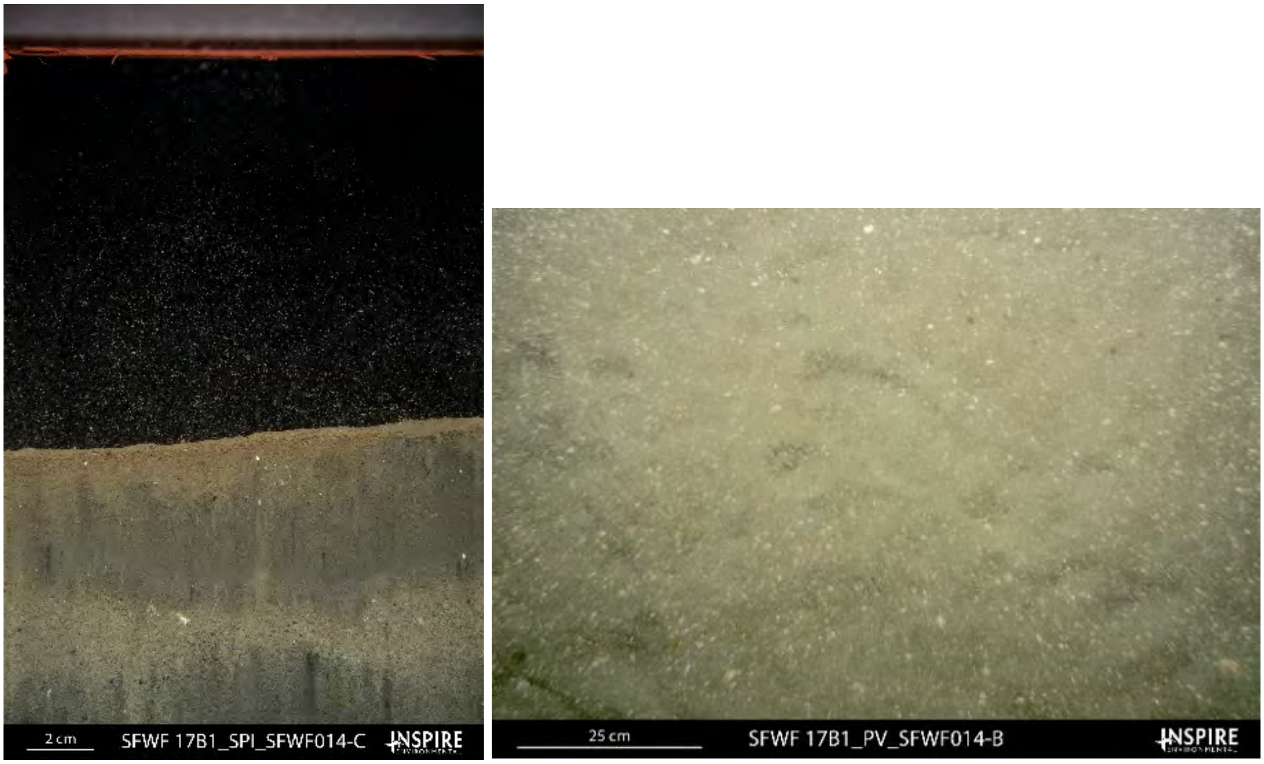
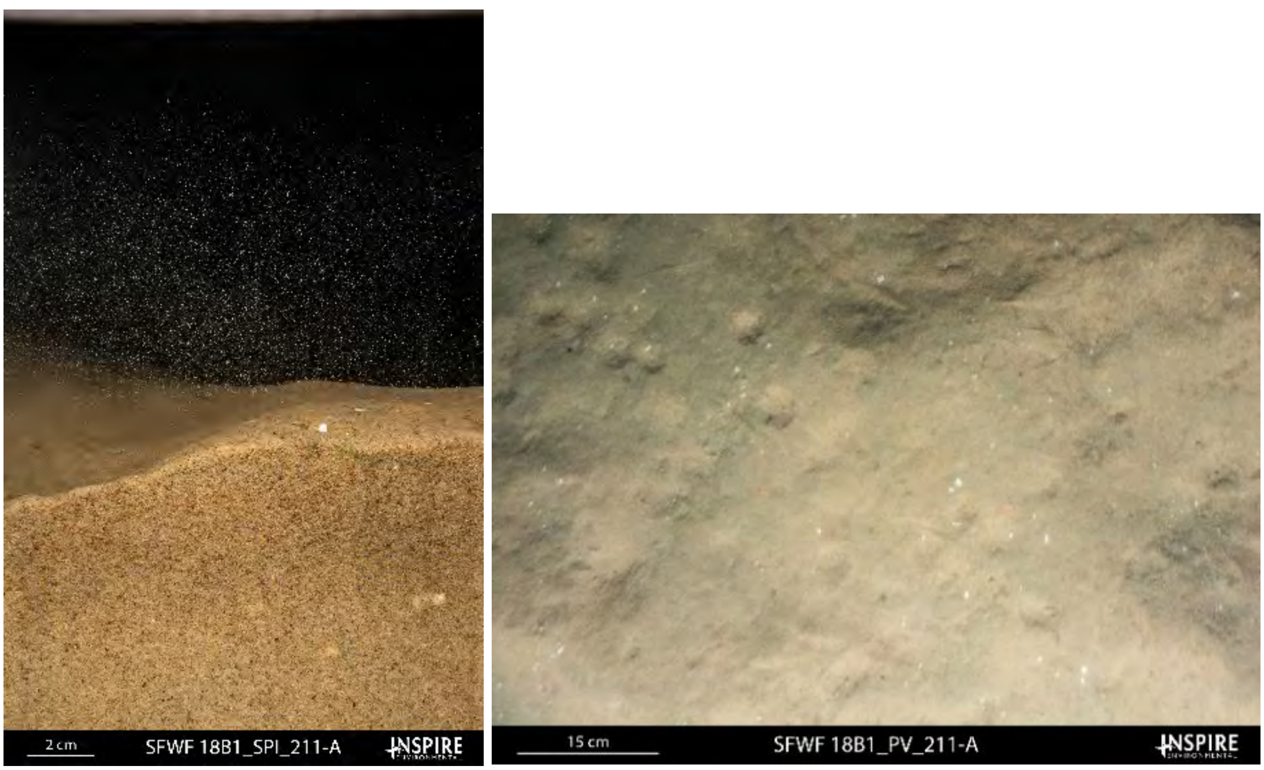


Figure 3. Geological seabed interpretation of glacial moraine refined to the benthic habitat type of glacial moraine for purposes of assessing areas of particular concern

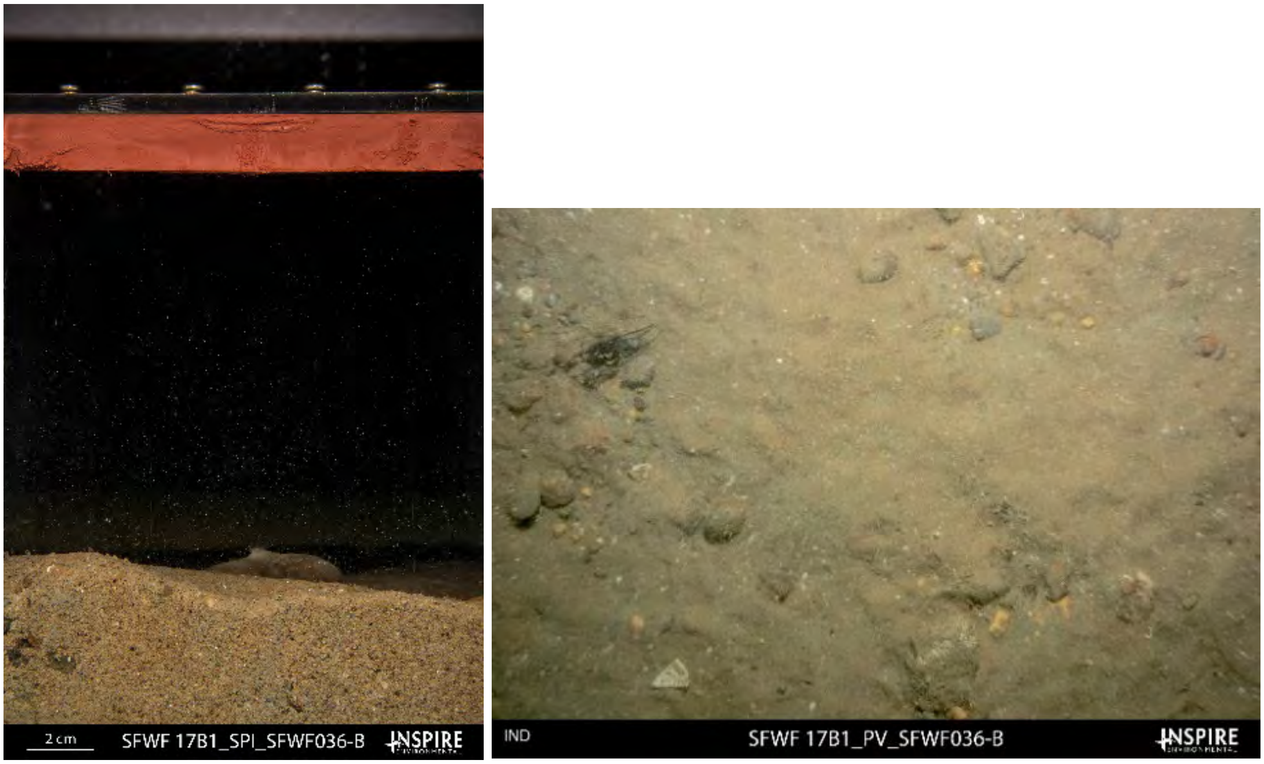


A) Mud and Sandy Mud



B) Sand and Muddy Sand

Figure 4. Images representative of each habitat type: A) Mud and Sandy Mud; B) Sand and Muddy Sand; C) Coarse Sediment; D) Glacial Moraine A; and E) Glacial Moraine B



C) Coarse Sediment

D) Glacial Moraine A

Figure 4 continued. Images representative of each habitat type: A) Mud and Sandy Mud; B) Sand and Muddy Sand; C) Coarse Sediment; D) Glacial Moraine A; and E) Glacial Moraine B

E) Glacial Moraine B

Figure 4 continued. Images representative of each habitat type: A) Mud and Sandy Mud; B) Sand and Muddy Sand; C) Coarse Sediment; D) Glacial Moraine A; and E) Glacial Moraine B

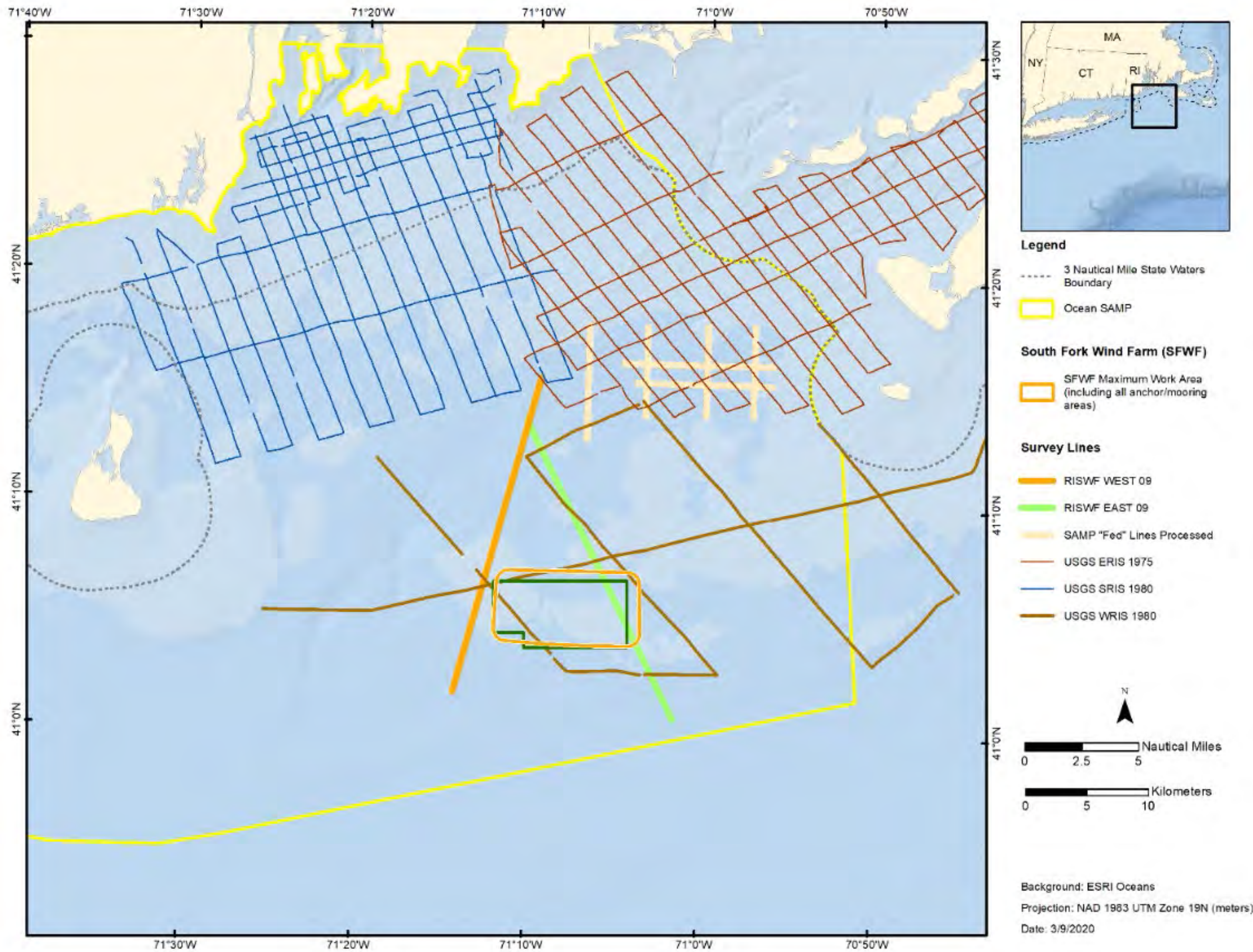
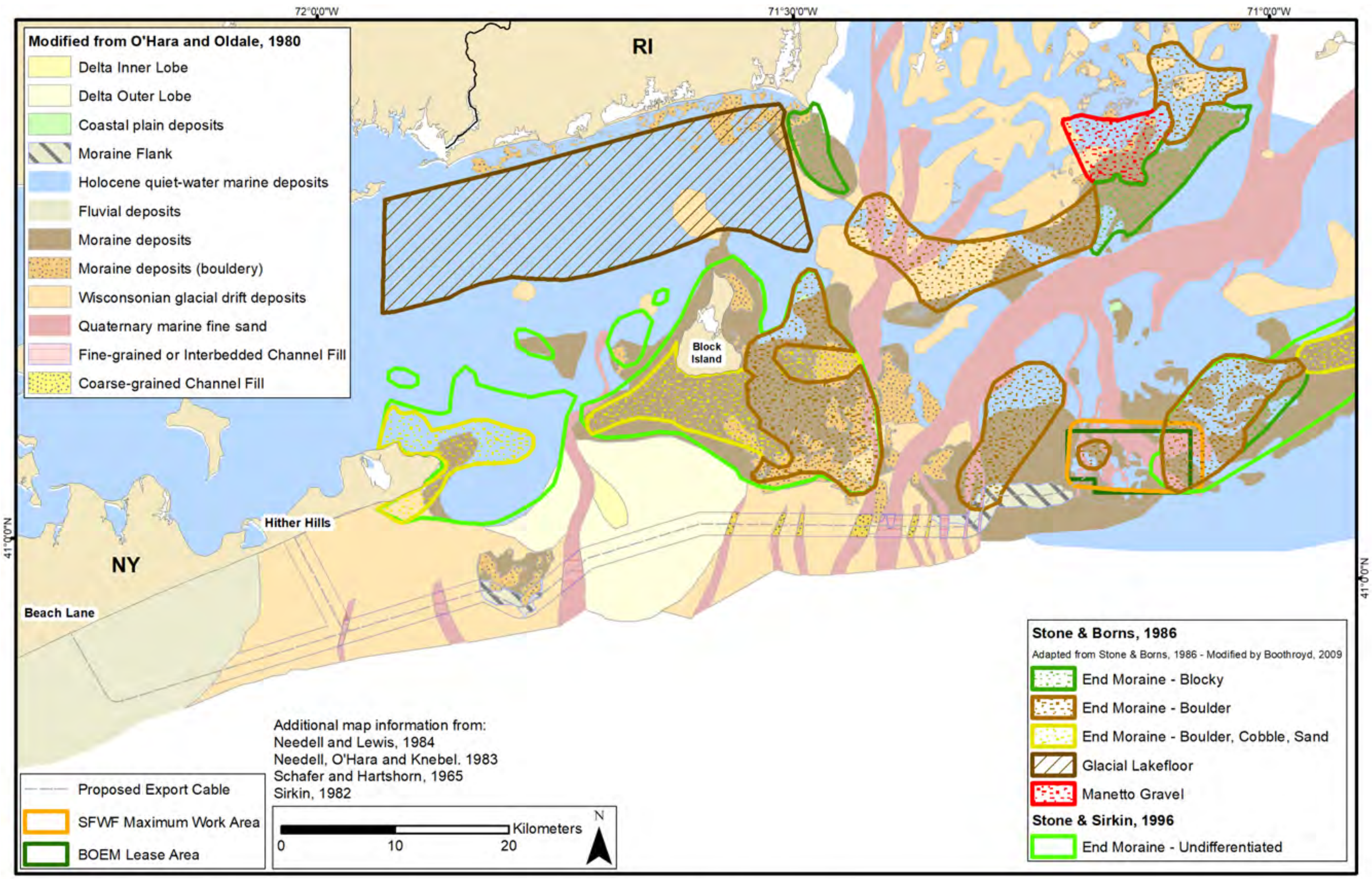


Figure 5. Geophysical data in Rhode Island Sound available in 2010 (from Carey et al. 2010)



Document Name: SFWF_18B1_cable_moraine_SAMP_OHara   Coordinate System: NAD 1983 UTM Zone 19N   Date: 3/11/2020

Figure 6. Distribution of surficial geological deposits (after Fugro 2019 modification to O'Hara and Oldale 1980) in Rhode Island Sound compared to Ocean SAMP moraine map

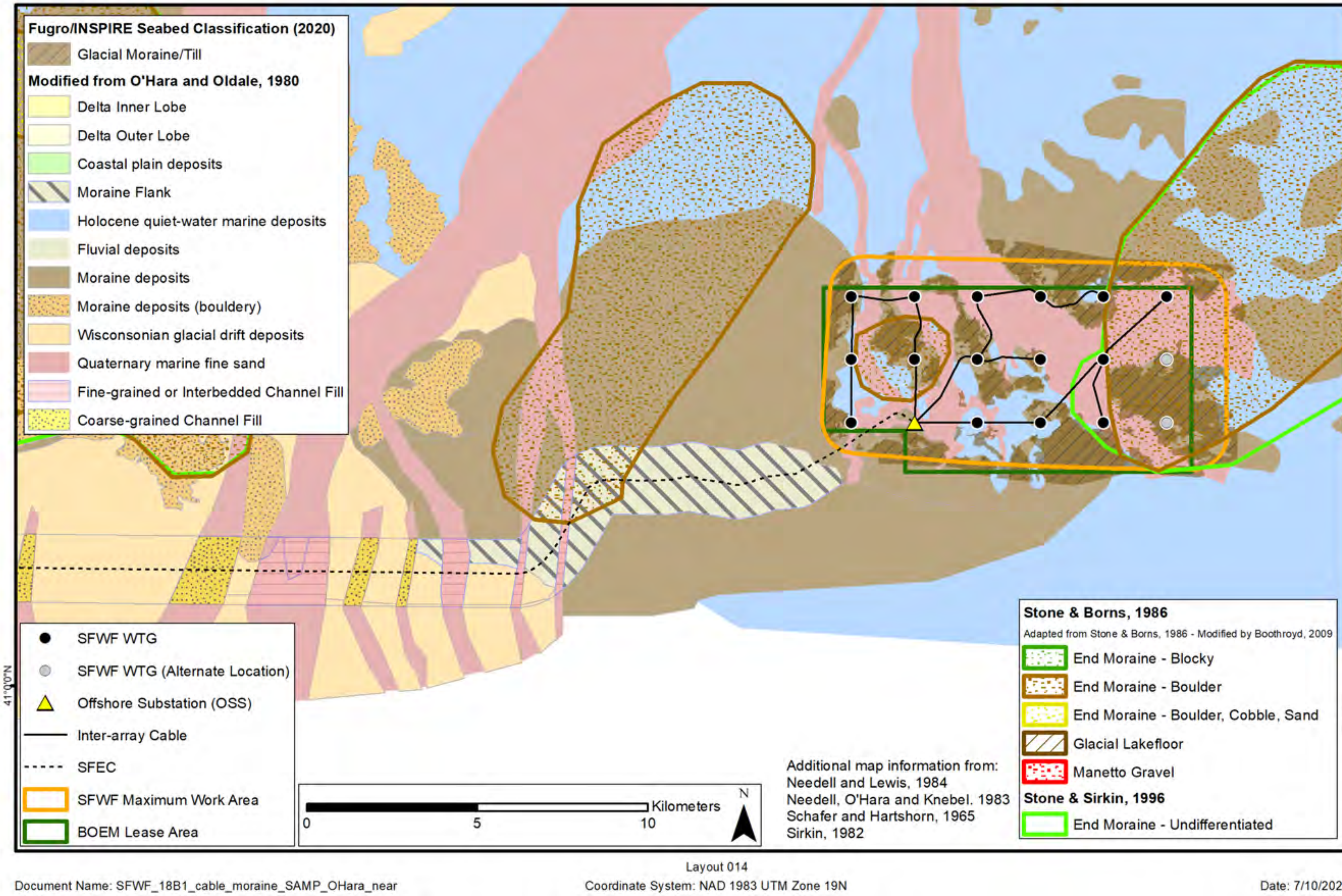


Figure 7. Distribution of surficial geological deposits in SFWF (after Fugro 2019 updated interpretation) compared to Ocean SAMP moraine map

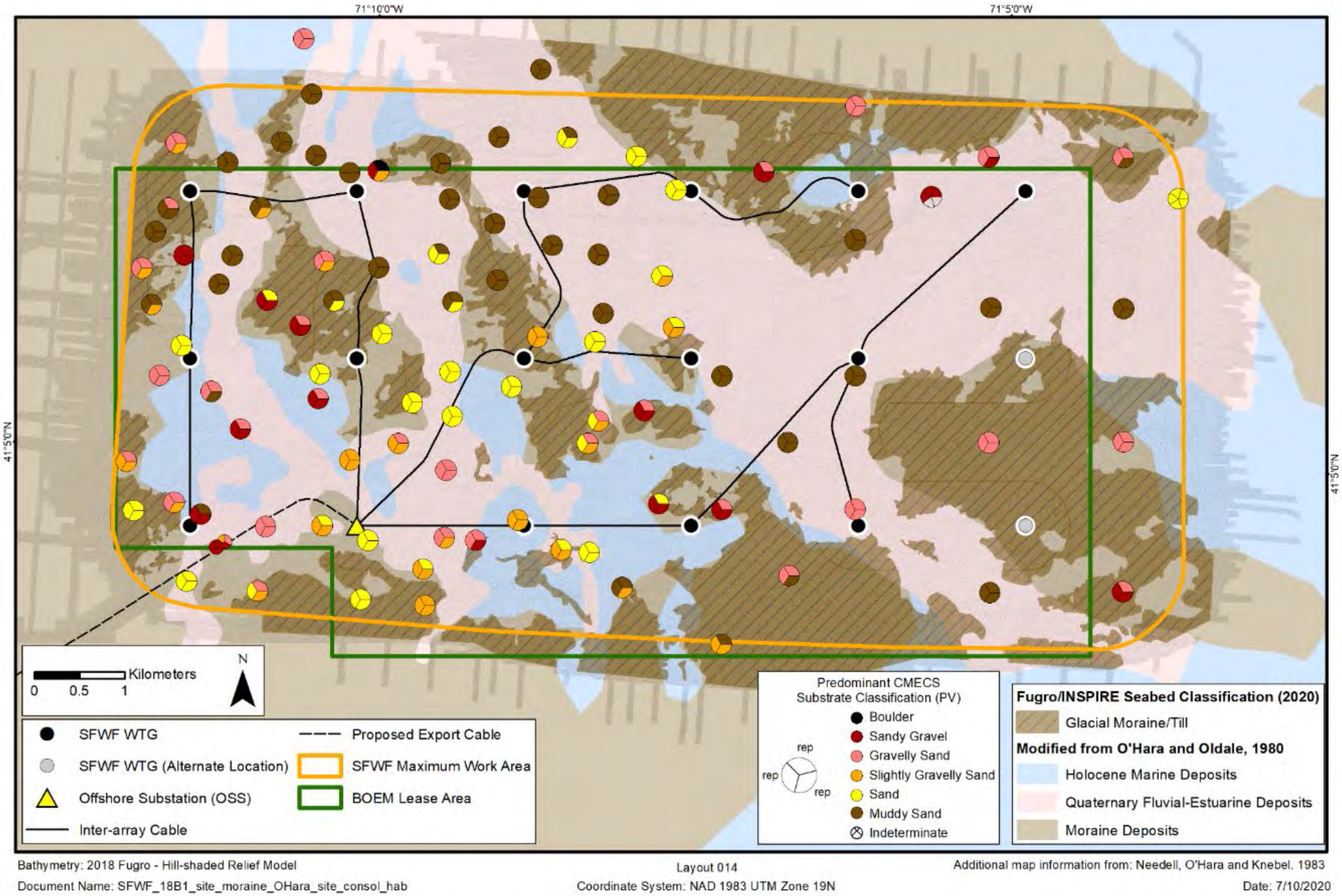
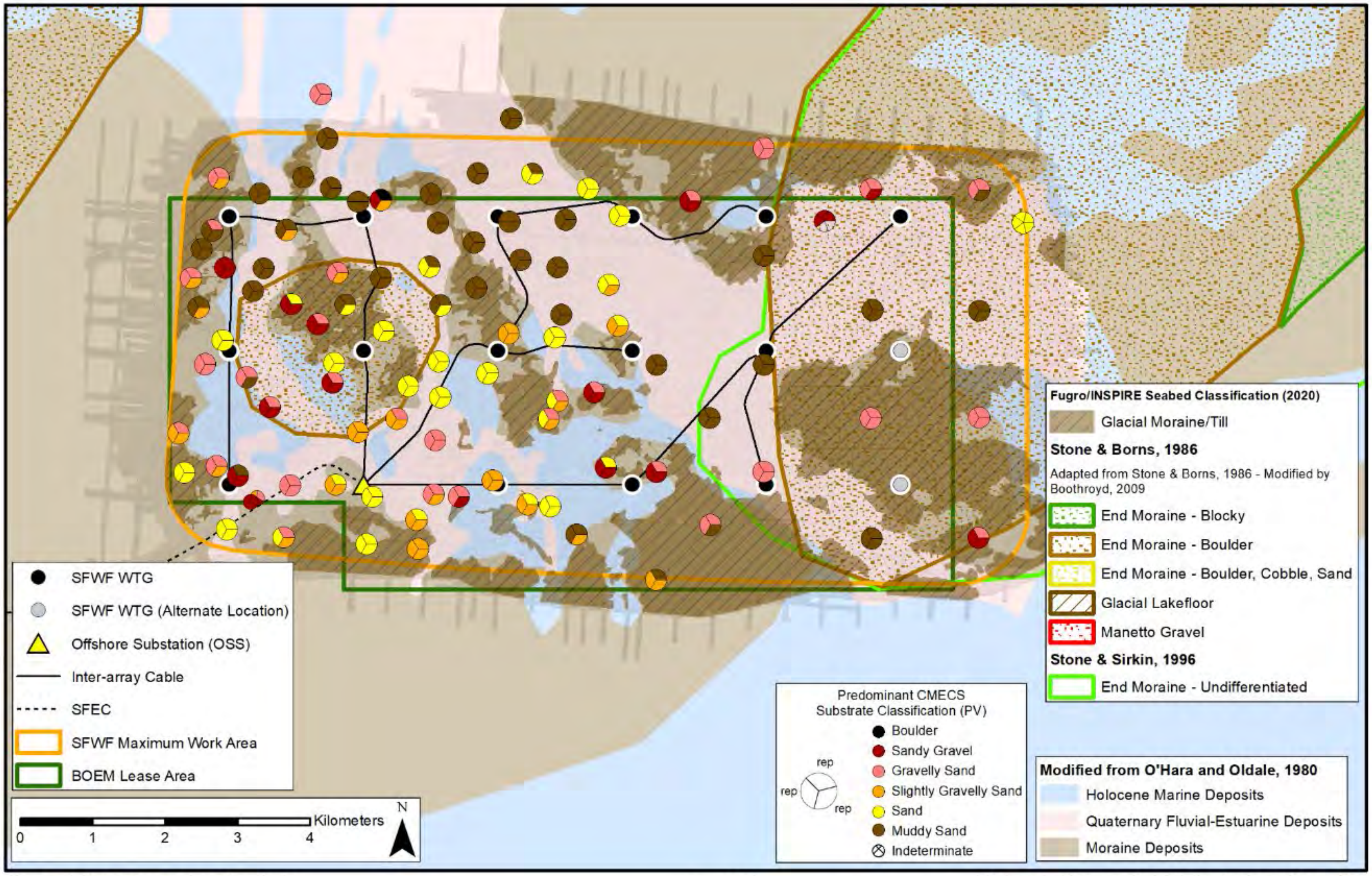


Figure 8. Distribution of surficial geological deposits (after Fugro 2019 updated interpretation) and Substrate types in SFWF



Bathymetry: 2018 Fugro - Hill-shaded Relief Model
Document Name: SFWF_18B1_site_moraine_OHara_site_consol_hab_Stone_Barns
Layout 014
Coordinate System: NAD 1983 UTM Zone 19N
Additional map information from: Needell, O'Hara and Knebel. 1983
Date: 7/10/2020

Figure 9. Distribution of surficial geological deposits (after Fugro 2019 updated interpretation) and Substrate types in SFWF compared to Ocean SAMP moraine map

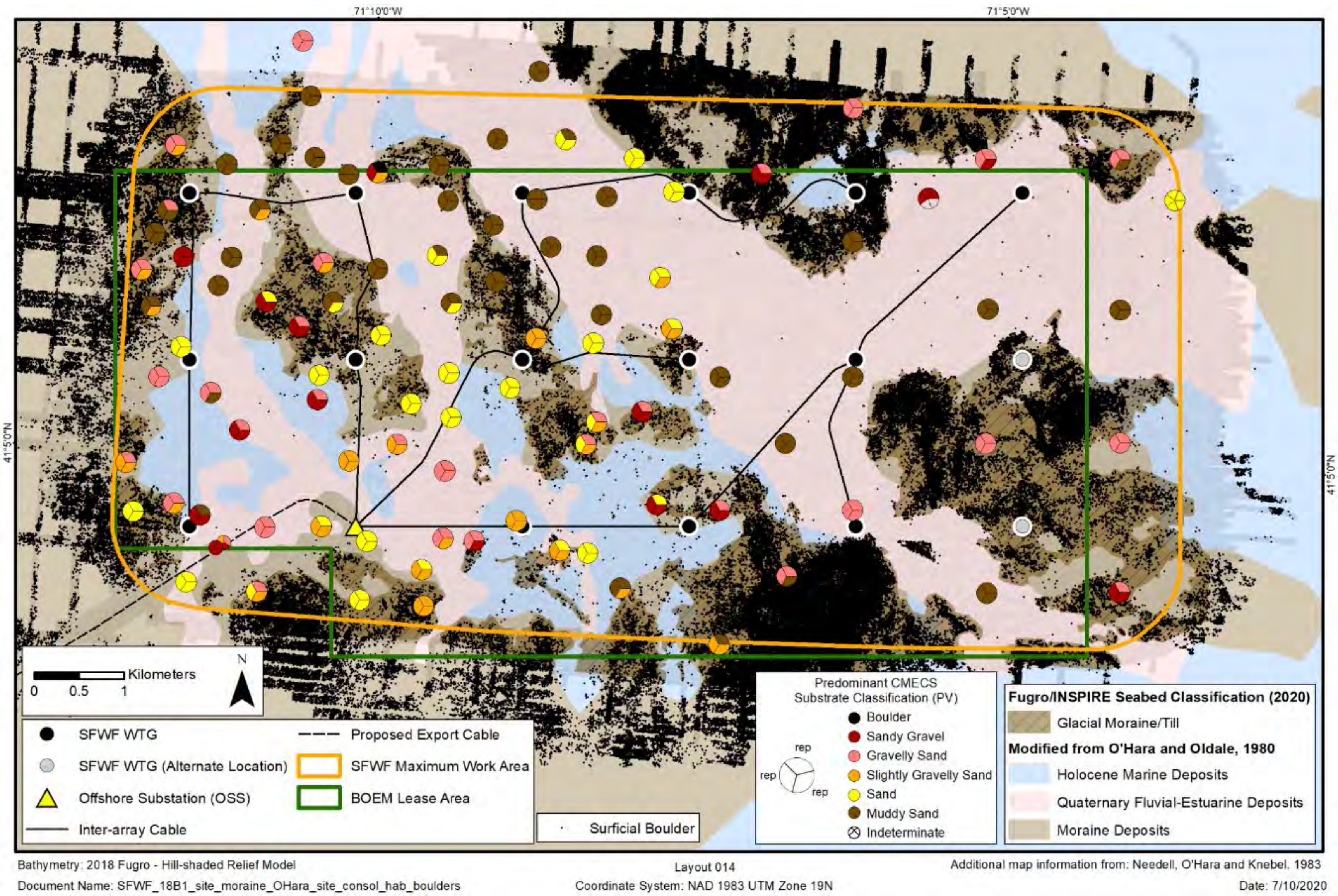


Figure 10. Boulder density (from Fugro 2019) compared to surficial geology (after Fugro 2019 updated interpretation)

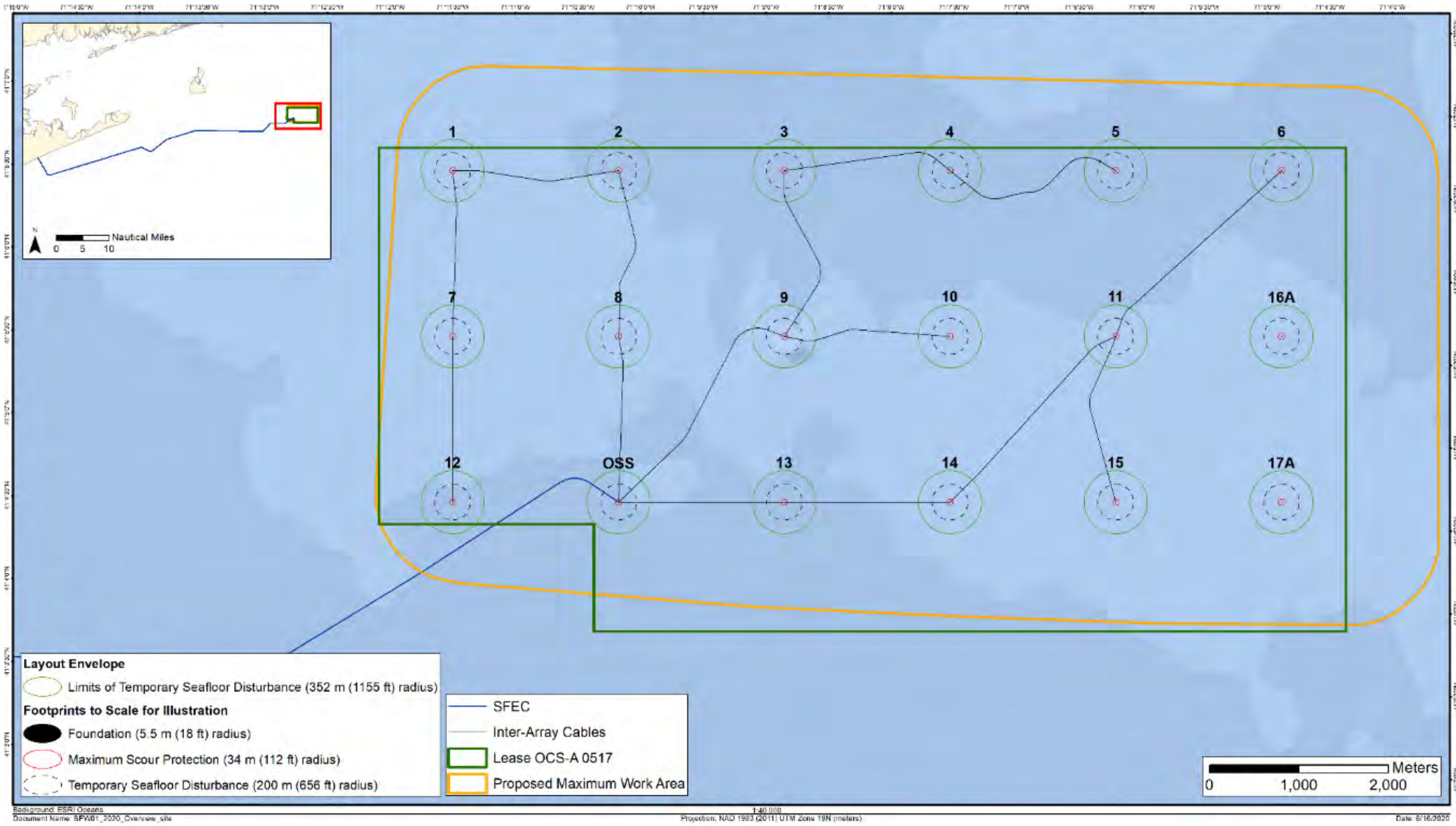


Figure 11. **South Fork Wind Lease Area proposed project design on 1 x 1 nm grid and planned Inter-array Cables**

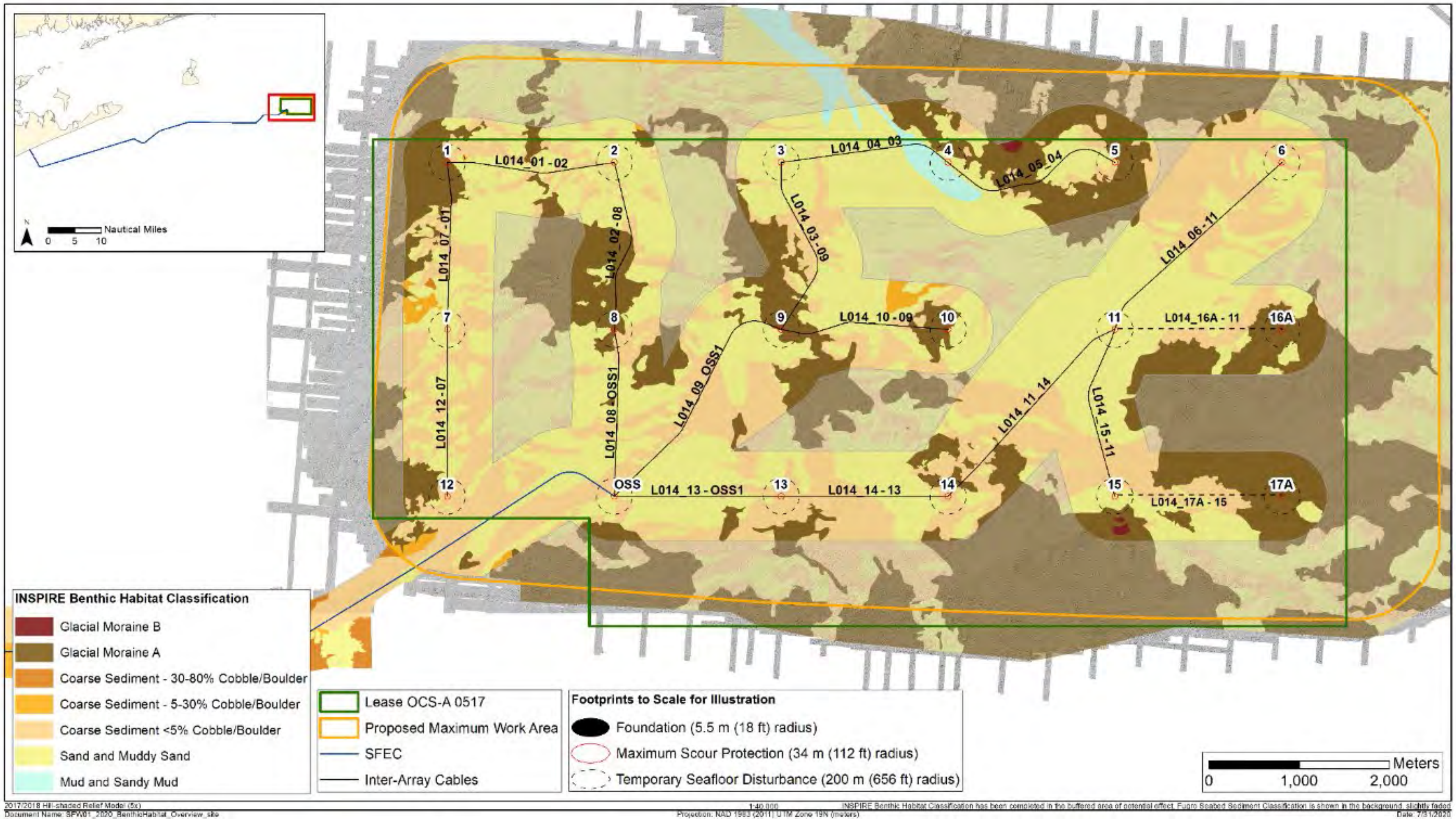


Figure 12. Benthic habitat classification at SFWF

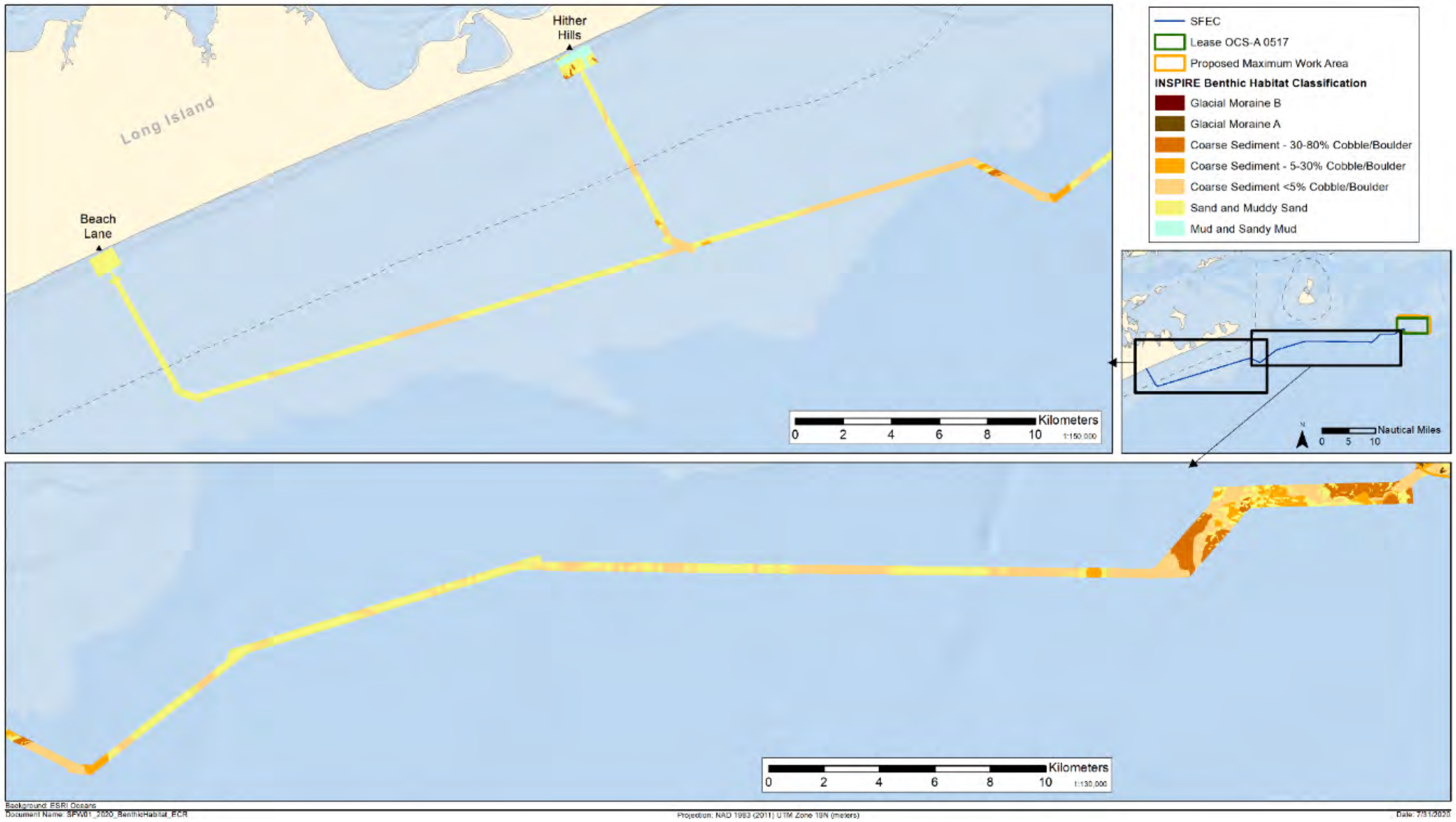


Figure 13. Benthic habitat classification at SFEC

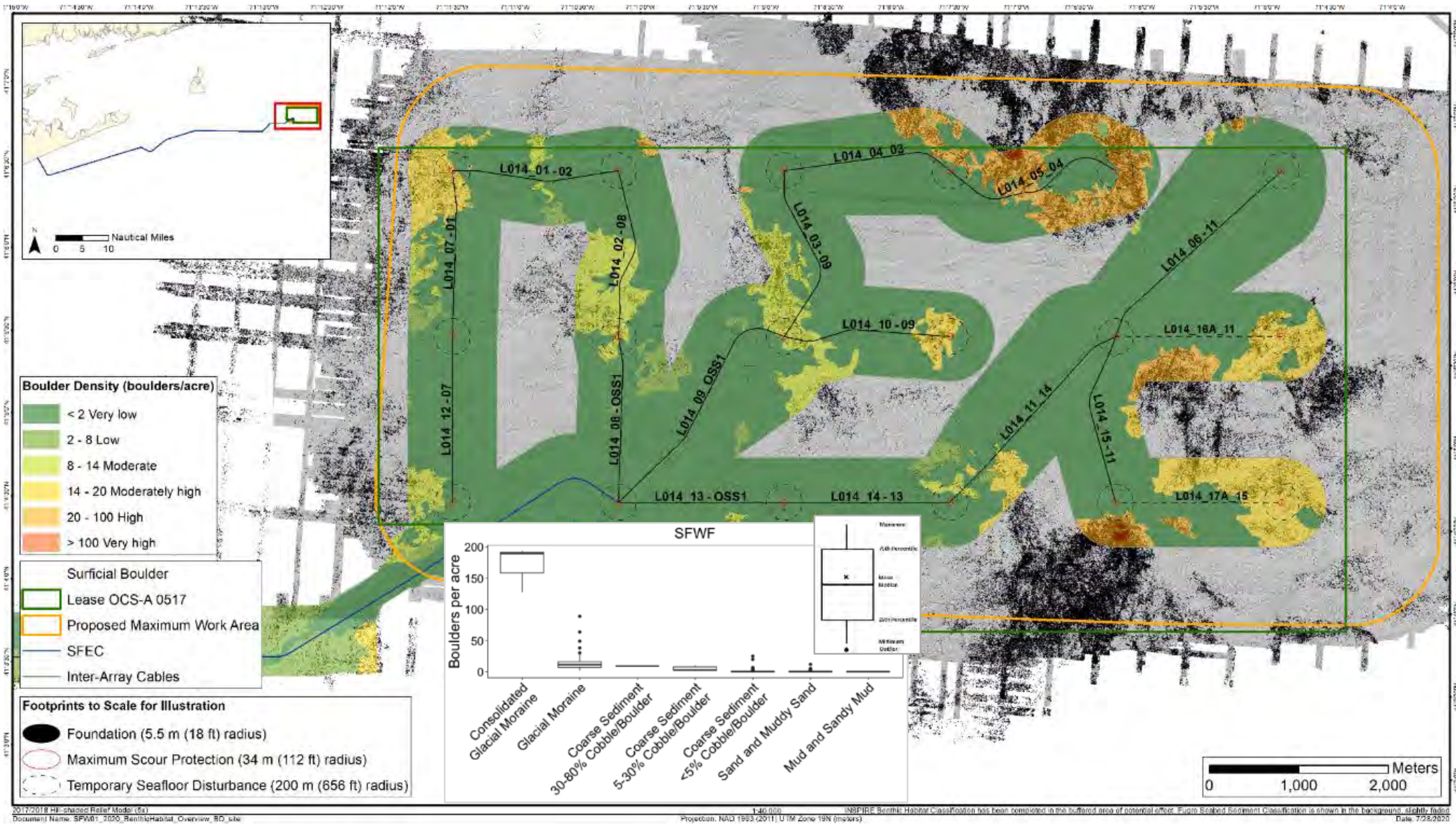


Figure 14. Boulder density at SFWF

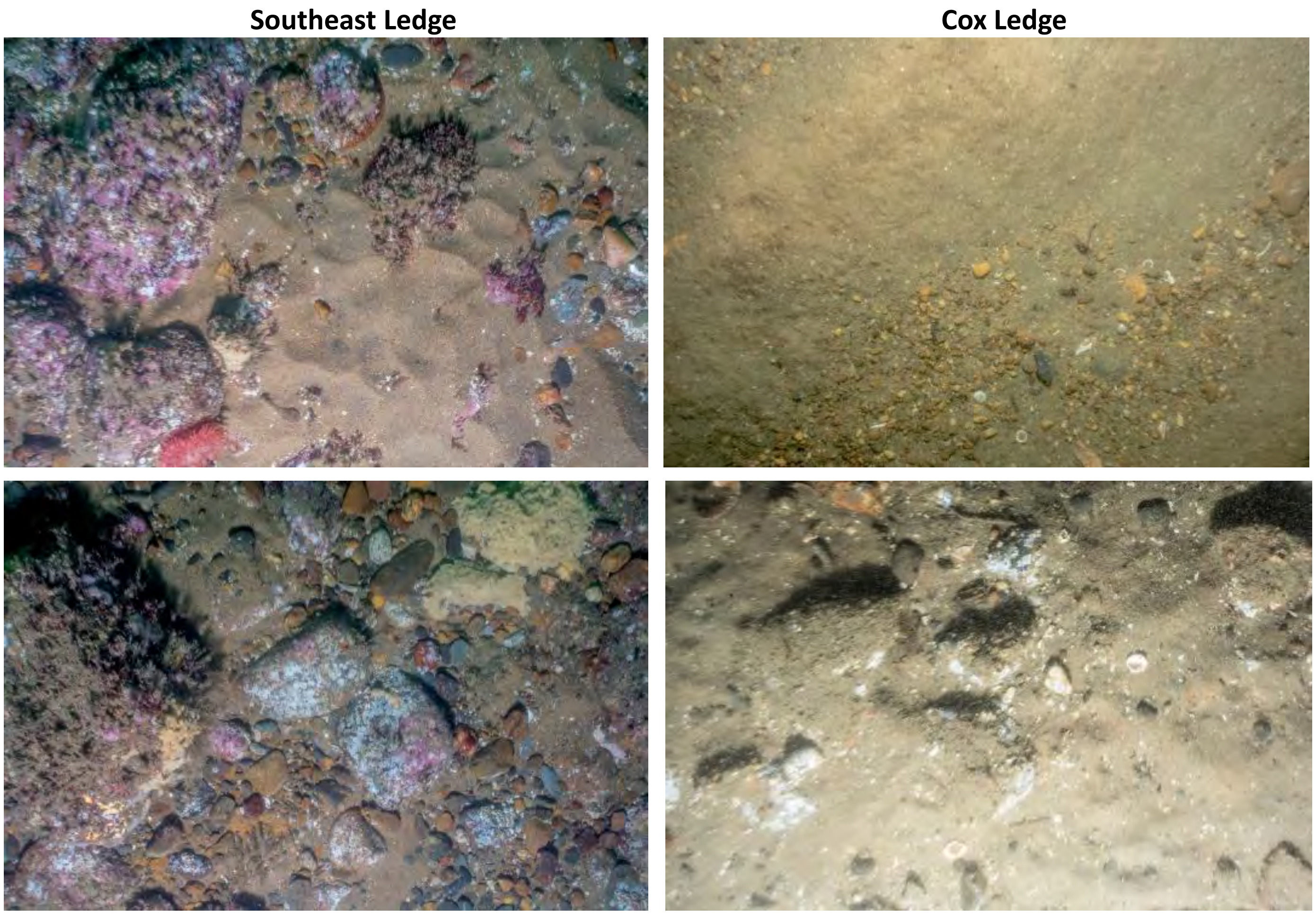


Figure 15. Comparison of glacial moraine habitats on Southeast Ledge, near the Block Island Wind Farm, and at Cox Ledge, which intersects the South Fork Wind lease area. Continuous and nearly continuous cobble/boulder fields supporting abundant and diverse epifauna are found at Southeast Ledge, whereas the moraine habitats found at Cox Ledge are primarily characterized by mobile gravelly sands with isolated patches of cobbles and boulders.

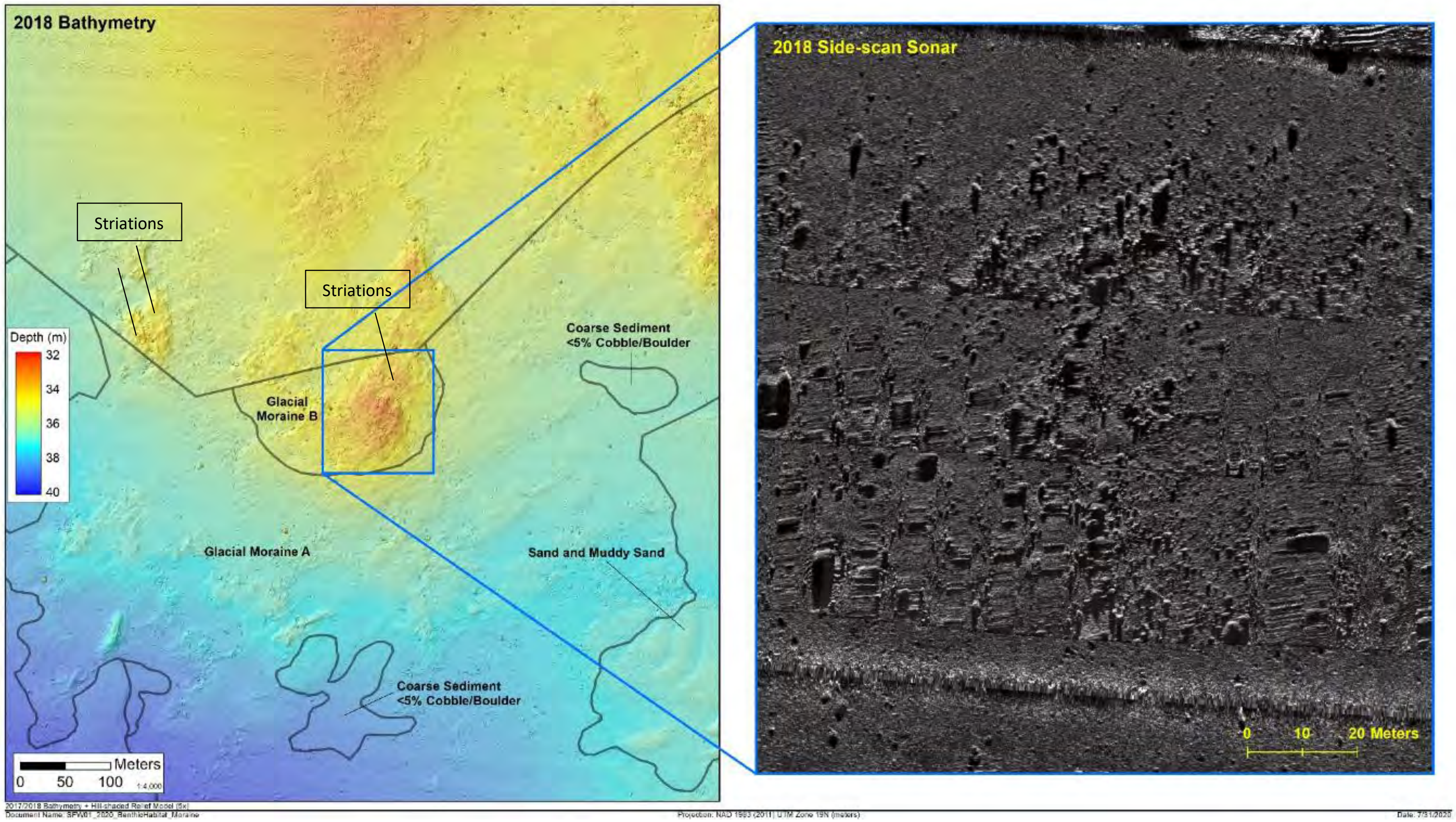


Figure 16. Example of Glacial Moraine B habitat at SFWF

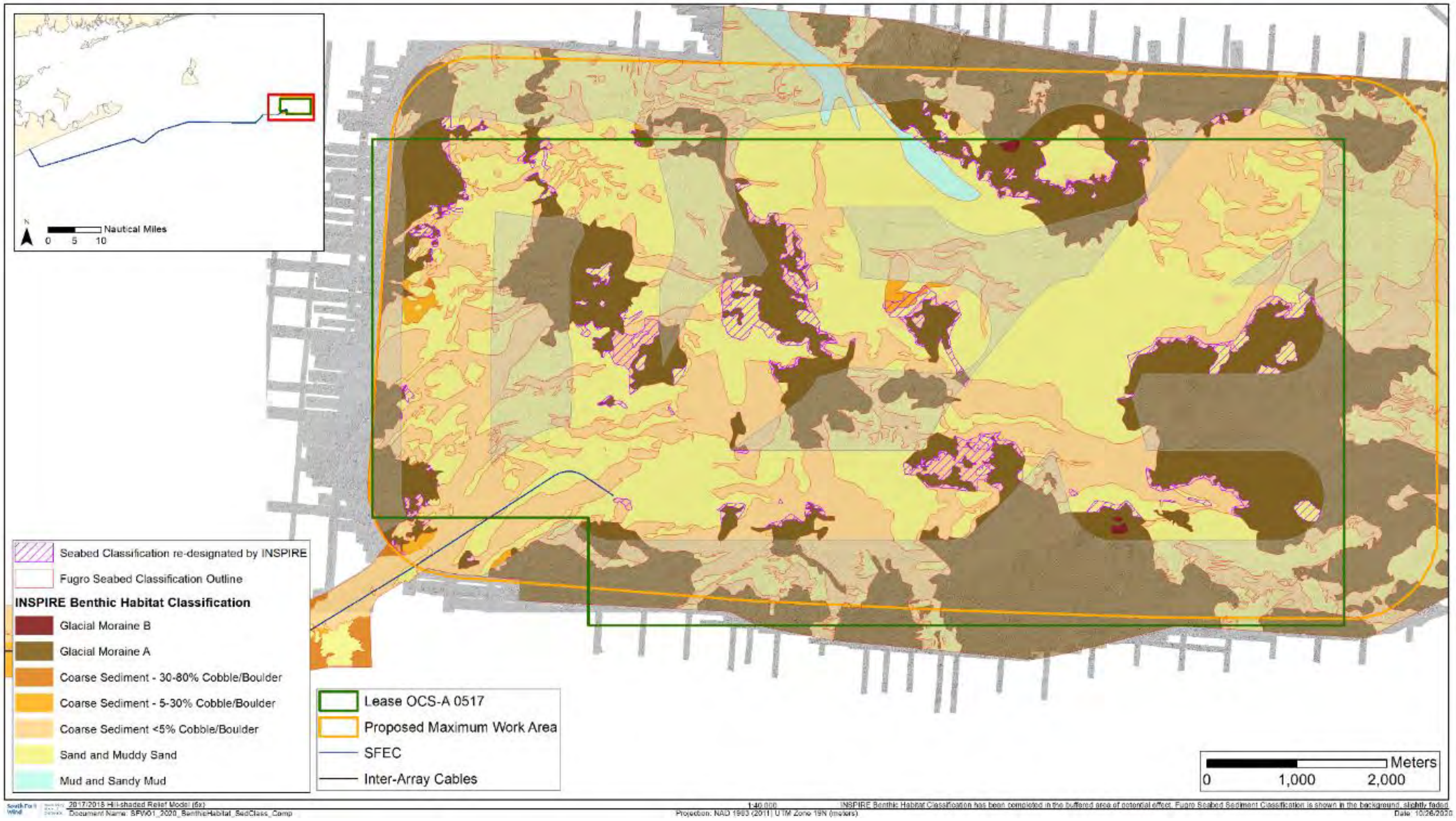


Figure 17. Areas of seabed moraine classification that were re-classified to a non-moraine habitat type at SFWF

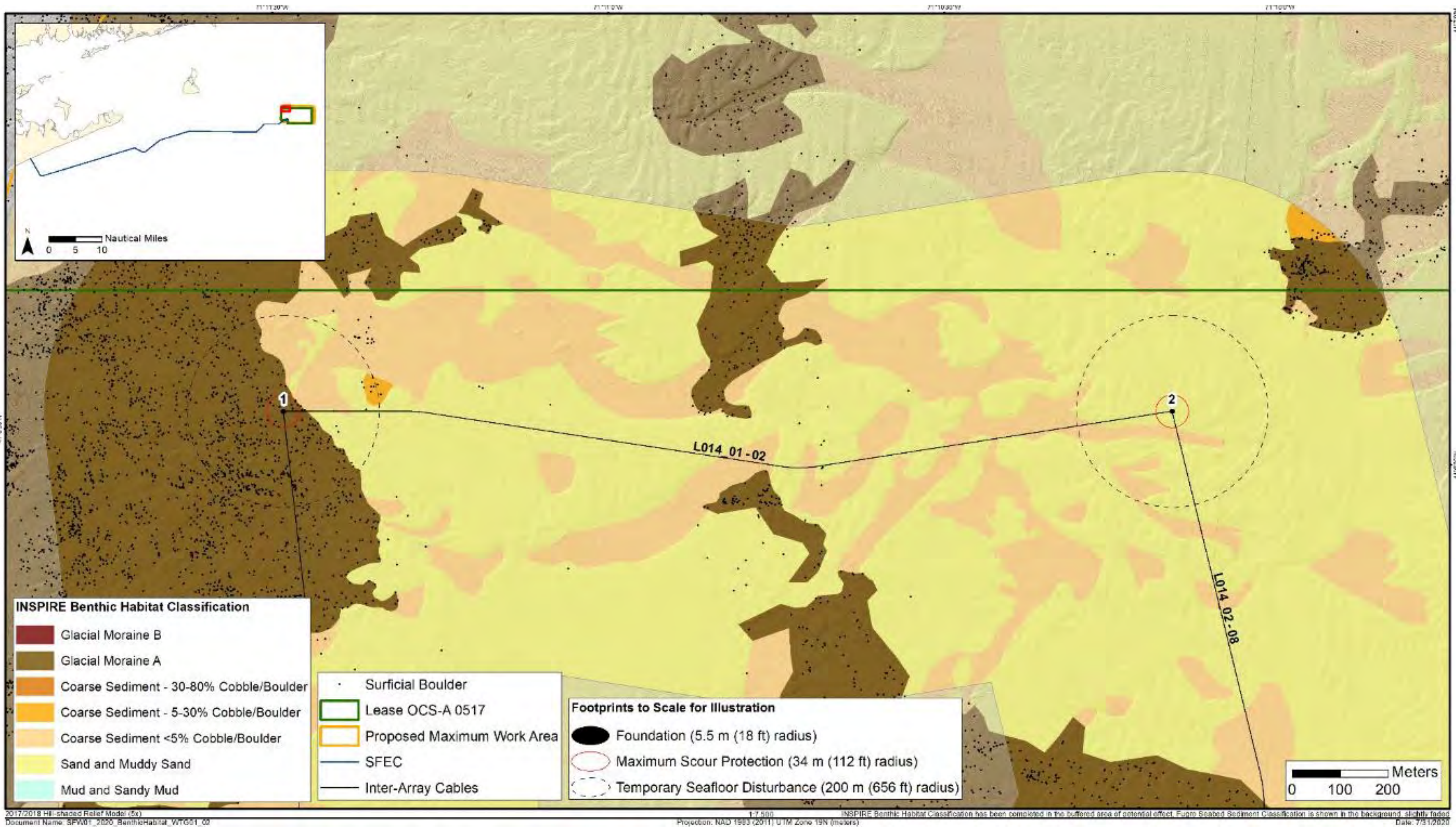


Figure 18. WTG1 and WTG2 with habitat classification

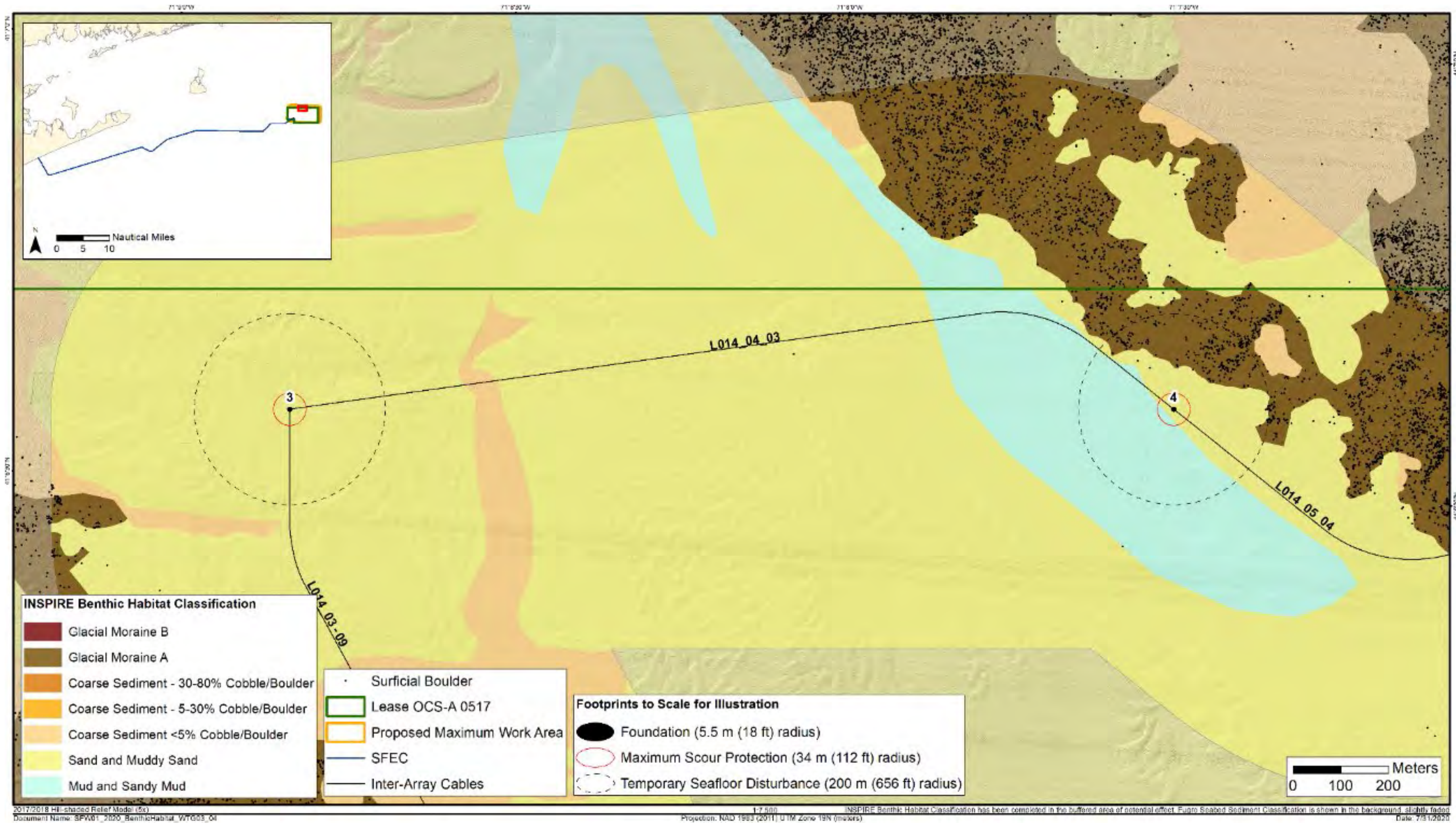


Figure 19. **WTG3 and WTG4 with habitat classification**

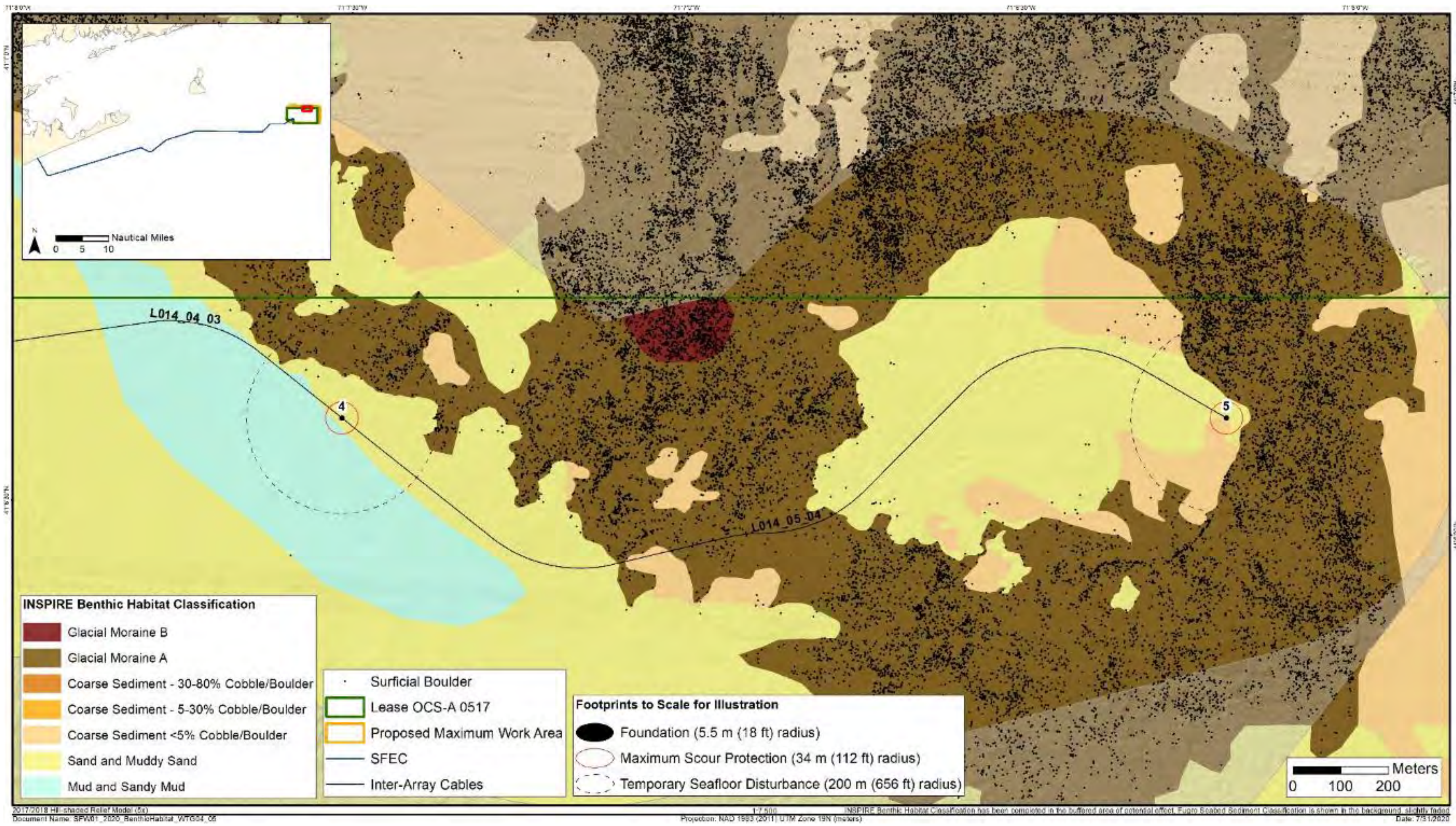


Figure 20. WTG4 and WTG5 with habitat classification

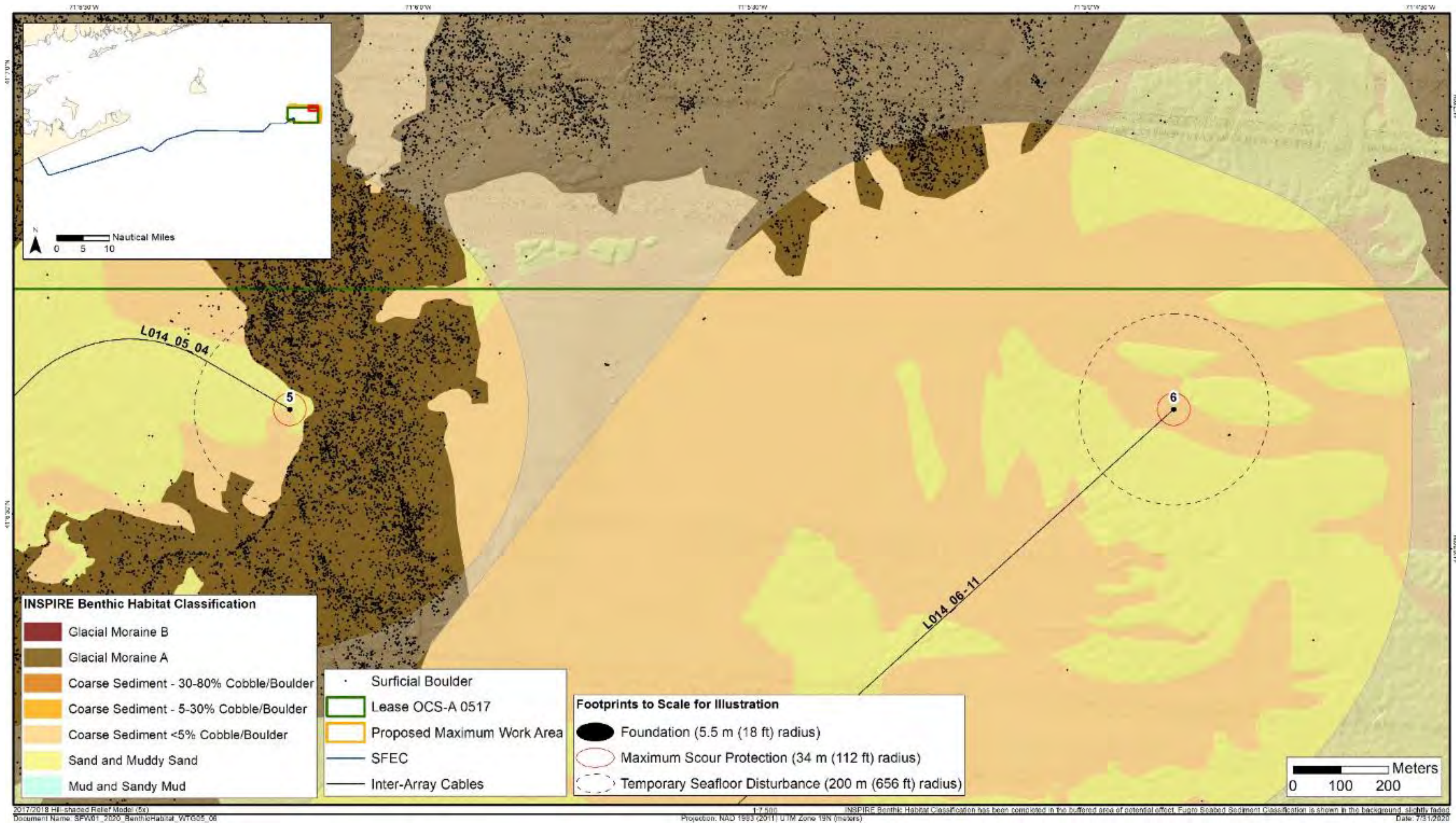


Figure 21. WTG5 and WTG6 with habitat classification

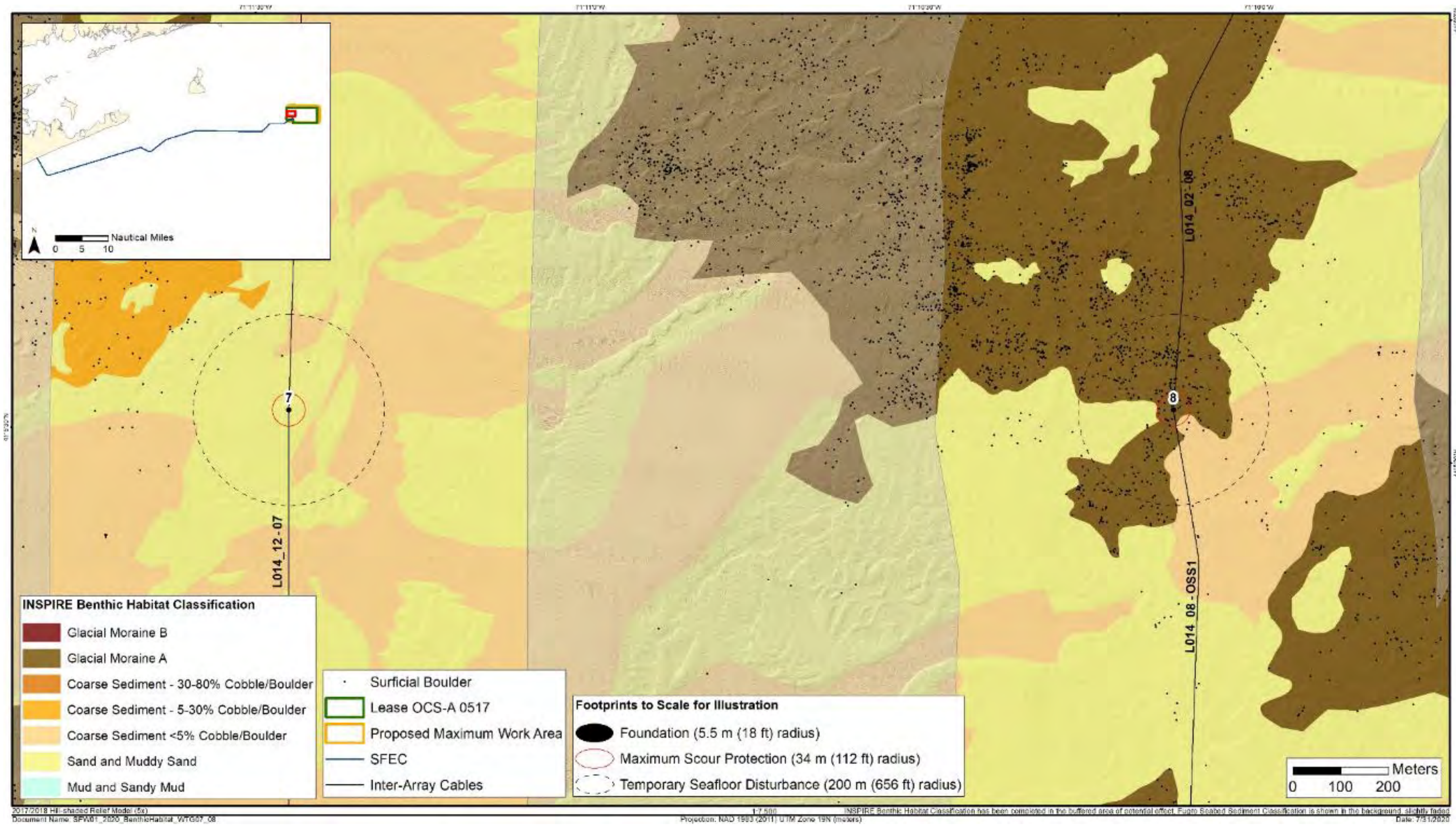


Figure 22. WTG7 and WTG8 with habitat classification

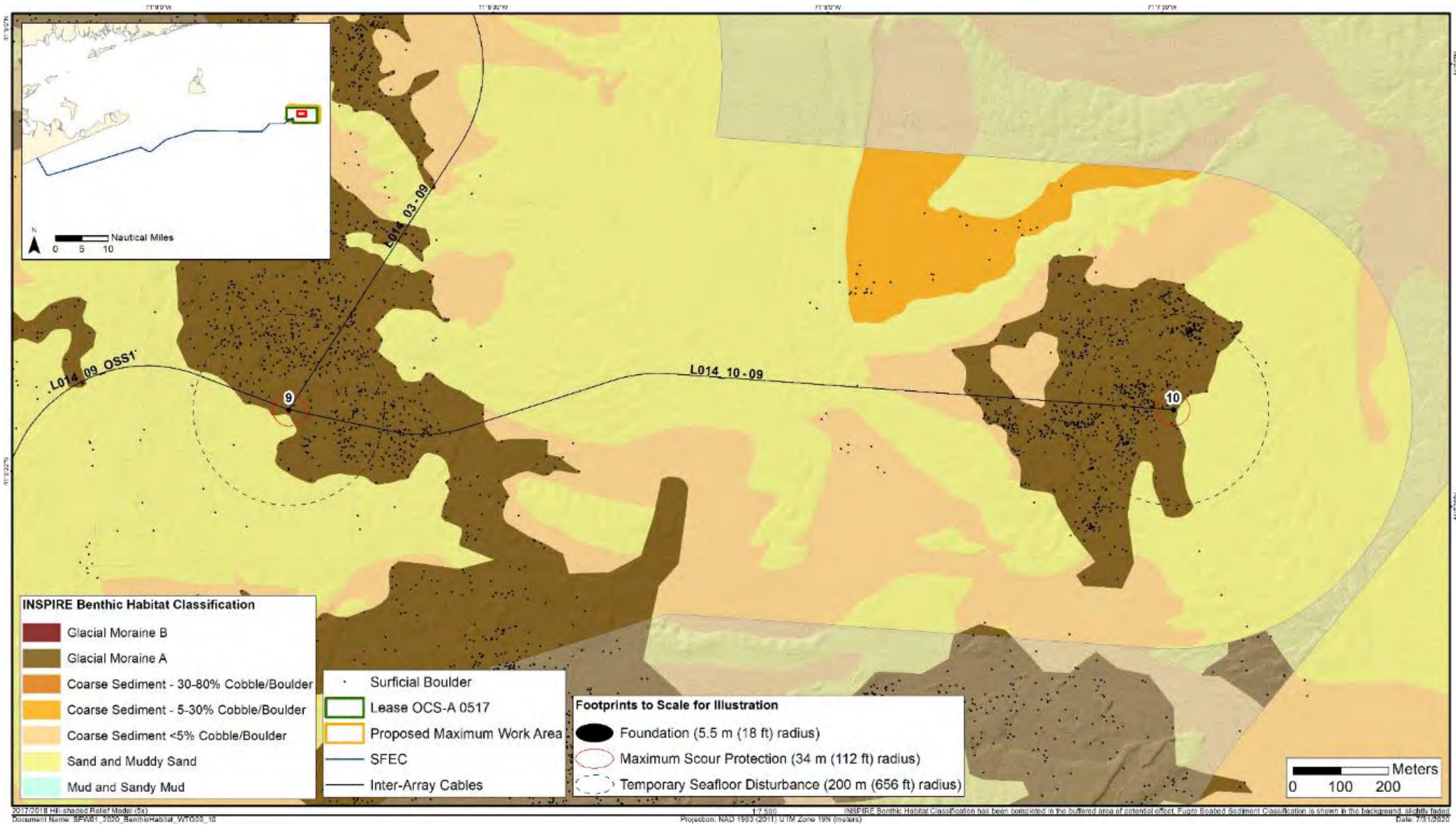


Figure 23. WTG9 and WTG10 with habitat classification

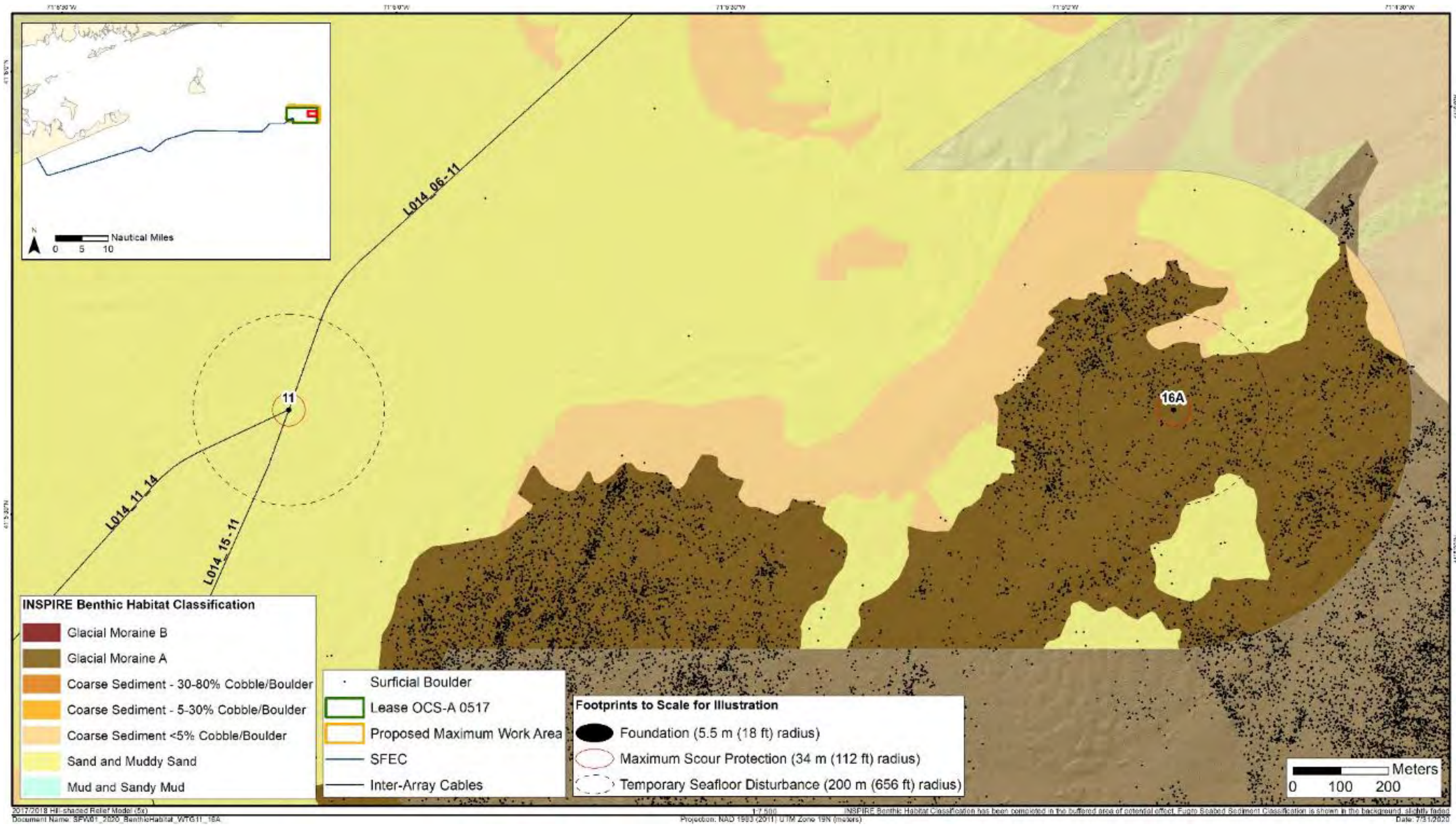


Figure 24. WTG11 and Alternate16A with habitat classification

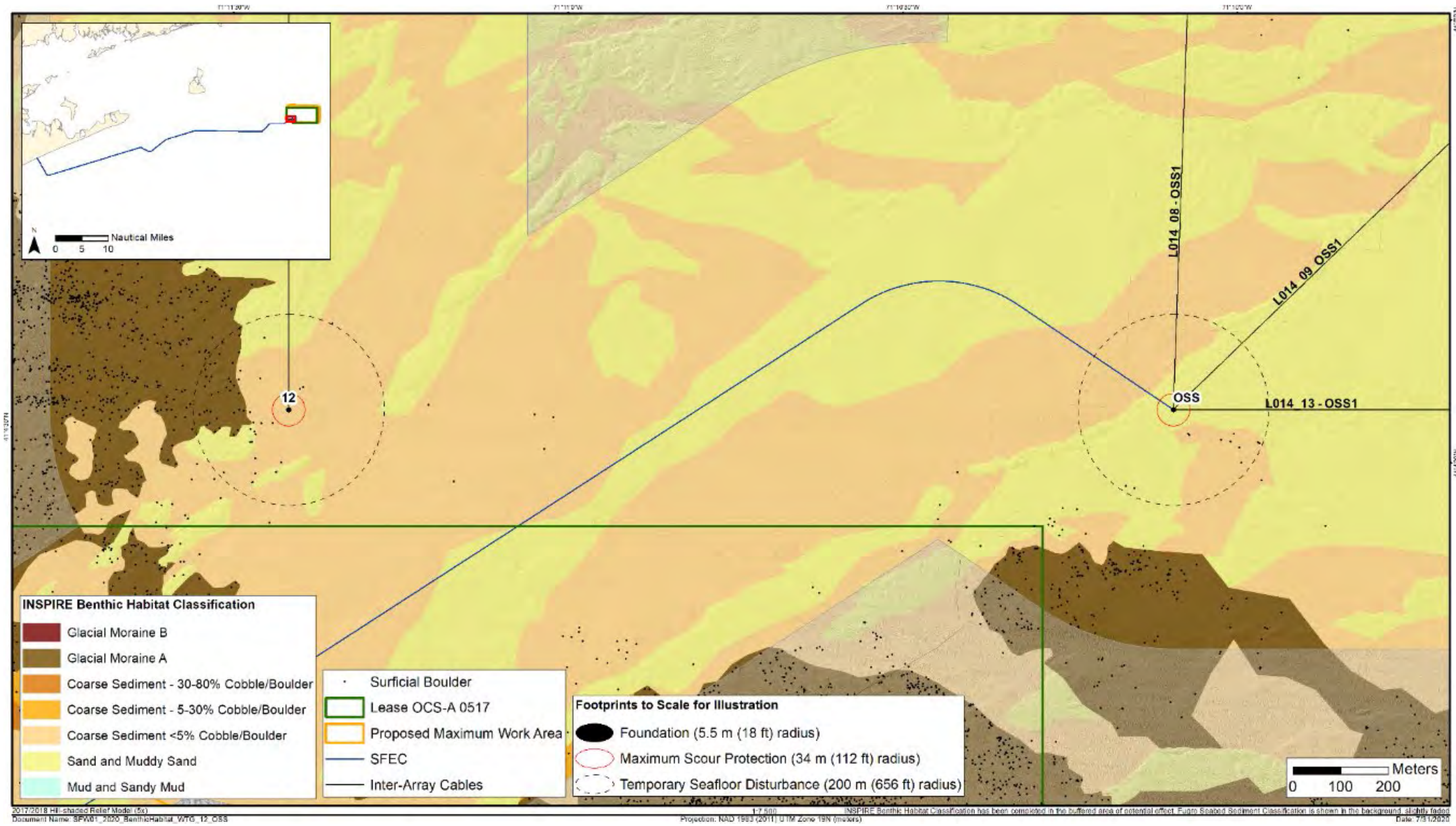


Figure 25. WTG12 and OSS with habitat classification

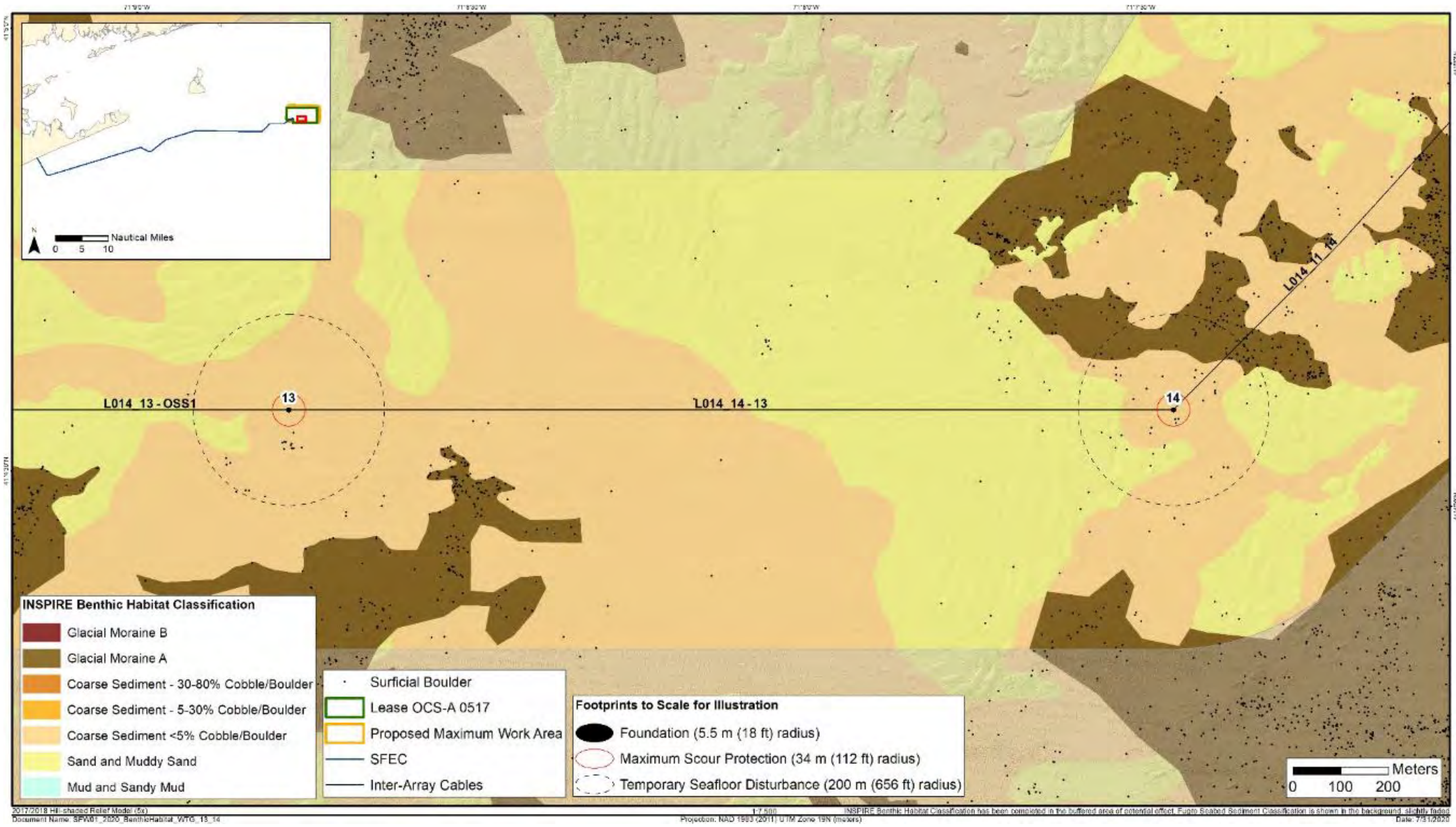


Figure 26. WTG13 and WTG14 with habitat classification

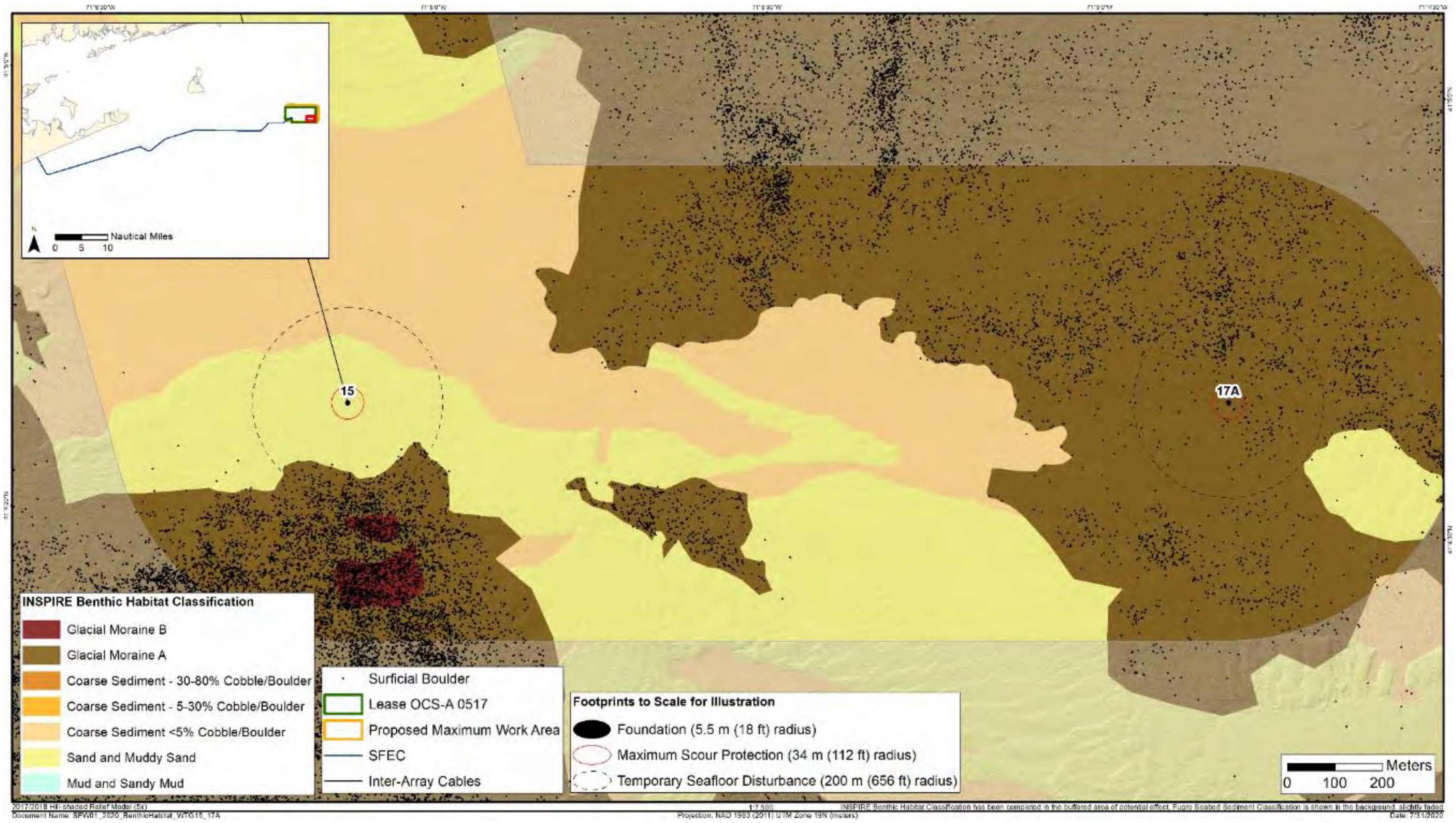


Figure 27. WTG15 and Alternate 17A with habitat classification

Appendix A

Data to Support the Characterization of Habitats within the South Fork Wind Lease Area and Export Cable

Data to Support the Characterization of Habitats within the South Fork Wind Lease Area and Export Cable

1. **Relevant summary reports (Appendices to COP)**
   - **Appendix H1.** *Integrated Geophysical and Geotechnical Site Characterization Report* (Fugro), Revised May 16, 2019 [source: Fugro 20 May 2019]
   - **Appendix H2.** *Geophysical Survey and Shallow Hazards Report* (Fugro), Revised May 16, 2019 [source: Fugro 20 May 2019]
   - **Appendix H3***. Geotechnical Data Report* (Fugro), April 3, 2019 [source: Fugro 20 May 2019]
   - **Appendix H4***. Sediment Profile and Plan View Imaging Physical Ground-Truth Survey in Support of the South Fork Wind Farm Site Assessment* (INSPIRE), Revised May 15, 2019 [source: INSPIRE]
   - **Appendix N.** Pre-Construction SPI PV Imaging Benthic Assessment Report (INSPIRE; *Sediment Profile and Plan View Imaging Benthic Assessment Survey in Support of the South Fork Wind Farm Site Assessment*), Revised May 15, 2019 [source: INSPIRE]

2. **Side-scan and/or multi beam tracklines**
   - SFWF_2018_2017_Trackline - Shapefiles exported from SFWF_2018_Data.gdb [source: Fugro 20 May 2019].
     - Shapefiles contain a survey_type column:
       - 2017 tracklines: HRG Multichannel, Patch Test, Marine Arch Single Channel
       - 2018 tracklines: Multichannel Seismic, Single-Channel Seismic, Sub-bottom Profiler

3. **SSS processed mosaics - 10 cm mosaics [source: re-exported by Fugro in Jan 2020 (Wind Area) and March 2020 (Export Cable)]**
   - Wind Area [source: re-exported by Fugro in Jan 2020]
     - 2017 SFWF survey - split into 4 “cells”
     - 2018 SFWF survey - split up into 7 “cells” which are numbered 01 – 07 from south to north
   - Export Cable [source: re-exported by Fugro in March 2020]
     - 2017 SFWF survey - split into 27 “cells.” Tiles 1-24 start in wind area and continue to near shore, CL1 - CL3 are cable landings

4. **Bathymetry – 50 cm resolution (2017 data) and 25 cm resolution (2018 data)**
   - Mosaic of the Wind Area [source: Fugro 20 May 2019]
     - SFWF_2018_MBES_25cm_Final.asc
   - Cable Route – Tiles [source: Fugro 20 May 2020]
     - 17021080_DeepWaterWind_MBE_84U19M_Chart01_50cm - 17021080_DeepWaterWind_MBE_84U19M_Chart11_50cm

5. **Backscatter – 50 cm resolution (2017 data) and 25 cm resolution (2018 data)**
   - 2017 – 50 cm resolution data, includes the export cable [source: Fugro August 2019]
   - 2018 – 25 cm resolution data [source: Fugro 20 May 2020]
     - 181230-SFEX_25cm_bs_final.asc

6. **Processed sub bottom lines –** *This data was not used in the analysis but requested by CRMC to be included in the data delivery.*
   - Uninterpreted SBP/UHRS PDF lines with shotpoints; navigation lines and shotpoints in GIS files [source Fugro May 2020]

7. **Ground truth data (Sediment grabs)**
   - Sediment Grab Samples [source Fugro 12 Dec 2019]
     - 2017: “SFWF_Grab_Samples” - shapefile with grain size data and Folk classification for 16 grabs
     - 2018: No grab samples

8. **Ground truth data (SPI/PV Images)**
   - SPI and PV Images from INSPIRE 2017 and 2018 Surveys
     - 2017 – 433 SPI Images & 431 PV Images [source INSPIRE]
     - 2018 – 59 SPI Images & 60 PV Images [source INSPIRE]
   - SFW_17B1_18B1_SPI_PV_STN_SUMMARY_GG_GIS_20190102 [shapefile – source INSPIRE]
     - 2017 & 2018 SPI/PV Stations with the following attribute fields (see metadata for more info):
       - PV: Dominant Biotic Subclass, Presence of boulders, Presence of attached fauna, Presence of sensitive taxa.
       - SPI: Mean Boundary Roughness, Mean Prism Penetration, Sediment Type Heterogeneity

9. **INSPIRE Benthic Habitat Classification (shapefile)**
   - SFW_INSPIRE_BenthicHabitatClassification_20200709.shp
     - Polygon dataset representing the benthic habitat type classification for the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) to support evaluation of essential fish habitat.
   - SFWF_Seabed_Classification_Fugro_20191104.shp
     - Polygon dataset representing the seabed sediment type classification for the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) based on a simplified and modified Folk classification system, plus an additional unit to capture glacial moraine seabeds.

AGREEMENT
REGARDING THE ESTABLISHMENT AND FUNDING OF THE
RHODE ISLAND FISHERIES DIRECT COMPENSATION PROGRAM
AND
COASTAL COMMUNITY FUND

This Agreement Regarding the Establishment and Funding of the Rhode Island Fisheries Direct Compensation Program and Coastal Community Fund (the "**Agreement**"), dated as of 30 JUNE, 2021, is made between South Fork Wind, LLC ("**SFW**") and the Rhode Island Coastal Resources Management Council ("**CRMC**") (together, the "**Parties**").

Recitals

WHEREAS, SFW holds a federal Commercial Lease of Submerged Lands for Renewable Energy Development with the U.S. Bureau of Ocean Energy Management ("**BOEM**"), OCS-A-0517 (the "**Lease**"), located in federal waters approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York;

WHEREAS, the Lease grants SFW the exclusive right to submit to BOEM a Construction and Operations Plan ("**COP**") for a wind energy project and to conduct the activities described in the COP if approved by BOEM and other Federal agencies having jurisdiction over such project and/or activities;

WHEREAS, on June 29, 2018, SFW submitted a COP to BOEM proposing to construct up to fifteen (15) wind turbine generators with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the wind turbine generators, an offshore substation, and an alternating current electric cable ("**Export Cable**") that will interconnect to the existing mainland electric grid in East Hampton, New York (collectively, the "**Project**");

WHEREAS, pursuant to the Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.* (the "**CZMA**"), CRMC established and received federal approval for a Geographic Location Description ("**GLD**") identified as the 2011 GLD, the specific boundaries of which are set forth in pages 5-7 of Rhode Island's Listed Federal Actions on file with the Office for Coastal Management of the National Oceanic and Atmospheric Administration and current as of the date set forth above;

WHEREAS, a portion of the Project, specifically the wind turbine generators, offshore substation, submarine cables, and portion of the Export Cable, falls within the boundaries of the 2011 GLD (the "**Jurisdictional Area**");

WHEREAS, CRMC has jurisdiction to review SFW's Project within the Jurisdictional Area for consistency with the enforceable policies of the Rhode Island Ocean Special Area Management Plan, 650-RICR-20-05-11.10 (the "**Ocean SAMP**"), pursuant to the CZMA, 16 U.S.C. § 1456, and its implementing regulations, 15 C.F.R. Part 930, Subparts D and E;

WHEREAS, CRMC received SFW's consistency certification for the Project on October 22, 2018, which certified that the proposed activities comply with the enforceable policies of the Ocean SAMP and will be conducted in a manner consistent with the Ocean SAMP enforceable policies;

WHEREAS, the Ocean SAMP requires that "[o]ffshore developments shall not have a significant adverse impact on the natural resources or existing human uses of the Rhode Island coastal zone" and requires an applicant to "modify the proposal to avoid and/or mitigate the impacts" (Ocean SAMP § 11.10.1(C));

WHEREAS, the Ocean SAMP further requires that "the potential adverse impacts of offshore

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developments and other uses on commercial or recreational fisheries be evaluated, considered, and mitigated" (Ocean SAMP § 11.10.1(G));

WHEREAS, the Jurisdictional Area historically has been fished by Rhode Island fishermen;

WHEREAS, SFW has modified its Project, including by adopting uniform 1 nautical mile by 1 nautical mile spacing between wind turbine foundations, targeting sufficient cable burial depth, adopting a robust fisheries monitoring plan focused on commercial and recreationally important species in the Project area, micrositing wind turbine foundations to minimize impacts to sensitive benthic habitats, adopting noise reduction systems during pile driving of wind turbine foundations, developing a gear loss claims process to compensate fishermen for lost or damaged gear and associated business interruptions costs, adjusting the Export Cable route to avoid areas of concern to fishermen, and incorporating automatic identification systems, enhanced cellular, and very-high frequency coverage into the wind turbine generators;

WHEREAS, on September 28, 2020, SFW submitted to CRMC a comprehensive mitigation proposal for potential adverse impacts to Rhode Island fisheries from the Project consisting of a report by the Woods Hole Oceanographic Institution on the economic impact of the Project on Rhode Island fisheries, a Rhode Island Fisheries Direct Compensation Program Proposed Term Sheet, attached hereto as Exhibit A-1 (Exhibit A-1 referred to as the "**Direct Compensation Program Term Sheet**"), and a Coastal Community Fund Proposed Term Sheet, attached hereto as Exhibit B-1 (Exhibit B-1 referred to as the "**Coastal Community Fund Term Sheet**");

WHEREAS, from approximately September 28, 2020 through May 25, 2021, SFW engaged in mitigation negotiations with CRMC and its advisory Fisherman's Advisory Board ("**FAB**");

WHEREAS, during the course of these negotiations, SFW increased its offer of compensatory mitigation to a final compensatory mitigation of Twelve Million and 00/100 Dollars ($12,000,000) over the life of the Project in an effort to reach an agreement with CRMC and the FAB, in recognition that the Project is the first project put forward by the Orsted/Eversource Joint Venture for offshore wind development in the Massachusetts/Rhode Island Wind Energy Area, and to cover any and all potential adverse impacts resulting from the Project so as to satisfy the requirements of the Ocean SAMP;

WHEREAS, CRMC recognizes and acknowledges that each proposed project that comes before CRMC stands alone and must be evaluated on its own merits, and that this compensatory mitigation does not provide a precedent for future offshore wind projects;

WHEREAS, CRMC staff recommended that the Twelve Million and 00/100 Dollars ($12,000,000) over the life of the Project be paid in one lump sum at the outset of the Project, the equivalent net present value of which is Five Million Two Hundred Thousand and 00/100 Dollars ($5,200,000);

WHEREAS, at a public meeting held June 2, 2021, CRMC approved a motion to accept and approve the finding of concurrence of consistency with the Ocean SAMP for the Project with the minimization from fifteen (15) to twelve (12) wind turbine generators and the compensatory mitigation of Five Million Two Hundred Thousand and 00/100 Dollars ($5,200,000) as offered by SFW, to be paid and set up according to the Direct Compensation Program Term Sheet with a direct compensation fund where claims are handled by a third-party administrator, paid out of an escrow account, and duly executed releases afforded to SFW when claims are paid and the Coastal Community Fund Term Sheet;

WHEREAS, although CRMC and SFW acknowledge that CRMC cannot require compensation as a condition of issuing a federal consistency certification, SFW agrees that SFW will establish a two-part compensation program to compensate Rhode Island fishermen for potential reasonably foreseeable adverse impacts not fully mitigated by the Project modifications within the Jurisdictional Area as outlined in the Direct

Compensation Program Term Sheet and Coastal Community Fund Term Sheet;

WHEREAS, pursuant to the compensation program, SFW will establish the Direct Compensation Fund in accordance with Direct Compensation Program Term Sheet (the direct compensation fund program established thereby referred to as the "**Direct Compensation Program**");

WHEREAS, pursuant to the compensation program, SFW will also establish a Coastal Community Fund (the "**Coastal Community Fund**") in accordance with the Coastal Community Fund Term Sheet; and

WHEREAS, CRMC will include the terms agreed to regarding the Direct Compensation Program in its federal consistency concurrence letter.

NOW THEREFORE, the Parties agree as follows:

SFW Compensatory Mitigation

1. SFW shall make one lump sum payment of Five Million Two Hundred Thousand and 00/100 Dollars ($5,200,000) as compensatory mitigation for Rhode Island fishermen as part of its overall Project modifications and mitigations to achieve consistency with the enforceable policies of the Ocean SAMP. SFW and CRMC agree and acknowledge that this lump sum amount reflects the Parties' recognition that the Project is the first project put forward by the Orsted/Eversource Joint Venture for offshore wind development in the Massachusetts/Rhode Island Wind Energy Area. Five Million Two Hundred Thousand and 00/100 Dollars ($5,200,000) is the net present value of Twelve Million and 00/100 Dollars ($12,000,000) over the life of the Project and shall be SFW's only financial contribution to mitigation in Rhode Island (the "**Compensatory Mitigation**").

2. A bank (the "**Trust Company**") shall serve as custodial administrator of the Compensatory Mitigation.

3. Notwithstanding anything herein to the contrary in Exhibit B-1 (Coastal Community Fund Term Sheet), within thirty (30) days after the receipt of all final federal, state and local permits, authorizations, concurrences and approvals necessary to construct and operate the Project as described in the approved COP, SFW shall provide the Compensatory Mitigation to the Trust Company to be held in an escrow account (the "**Escrow Account**") substantially in accordance with the terms of and in the form of the Escrow Agreement attached hereto as <u>Exhibit A-2</u> (the "**Escrow Agreement**") with such changes as are requested/required by the Escrow Agent.

4. The Compensatory Mitigation shall be ear-marked as follows:

    i. Three Million Five Hundred Thousand and 00/100 Dollars ($3,500,000) for compensation for commercial and for-hire charter fishing operations for mitigation of direct losses/impacts arising from the construction and operation of the Project and unforeseen, extraordinary events that lead to later business interruption and direct losses/impacts caused by the Project. The Trust Company shall be provided with the following or similar investment guidelines and directed to manage the funds accordingly, with the overall investment goal of achieving an average annual rate of return of no less than 3 percent:

        a) 30 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

        b) 40 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

        c) 30 percent investment-grade Corporate bonds with a bond yield of no less than 4.0 percent;

ii. Seven Hundred Fifty Thousand and 00/100 Dollars ($750,000) for direct losses/impacts caused by decommissioning. The Trust Company shall be provided with the following or similar investment guidelines and directed to manage the funds accordingly, with the overall investment goal of achieving an average annual rate of return of no less than 4 percent:

a) 15 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

b) 15 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

c) 60 percent investment-grade Corporate bonds with a bond yield of no less than 4.5 percent; and

iii. Nine Hundred Fifty Thousand and 00/100 Dollars ($950,000) for the Coastal Community Fund, which the Trust Company shall disburse to the Fund (as defined in Paragraph 16) pursuant to the provisions below and in accordance with the Escrow Agreement. The Trust Company shall be provided with the following or similar investment guidelines and directed to manage the funds accordingly, with the overall investment goal of achieving an average annual rate of return of no less than 3 percent:

a) 30 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

b) 40 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

c) 30 percent investment-grade Corporate bonds with a bond yield of no less than 4.0 percent.

5. Any Compensatory Mitigation in the Escrow Account remaining upon completion of Project decommissioning shall be transferred to the Coastal Community Fund to be used in accordance with the purposes of the Coastal Community Fund as specified in the Coastal Community Fund Term Sheet and the Fund agreement.

6. The Trust Company and TAP selected by SFW shall be subject to the approval of CRMC, which approval shall not be unreasonably withheld, conditioned or delayed. Upon selection and final approval of the Trust Company and TAP, SFW shall have no further involvement whatsoever with respect to the Compensatory Mitigation, Direct Compensation Program, or Coastal Community Fund. The Compensatory Mitigation is funded at a level such that the funding would be exhausted if the fund over-paid incorrectly on the claims made.

Establishment of the Direct Compensation Program

7. The purpose of the Direct Compensation Program is to provide financial compensation to eligible Rhode Island fishermen for mitigating direct losses/impacts to commercial and for-hire (charter) fishing from the construction, operation and decommissioning of the Project.

8. The Direct Compensation Program will be established in accordance with the Direct Compensation Program Term Sheet. The TAP selected pursuant to the Direct Compensation Program Term Sheet shall have authority and discretion to establish such additional terms and conditions for the Direct Compensation Program as are required to fulfill its purpose so long as any such additional terms and conditions are consistent with the Direct Compensation Program Term Sheet, Eligibility Form substantially in the form attached as Exhibit A-3, Model Claims Form substantially in the form attached as Exhibit A-4, and Form of Release of Liability substantially in the form attached as Exhibit A-5. Any ambiguity between the Direct Compensation Program Term Sheet and this Agreement shall be resolved by the TAP in favor of this

Agreement, which embodies the final intent of the Parties with respect to the Direct Compensation Program.

9. Applicants shall apply for eligibility for the Direct Compensation Program by submitting an Eligibility Form established by the TAP in substantially in the form attached as Exhibit A-3. The eligibility period will begin prior to the claims and payment period and will last for a reasonable period of time. The TAP will approve or reject eligibility submittals during the eligibility period. Eligibility will be based on historic fishing in the Jurisdictional Area and a direct impact or direct loss caused by the Project. If eligibility is rejected, an appeal process to a neutral third party will be available.

10. Once the eligibility period closes, new applicants may only enter the Direct Compensation Program and evidence eligibility at the time of either decommissioning or during operations if and only if an unforeseen, extraordinary event ("**Operations Interruptions Event**") occurs that leads to business interruptions and direct impacts/losses caused by the Project. In any such case, the eligibility period will re-open for a reasonable period. New applicants identified during this period may seek compensation from the ear-marks set aside for such contingencies as identified in Paragraph 4 herein.

11. The TAP will establish a claims review and decision process in accordance with the Direct Compensation Program Term Sheet. Applicants shall apply for compensation from the Direct Compensation Program for one of the three payment phases of construction and operations, decommissioning, and/or Operations Interruptions Events by submitting a claims form substantially in the form of the Model Claims Form attached as Exhibit A-4. The TAP will approve or reject claims submittals during the claims period. If a claim is rejected, an appeal process to a neutral third party will be available.

12. All confidential, non-public or proprietary information (the "**Information**") provided by applicants to the TAP will be kept confidential unless disclosure is required by law, rule, regulation, regulatory authority or pursuant to a legal or similar process. In such an event, the TAP shall only disclose that portion of the Information that it determines it is legally required to disclose and shall request confidential treatment of any Information so disclosed.

13. In accordance with the Direct Compensation Fund Term Sheet, the amount of payment will be based on: the eligible claimant's historical activity in the Jurisdictional Area such that applicants with a higher value of historical landings in the Jurisdictional Area will receive higher payment than those that have a lower value of historical landings; the number of eligible applicants; and preservation of funds in the Escrow Account for future applicants.

14. In consideration for receipt of funds from the Direct Compensation Program, applicants simultaneously shall execute a Form of Release of Liability substantially in the form attached as Exhibit A-5.

15. The Direct Compensation Program is not intended to address or provide compensation for any claims of lost or damaged gear or related economic loss. Any such claim submitted to the Direct Compensation Program shall be immediately rejected by the TAP without any right to an appeal and referred to Orsted under the Orsted Fishing Gear Conflict Prevention and Claim Procedure, which is publicly available through Orsted's Mariners' website.

Establishment of the Coastal Community Fund

16. The Coastal Community Fund shall be established for Rhode Island fishermen as an entity independent of the State of Rhode Island (the "**Fund**") in accordance with Rhode Island law to fulfill the purposes outlined in the Coastal Community Fund Term Sheet and accompanying agreement substantially in the form attached as Exhibit B-2.

17. The Compensatory Mitigation and funding mechanism set forth in this Agreement supersede Section II, Creation, Use and Funding of the Coastal Community Fund, of the Coastal Community Fund Term Sheet.

18. SFW will provide initial funding for the Coastal Community Fund pursuant to the Compensatory Mitigation ear-mark set forth in Paragraph 4.

19. The Fund shall be used only to fund projects that satisfy the Coastal Community Fund's objectives, which explicitly do not include funding for litigation, regulatory work, or petitioning activities, and that are approved by the SFW Coastal Community Advisory Council ("**Advisory Council**"), including for support for Rhode Island companies that support Rhode Island fishing interests. The composition and number of the Advisory Council will be determined by CRMC staff in consultation with the FAB or other fishermen's association. The Advisory Council directs an escrow agent or similar agent to release funds from the Fund once a project is approved.

20. SFW will have no rights or role with respect to the Advisory Council's management of the Fund or approval of project funding requests as long as such approvals further the purpose of the Coastal Community Fund.

Payment of Expenses for the Funds

21. The reasonable costs and expenses incurred in the establishment and implementation of the Coastal Community Fund and the Direct Compensation Program shall be paid from the Fund and Escrow Account, respectively. A cap may be placed on the costs and expenses.

Precedent Conditions

22. This Agreement and the implementation of the Direct Compensation Program and Coastal Community Fund shall be contingent upon the occurrence of each of the following events:

    a. On or before July 2, 2021, CRMC issuing its conditional concurrence with SFW's consistency certification as voted by the Council on June 2, 2021; and

    b. SFW receiving all other final federal, state, and local permits, authorizations, concurrences and approvals necessary to construct and operate the Project as described in the approved COP.

For the avoidance of doubt, if: (i) CRMC does not issue its conditional concurrence with SFW's consistency certification on or before July 2, 2021; or (ii) SFW fails to receive all other such permits, authorizations, concurrences and approvals, then SFW shall have no further obligations under this Agreement.

Dispute Resolution

23. If either Party alleges that there exists a dispute or disagreement regarding the matters covered by this Agreement, it shall notify in writing the other Party of such alleged dispute or disagreement ("**Dispute Notice**"). The Parties shall attempt to resolve the alleged dispute or disagreement through good faith negotiations. If the Parties fail to resolve the alleged dispute or disagreement within sixty (60) days of the Dispute Notice, the Party alleging the dispute or disagreement may enforce this Agreement only by specific performance, injunctive relief or a declaratory judgment action pursuant to R.I.G.L. § 9- 30-1 *et seq.* The remedies of specific performance, injunctive relief and declaratory judgment shall be cumulative of all other rights and remedies at law or equity of the Parties under this Agreement.

Governing Law

24. This Agreement shall be construed in accordance with and all disputes hereunder shall be controlled by the laws of the State of Rhode Island without regard to its conflict of laws principles. For the purposes of this Agreement only, Rhode Island shall be the forum state for all forms of dispute resolution between the Parties, including but not limited to judicial actions to enforce the Agreement.

Entire Agreement

25. This Agreement constitutes the entire agreement of the Parties as to the subject matter herein, and supersedes any and all prior oral or written agreements of the Parties. This Agreement cannot be changed or modified except in a written instrument signed by both Parties.

Recitals

26. The above recitals are incorporated herein by reference.

Successors and Assigns

27. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns.

No Third-Party Beneficiaries

28. The Parties do not confer any rights or remedies upon any person other than the Parties to this Agreement and their respective successors and assigns.

Severability

29. If any part of this Agreement is found to be unenforceable, the rest will remain in full force and effect and shall be interpreted so as to give full effect to the intent of the Parties.

Execution in Counterparts

30. This Agreement may be executed in counterparts and by the different Parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all counterparts shall together constitute one and the same instrument. This Agreement may be delivered by the exchange of signed signature pages by facsimile transmission, electronic signatures, or by attaching a pdf copy to an e-mail, and any printed or copied version of any signature page so delivered shall have the same force and effect as an originally signed version of such signature page.

Term; Termination

31. The term of this Agreement shall start on the date of this Agreement. If any of the “Precedent Conditions” above cannot be fulfilled, this Agreement shall terminate upon the date in which it becomes apparent that such condition set forth in the “Precedent Conditions” cannot be fulfilled. If the “Precedent Conditions” are fulfilled, this Agreement shall expire on the date in which the all funds contributed by SFW to the Coastal Community Fund and the Direct Compensation Program have been disbursed.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed as of the date first written above.

SOUTH FORK WIND, LLC

By: ______________________
Name: ROBERT MASTRIA
Title: Authorized Person

By: ______________________
Name: Melanie Gearon
Title: Authorized Person

RHODE ISLAND COASTAL RESOURCES MANAGEMENT COUNCIL

By: ______________________
Name:
Title: EXECUTIVE DIRECTOR

#60907143

Exhibit A-1

South Fork Wind (SFW) Rhode Island Fisheries Direct Compensation Program
Proposed Term Sheet

I. Purpose and Brief Description

- The SFW Rhode Island Fisheries Direct Compensation Program will provide financial compensation for mitigating impacts to commercial fishing from the construction, operation and decommissioning of SFW.
- The SFW Rhode Island Fisheries Direct Compensation Program will pay eligible fishers within a reasonable period of time after their claim is approved from an escrow account to be funded in a lump sum according to the process defined below.
- The SFW Rhode Island Fisheries Direct Compensation Program has two key parts: 1) determining which fishers are eligible for compensation based on their historical fishing activity in SFW; and 2) calculating the amount of individual compensation based on an open and transparent predetermined payment framework that applies a tiered approach. In this tiered approach, every eligible fisher receives a payment but those with higher historical value landings within SFW receive more compensation than those with lesser value landings.

II. Creation, Use and Funding of SFW Escrow Account and Technical Assistance Provider

- SFW will fund an escrow account for the SFW Fisheries Compensation Program. The escrow will be managed by an independent third party selected by SFW with advice and input from CRMC and the FAB.
- SFW will fund the escrow account in an upfront lump sum payment within thirty days after the receipt of all final federal, state and local permits and approvals. Such payment will be informed by analyses performed by Woods Hole. The funds will be allocated into accounts for the various gear types based upon the Woods Hole analysis.
- SFW will pay for the cost of a Technical Assistance Provider (TAP). The TAP will ease the administrative aspects of the program on fishers. The TAP will be responsible for overseeing the administration of the fund as described below. SFW will select the TAP through a competitive process with advice and input from CRMC and the FAB.

III. Pre-Qualifying for Compensation During the Eligibility Period

- The purpose of the eligibility period is to provide sufficient time for fishers to prequalify for compensation to improve the efficiency of the claim and payment phase so that the payment of approved claims will be fast.

- During the eligibility phase, fishers will be asked to fill out a simple certification form stating that they have fished in the SFW area over a three-year period. Fishers will be required to list the approximate value of their landings from that area over the three years.

- SFW will seek advice from the FAB and CRMC on the documentation for eligibility.

- The TAP will be available to assist fishers with filing for eligibility. All information from fishers will be kept confidential by SFW and the TAP.

- The eligibility period will begin prior to the claims and payment period and will last for a reasonable period of time.

- The TAP will approve or reject eligibility submittals during the eligibility period. If eligibility is rejected, an appeal process to a neutral third party will be available.

- SFW will have no rights or role with respect to the TAP's approval or rejection of eligibility submittals.

IV. Claim and Payment Period for Eligible Fishers

- The claim and payment period for eligible fishers to obtain funds from the escrow will begin upon completion of SFW's commissioning and will last for a reasonable time period. Eligible fishers may submit claims for each gear type for which they have confirmed eligibility. For the avoidance of doubt, fishers may submit a claim for more than one gear type account so long they have confirmed eligibility.

- The claim form will require that the eligible fisher provide specific information and documentation on landings by gear type over the three-year period supporting the estimate provided during the eligibility period. Proof of eligibility may include VTR and log book data.

- SFW will seek advice from the FAB and CRMC on the documentation required to be produced for claims.

- Each payment form will include a release of liability by the certifying fisher releasing SFW from any future claim for additional compensation or other relief under that gear type upon receipt of compensation.

- The amount of the payment will be based on the eligible fishers' historical activity in the SFW area. Payments will be established in tiers by fishery.

    i. Once the eligibility period ends, tiered payment levels will be established for allocating funds. Fishers with a higher value of historical landings in the SFW area will receive higher payment than those that have a lower value of historical landings. A minimum payment will be incorporated to ensure all fishers with any level of historical landings from the SFW area will receive a payment. The predetermined funding framework will provide full transparency of how much compensation each eligible claimant will receive.

ii. The full amount of funds in each fishery account will be paid to the eligible fishers.

- Payments will be made within a reasonable time frame.

- The TAP will approve claims consistent with the predetermined funding framework. SFW will have no role with the claim and payment period. Upon approval from the TAP, the escrow agent will pay funds directly to the eligible fisher.

* * *

Exhibit A-2

Form of Escrow Agreement

ESCROW AGREEMENT

THIS ESCROW AGREEMENT (the "**Agreement**"), dated [________________] is by and between [THE TECHNICAL ASSISTANCE PROVIDER] (the "**TAP**"); and [____________________] (the "**Escrow Agent**") (together, the "**Parties**").

RECITALS

WHEREAS, South Fork Wind, LLC ("**SFW**") submitted a Construction and Operations Plan to the U.S. Bureau of Ocean Energy Management proposing to construct up to fifteen (15) wind turbine generators with a nameplate capacity of 6 to 12 MW per turbine, submarine cables between the wind turbine generators, an offshore substation, and an alternating current electric cable that will interconnect to the existing mainland electric grid in East Hampton, New York (the "**Project**");

WHEREAS, at a public meeting held June 2, 2021, the R.I. Coastal Resources Management Council ("**CRMC**") approved a motion to accept and approve a finding of concurrence of consistency with the Rhode Island Ocean Special Area Management Plan ("**Ocean SAMP**") for the Project pursuant to the Coastal Zone Management Act, 16 U.S.C. § 1451 *et seq.*, with the minimization from fifteen (15) to twelve (12) wind turbine generators and the compensatory mitigation as described below;

WHEREAS, as part of the mitigation negotiations concerning the Project, SFW and CRMC entered into that certain Agreement regarding the Establishment and Funding of the Rhode Island Fisheries Direct Compensation Program and Coastal Community Fund dated [___________], (the "**Establishing Agreement**"), pursuant to which SFW agreed to make a compensatory mitigation payment in one lump sum payment of Five Million Two Hundred Thousand and 00/100 Dollars ($5,200,000) (the "**Escrow Funds**") representing the net present value of the final compensatory mitigation of Twelve Million and 00/100 Dollars ($12,000,000) over the life of the Project to cover any and all potential adverse impacts resulting from the Project so as to satisfy the requirements of the Ocean SAMP;

WHEREAS, pursuant to the Establishing Agreement, the Escrow Funds are to be used to fund: (i) a Direct Compensation Program pursuant to that certain South Fork Wind Rhode Island Fisheries Direct Compensation Program Proposed Term Sheet] (the "**Direct Compensation Program Term Sheet**"), as attached to the Establishing Agreement; and (ii) a Coastal Community Fund established as non-profit entity independent of the State of Rhode to fulfill the purposes outlined in the Coastal Community Fund Term Sheet, as attached to the Establishing Agreement (the "**Coastal Community Fund Term Sheet**" and together with the Direct Compensation Program Term Sheet, the "**Term Sheets**"); and

WHEREAS, the Parties are entering this Agreement to set forth the duties and obligations of the Escrow Agent with respect to the Escrow Funds in accordance with the Establishing Agreement and the Term Sheets.

NOW, THEREFORE, in consideration of the foregoing and the covenants herein contained, the parties hereby agree as follows:

1. **Recitals**: The above recitals are incorporated herein by reference.

2. **Establishment of Escrow Account**: The Escrow Funds shall be delivered to the Escrow Agent by SFW to be placed into an account or accounts that shall be used solely for the purposes as set forth herein. The Escrow Funds shall be earmarked and used for the following purposes:

a. Three Million Five Hundred Thousand and 00/100 Dollars ($3,500,000) for compensation to commercial and for-hire charter fishing operations for mitigating impacts arising from direct impacts/losses from the construction and operation of SFW and from direct impacts/losses from unforeseen, extraordinary events that lead to later business interruption during the operation of SFW (the "**Initial Direct Compensation Program**");

b. Seven Hundred Fifty Thousand and 00/100 Dollars ($750,000) for direct impacts/losses from decommissioning (the "**Additional Direct Compensation Program**" and together with the Initial Direct Compensation Program, the "**Direct Compensation Program**"); and

c. Nine Hundred Fifty Thousand and 00/100 Dollars ($950,000) for the Coastal Community Fund (the "**Coastal Community Fund**").

The Escrow Agent hereby agrees to hold and invest the Escrow Funds in a separate, interest bearing account (the "**Escrow Account**") as provided in this Escrow Agreement. Neither the Escrow Account nor the Escrow Funds shall be subject to any security interest, lien or attachment of any party or of any creditor of any party. The Escrow Agent agrees to use commercially reasonable efforts in accordance with its internal investment and management policies to follow the investment guidelines set forth below or substantially similar to those set forth below for the respective earmarks:

a. ***Initial Direct Compensation Program***: with the overall investment goal of achieving an average annual rate of return of no less than 3 percent:

i. 30 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

ii. 40 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

iii. 30 percent investment-grade Corporate bonds with a bond yield of no less than 4.0 percent;

b. ***Additional Direct Compensation Program***: with the overall investment goal of achieving an average annual rate of return of no less than 4 percent:

i. 15 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

ii. 15 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

iii. 60 percent investment-grade Corporate bonds with a bond yield of no less than 4.5 percent;

c. ***Coastal Community Fund***: with the overall investment goal of achieving an average annual rate of return of no less than 3 percent:

i. 30 percent U.S. Treasuries with a 30-year Treasury yield of no less than 2.0 percent;

ii. 40 percent Municipal bonds with a bond yield of no less than 2.5 percent; and

iii. 30 percent investment-grade Corporate bonds with a bond yield of no less than 4.0 percent.

3. Actions of Escrow Agent and Release of Escrow Funds:

a. ***Direct Compensation Program***.

From time to time, the Escrow Agent shall receive written notice (each a "**Notice**") from the TAP, the Escrow Agent shall examine the Notice, and then the Escrow Agent shall release the amount provided in such Notice to the recipient indicated in the Notice. Each Notice shall specify if the amount to be released is to be released from the Initial Direct Compensation Program or the Additional Direct Compensation Program. The Escrow Agent shall have no duty or obligation to verify the details provided in any Notice and is to rely completely on the written instructions provided in a Notice from the TAP. The Escrow Agent shall keep the TAP informed of the balance of the Escrow Funds earmarked for the Initial Direct Compensation Program and the Additional Direct Compensation Program. From time to time, based on five (5) year intervals as set forth in the Establishing Agreement and Direct Compensation Program Term Sheet, the TAP may send written notice to the Escrow Agent requesting that a portion of the Escrow Funds designated for the Direct Compensation Program be released to the Coastal Community Fund. Upon completion of the Project, the TAP shall request in writing to the Escrow Agent that any Escrow Funds remaining that are earmarked for the Direct Compensation Program be released to the Coastal Community Fund.

b. ***Coastal Community Fund.***

Upon the establishment of the Coastal Community Fund, the Escrow Agent, upon joint written notice from SFW and CRMC shall release that portion of the Escrow Funds earmarked for the Coastal Community Fund to the applicable account listed on the foregoing written notice in order to fund the Coastal Community Fund to be managed and held by the Coastal Community Advisory Council as [trustees] of the Coastal Community Fund in accordance with the governing documents of the Coastal Community Fund.

4. Additional Duties of Escrow Agent:

a. The duties and obligations of the Escrow Agent shall be limited to and determined solely by the express provisions of this Escrow Agreement and no implied duties or obligations shall be read into this Escrow Agreement against the Escrow Agent.

b. The Escrow Agent hereby accepts its appointment and agrees to act as Escrow Agent under the terms and conditions of this Escrow Agreement and acknowledges receipt of the Escrow Funds. Escrow Agent shall receive normal and customary fees for acting as escrow agent hereunder up to a total fee of [___________] ($_____) to be paid from the Escrow Funds. The Escrow Agent shall be reimbursed from the Escrow Funds for the reasonable and documented actual out-of-pocket expenses Escrow Agent incurs in connection with acting as escrow agent hereunder, such as wire or transfer charges or investment fees or commissions charged to Escrow Agent by the bank at which the Escrow Account is maintained.

c. In the event conflicting demands are made or notices served upon the Escrow Agent the Parties hereto expressly agree that such Escrow Agent shall have the absolute right, at such Escrow Agent's election, to do any of the following:

   i. In the event of litigation, the Escrow Agent may deliver all or any part of the Escrow Funds to the Clerk of any Court in which the litigation is pending; or

   ii. File a suit in interpleader and deliver the Escrow Funds or any part thereof to the Court in which the action is commenced, and obtain an order from the Court requiring the Parties to interplead and litigate in such court their several claims and rights amongst themselves. In the event such interpleader suit is brought, such Escrow Agent shall ipso facto be fully released and discharged from all obligations to further perform any and all duties or obligations imposed upon it by this Agreement.

d. The Escrow Agent shall not be liable for any act which the Escrow Agent may do or omit to do, hereunder or for any mistake of fact or law, or for any error of judgment, or for the misconduct of any employee, agent or attorney appointed by it, while acting in good faith, unless caused by or arising from its own gross negligence or willful misconduct.

e. The Escrow Agent does not have any interest in the Escrow Account or in the Escrow Funds deposited hereunder but is serving as escrow holder only and having only possession thereof. This paragraph shall survive notwithstanding any termination of this Escrow Agreement or the resignation of the Escrow Agent

f. The Escrow Agent (and any successor Escrow Agent) may at any time resign as such by delivering the Escrow Funds to (i) any banking corporation or trust company organized under the laws of the United States or of any state which corporation or company is jointly designated by the other parties hereto in writing as successor escrow agent and consents in writing to act as successor escrow agent or (ii) any court of competent jurisdiction; whereupon the Escrow Agent shall be discharged of and from any and all further obligations arising in connection with this Escrow Agreement. The resignation of the Escrow Agent will take effect on the earlier of (x) the appointment of a successor escrow agent by designation by the other parties to this Escrow Agreement and delivery of the Escrow Funds to such successor escrow agent (or delivery of the Escrow Funds to any court of competent jurisdiction) or (y) the day that is 60 days after the date of delivery of its written notice of resignation to the other parties hereto. If at that time the Escrow Agent has not received a designation of a successor Escrow Agent, the Escrow Agent's sole responsibility after that time shall be to safekeep the Escrow Funds until receipt of a designation of successor Escrow Agent, or a joint written instruction as to disposition of the Escrow Funds by the other parties hereto, or a final order of a court of competent jurisdiction mandating disposition of the Escrow Funds.

5. **Notices**: All claims, notices, consents objections and other communications under this Escrow Agreement shall be in writing and shall, except as otherwise provided herein, be deemed to have been duly given when (i) delivered by hand, (ii) sent by electronic mail, provided that a copy is mailed by certified mail, return receipt requested, or (iii) when received by the addressee, if sent by Express Mail, Federal Express or other express delivery service, in each case, at the appropriate addresses and emails as set forth below:

If to Escrow Agent:

[________________]
Attn: [__________]
[________________]
[________________]

With copies to:

[________________]
Attn: [__________]
[________________]
[________________]
If to TAP:

[________________]
Attn: [__________]
[________________]
[________________]

With copies to:

[________________]
Attn: [__________]
[________________]
[________________]

Or such other person designated in writing and served in accordance with this paragraph.

6. **Termination**: This Escrow Agreement shall automatically terminate upon the final distribution of the Escrow Funds in accordance with the terms hereof.

7. **Successors and Assigns**: This Escrow Agreement shall be binding upon and inure to the benefit of the respective successors and permitted assigns of the Parties hereto, provided that this Escrow Agreement may not be assigned by any Party without the prior written consent of the other, which consent shall not be unreasonably withheld.

8. **No Third-Party Beneficiaries:** The Parties do not confer any rights or remedies upon any person other than the Parties to this Agreement and their respective successors and assigns.

9. **Severability**: If any portion or provision of this Escrow Agreement shall to any extent be declared illegal or unenforceable by a court of competent jurisdiction, then the application of such portion or provision in circumstances other than those as to which it is so declared illegal or unenforceable, shall not be affected thereby, and each portion and provision of this Escrow Agreement shall be construed by modifying or limiting it so as to be valid and enforceable to the maximum extent compatible with, and possible under, applicable law. The provisions hereof are severable, and in the event any provision hereof should be held invalid or unenforceable in any respect, it shall not invalidate, render unenforceable or otherwise affect any other provision hereof.

10. **Entire Agreement**: This Escrow Agreement constitutes the entire agreement between the Parties and supersedes any and all prior communications, agreements and understandings, written and oral, with respect to the subject matter hereof.

11. **Amendments**: This Escrow Agreement may not be amended or modified at any time except in such manner as may be agreed upon by a written instrument executed by the TAP and the Escrow Agent.

12. **Waiver**: No waiver of any provision hereof shall be effective unless made in writing and signed by the waiving Party. The failure of any Party to require the performance of any term or obligation of this Escrow Agreement, or the waiver by any Party of any breach of this Escrow Agreement, shall not prevent any subsequent enforcement of such term or obligation or be deemed a waiver of any subsequent breach.

13. **Headings**: The headings and captions in this Escrow Agreement are for convenience of reference only and shall not in any way affect the meaning or interpretation of this Escrow Agreement.

14. **Governing Law**: This Escrow Agreement shall be construed and enforced in accordance with the domestic substantive laws of the State of Rhode Island, without giving effect to any choice or conflict-of-law provision or rule that would cause the application of the laws of any other jurisdiction.

15. **Waiver of Jury Trial**: TO THE EXTENT NOT PROHIBITED BY APPLICABLE LAW WHICH CANNOT BE WAIVED, EACH PARTY TO THIS AGREEMENT HEREBY WAIVES, AND COVENANTS THAT IT WILL NOT ASSERT (WHETHER AS PLAINTIFF, DEFENDANT OR OTHERWISE), ANY RIGHT TO TRIAL BY JURY IN ANY FORUM IN RESPECT OF ANY ISSUE, CLAIM, DEMAND, ACTION OR CAUSE OF ACTION ARISING OUT OF OR PASSED UPON THIS AGREEMENT OR THE SUBJECT MATTER HEREOF, WHETHER NOW EXISTING OR HEREAFTER ARISING AND WHETHER SOUNDING IN TORT OR CONTRACT OR OTHERWISE. ANY OF THE PARTIES HERETO MAY FILE AN ORIGINAL

COUNTERPART OR A COPY OF THIS SECTION 14 WITH ANY COURT AS WRITTEN EVIDENCE OF THE CONSENT OF EACH OF THE PARTIES HERETO TO THE WAIVER OF HIS OR ITS RIGHT TO TRIAL BY JURY.

16. **Counterparts**: This Escrow Agreement may be executed in any number of counterparts and by each of the parties hereto in separate counterparts, each of which when so executed shall be deemed to be an original and all of which together shall constitute one and the same agreement.

IN WITNESS WHEREOF, the undersigned have executed this Escrow Agreement as of the date first written above.

[ESCROW AGENT]	**[TAP]**
By: ______________________________	By: ______________________________
Name:	Name:
Title:	Title:

Exhibit A-3

Model Eligibility Form

Rhode Island Fisheries Direct Compensation Program Eligibility Application

Commercial fishermen and party/charter boat operations must use this form to demonstrate eligibility for compensation under the South Fork Wind (SFW) Rhode Island Fisheries Direct Compensation Program. The Rhode Island Fisheries Direct Compensation Program will provide financial compensation for mitigating direct losses/impacts to commercial fishing and party/charter boat operations during the construction, operation, and decommissioning phases of SFW. Separate eligibility forms must be submitted for each affected vessel. This form must be completed in full and delivered to the Technical Assistance Provider (TAP) designated to administer the fund. Applicants can file the form electronically by emailing it to [TAP email address] or by mailing it to [TAP address]. You may contact the TAP by email or by phone ([TAP phone number]) if you have questions on the application.

The purpose of this eligibility phase is to prequalify for compensation to improve the efficiency of the claim and payment phase and pay claims faster. Once you are deemed eligible by the TAP, you will be asked to submit a simplified claims form to inform your direct compensation payment.

The TAP will approve or reject eligibility submittals during the eligibility period based on the information submitted with your application. If eligibility is rejected, you can appeal to a third party. Information on appeals will be provided when the TAP responds to your eligibility application.

I. Applicant Information

A. Name: ____

First Last M.I.

B. Mailing Address:

____

Street Address Apartment/Unit

____

City State Zip

C. Place of Residence (if different from mailing address):

____

Street Address Apartment/Unit

____

City State Zip

D. Phone: ____________________
E. Email: _____________________
F. Fishing Operation Information (complete section that applies):

- ☐ Commercial fishing operation
  1. Vessel Name: ____
  2. State Registration Number/Coast Guard Documentation Number: _________
  3. Homeport (as listed on your state or Coast Guard registration): ____
  4. Federal Permit (if applicable): ______________________________
  5. RI Commercial Fishing License Number: ______________________
  6. Please check all that apply (owner and operator cannot make separate claims):
     - ☐ I am the owner of this vessel.
     - ☐ I am the operator of this vessel.
  7. Tax Identification Number (TIN), if applicable: __________________
- ☐ Party and charter boat information
  1. Vessel Name: ________________________________
  2. RI Charter/Party License Number: ______________________
  3. Federal Permit (if applicable): _______________________
  4. Business Name (if different from applicant name): ___________________
  5. Please check all that apply (owner and operator cannot make separate claims):
     - ☐ I am the owner of this vessel.
     - ☐ I am the operator of this vessel.
  6. Tax Identification Number (TIN), if applicable: ___________________

II. Demonstration of Eligibility

Identify the project phase for which you are claiming economic impacts and seeking compensation:

- ☐ Business Interruption during construction and the operations period following construction.
- ☐ Business interruption during the decommissioning phase.
- ☐ Unforeseen business interruption during the operations phase as set forth in more detail in Schedule A to this form.

Applicants must stipulate to the following eligibility criteria:

- You must own the vessel or a valid state or federal fishing permit to operate the vessel;
- You must have a homeport in Rhode Island (as documented on your vessel registration) or be a resident or incorporated business in Rhode Island; and
- You must demonstrate a history of the vessel operating in the SFW Project area in the three years prior to eligibility and having incurred a direct impact/ direct loss caused by SFW.

Schedule B identifies the documentation needed to verify eligibility. Failure to provide adequate documentation to the TAP may lead the TAP to disqualify you from participating in the program.

III. Confidentiality

Information provided via this application process will be kept confidential by the TAP, except as otherwise required by law.

IV. Notification

The TAP will notify you of the decision regarding your eligibility by contacting you at the email address provided above.

V. Certification and Release

By completing and signing this form, I certify my understanding of the following:

A. I certify that I have provided complete and truthful information here and to the TAP for considering my eligibility.

B. I certify that I am duly authorized to bind the entity or individual and the vessel or operator identified above.

C. I consent to allowing the TAP to use VTRs and SAFIS logbook data, as applicable, to verify the information contained in this application, and I waive any and all confidentiality pertaining to this information as it relates to this application.

Signature ___________________________ Date ___________________________

Title (if any): _________________________

Schedule A: Examples/Operations Interruptions Events Qualifying for Compensation

1. Possible business interruptions arising from unforeseen extraordinary events may include the following or similar event:
    - Extraordinary maintenance in the Project area resulting in extended constrained access within the Project area
2. Examples of excluded Operations Interruptions are:
    - Fishery management measures that constrain catch or access to fishing grounds (e.g., quotas, area closures) or seasonal restrictions;
    - General declines in stock for targeted species caused by climate change;
    - Environmental changes;
    - Harmful algal blooms;
    - Vessel or other property damage;
    - Reductions in fishing activity due to personal illness or public health measures;
    - Inclement weather; or
    - Force majeure events.

Schedule B. Documentation to Affirm Eligibility to Participate in the Direct Compensation Program

A. Commercial fishing documentation is required for the three years prior to construction.

- If you file Vessel Trip Reports (VTRs) with the National Marine Fisheries Service (NMFS):
  - You must submit one of the following documents:
    - Your VTR data for the relevant years; or
    - Documentation that you have authorized NMFS to release your VTR data to the TAP.
  - While optional, you may also submit:
    - Documentation that you have authorized NMFS to release vessel monitoring system (VMS) or observer program data relevant to your vessel.
    - Other detailed electronic information (e.g., chart plotter data) documenting effort within the SFW Project Area.
- If you do not file VTRs with NMFS:
  - You must submit one of the following documents:
    - Rhode Island Department of Environmental Management (RIDEM) catch and effort logbook data, whether filed electronically (through the Standard Atlantic Fisheries Information System, SAFIS) or via paper; or
    - Documentation that you have authorized RIDEM to release your RIDEM catch and effort logbook data.
  - While optional, you may also submit other electronic information (e.g., chart plotter data) or independently maintained logbooks that document your activity in the SFW Project Area.

B. Party/Charter boat documentation is required for the three years prior to construction:

- You must submit eTRIPS Desktop or Mobile trip data submitted to RIDEM or documentation that you have authorized RIDEM to release your trip data.
- While optional, you may submit other electronic information (e.g., chart plotter data) or independently maintained logbooks that document your activity in the SFW Project Area.

Exhibit A-4

Model Claims Form

Rhode Island Fisheries Direct Compensation Program Claim Application

Commercial fishermen and party/charter boat operations must use this form to file claims for direct compensation of economic impacts directly attributable to the South Fork Wind (SFW) project. The SFW Rhode Island Fisheries Direct Compensation Program will provide financial compensation for mitigating impacts to commercial and party/charter boat fishing during the construction, operation, and decommissioning phases of SFW. Only applicants who have separately filed an eligibility form and been approved to participate in the SFW Direct Compensation Program for the applicable project phase may complete this claim form. Separate claim forms must be submitted for each affected vessel. If you are a new fisherman in the SFW Project Area, you will need to apply for eligibility prior to submitting this claim form.

This form must be completed in full and delivered to the Technical Assistance Provider (TAP) designated to administer the fund. Applicants can file the form electronically by emailing it to [TAP email address] or by mailing a physical copy to [TAP address]. You may contact the TAP by email or by phone ([TAP phone number]) if you have questions on the application.

I. Applicant Information

A. Name: ____

First Last M.I.

B. Phone: ___________________________

C. Email: ____________________________

D. Vessel Name: ____

E. If any identification information (e.g., vessel registration number, fishing permit number) provided when you applied for eligibility has changed, please note that here:

____

____

____

II. Economic Impact

A. A claim may be filed for impacts incurred in each of the following. Please check the phase that is relevant to your claim:

- ☐ Construction and Operations
- ☐ Decommissioning
- ☐ Unforeseen Business Interruption During Operations (see Schedule A for a list of eligible events; if more than one separate and unrelated eligible event occurs, you may submit an application for any such applicable eligible event.)

B. The basis for your claim will be your average historical gross revenue

1. Commercial Fishing Operations

   Claims are estimated based on your historical gross revenue in the SFW Project Area, incorporating the years prior to construction, decommissioning or the unforeseen operations interruptions event.

   a) *Complete Table 1 below to document your landings and gross revenue in each year that you fished. If you did not fish in a given year, leave the space blank.*
   b) *Using the same table, calculate your average annual gross revenue based on the highest three years, i.e., the sum of your top three gross revenue figures divided by three. This figure will be the basis for your claim (see below).*

Table 1. ESTIMATION OF AVERAGE ANNUAL COMMERCIAL FISHING REVENUE FROM WITHIN SFW		
Year	**Landings (pounds)**	**Gross (Ex-Vessel) Revenue ($)**
5 years ago		$
4 years ago		$
3 years ago		$
2 years ago		$
Last year		$
AVERAGE ANNUAL GROSS REVENUE BASED ON TOP THREE YEARS		**$**

2. Party/Charter Boat Operations

   Claims are estimated based on your historical gross receipts, as reported to the tax authorities, scaled for trips made in the SFW Project Area. The TAP will compare your gross receipts in the tax year your claim event occurs to the average annual gross receipts for the three tax years immediately prior to your claim event.

   a) *Using Table 2 below, document the number of trips you led to the SFW Project Area in each tax year.*
   b) *Using the same table, report your annual gross receipts in each tax year. This information should be obtained from your tax returns.*
   c) *Using the same table, calculate the difference between your pre- and post-claim annual gross receipts. The net change in gross receipts is the basis for your claim (see below).*

Table 2. ESTIMATION OF PARTY/CHARTER BOAT REVENUE IMPACT FROM WITHIN SFW		
Year	**Number of Trips in SFW Project Area**	**Annual Gross Receipts**
3 years ago		$
2 years ago		$
Last year		$
Average Annual Pre-Claim Event Gross Receipts		$
Current year (post-claim event)		$
Net Economic Impact *(Difference Between Post-Claim Event Gross Receipts and Average Annual Pre-Claim Event Gross Receipts)*		**$**

C. Documentation for Economic Impact

1. Please attach the following documentation. If you provided the following documentation as part of your initial eligibility form, there is no need to duplicate your submission.
   a) *Commercial fishing documentation: You may provide personal or business tax returns to corroborate your gross revenue data. If you prefer not to do so, please provide the following documentation:*
      - If you file Vessel Trip Reports (VTRs) with the National Marine Fisheries Service (NMFS), you must submit either your VTR data for the relevant years or documentation that you have authorized NMFS to release your VTR data to the TAP.
      - If you do not file VTRs with NMFS, you must submit Rhode Island Department of Environmental Management (RIDEM) catch and effort logbook data (whether filed electronically through SAFIS or via paper) or documentation that you have authorized RIDEM to release your catch and effort logbook data.
      - You must submit dockside sales reports.
   b) *Party/charter boat documentation:*
      - You must provide personal or business tax returns to corroborate your gross receipts data.
      - You must submit eTRIPS Desktop or Mobile trip data submitted to submitted to RIDEM or documentation that you have authorized RIDEM to release your trip data.

III. Amount of Claim

Each eligible applicant may apply for a one-time pro-rata fixed payment to compensate for economic impacts corresponding to the following and please check the box for the one you are seeking compensation for:

- ☐ Business Interruption during construction and the operations period following construction.
- ☐ Business interruption during the decommissioning phase.
- ☐ Business interruption during the operations phase that arises from an event listed in Schedule A to this form. (If more than one separate and unrelated eligible event occurs, you may submit an application for any such applicable eligible event.)

Calculation of the compensation payment differs by project phase and by Applicant Type, as explained below.

A. For commercial fishing vessels:

1. Compensation for impacts during construction and operation are calculated as Average Annual Gross Revenue times a Construction Scaling Factor, which will reflect adjustments for variable expenses to approximate net operating income.
2. Compensation for impacts during decommissioning are calculated as Average Annual Gross Revenue times a Decommissioning Scaling Factor, which will reflect adjustments for variable expenses to approximate net operating income.

3. Compensation for impacts arising from unforeseen business interruption during operations are calculated as Average Annual Gross Revenue times a Business Interruption Scaling Factor, which will reflect adjustments for variable expenses to approximate net operating income.

B. For charter/party vessels:

1. Compensation for impacts during construction and operation are calculated as Net Economic Impact from Section II, Table 2 times a Construction Scaling Factor which will reflect adjustments for variable expenses to approximate net operating income.
2. Compensation for impacts during decommissioning are calculated as Net Economic Impact from Section II, Table 2 times a Decommissioning Scaling Factor which will reflect adjustments for variable expenses to approximate net operating income.
3. Compensation for impacts arising from unforeseen business interruption during operations are calculated as Net Economic Impact from Section II, Table 2 times a Business Interruption Scaling Factor which will reflect adjustments for variable expenses to approximate net operating income.

IV. Confidentiality

Information provided via this application process will be kept confidential by the TAP, except as otherwise required by law.

Information pertaining to final award amounts, along with names, addresses, and tax identification numbers, and only this specific information, will be provided to the escrow agent for the purpose of issuing payments.

V. Certification and Release

By completing and signing this form, I certify my understanding of the following:

A. As a condition to and in full consideration of any payment, I will execute the attached release.

B. I certify under the pains and penalties of perjury that I have provided complete and truthful information here and to the TAP for calculating my claim.

C. I certify that I am duly authorized to bind the entity or individual identified above.

D. I consent to allowing the TAP to use VTRs, SAFIS logbook data, dockside sales reports, NMFS Dealer data, and/or information from the Rhode Island Division of Taxation, as applicable, to verify the information contained in this application, and I waive any and all confidentiality pertaining to this information as it relates to this application.

Signature ______________________________ Date ______________________________

Title (if any): ____________________________

Schedule A: Examples/Operations Interruptions Events Qualifying for Compensation

1. Possible business interruptions arising from unforeseen extraordinary events may include the following or similar events:

    a. Extraordinary maintenance in the Project area resulting in extended constrained access within the Project area; or

2. Examples of excluded Operations Interruptions are:

    a. Fishery management measures that constrain catch or access to fishing grounds (e.g., quotas, area closures) or seasonal restrictions;

    b. General declines in stock for targeted species caused by climate change;

    c. Environmental changes unrelated to SFW;

    d. Harmful algal blooms;

    e. Vessel or other property damage;

    f. Reductions in fishing activity due to personal illness or public health measures;

    g. Inclement weather; or

    h. Force majeure events.

Exhibit A-5

Release of Liability

I, ______________, have submitted a claim for compensation to the South Fork Wind Rhode Island Fisheries Direct Compensation Program (the “Program”) for business interruption losses for one of the following three Program phases described in the claims form [(1) construction and the operations period following construction, (2) decommissioning, or (3) Operations Interruptions Events] (circle one) (the “Claim”). I assert that my Claim resulted directly from the South Fork Wind project. By signing this Release of Liability, I acknowledge that the Program has accepted and paid my Claim. My acceptance of such payment constitutes full, final and complete payment for this Claim. I agree on behalf of myself, and all my personal representatives, heirs, executors, administrators, agents, representatives, employees, affiliates, business partners, predecessors-in-interest, successors-in-interest, and assigns (the “Releasing Parties”) that neither South Fork Wind, LLC, Orsted North America, Inc., Eversource Investment LLC, nor any of their affiliates or joint venture partners, officers, directors, shareholders, employees, agents, representatives, insurers, predecessors, parents, subsidiaries, successors, and assigns (the “Released Parties”) shall have any further outstanding or ongoing obligation with respect to this Claim, even if the Releasing Parties learn new information about the Claim I agree that neither I nor the Releasing Parties will, directly or indirectly, assert any claim, or commence, join in, prosecute, participate in, or fund any part of, any suit or other proceeding of any kind against the Released Parties arising out of, related to or concerning in any way the Claim, and I and the Releasing Parties forever release and discharge the Released Parties from any liability arising under, related to, or concerning such Claim.

I acknowledge that I am duly authorized to sign on behalf of the entity indicated below. Signed under pains and penalties of perjury.

____
Date

____
Signature

____
Name

#60907143

ACKNOWLEDGEMENT

State of Rhode Island
County of __________

On this ___ day of ________, 20__, before me, the undersigned notary public, personally appeared ____________ and proved to me, through satisfactory evidence of identification, to be the person whose name is signed on the attached document, and who acknowledged that they signed the document voluntarily for its stated purpose.

____
Notary Public ____________________
Notary ID # ______________________
My commission expires ____________

Exhibit B-1

South Fork Wind (SFW) Coastal Community Fund Proposed Term Sheet

I. Purpose

- SFW will establish the SFW Coastal Community Fund to provide grants for initiatives supporting the general betterment of coastal communities in Rhode Island.

- By way of example, the SFW Coastal Community Fund may be used for the following objectives:

    - Supporting the recreational and charter boat industry;

    - Providing marketing and promotional support for processors, manufacturers of local seafood products, party or charter boat services;

    - Enhancing opportunities for training, apprenticeship, and employment in the commercial fishing industry, offshore wind industry, and other sectors of the coastal economy;

    - Improving infrastructure that supports the commercial fishing industry including but not limited to processors, wholesalers, and recreational fishers;

    - Supporting the enhancement and productivity of the commercial fishing industry; and

    - Supporting technology development to reduce potential conflicts between commercial fishing and offshore wind operations.

II. Creation, Use and Funding of the Coastal Community Fund

- SFW will establish an escrow account that will be overseen by an independent third-party escrow agent selected by SFW with input from CRMC and the FAB.

- SFW will fund the escrow account with five consecutive annual payments beginning immediately upon the conclusion of SFW commissioning activities. Such payment will be informed by analyses performed by Woods Hole on the indirect economic impacts from SFW.

- These funds will only be used to fund projects that satisfy the SFW Coastal Community Fund‘s objectives and as approved by the SFW Coastal Community Advisory Council (“Advisory Council”). The composition and number of the Advisory Council will be decided by CRMC with advice from the FAB.

- SFW will have no rights or role with respect to the Advisory Council’s approval of project funding requests.

III. Distribution of Escrow Account Funds

- Each request for project funding must be submitted to the Advisory Council and affirm that funds will be used to support projects that meet the objectives of the fund.

- The Advisory Council will review all submitted proposals. The Advisory Council will either approve, reject with an explanation, or request additional documentation necessary to complete its evaluation of a proposal.

- The process and form of such proposals will be determined by the Advisory Council.

- Upon notification of project approval from the Advisory Council, the escrow agent will disburse funds directly to the project applicant.

- In the event the fund is oversubscribed, the Advisory Council may, in its sole discretion, approve partial payment of a proposal.

* * *

Exhibit B-2

Form of Fund Agreement

The agreement establishing the Fund shall be prepared after the date hereof by SFW, with the advice and input of CRMC, in accordance with the Agreement and the Coastal Community Fund Term Sheet. Such agreement shall be subject to the review and approval of CRMC, which approval shall not be unreasonably withheld.