September 28, 2020

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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

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[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.

South Fork Wind's Fisheries Mitigation Framework

Commercial Fisheries Compensation Fund

Objective: Direct financial mitigation to fishers operating in Project area

Approach:

- Funding guided by Woods Hole analysis
- Escrow independently managed with funds allocated by gear type
- Fishers can participate in multiple allocations for different gear types (e.g. pot and gillnet)
- Eligibility period will pre-qualify fishers based on defined eligibility requirements
- Payments based on historical activity in the Project area
- Independent Technical Assistance Provider available to ease the administrative aspects of the program

Coastal Community Fund

Objective: Benefit the fishing community and associated industries by offering grants and direct payments in response to proposals

Approach:

- Funding guided by Woods Hole analysis
- Escrow independently managed
- Selection of project funding made by an independent council that will be formed by CRMC with FAB input
- Potential uses of the funds: support for charter fishing businesses, promotion of processors, seafood marketing, employment and training, and research and innovation

South Fork Wind | Powered by Ørsted & Eversource

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,

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

Table of Contents

List of Figures

List of Tables

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.

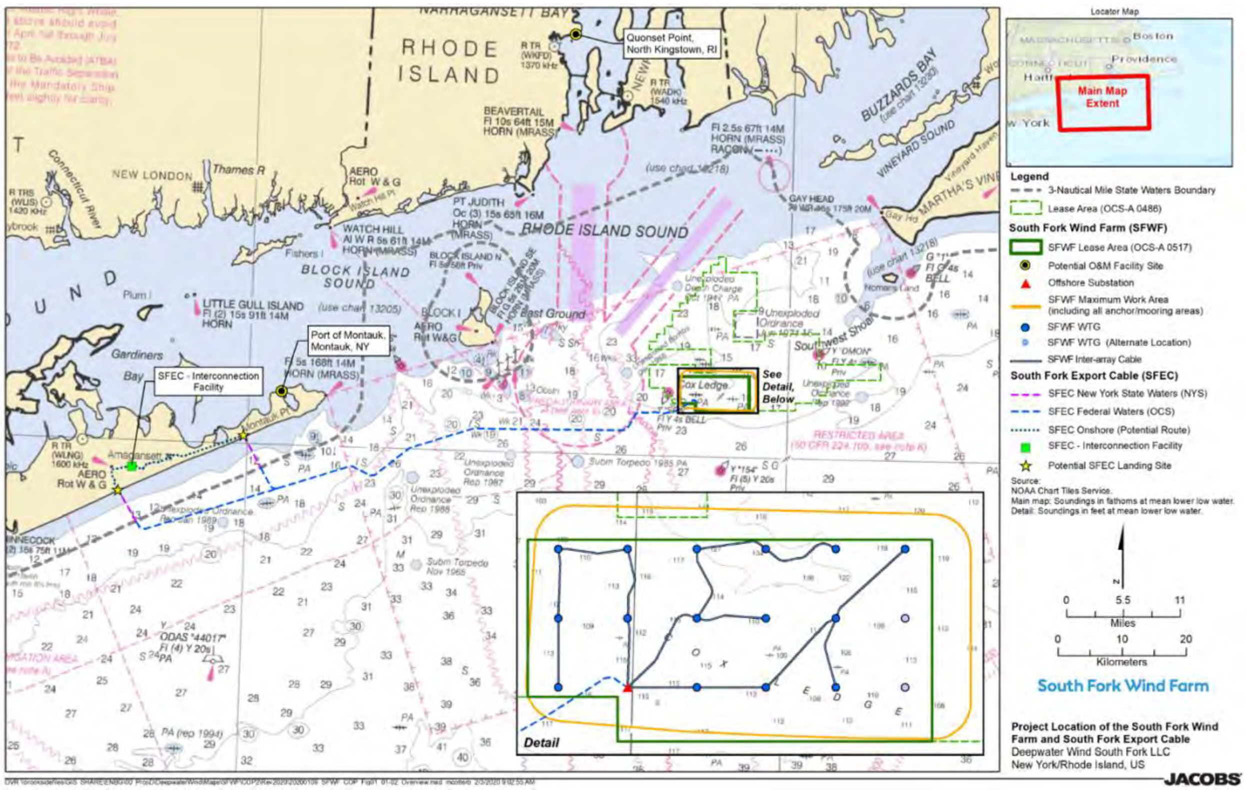

Figure 1. South Fork Wind Lease Area and export cable routes. Source: South Fork Wind Farm Construction and Operations Plan (Deepwater Wind South Fork 2020).

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.

		Average value of landings/year		**Multiplier**	**Total impact/year**
Area	**State**	VTR data only	with lobster & Jonah crab adjustment		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.

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

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.

References

Bartley, M.L., P. English, J.W. King, and A.A. Khan; HDR. 2019. Benthic monitoring during wind turbine installation and operation at the Block Island Wind Farm, Rhode Island – Year 2. Final report to the US Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2019-019.

Benjamin, S., M.Y. Lee, and G. dePiper. 2018. Visualizing fishing data as rasters. NEFSC Ref Doc 18-12; 24 pp. https://www.nefsc.noaa.gov/publications/crd/crd1812/

Bergström, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, N. Åstrand Capetillo, and D. Wilhelmsson. 2014. Effects of offshore wind farms on marine wildlife – a generalized impact assessment. *Environmental Research Letters* 9(3).

Deepwater Wind South Fork, LLC. 2020. Construction and operations plan, 30 CFR Part 585, South Fork Wind Farm. Prepared by Jacobs Engineering; submitted to the Bureau of Ocean Energy Management, US Department of the Interior. https://www.boem.gov/renewable-energy/state-activities/south-fork

DePiper, G.S. 2014. Statistically assessing the precision of self-reported VTR fishing locations. NOAA Technical Memorandum NMFS-NE-229. https://repository.library.noaa.gov/view/noaa/4806

Free, C.M., J.T. Thorson, M.L. Pinsky, K.L. Oken, J. Wiedenmann, and O.P. Jensen. 2019. Impacts of historical warming on marine fisheries production. *Science* 363:979-983.

Hoagland, P., T.M. Dalton, D. Jin and J.B. Dwyer. 2015. An approach for analyzing the spatial welfare and distributional effects of ocean wind power siting: the Rhode Island/Massachusetts Area of Mutual Interest. *Marine Policy* 58:51-59.

Hooper, T., M. Ashley, and M. Austen. 2015. Perceptions of fishers and developers on the co-location of offshore wind farms and decapod fisheries in the UK. *Marine Policy* 61:16–22. https://doi.org/10.1016/j.marpol.2015.06.031

IMPLAN Group. 2004. IMPLAN Professional: Social Accounting and Impact Analysis Software. 3rd Edition. Huntersville, NC.

Industrial Economics. 2015. Atlantic Large Whale Take Reduction Plan: Introduction to NMFS' Co-Occurrence Model. Presentation at Annual Meeting of the Marine Mammal Commission. May 6. Industrial Economics, Inc., Cambridge, MA.

King, D.M. 2019. Economic exposure of Rhode Island commercial fisheries to the Vineyard Wind Project. Report prepared for Vineyard Wind LLC by King and Associates, Inc. Plymouth, MA.

Kirkpatrick, A.J., S. Benjamin, G.S. DePiper, T. Murphy, S. Steinback, and C. Demarest. 2017a. Socio-economic impact of Outer Continental Shelf wind energy development on fisheries in the U.S. Atlantic. Volume I – Report Narrative. U.S Dept. of the Interior, Bureau of Ocean Energy Management, Atlantic OCS Region, Washington, D.C. OCS Study BOEM 2017-012. 150 pp.

Kirkpatrick, A.J., S. Benjamin, G.S. DePiper, T. Murphy, S. Steinback, and C. Demarest. 2017b. Socio-economic impact of Outer Continental Shelf wind energy development on fisheries in the U.S. Atlantic.

Volume II – Appendices. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Atlantic OCS Region, Washington, D.C. OCS Study BOEM 2017-012. 191 pp.

Langhamer, O. 2012. Artificial reef effect in relation to offshore renewable energy conversion: state of the art. *The Scientific World Journal*, 2012. https://doi.org/10.1100/2012/386713

Leung, D.Y.C. and Y. Yang. 2012. Wind energy development and its environmental impact: a review. *Renewable and Sustainable Energy Reviews* 16(1):1031–1039. https://doi.org/10.1016/j.rser.2011.09.024

Lindeboom, H.J., H.J. Kouwenhoven, M.J.N. Bergman, S. Bouma, S. Brasseur, R. Daan, R.C. Fijn, D. deHaan, S. Sirksen, R. van Hal, R. Hille Ris Lambers, R. ter Horstede, K.L. Krijgsveld, M. Leopold, and M. Scheidat. 2011. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters 6(3). https://doi.org/10.1088/1748-9326/6/3/035101

Lüdeke, J. 2017. Offshore wind energy: good practice in impact assessment, mitigation and compensation. *Journal of Environmental Assessment Policy and Management* 19(01):1750005. https://doi.org/10.1142/S1464333217500053

Maar, M., K. Bolding, J. Kjerulf, J.L.S. Hansen, and K. Timmermann. 2009. Local effects of blue mussels around turbine foundations in an ecosystem model of Nysted off-shore wind farm, Denmark. *Journal of Sea Research* 62(2–3):159–174.

National Marine Fisheries Service (NMFS). 2020. Online landings database. https://foss.nmfs.noaa.gov/apexfoss/

Oremus, K.L. 2019. Climate variability reduces employment in New England fisheries. PNAS 116(52):26444-26449. https://doi.org/10.1073/pnas.1820154116

Rhode Island Department of Environmental Management (RIDEM). 2019. Rhode Island fishing value in the Vineyard Wind Construction and Operations Plan area. Rhode Island Department of Environmental Management Division of Marine Fisheries.

Rhode Island Department of Environmental Management (RIDEM). 2018. Spatiotemporal and economic analysis of Vessel Monitoring System data within the New York Bight call areas. Rhode Island Department of Environmental Management Division of Marine Fisheries.

Rhode Island Department of Environmental Management (RIDEM). 2017. Spatiotemporal and economic analysis of Vessel Monitoring System data within wind energy areas in the greater North Atlantic, Addendum I. Rhode Island Department of Environmental Management Division of Marine Fisheries.

ten Brink, T.S., T. Dalton, and J. Livermore. 2018. Perceptions of commercial and recreational fishers on the potential ecological impacts of the Block Island Wind Farm (US), the first offshore wind farm in North America. *Frontiers of Marine Science* 5:439, doi: 10.3389/fmars.29187.00439

Vallejo, G.C., K. Grellier, E.J. Nelson, R.M. McGregor, S.J. Canning, F.M. Caryl, and N. McLean. 2017. Responses of two marine top predators to an offshore wind farm. *Ecology and Evolution*, (February), 8698–8708. https://doi.org/10.1002/ece3.3389

Wilber, D.H., D.A. Carey, and M. Griffin. 2018. Flatfish habitat use near North America's first offshore wind farm. *Journal of Sea Research* 139(November 2017):24–32. https://doi.org/10.1016/j.seares.2018.06.004

Wilhelmsson, D., and T. Malm. 2008. Fouling assemblages on offshore wind power plants and adjacent substrata. *Estuarine, Coastal and Shelf Science* 79:459–466. https://doi.org/10.1016/j.ecss.2008.04.020

Wilhelmsson, D., T. Malm, and C.O. Marcus. 2006. The influence of offshore windpower on demersal fish. *ICES Journal of Marine Science* 63(63). https://doi.org/10.1016/j.icesjms.2006.02.001

Willsteed, E., A.B. Gill, S.N.R. Birchenough, S. Jude. 2017. Assessing the cumulative environmental effects of marine renewable energy developments: Establishing common ground. *Science of the Total Environment* 577(15 January 2017):19-32. https://doi.org/10.1016/j.scitotenv.2016.10.152

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.

Species	*Mean* Value/year (2019 $)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2019 $)	*Standard Deviation* 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.