Coastal Effects Analysis for South Fork Wind – CRMC File 2018-10-082

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 (VTR and 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 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 DWSF 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 buefin 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 important 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 vessel monitoring system (VMS)[1] data the Northeast Ocean Data Portal website at northeastoceandata.org has provided 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 to the extent that the data provides. 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 Vessel Trip Reports (VTR) [2] or VMS. Accordingly, the density of fishing activity and 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

[1] 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.

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

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.

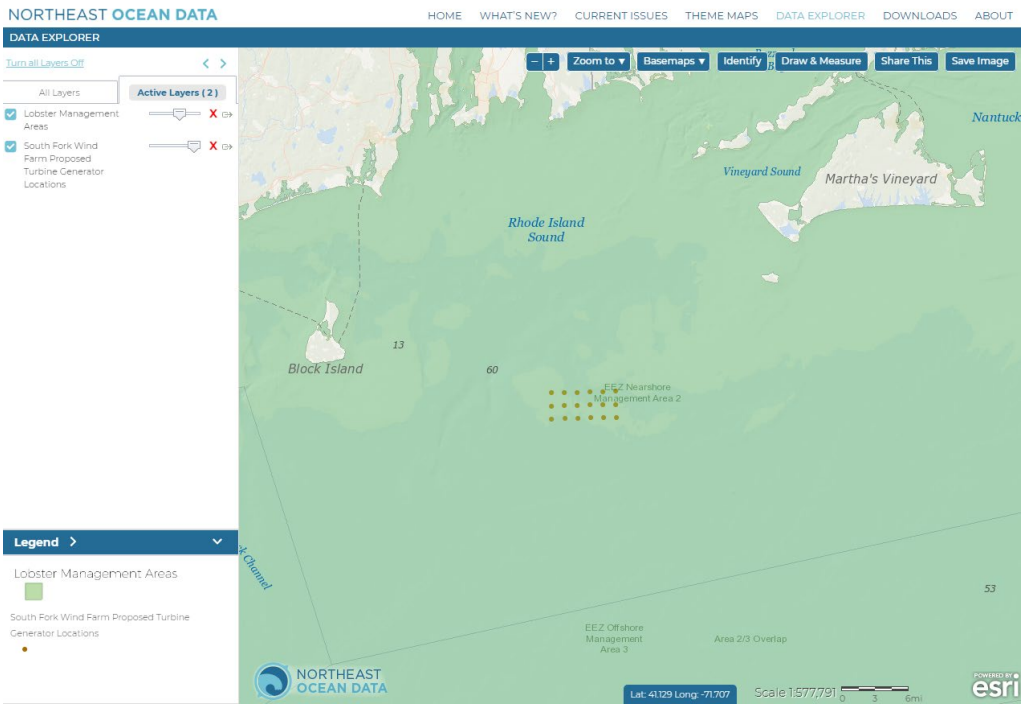

Figure 2. The SFW turbine foundations (dots) are shown in the center of the image within Lobster Management Area 2. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

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 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.

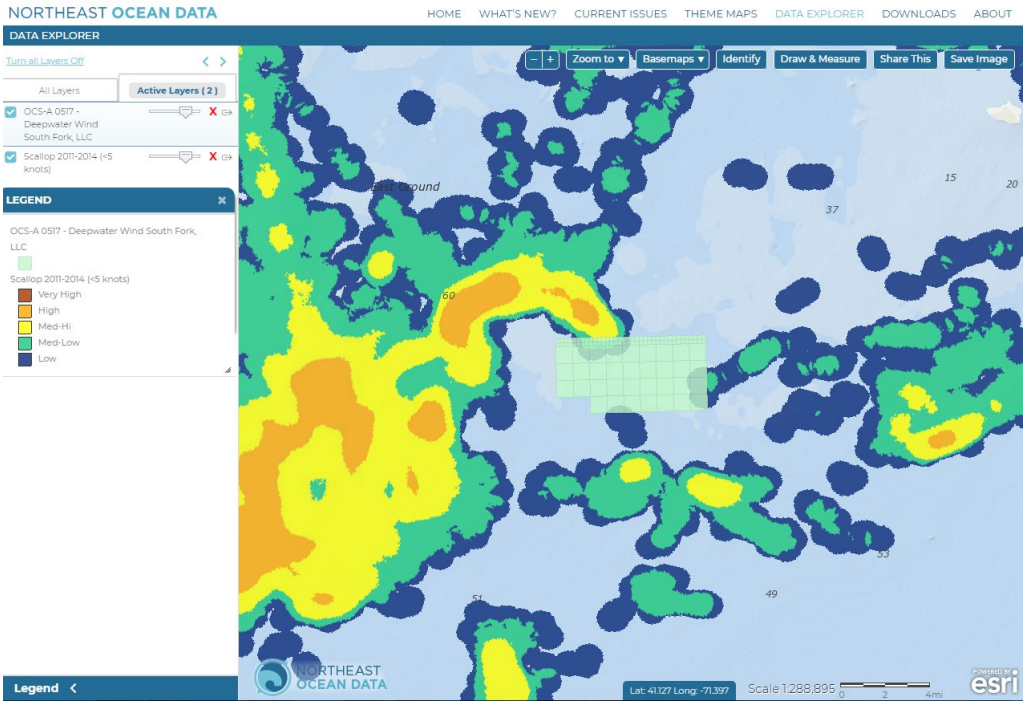

Figure 3. Scallop fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

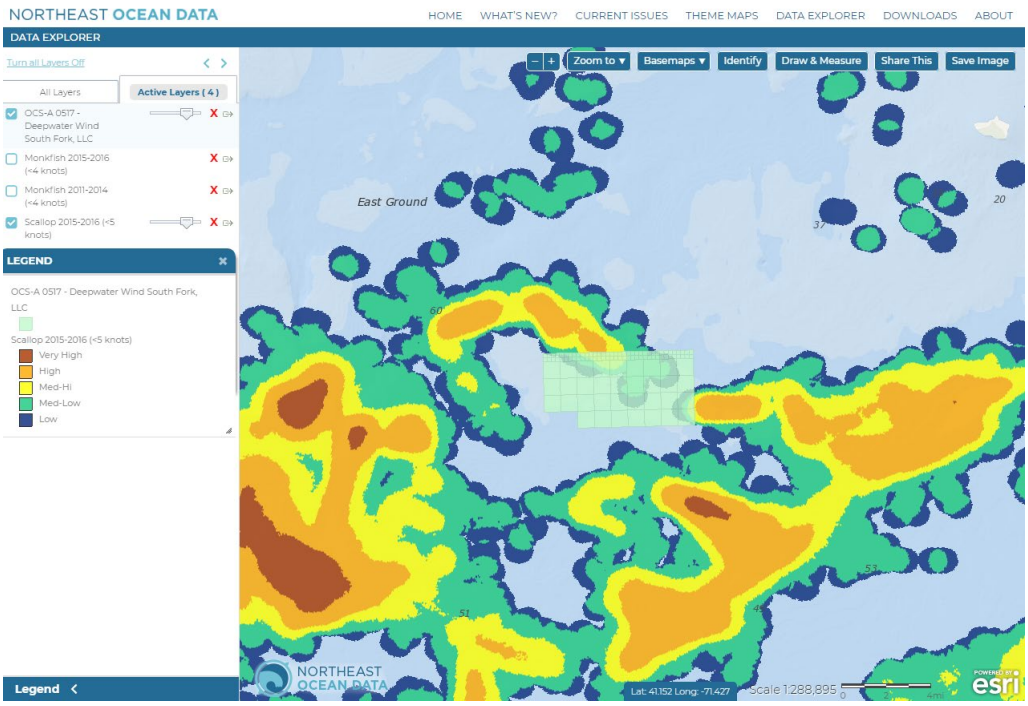

Figure 4. Scallop fishing activity 2015-2016. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

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.

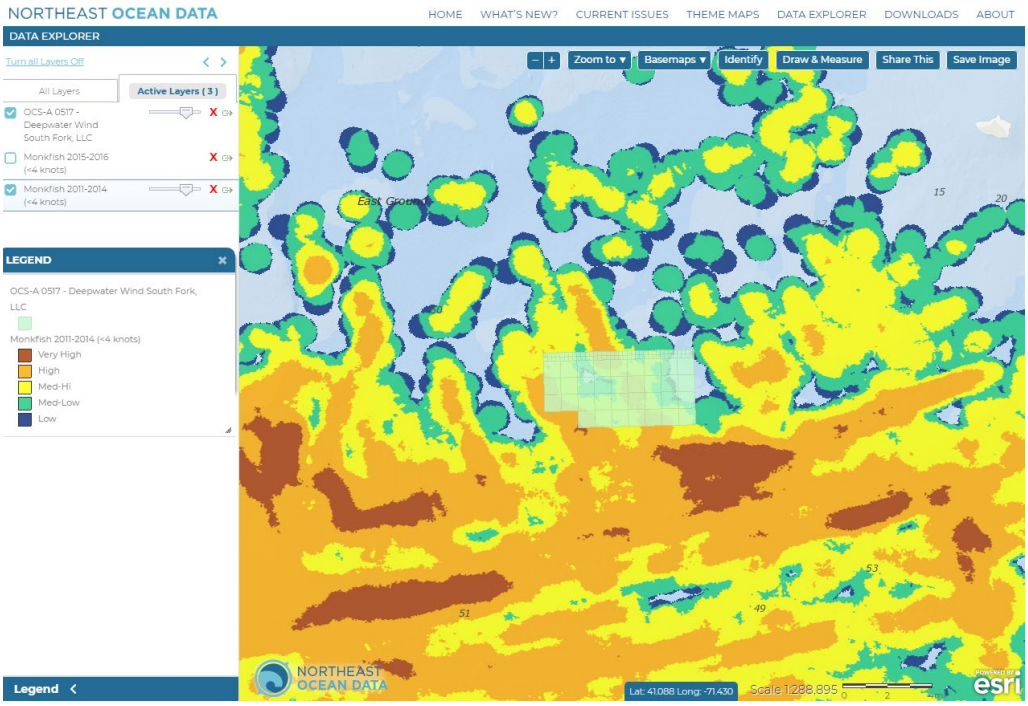

Figure 5. Monkfish fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

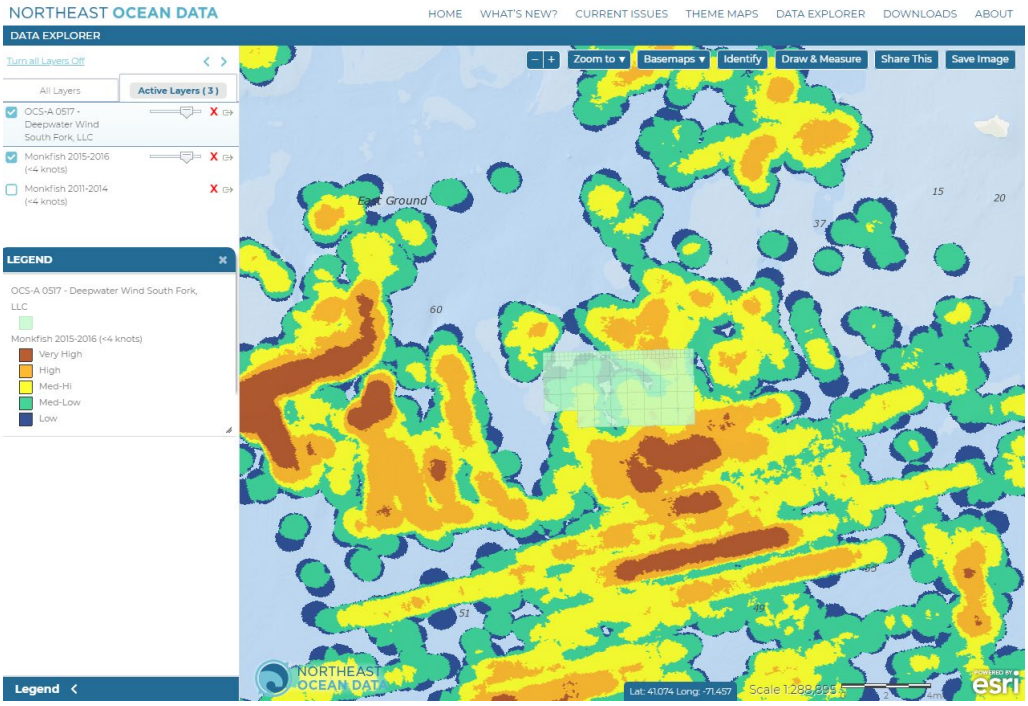

Figure 6. Monkfish fishing activity 2015-2016. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

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.

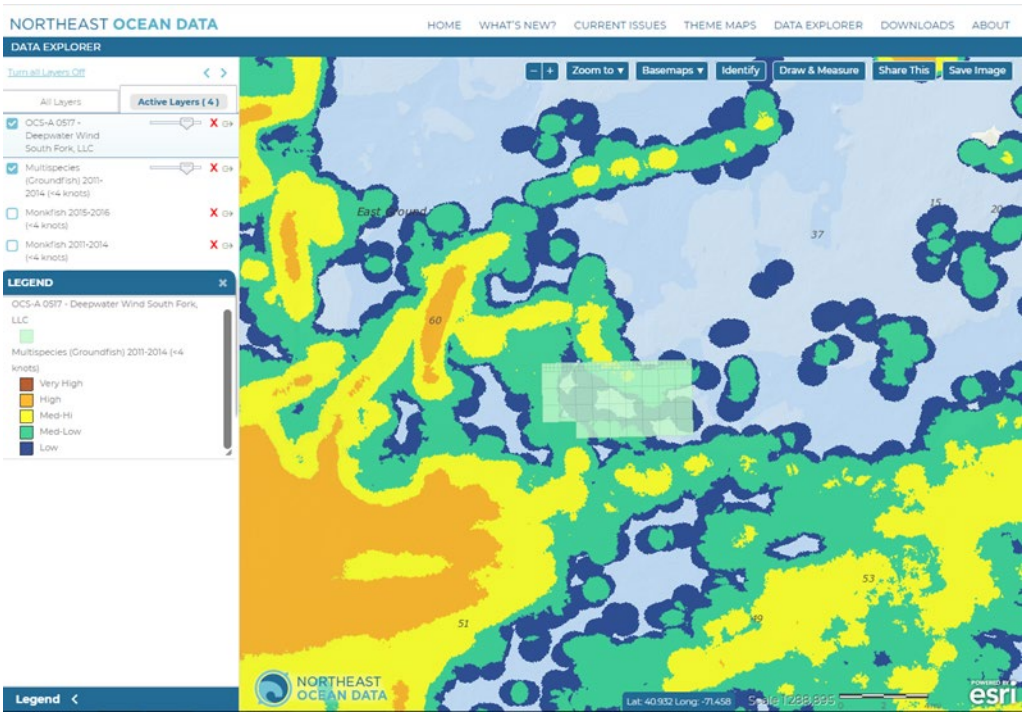

Figure 7. Multispecies (groundfish) fishing activity 2011-2014. The SFW lease is shown in the center of the image. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

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. 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 Construction and Operation Plan 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.

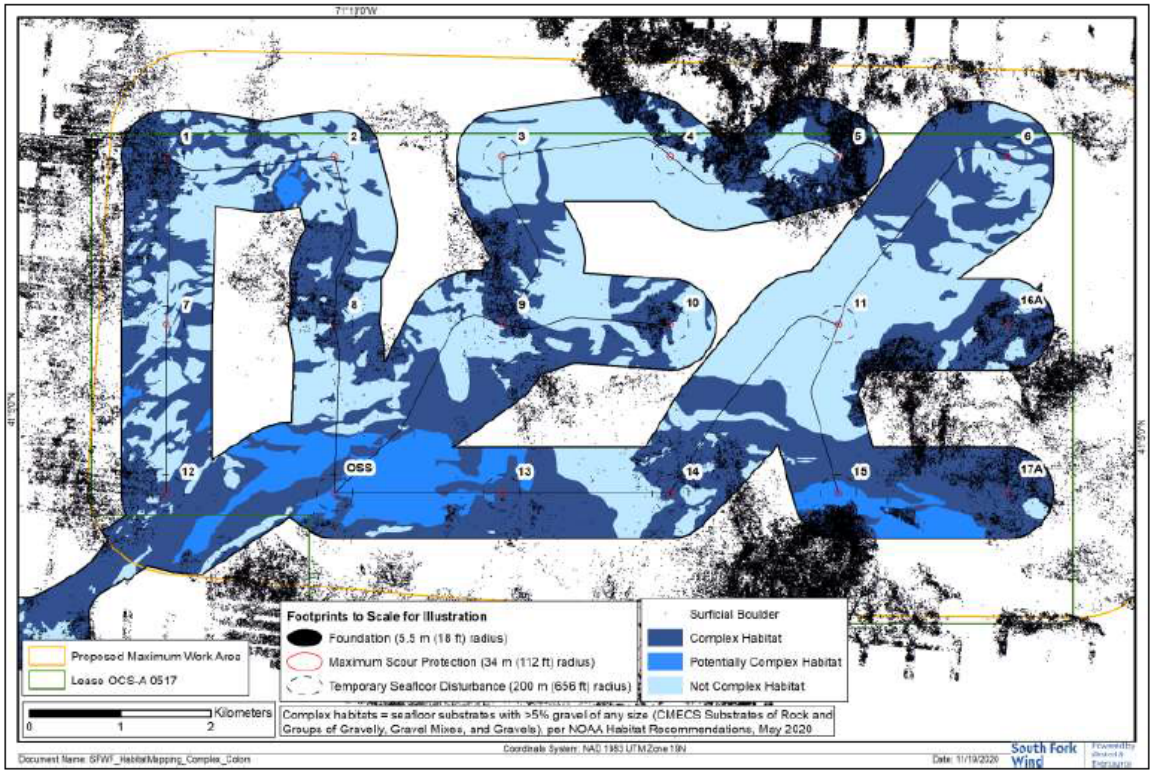

Figure 8. Layout of the proposed South Fork wind farm overlain on habitat within the lease area. The areas composed of black dots indicate the presence of surficial boulders. Source: Figure 3.4.2-1 of the BOEM SFW DEIS at 3-6.

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

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 of the ocean for the for-hire 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. 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.

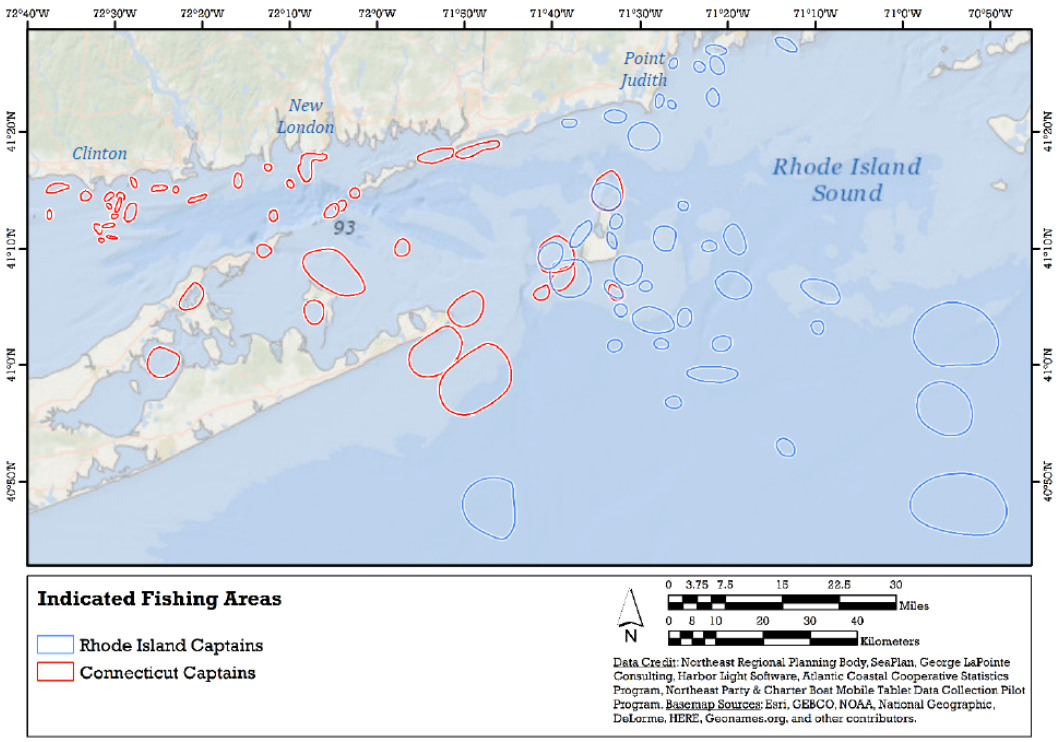

Figure 9. The blue polygon located directly below "Rhode Island Sound" in the graphic is approximately where the SFW project is proposed on Cox Ledge. Source: Figure 8 of the 2016 Party and Charter Vessel Mapping Study. https://www.openchannels.org/literature/15610

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)

Commercial Fishing Activity

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 X. 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 X .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 Appendix X. 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. Industrial Economics on behalf of the developer estimated an annual average recreational value of $231,000 following review of the RISAA data. 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 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 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.

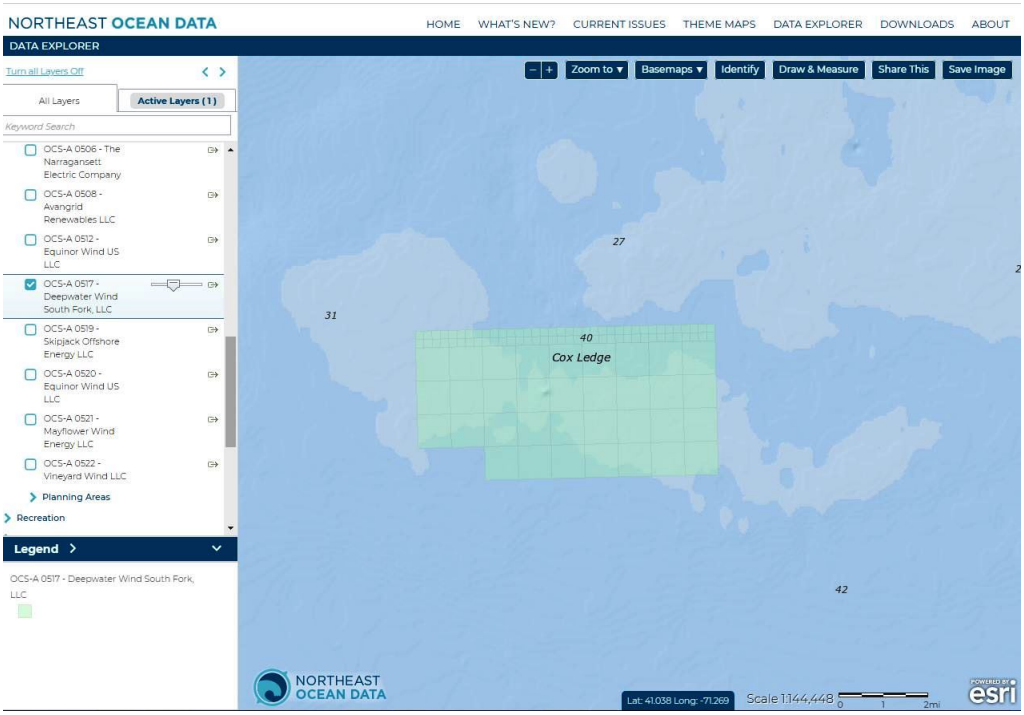

Figure 10. An overlay of the SFW lease OCS-A 0517 shown as the shaded light green area in the center of the image with Cox Ledge, the underlying gray shaded area. Source: Northeast Ocean Data online viewer https://www.northeastoceandata.org/.

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).[3] 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

[3] 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."

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 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 X1 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 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 reproductive, 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 exceeding established thresholds for mortality 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 X. 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. However, building out the lease areas proposed 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.

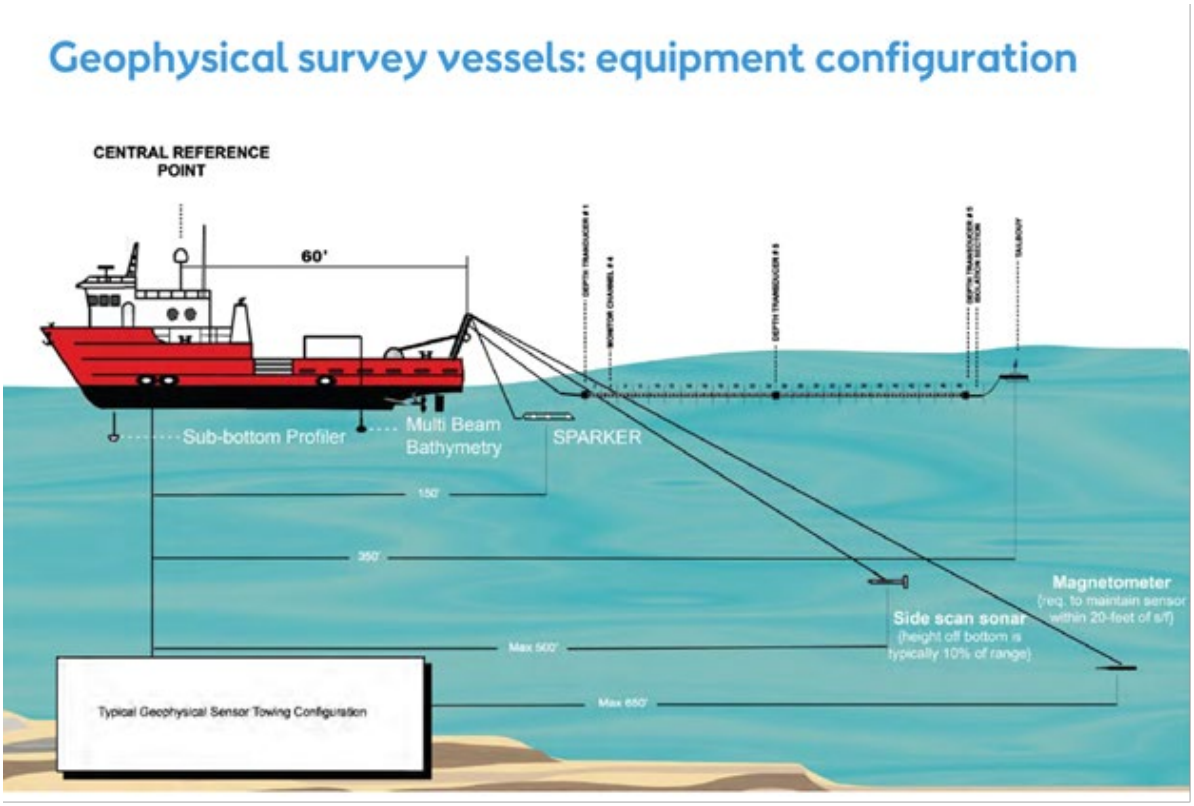

Figure 11: Typical geophysical survey vessel sensor towing configuration. Graphic courtesy of Ørsted.

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, including 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 unavoidable adverse impacts 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 currently proposed SFW mitigation package in its entirety 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.