MAYFLOWER WIND

Appendix V. Commercial and Recreational Fisheries and Fishing Activity Technical Report

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MAYFLOWER WIND

COP Appendix V

Commercial and Recreational Fisheries and Fishing Activity Technical Report

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ACRONYMS AND ABBREVIATIONS

Abbreviation	Meaning
ACCSP	Atlantic Coastal Cooperative Statistics Program
AIS	Automatic Identification System
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management
CFCRI	Commercial Fisheries Center of Rhode Island
COP	Construction and Operations Plan
CRMC	Coastal Resources Management Council
ECC	export cable corridor
FCP	Fisheries Communication Plan
FAB	Fisherman's Advisory Board
FLO	Fisheries Liaison Officer
FMP	Fishery Management Plan
FR	Fisheries Representative
ft	foot
GARFO	Greater Atlantic Regional Fisheries Office
GPS	Global Positioning Systems
HMS	highly migratory species
in	inch
km	kilometer
km^2	square kilometer
kt	knot
lbs.	pounds
Lease Area	Lease Area OCS-A 0521
LMA	Lobster Management Area
m	meter
MA DMF	Massachusetts Division of Marine Fisheries
MA/RI WEA	Massachusetts Rhode Island Wind Energy Area
MAFMC	Mid-Atlantic Fishery Management Council
MARCO	Mid-Atlantic Regional Council on the Ocean
Mayflower Wind	Mayflower Wind Energy LLC
MFAC	Marine Fisheries Advisory Council
mi	mile
mi^2	square mile
MLA	Massachusetts Lobsterman's Alliance
mm	millimeter
MRIP	NOAA Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NBPA	New Bedford Port Authority
NEFMC	New England Fishery Management Council
NFMA	Northern Fishery Management Area
nm	nautical mile
NMFS or NOAA Fisheries	NOAA's National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NROC	Northeast Regional Ocean Council
OCS	Outer Continental Shelf
RFMC	Regional Fishery Management Council

Abbreviation	Meaning
RIDEM	Rhode Island Department of Environmental Management
RODA	Responsible Offshore Development Alliance
ROSA	Responsible Offshore Science Alliance
SAFIS	Standard Atlantic Fisheries Information System
SFMA	Southern Fishery Management Area
mt	metric ton
U.S.	United States
VHF	Very High Frequency
VMS	Vessel Monitoring System
VTR	Vessel Trip Report
WEA	Wind Energy Area

1 PURPOSE AND INTENT OF THIS TECHNICAL REPORT

Mayflower Wind Energy LLC (Mayflower Wind) proposes an offshore wind renewable energy generation project located in federal waters off the southern coast of Massachusetts in the Commercial Lease of Submerged Lands for Renewable Development on the Outer Continental Shelf OCS-A 0521 (the Lease Area), which will deliver electricity to the regionally administered transmission system via export cables with landfall sites in Falmouth, Massachusetts and Somerset, Massachusetts. The Offshore Project Area for this assessment is defined as the Lease Area, and the Falmouth and Brayton Point export cable corridors to the landfall sites.

This report serves as a supplemental reference to Section 11 of the Mayflower Wind Construction and Operations Plan (COP) and includes an in-depth review of the commercial and recreational fisheries and fishing activity that occurs in the broader region, the Massachusetts Rhode Island Wind Energy Area (MA/RI WEA), and the Offshore Project Area, the coinciding economic valuations of that activity and effort, and a discussion of commercial and recreational fishery exposure to Project development. The MA/RI WEA, designated by the Bureau of Ocean Energy Management (BOEM) in their federal leasing program, encompasses seven adjacent leased areas of the OCS, one of which is the Mayflower Wind Lease Area. Some fisheries data analyzed in this report covers what is deemed the Massachusetts Wind Energy Area (WEA) according to Kirkpatrick et al. (2017), which includes the Lease Area but not the full Offshore Project Area. Herein, the area described in Kirkpatrick et al.'s analysis as the Massachusetts WEA is denoted as the "Kirkpatrick Study Area" and is included in this technical report to place fisheries and fishing activity in the Offshore Project Area in the broader context of fisheries and fishing activity in the region. The overall intent of this report is to provide a comprehensive regional historic and current review of fisheries and fishing activity on the Atlantic OCS, with an emphasis in the New England region, and a detailed review of historic and current fisheries and fishing activity in the Offshore Project Area.

1.1 REPORT ORGANIZATION

This report describes and analyzes the following:

- Commercial and recreational fishing activity in the Atlantic OCS and Offshore Project Area;
- Commonly caught commercial and recreational species in the Atlantic OCS and Offshore Project Area;
- Relevant trends of commercial and recreational fishery resources;
- Federal and state management of commercial and recreational fisheries; and
- The Project's outreach and engagements with commercial and recreational fishermen.

A review of potential effects on commercial and recreational fisheries and fishing activity from the Project's construction, operations and maintenance, and decommissioning phases are discussed in Section 11 of the Mayflower Wind COP.

1.1.1 Fisheries Data Sources and Descriptions

Fisheries data (e.g., landings, valuation, assessments, etc.) and information are collected in various ways (e.g., commercial permit holders that self-report their catches, independent observers on the vessels, landings data at the ports, etc.). **Table 1-1** list the data sources used in this report. These sources

provide information regarding the landings and values of specific species, the type of fishing gear deployed, and the geographic location of fishing activity in the region and Offshore Project Area. Data analyzed also include supplemental fishing data and information provided by fishermen, by federal and state government agencies, and by academic and non-governmental institutions. This and other fisheries related sections (Appendix L1, Offshore Designated Protected Areas Report; Appendix M, Benthic and Shellfish Resources Characterization Report; Appendix N, Essential Fish Habitat Assessment and Protected Fish Species Assessment; Appendix P2, Offshore EMF Assessment, and Sections 6.6, 6.7, and 11.0) are also based on a review of published scientific literature and publicly available reports, including vessel-based monitoring databases and synthesis reports conducted for other offshore wind facilities in the northern United States (U.S.) Atlantic. Field observations, including fishermen scouting reports collected during Mayflower Wind geophysical and geotechnical surveys for the proposed Project, and direct outreach to fishermen were also used to inform this assessment.

Several data sources and reports were aggregated to provide a synthesis of fishing activity and density within the MA/RI WEA and Offshore Project Area, summarized in **Table 1-1** and **Table 1-2**. This section describes the data sources used for this report, including the sources for the data and the geographic coverage for the dataset(s).

TABLE 1-1. COMMERCIAL FISHERIES DATA SOURCES

Source	Data	Study Area	Citations and Links
Federal Data Sources			
National Oceanic and Atmospheric Administration (NOAA)'s National Marine Fisheries Service (NMFS)	Vessel trip reports (VTR)	Mayflower Wind Offshore Project Area	NMFS, 2020c
	Commercial fishing revenue maps based on VTR	State and federal waters	NMFS, 2020a
	Annual Commercial Landing Statistics	State and federal waters	NOAA Fisheries, 2021
	Socioeconomic Impacts of Atlantic Offshore Wind Development	All Atlantic OCS Offshore Wind Energy Lease Areas	NMFS, 2020b
	Commercial fisheries landings and values	Mayflower Wind Lease Area, Export Cable Corridors (ECCs), Nearby Offshore Wind Energy Lease Areas	NMFS, 2020c NMFS, 2021
NMFS Law Enforcement	VTR raw position report data (in the form of polar histograms)	Mayflower Wind Lease Area	NMFS, 2020d
Atlantic Coastal Cooperative Statistics Program (ACCSP)	Comprehensive, species-specific landings database	State and federal waters	ACCSP, 2020

Source	Data	Study Area	Citations and Links
BOEM	Report: Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic	Massachusetts Wind Energy Area (federal waters)	Kirkpatrick et al., 2017
Northeast Regional Ocean Council (NROC)	Visualization and mapping of Vessel Monitoring Systems (VMS) data	State and federal waters	NROC, 2018
Mid-Atlantic Regional Council on the Ocean (MARCO)	Visualization and mapping of VTR data	State and federal waters	MARCO, n.d.
State Resources			
Massachusetts Department of Marine Fisheries (MA DMF)	Annual Landings Reports	State waters, statistical reporting areas 10 (Nantucket Sound) and 12 (waters south of Muskeget Channel)	MA DMF, 2019b
Massachusetts Office of Coastal Zone Management	Massachusetts Ocean Management Plan	State waters	MA CZM, 2015
CRMC	CRMC Federal Consistency Manual	State and federal waters	CRMC, 2018
CRMC	Rhode Island Ocean Special Area Management Plan (SAMP), Chapter 5 "Commercial and Recreational Fisheries"	State and federal waters	CRMC, 2010
Mayflower Wind Sourced Data			
Mayflower Wind	Stakeholder outreach and engagement	State and federal waters	Appendix A, Agency Correspondence, Appendix X, Navigation Safety Risk Assessment
	Geotechnical and geophysical surveys and scouting reports	Mayflower Wind Lease Area, ECC, Nearby Offshore Wind Energy Lease Areas	Mayflower Wind Energy LLC. 2019 and 2020. Appendix E, Marine Site Investigation Report, Appendix E.1 Geohazard Report for Export Cable Corridor, Appendix E.2 Geohazard Report for Lease Area, Appendix E.3, Measured and Derived Geotechnical Parameters and Final Results

TABLE 1-2. RECREATIONAL FISHERIES DATA SOURCES

Source	Data	Study Area	Citation and Link
Massachusetts Recreational Saltwater Fishing Regulations	Information on commonly caught recreational fish species and regulations information	State waters	MA DMF, 2020a
Rhode Island Recreational Saltwater Fishing Regulations			RIDEM, 2021c
NOAA Marine Recreational Information Program (MRIP)	Recreational Fisheries Statistics	Federal waters	NOAA Fisheries, 2021

1.1.1.1 Fisheries Data Types

Fisheries data analyzed in this section were integrated from a variety of sources, typically by federal and/or state regulation or by voluntary reporting. Data spans different types of platforms, management tools, and databases assimilating different levels of spatial and temporal information. Some datasets are collected from vessel navigation-based reporting systems whereas other datasets are assimilated based on confidential information reported to regulatory authorities, e.g., fisheries landings in ports, that provide information on tracks and speeds of fishing vessels. Each data source has limitations in the types and level of information represented but data gaps or limitations in one source are often supplemented with other available sources, which provides a representation of fisheries and fishing activity over time and space in the Offshore Project Area to the greatest degrees of accuracy and precision practicable. Each of these datasets and how the data were interpreted for this report is described below.

Vessel Trip Report Data

Vessel Trip Reports (VTRs) are required for any federally permitted vessel when fish are caught, or when operations include activities that would support fishing. This includes preparing to catch or harvest fish, or when attempting to catch or harvest fish, even if no landings are made. VTR data are self-reported by fishermen and can provide information on when and where a catch occurs, trip date, species and quantities caught, trip location, principal port, and vessel data. Because of how VTRs are collected, there can be potential, and even significant, lag time from catch to reporting to analysis. As self-reported data, VTRs cannot always be directly verified by the permitting agency. Location details of where fish were caught as reported in VTRs are not as granular as Vessel Monitoring System (VMS) data.

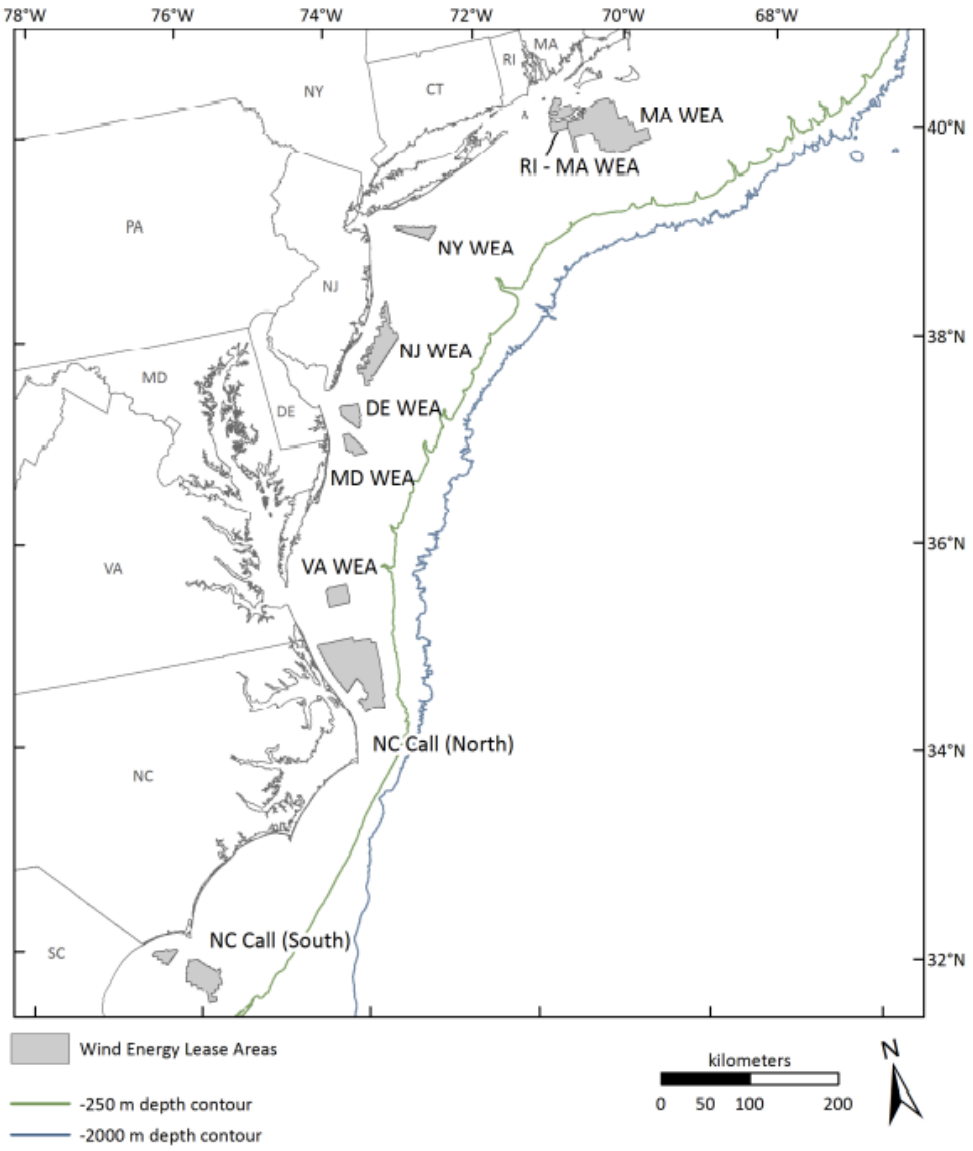
VTRs report only a single set of coordinates for each trip, regardless of how long the trip is or area fished within that trip time. VTR datasets are useful as the information can be aggregated into broad statistical chart areas to provide a sense of where, when, and how certain species are being caught. To reduce the effect of location inaccuracy that stems from representing a fishing trip that may cover a large area as a single point, the databases built by the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS, also known as NOAA Fisheries) and NMFS's Greater Atlantic Regional Fisheries Office (GARFO) from raw VTR data are presented as modeled fishing intensity raster datasets that smooth the locations of catch information (Benjamin et al., 2018). This approach more appropriately represents spatial fishing effort but does not present catch location at the VTR reported location for that trip and may overstate the catch of some species in the Offshore Project Area.

In addition to publicly available, rasterized VTR data for the Atlantic OCS Wind Energy Areas (WEAs) compiled in the series of NMFS reports collectively titled "Socioeconomic Impacts of Atlantic Offshore Wind Development," NMFS provided Mayflower Wind with customized fisheries landings and valuation

data specific to the Offshore Project Area based on the Lease Area boundaries as well as a shapefile for the proposed export cable corridors (NMFS, 2020b; NMFS, 2020c; NMFS, 2020d; NMFS, 2021). This Mayflower Wind-specific dataset provides a picture of the location of fishing effort, species targeted, ports landing fish, and the landings and valuations of these fisheries within the Offshore Project Area while Kirkpatrick et al. (2017) presents species, Fishery Management Plans (FMP), ports, and gear types in the Kirkpatrick Study Area ranked by exposure and the NMFS (2020b) socioeconomic data presents the Top 10 Most Impacted Species by landings and then revenue in the Lease Area. The Falmouth and Brayton Point export cable corridors are collocated for approximately 9.3 nm (17.2 km) north of the Lease Area before the Brayton Point export cable corridor turns west. The manner in which this modeled VTR data is produced precludes the generation of separate data sets for both export cable corridors for this collocated portion. It also precludes the equal division of data into each export cable corridor, particularly in a relatively small area such as this. The result of this is that the data representing landings shown by the dataset for the Falmouth export cable corridor (NMFS, 2020c) reflects the entire length of the Falmouth export cable while the data representing landings shown by this dataset for the Brayton Point export cable corridor (NMFS, 2021) does not represent the collocated portion but does represent the remainder of the length of that export cable corridor to the landfall site at Brayton Point. Producing the data in this way prevents double counting of fishing activity but may understate the level of fishing activity in the Brayton Point export cable corridor (relative to the size of this collocated portion) although the modeled VTR data representing fishing activity in this collocated portion is in fact represented in the data for the Falmouth export cable corridor. It should be noted that in NMFS (2020b) socioeconomic data as well as the NMFS-provided Mayflower Wind-specific data (2020c; 2021), the Lease Area is delineated as two separate parcels which have been combined for the purposes of this report to represent the full extent of the Lease Area.

The Kirkpatrick Study Area is shown in **Figure 1-1** and, as previously described, is referred to in that study as the Massachusetts WEA but is referred to as the Kirkpatrick Study Area herein.

While there is broad agreement between these datasets in regard to which species and ports may be most exposed/impacted by the proposed Project, ranking via exposure in the Kirkpatrick data versus ranking via impact (as measured by landings, revenue, etc.) in the NMFS data (as well as other assumptions including geographic range) results in different species and ports being represented in the Kirkpatrick “most exposed” lists and the NMFS “most impacted” lists. The NMFS-provided Mayflower Wind-specific data are the only one of these three datasets to represent the export cable corridors in addition to the Lease Area. Differences between the NMFS socioeconomic data summaries and the NMFS-provided Mayflower Wind-specific data for the same temporal and spatial extents are mostly minor and are likely due to rounding or the treatment of confidential data. The NMFS ‘data download site’ that presents the modeled VTR data used to create the socioeconomic data summaries is, however, identical to the NMFS-provided Mayflower Wind-specific data (NMFS, 2020d).



Source: Kirkpatrick et al., 2017

FIGURE 1-1. THE KIRKPATRICK STUDY AREA

Vessel Monitoring System

A fishing vessel is required to carry a VMS and transmit a signal indicating its position when fishing for species under a federal or state permit. Near the Offshore Project Area, VMS is required when fishing for Atlantic sea scallops, monkfish, Atlantic herring, Atlantic surfclam, ocean quahog, shortfin squid, longfin squid, butterfish, and species managed under the Northeast Multispecies Management and Consolidated Atlantic Highly Migratory Species (HMS) Management Plans. An overview of these management efforts is provided in Section 2.1 (NOAA Fisheries, 2021b).

VMS data can provide information regarding the date, speed over ground, and vessel's declaration code. This can help to identify a type of vessel, permit the vessel holds, and/or gear-type. VMS data showing

vessels traveling below a certain speed for a given fishery (often assumed as either four or five knots [kt]) may indicate whether a vessel is actively fishing rather than transiting. The amount of vessel activity below these speeds may most accurately be interpreted as the relative level of vessel presence at speeds likely consistent with fishing activity. Where speed is not indicated, there is no distinction to whether a vessel is fishing or transiting. The most accurate interpretation is that VMS data indicate relative levels of vessel presence in an area. This type of data does may not fully represent trends in fishing activity specific to the fishery from changing environmental and economic conditions, fisheries management, and other factors.

The Mid-Atlantic Regional Council on the Ocean (MARCO) and Northeast Regional Ocean Council (NROC) maintain publicly available aggregated maps built from government-provided VMS data. VMS data for the Northeast and Mid-Atlantic regions from 2006 and 2016 can be utilized to monitor commercial fishing activities with individual species, e.g., herring, or groupings of species, i.e., pelagic (see Section 6.7 of the Mayflower Wind COP).

Automatic Identification System

Automatic Identification System (AIS) is an automated, continuous tracking system that provides a record of the operational history of an AIS-transmitting system, whether it is affixed to a vessel or a navigational mark. AIS operates in the Very High Frequency (VHF) mobile maritime band and used Global Positioning Systems (GPS) to broadcast a vessel's characteristics like course, position, speed, dimension, name and destination, and others. Because AIS signals are transmitted frequently (2 to 10 seconds for Class A and 30 to 180 seconds for Class B when underway), it can be considered as the most precise tracking mechanism for those vessels required to use it. AIS must be turned on or information cannot be exchanged. Federal regulations (33 Code of Federal Regulations 164.46) mandate which vessels are required to carry AIS and this includes fishing vessels that are greater than 65 feet (ft) (20 meters [m]) in length and are self-propelled. The specific requirements for the carriage of AIS Class A and Class B are:

AIS Class A device:

- Self-propelled vessel of 65 feet or more in length engaged in commercial service
- A towing vessel of 26 feet or more in length and more than 600 horsepower, engaged in commercial service
- A self-propelled vessel that is certificated to carry more than 150 passengers
- A self-propelled vessel engaged in dredging operation in or near a commercial channel or shipping fairway in a manner likely to restrict or affect navigation of other vessels

A self-propelled vessel engaged in the movement in:

- Certain dangerous cargo
- Flammable or combustible liquid cargo in bulk

AIS Class B device:

- Fishing industry vessels
- Vessels that are certified to carry less that 150 passengers that:
    - Do not operate in a Vessel Traffic Service or Vessel Movement Reporting Service area

- Do not operate at speeds in excess of 14 nautical miles per hour

- Vessels engaged in dredging operations

AIS Class B devices are lower cost and operate with lower power requirements but transmit less information than AIS Class A devices which impacts statements that can be made using data transmitted from these devices.

Landings Data

NMFS's Fisheries Statistics Division houses a variety of publicly accessible data on commercial and recreational fisheries. From 1990 onward, landings can be searched by state, species, date, and pound or dollar value of landings. Trip-level reporting to state regulatory agencies in Rhode Island and Massachusetts, the Rhode Island Department of Environmental Management's (RIDEM) Division of Marine Fisheries (DMF) and the Massachusetts Division of Marine Fisheries (MA DMF), are similar for fishing activity not already captured under other trip-level reporting requirements (i.e. federally permitted vessels reporting bluefin tuna landings to NMFS or landings with VTR reporting requirements to GARFO)..

The Atlantic Coastal Cooperative Statistics Program (ACCSP) supplies non-confidential fishery-dependent data from 23 state and federal program agencies for public use. For recreational fisheries, ACCSP works with partners to collect angler data and hires services to conduct telephone surveys to coordinate recreational fisheries data collection. Yearly commercial landing statistics can be sorted by state, year, and species through the Standard Atlantic Fisheries Information System (SAFIS), managed by ACCSP. NMFS maintains the Marine Recreational Information Program (MRIP) which is a database of recreational fishing statistics including participation, effort, and catch (NOAA Fisheries, 2019a).

The data described above provide very valuable information about commercial and recreational fisheries but they cannot provide a complete picture as it is not possible to monitor the landings of every permit holder in a fishery or to count and measure every fish in a stock using nonlethal means. Thus, fishery-independent surveys are conducted by NOAA Fisheries' Northeast Fishery Science Center, research organizations, and state natural resources agencies. Data from these surveys, and inferences that can be drawn from them, are critical to informing fisheries management decisions and also in describing the potential effects on commercial and recreational fisheries from the development of offshore wind projects.

1.1.2 Fisheries Data Limitations

Due to the nature of what data are collected and how it is collected, some commercial and recreational fisheries data reviewed in this report includes data gaps and limitations resulting from a variety of factors. These include differences in VMS reporting requirements for certain fisheries, the very limited geographical information present in VTRs, the confidentiality of various data sources, and the lack of landings data for less lucrative or common species. These data gaps and limitations are well known, understandable, and present challenges to all data users, including fisheries managers. Where data gaps and limitations exist, many parties have historically put much effort into drawing inferential conclusions with varying levels of accuracy and precision, depending on the available data while acknowledging the available data's inherent limitations. Mayflower Wind reviewed commercial and recreational data sources from various sources and stakeholders in the commercial and recreational fisheries industry to

form a comprehensive depiction of fishing activity in the broader region and in the Offshore Project Area. As often happens when attempting to answer questions on fisheries, where precise, real-time fishing activity data are not available, the data that is available, and inferential conclusions that can be drawn from it, allow for statements with a sufficient degree of certainty to support necessary analyses and for the identification of Commonly Caught Species in and around the Offshore Project Area that are discussed later.

The main limitation with utilizing VMS data is that it is not required for some species, including American lobster (*Homarus americanus*), which is an important commercial fishery in the region. Gaps in VMS data are supplemented with other vessel-related data such as self-reported VTR data and landings data collected in the Offshore Project Area (NMFS, 2020b; NMFS, 2020c; NMFS, 2020d; and NMFS, 2021). Inversely to gaps in VMS data, gaps in VTR data are supplemented with VMS data (raw position data and data visualization tools; see) along with information included in FMPs that detail species assessment trends and top ports for commercial and recreational species.

While this NMFS VTR data, like most fisheries data, has limitations that preclude statements with absolute certainty, it represents the best Offshore Project Area-specific data sets available. Notably, a limitation of this data is that it summarizes only federal data sources and that federal lobster permits do not trigger federal permit requirements. This results in lobster and crab being underrepresented in these data sets. However, the degree to which the lobster fleet is underrepresented varies and representation generally improves further from shore and in southern New England as compared to northern New England (ASMFC, 2018).

It is important to note that the absence of data does not necessarily mean that no fishing activity occurred in the area or fishery exhibiting that absence of data. As suggested by NMFS to address these limitations, state and other aggregated databases were queried to augment this data.

Limitations of landings data utilized in this analysis also include data gaps due to confidentiality measures or because of a low threshold of data available. This is known as the rule of three in landings data, wherein records that are not associated with three or greater unique dealers or permits were not fully reported to preserve confidentiality. In these instances, historical landings data, stock assessment, VMS data, and species-specific occurrence data were assessed to draw conclusions on fishing activity in the broader region and the Offshore Project Area.

2 COMMERCIAL FISHERIES

The U.S. Northeast is one of the nation's most historic commercial fishing regions. The fisheries resources targeted by commercial fleets in the region vary by gear type and vessel size and are dictated by seasons, quotas, environmental factors, market forces, and the federal and state-led regulations that help manage these resources. The commercial fish species range from pelagic HMS such as bluefin tuna (*Thunnus thynnus*), demersal fish (groundfish) such as winter flounder (*Pseudopleuronectes americanus)*, squid such as shortfin, or illex, squid (*Illex illecebrosus*), and shellfish such as ocean quahog (*Arctica islandica*). Subsections 2.1 through 2.4 below describe commercially targeted species in the broader region and the Offshore Project Area, including management of and trends in species distributions, catch effort and landings, gear types, and ports.

2.1 MANAGEMENT

Commercially important fish species in this region are highly regulated by federal, state, and/or local governments, either through a Regional Fishery Management Council (RFMC) (e.g., under Magnuson-Stevens Fishery Conservation and Management Act [MSA]), an interstate compact agreement (refer to Section 2.1.2), a state commission (e.g., Massachusetts General Law Chapter 130), a joint management scheme, particularly for transboundary fisheries, or very direct oversight such as town-level management of shellfish resources. The highest value fisheries reported for the five coastal New England states are found in both federal and state waters. For federal fisheries management, the MSA, 16 United States Code 1801 *et seq*., was enacted to promote the sustainable management of coastal fisheries by establishing eight RFMCs to govern fisheries on regional scales. The Councils develop FMPs that propose quotas, fishing seasons, rules for fishermen in federal waters, etc., which NMFS can implement, along with other measures (RFMC, 2019). On a state level, coastal waters are public resources and are managed in Massachusetts by MA DMF and in Rhode Island by RIDEM DMF. Additional oversight and management of certain aspects of Rhode Island fisheries as they relate to their management as a coastal resource alongside other activities comes from the Rhode Island Coastal Resources Management Council (CRMC) and the Fishermen's Advisory Board (FAB) that advises CRMC. While MA DMF and RIDEM manage these fisheries, there are specific instances such as shellfish, which have elements of their management conducted at the local level with oversight from the MA DMF and RIDEM and other state agencies.

In many management instances, fisheries are a shared coastal resource managed cooperatively between multiple agencies and MA DMF, RIDEM, and neighboring state agencies collaborate with other state governments and the federal government to ensure the management and resiliency of fish stocks. The agency that has primary management authority for a fish or shellfish species is determined by the predominance of the fishery in state versus federal waters. For example, more than 80 percent of American lobster is harvested in state waters; therefore, the Atlantic States Marine Fisheries Commission (ASMFC) is the management lead. Fisheries that occur largely in both state and federal waters, such as black sea bass, bluefish, summer flounder, and winter flounder, are managed through either joint or complementary FMPs with the RFMCs and NMFS.

Management interests can diverge, not only between the states and federal managers, but also between the states themselves. When state measures differ from federal regulations, fishermen must

adhere to the more restrictive measures. **Table 2-1** below details which governing body manages different FMPs in the region.

TABLE 2-1. FEDERAL AND STATE FMPS FOR COMMONLY CAUGHT SPECIES IN AND AROUND THE OFFSHORE PROJECT AREA

Fishery Management Plan	NEFMC	MAFMC	ASMFC	NMFS
Atlantic Sea Scallop	x			
Northeast Multispecies [1]	x			
Small-Mesh Multispecies (Whiting) [2]	x			
Atlantic Deep-Sea Red Crab	x			
Northeast Skate Complex [3]	x			
Atlantic Salmon	x			
Atlantic Herring	x		x	
Monkfish	x	x		
Spiny Dogfish	x	x	x	
Mackerel, Squid, Butterfish		x		
Tilefish [4]		x		
Atlantic Surfclam and Ocean Quahog		x		
Summer Flounder, Scup, Black Sea Bass		x	x	
Bluefish		x	x	
American Eel			x	
American Lobster			x	
Atlantic Croaker			x	
Atlantic Menhaden			x	
Atlantic Striped Bass			x	
Atlantic Sturgeon			x	
Coastal Sharks [5]			x	
Horseshoe Crab			x	
Jonah Crab			x	
Northern Shrimp			x	
Red Drum			x	
Shad and River Herring			x	
Shellfish			x	
Spanish Mackerel			x	
Spot			x	
Spotted Seatrout			x	
Tautog			x	
Weakfish			x	
Consolidated Atlantic Highly Migratory Species [6]				X

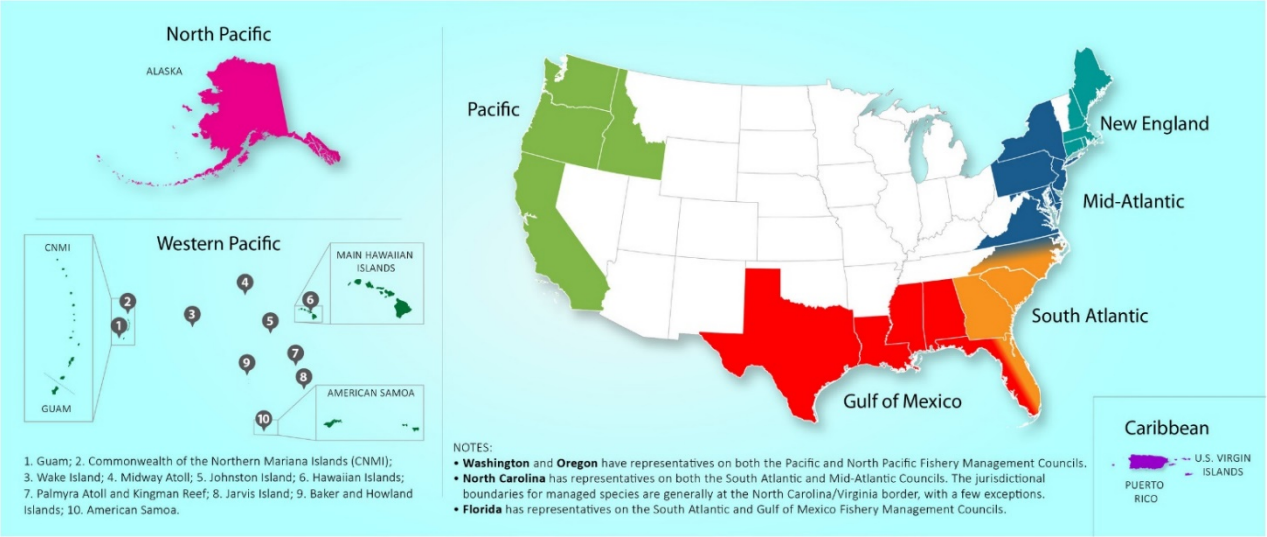
1 Includes: Atlantic cod, haddock, yellowtail flounder, Atlantic pollock, American plaice, Atlantic halibut, Acadian redfish, Atlantic wolfish, ocean pout; witch, windowpane, and winter flounders; and white, silver, and red hakes.
2 Includes: silver, red, and offshore hakes.
3 Includes: winter, smooth, thorny, barndoor, little, clearnose, and rosette skates.
4 Includes: golden and blueline tilefish.
5 Includes: sand tiger, bigeye sand tiger, whale, basking, white, dusky, bignose, Galapagos, night, reef, narrowtooth, Caribbean, sharpnose, smalltail, Atlantic angel, longfin mako, bigeye, thresher, sharpnose sevengill, bluntnose sixgill, bigeye sixgill, sandbar, Atlantic sharpnose, finetooth, bonnethead, blacknose, silky, tiger, blacktip, spinner, bull, lemon, nurse, scalloped hammerhead, great hammerhead, smooth hammerhead, shortfin mako, porbeagle, common thresher, oceanic whitetip, blue, smooth dogfish, and Florida smoothhound sharks.

Fishery Management Plan	NEFMC	MAFMC	ASMFC	NMFS
6 Includes: sailfish, swordfish; longbill and roundscale spearfish; blue and white marlin; skipjack, albacore, yellowfin, bigeye, and bluefin tuna; and basking, great hammerhead, scalloped hammerhead, smooth hammerhead, white, nurse, bignose, blacktip, bull, Caribbean, dusky, lemon, night, sandbar, silky, spinner, tiger, sand tiger, angel, bonnethead, Atlantic sharpnose, blacknose, finetooth, smalltail, bigeye sixgill, sevengill, sixgill, longfin mako, porbeagle, shortfin mako, blue, oceanic whitetip, bigeye thresher, and thresher sharks.				

2.1.1 Federal

New England Fishery Management Council (NEFMC) manages an area from 3 to 200 nm (5.6 to 370.4 km) off Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut, as seen in **Figure 2-1**. NEFMC jurisdiction extends to fishing grounds in the Gulf of Maine and Georges Bank, and southern New England. NEFMC's jurisdiction for some species overlaps partly with the Mid-Atlantic Council (see below). Twenty-nine species are managed under nine FMPs, including sea scallops, groundfish, Atlantic herring, skates, red crab, monkfish, and whiting, as seen in **Figure 2-1**.

Mid-Atlantic Fishery Management Council (MAFMC) manages an area from 3 to 200 nm (5.6 to 370.4 km) off the coast of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, as seen in . MAFMC manages 64 species with seven FMPs, including summer flounder, scup, sea bass, Atlantic mackerel, squid, butterfish, surfclam, ocean quahogs, bluefish, golden and blueline tilefish, spiny dogfish, and monkfish, as seen in **Figure 2-1**.

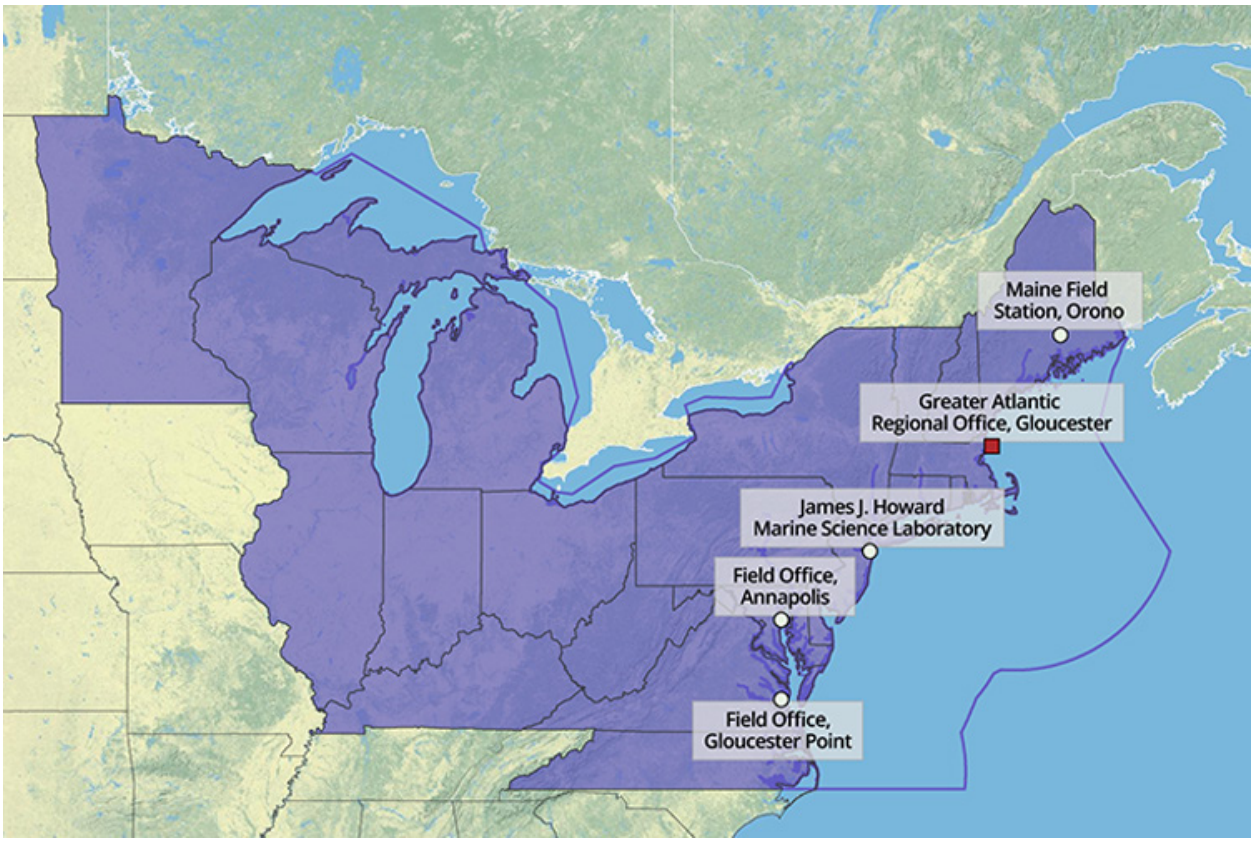


Source: fisherycouncils.org, 2021.

FIGURE 2-1. AREAS MANAGED BY THE EIGHT REGIONAL FISHERY MANAGEMENT COUNCILS

The **Greater Atlantic Regional Fisheries Office (GARFO)**, under NMFS, manages an area of approximately 100,000 square miles (mi^2) (258,998 square kilometers [km^2]) of the Northwest Atlantic ranging from the Great Lakes and the waters of Maine to Cape Hatteras, North Carolina, as seen in **Figure 2-2** (NOAA Fisheries, 2020a). This office partners closely with NEFMC, MAFMC, and ASMFC to manage the collective 42 fisheries and 14 FMPs.

NOAA Fisheries, or NMFS, manages HMS which cross domestic and international borders under the Consolidated Atlantic Highly Migratory Species Management Plan. Their jurisdiction spans the Atlantic Ocean, Gulf of Mexico, and Caribbean waters. HMS include tunas, sharks, swordfish, and billfish.



Source: NOAA Fisheries, 2020a.

FIGURE 2-2. AREA MANAGED BY GARFO

2.1.2 State

The **ASMFC** formed as an interstate compact to coordinate the management of 27 migratory fish species along the Atlantic coastal states (ASMFC, 2020a), as shown in **Table 2-1**. ASMFC establishes state harvest guidelines for specific interstate fisheries along the Atlantic coast from 0 to 3 nm (0 to 5.6 km) offshore. Because a large percentage of lobster landings originate in state waters and because of the importance of the lobster fishery, ASMFC's management of this fishery is particularly important.

The **MA DMF** is the state agency responsible for managing commercial and recreational marine fisheries extending 0 to 3 nm (0 to 5.6 km) from the Massachusetts shore (MA DMF, 2019a). MA DMF works closely with NEFMC, MAFMC, and ASMFC to evaluate and select fisheries management policies to implement. It should be noted that portions of the Offshore Project Area such as Muskeget Channel and Nantucket sound are subject to state fisheries laws developed and regulated by the MA DMF.

The MFAC represents interests from both the commercial and recreational fishing industries in Massachusetts. Members appointed to the Commission are drawn from the commercial and

recreational fishing industries as well as academia and other fisheries interests in a similar manner to RFMCs. The Commission approves proposed regulatory changes for state-managed fisheries (MFAC, 2021).

RIDEM's DMF is the state agency responsible for managing commercial and recreational marine fisheries extending 0 to 3 nm (0 to 5.6 km) from the Rhode Island shore. Similar to the MA DMF and other DMFs, RIDEM and the Rhode Island DMF work closely with the NEFMC, MAFMC, and ASMFC on fisheries management issues. RIDEM is Rhode Island's leading agency in marine fisheries science and management with a mission to manage and enhance Rhode Island's marine resources and habitats through sound science, informed management decisions, and education. It should be noted that part of the Offshore Project Area, including the portions of Rhode Island Sound and Narragansett Bay that are under Rhode Island's jurisdiction (RIDEM, 2021a).

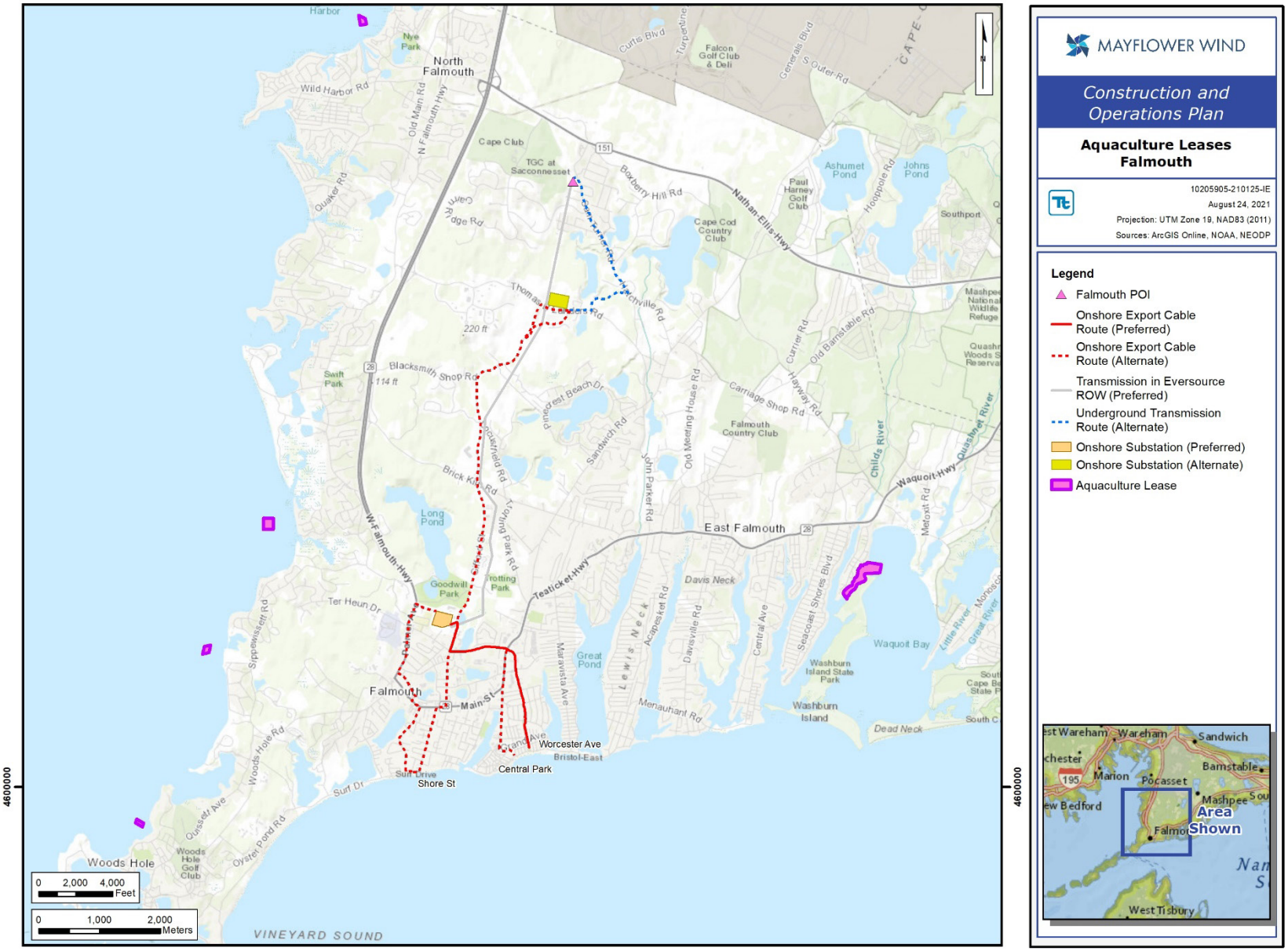
The **CRMC** is a management agency with regulatory functions and a primary responsibility for the continued planning and management of Rhode Island's coastal resources through the implementation of coastal management plans. Comprised of a council of appointed representatives and a staff of professional subject matter experts, CRMC is authorized to formulate policies and plans and to adopt regulations necessary to implement various management programs. CRMC's regulatory authority extends from 0 to 3 nm (0 to 5.6 km) from shore (CRMC, 2021).

The **FAB**, created by the Rhode Island Special Area Management Plan, is comprised of appointed commercial and recreational fishermen that advise CRMC on issues that involve fishing activity and other activities that impact fishing activity. Information gathered, concerns raised, and suggestions made by the FAB serve to inform CRMC actions (CRMC, 2013).

2.1.2.1 Shellfish Aquaculture Management

There are currently no ocean-based, commercial-scale finfish aquaculture operations in Massachusetts or Rhode Island state waters.

Massachusetts cities and towns manage the shellfish fisheries in all waters within their boundaries that are not closed by the MA DMF for public health or other reasons, except for the commercial harvest of Atlantic surfclams and ocean quahogs which remain under federal control. All shellfish aquaculture requires permits from MA DMF and permits from the nearest municipality. A commercial harvest permit is also required to sell shellfish in Massachusetts. **Figure 2-3** shows aquaculture leases in Falmouth, Massachusetts; none are located near the proposed Landfall Site in Falmouth, Massachusetts. In 2017, the Town of Falmouth, Massachusetts, developed a Rotational Aquaculture Plan to address estuaries within the area that would be suitable for aquaculture production (Town of Falmouth, 2017). Nine of fifteen estuaries in Falmouth, Massachusetts, are conditionally approved for shellfish production and have historically had a productive bottom for wild harvesting in the area. Two of the fifteen are currently open for shell fishing. The town proposes a rotational system because it accomplishes the goal of allowing private aquaculture to expand into the two estuaries currently open to shell fishing. Other estuaries that have been identified by the town for the proposed aquaculture program include Megansett Harbor, Rands Canal, Quissett Harbor, Great Pond, Bournes Pond, and Waquoit Bay/Eel Pond. There are no mapped, permitted commercial aquaculture operations in or near Brayton Point in Somerset, Massachusetts.



Source: NOAA Office for Coastal Management, 2018.

FIGURE 2-3. AQUACULTURE LEASES NEAR THE FALMOUTH EXPORT CABLE CORRIDOR

The CRMC is the regulatory body that manages aquaculture leasing and permitting within Rhode Island state waters. Much of the Rhode Island aquaculture industry, which primarily produce oysters, occurs within the State's several inland salt ponds, but there are some permitted aquaculture sites operations in open, nearshore waters in Narragansett Bay (RIDEM, 2021b). There are active and permitted aquaculture sites, floating fish traps, fixed monitoring sites, and oyster research sites within Rhode Island state waters (RIDEM, 2021b). Although there are several approved aquaculture areas within The Cove on Aquidneck Island and adjacent to Hog Island, Rhode Island, the Brayton Point export cable corridor is not directly adjacent or collocated with any of these sites. The floating fish trap fishery is unique to Rhode Island and targets wild fish but is permitted and managed through a mechanism similar to aquaculture operations. Although there are permitted and actively fished floating fish traps in the mouth of and in the Sakonnet River, none of these are directly adjacent or collocated with the Brayton Point export cable corridor. **Figure 2-4** shows aquaculture leases near the portion Brayton Point export cable corridor in the Sakonnet River; none are located near the proposed landfall sites at Brayton Point. Not all floating fish traps and aquaculture sites shown in **Figure 2-4** are actively fished/utilized; some are permitted but not in active use.

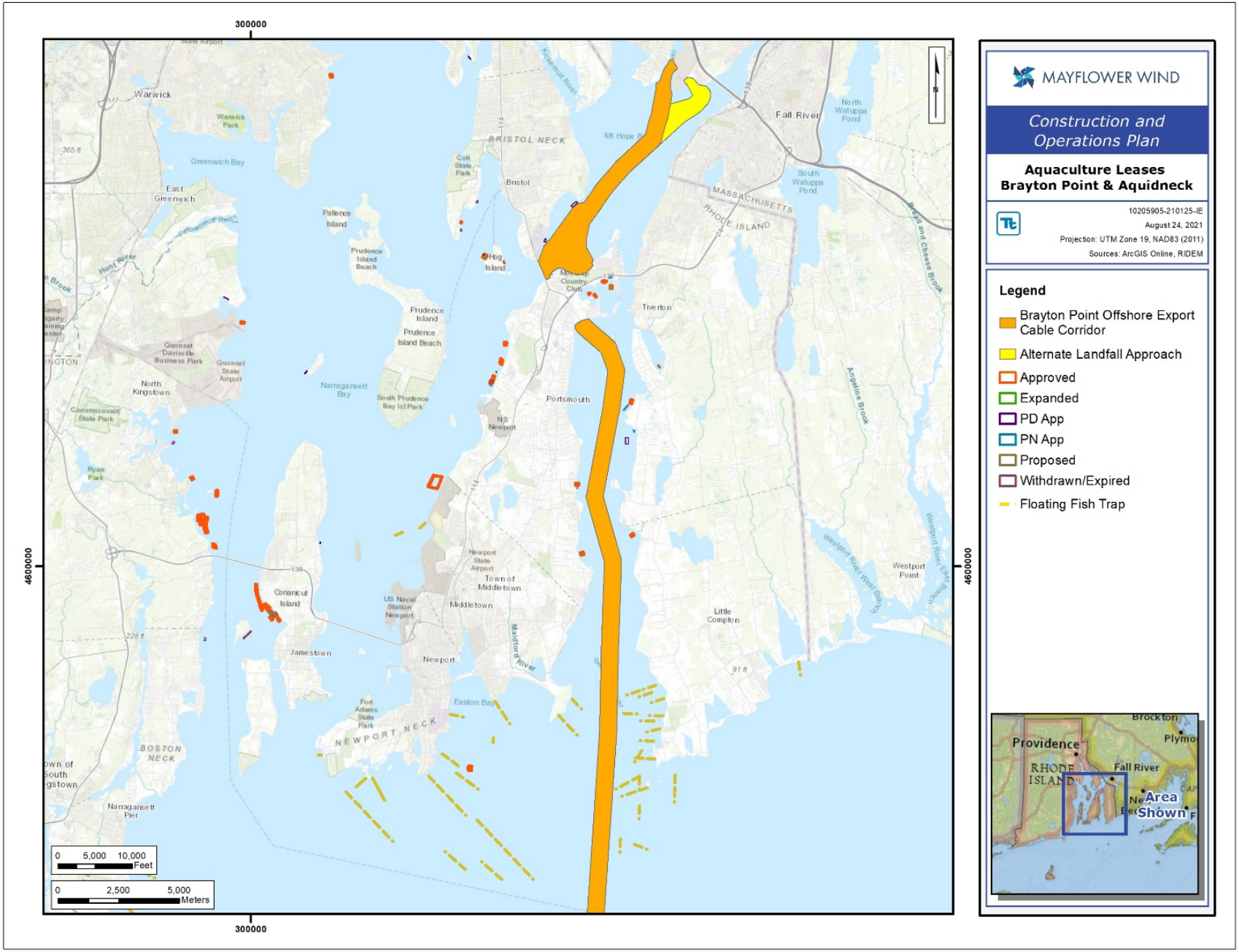


FIGURE 2-4. AQUACULTURE LEASES NEAR THE BRAYTON POINT CABLE CORRIDOR

2.2 COMMONLY CAUGHT COMMERCIAL SPECIES IN THE REGION

This subsection discusses fishing activity targeting commonly caught federally and state-managed commercial fisheries in the broader region as it pertains to the Offshore Project Area. Discussions of fishing activity in the Lease Area and the export cable corridors are provided later so that activity can be set within the regional context established here. A summary of management, relevant information for fisheries and fishing activity, and expected trends in commonly caught species driven by climate change is also provided. The potential effects of Project activities on these fisheries and fishing activity described in Section 11 of the Mayflower Wind COP.

A large number of species are caught commercially in and around the Offshore Project Area (**Table 2-2**); however, the amounts and values of species caught range from thousands to millions in dollars and pounds. Additionally, there are large variations in seasonal and annual fishing activity in response to variations in fisheries resource distributions. While the fishing activity in the Offshore Project Area is relatively lower than elsewhere in the region, there are commercial fishing vessels from Massachusetts, Rhode Island, and other states that fish in the Offshore Project Area. Fish caught in the Offshore Project Area may be landed in Massachusetts and Rhode Island but may also be landed in other states. To provide a broader, regional frame of reference for commercial fishing activity, landings from Massachusetts, Rhode Island, Connecticut, New York, and New Jersey in 2019 are shown in . This, along with the exposure analysis conducted by Kirkpatrick et al. (2017), allows for landings from the Offshore Project Area to be better understood in the larger context in which fisheries exist and commercial fishing activity is conducted in the region.

TABLE 2-2. COMMERCIAL LANDINGS IN MASSACHUSETTS, RHODE ISLAND, CONNECTICUT, NEW YORK, AND NEW JERSEY, 2019

Rank	Species	Pounds (lbs.)	Species	Value ($)
1	Menhaden	86,113,435	Sea scallop	$525,585,154
2	Shortfin squid	58,196,016	American Lobster	$108,458,206
3	Sea scallop	55,837,828	Longfin squid	$42,195,146
4	Atlantic surfclam	34,362,291	Eastern Oyster	$37,294,451
5	Longfin squid	26,997,528	Atlantic surfclam	$29,229,303
6	Monkfish	20,926,409	Shortfin squid	$27,316,141
7	American Lobster	19,181,793	Haddock	$18,267,804
8	Haddock	18,737,505	Summer flounder	$17,300,186
9	Winter skate	17,399,657	Northern quahog	$16,947,565
10	Jonah crab	15,105,753	Menhaden	$14,938,549

Source: NOAA Fisheries, 2021

To identify commonly caught species in relation to the proposed Project, measures of fishery exposure from the Kirkpatrick et al. study (2017), the NMFS socioeconomic data (NMFS, 2020b), and data provided by NMFS and customized based on the boundaries of the Offshore Project Area (NMFS, 2020c) were used.

In the case of the Kirkpatrick et al. (2017) study, species presented in are the “top 10 exposed species” to the Kirkpatrick Study Area, decreasing by the percent of species revenue exposed (**Table 2-3**).

TABLE 2-3. "TOP 10 EXPOSED SPECIES" TO THE KIRKPATRICK STUDY AREA, 2007 – 2012

Species	Species Average Exposed Revenue	Species Average Total Revenue	Exposed Species Revenue (Percent)
Silver Hake	$327,355	$9.592,553	3.4
Ocean Quahog	$851,030	$27,233,867	3.1
Skates	$119,890	$6,054,223	2.0
Monkfish	$340,775	$19,759,447	1.7
Jonah Crab	$87,011	$5,130,697	1.7
Longfin Squid	$285,547	$24,867,195	1.1
Atlantic Herring	$138,193	$23,241,713	0.6
Summer Flounder	$90,433	$22,019,367	0.4
American Lobster	$175,972	$212,474,994	0.1
Atlantic Sea Scallop	$203,180	$428,413,267	0.0

Source: Kirkpatrick et al., 2017

For NMFS socioeconomic data, species presented are the "Top 10 most impacted" species (NMFS, 2020b) (**Table 2-4**). As described above, this dataset splits the Lease Area into two separate parcels which have then been combined to reflect the full extent of the Lease Area, there are actually eleven, and not ten, most impacted species for the Lease Area.

TABLE 2-4. 'TOP 10 MOST IMPACTED' SPECIES IN THE LEASE AREA, 2008 – 2018

Rank	Species	Landings (lbs.)	Species	Value ($)
1	Jonah Crab	1,048,000	Jonah Crab	$827,000
2	Atlantic Herring	1,020,000	Longfin Squid	$749,000
3	Silver Hake	655,000	Monkfish	$448,000
4	Longfin Squid	648,000	Scup	$400,000
5	Scup	559,000	Silver Hake	$394,000
6	Skates	327,000	American Lobster	$306,000
7	Monkfish	303,000	Summer Flounder	$255,000
8	Summer Flounder	89,000	Golden Tilefish	$215,000
9	American Lobster	72,000	Sea Scallop	$179,000
10	Golden Tilefish	61,000	Skates	$166,000
11	Sea Scallop	20,000	Atlantic Herring	$80,000

Source: NMFS, 2020b.

In the case of the Mayflower Wind-specific data provided by NMFS, **Table 2-5** shows, in decreasing order, aggregate landings and values associated with commercial fishing activity in the Offshore Project Area from 2008 to 2018 (NMFS, 2020c, 2021). For the purposes of this report, several assumptions were made regarding how this data was reported. Because of standard confidentiality limitations, some data were aggregated as "All Others" and were not linked to a specific species. However, some of this data was considered alongside species-linked data because, while it was anonymized at the species level, it was linked to either a single-species FMP (i.e., Atlantic herring, Atlantic deep-sea red crab) or a multi-species FMP that is treated in this report collectively as a single unit (i.e., Atlantic surfclams/ocean quahog, Northeast skate complex). However, NMFS did not provide FMP data for "All Others" data

recordings in the custom Brayton Point export cable corridor data. Therefore, landing data for "All Others" species with characterized FMPs is only available for the Lease Area and the Falmouth export cable corridor route. Additionally, because the whelk (also known locally as conch) fishery is almost entirely comprised of two species (knobbed and channeled), the landings and values of those species are combined as is commonly done in external data assessments.

TABLE 2-5. COMMONLY CAUGHT SPECIES IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Rank	Species	Landings (lbs.)	Species	Value ($)
1	Longfin Squid	8,864,957	Longfin Squid	$10,511,239
2	Atlantic Herring	6,789,767	American Lobster	$2,509,084
3	Skate Wings	3,905,683	Channeled Whelk	$1,759,723
4	All Others	1,616,727	Summer flounder/ Fluke	$1,646,741
5	Scup	1,603,194	All Others	$1,077,921
6	Silver Hake	1,330,763	Scup	$1,073,863
7	Jonah Crab	1,327,499	Jonah Crab	$1,024,534
8	American Lobster	568,094	Silver Hake	$775,931
9	Summer flounder/ Fluke	507,250	Skate Wings	$753,487
10	Spiny Dogfish	450,139	Atlantic Herring	$714,770
11	Monkfish	448,805	Monkfish	$692,672
12	Bluefish	292,781	Sea Scallops	$683,964
13	Atlantic Mackerel	285,933	Black Sea Bass	$523,502
14	Butterfish	260,028	Golden Tilefish	$229,284
15	Channeled Whelk	241,034	Bluefish	$160,557
16	Red Hake	183,294	Butterfish	$153,942
17	Black Sea Bass	144,524	Winter Flounder	$102,437
18	Rock Crab	113,190	Knobbed Whelk	$101,697
19	Sea Scallops	76,689	Spiny Dogfish	$98,294
20	Shortfin Squid	67,962	Atlantic Mackerel	$81,452
21	Golden Tilefish	64,326	Yellowtail Flounder	$77,168
22	Yellowtail Flounder	48,734	Rock Crab	$58,605
23	Winter Flounder	46,561	Striped Bass	$56,651
24	Smooth Dogfish	38,385	Cod	$53,435
25	Kingfish	32,522	Red Hake	$52,733
26	Knobbed Whelk	31,893	Bonito	$37,413
27	Surfclam	25,763	Tautog	$34,064
28	Cod	25,355	Shortfin Squid	$28,068
29	Haddock Roe	21,430	Kingfish	$25,237
30	Offshore Hake	21,210	Surfclam	$24,006
31	Little Tuna	19,642	Haddock Roe	$23,274
32	Bonito	15,056	Smooth Dogfish	$20,420
33	Striped Bass	13,900	Offshore Hake	$13,862
34	Tautog	12,284	White Hake	$13,216
35	White Hake	9,931	Albacore Tuna	$11,753
36	Horseshoe Crab	9,463	Horseshoe Crab	$11,347
37	Albacore Tuna	8,792	Little Tuna	$9,352
38	Pollock	7,775	Lightning Whelk	$7,778
39	Blue Crab	7,573	Pollock	$7,312
40	Redfish	4,413	Weakfish	$7,119
41	Lightning Whelk	3,907	Blue Crab	$5,611

Rank	Species	Landings (lbs.)	Species	Value ($)
42	Weakfish	3,585	Witch Flounder	$5,374
43	American Plaice	3,314	American Plaice	$4,905
44	Sea Robins	3,250	Redfish	$2,657
45	Conger Eel	3,127	Conger Eel	$1,726
46	Witch Flounder	2,828	Cunner	$1,505
47	Seatrout	1,515	John Dory	$1,474
48	John Dory	1,373	Sea Robins	$844
49	Blueback Herring	1,096	Triggerfish	$673
50	Cunner	867	Blueback Herring	$582
51	Fourspot Flounder	800	Seatrout	$532
52	Triggerfish	555	American Eel	$477
53	Menhaden	519	Atlantic Halibut	$413
54	Windowpane Flounder	419	Eels	$270
55	Atlantic Croaker	390	Fourspot Flounder	$249
56	Eels	282	Atlantic Croaker	$235
57	Crabs	257	Windowpane Flounder	$203
58	Thresher Shark	233	Thresher Shark	$195
59	Sea Raven	163	Sea Raven	$193
60	American Eel	88	Blueline Tilefish	$142
61	Blueline Tilefish	63	Crabs	$133
62	Spot	58	Menhaden	$127
63	Atlantic Halibut	55	Hard Quahog	$126
64	Chub Mackerel	54	Cusk	$41
65	Cusk	42	Chub Mackerel	$37
66	Ocean Pout	42	Wolffish	$34
67	Wolffish	38	Mahi Mahi	$31
68	Spanish Mackerel	25	Spanish Mackerel	$27
69	Hard Quahog	19	Spot	$23
70	Other Finfish	11	Ocean Pout	$20
71	Mahi Mahi	10	Other Finfish	$5
72	American Shad	5	American Shad	$4
73	Mullets	2	Cobia	$3
74	Cobia	1	King Mackerel	$2
75	King Mackerel	1	Mullets	$1
76	Tilefish	1	Tilefish	$1

Source: NMFS, 2020c; NMFS, 2021.

In the following sections, commonly caught species are described further in terms of presence and distribution in the region and Offshore Project Area followed by analysis and review of fishing activity in the Kirkpatrick Study Area. Further specifics and context of the fishing activity in the Offshore Project Area and potential impacts to fisheries and fishing activity from the Project are discussed in Section 11 of the COP, Commercial and Recreational Fisheries and Fishing Activity. The species listed in the subsection below were identified using the Kirkpatrick et al. (2017) "Top 10 exposed species" and the NMFS socioeconomic data (2020b) "Top 10 most impacted" lists, both of which are fully addressed in this report. Further, species with significant landings in the Offshore Project Area-specific data provided by NMFS (2020c, 2021) or species that have been identified as particularly relevant in the Offshore

Project Area based on outreach to the fishing community conducted by the Mayflower Wind Fisheries Liaison Officer (FLO) are also addressed.

2.2.1 Federal

2.2.1.1 Longfin Squid

The longfin, or loligo, squid (*Doryteuthis [Amerigo] pealeii)* fishery operates primarily from Massachusetts to North Carolina (NOAA Fisheries, n.d., a) (**Table 2-6**). This fishery is managed along with shortfin squid under the MAFMC. The two primary ports for longfin squid are Point Judith, Rhode Island and North Kingstown, Rhode Island. Other top longfin squid ports as of 2016 in New York were Montauk, Hampton Bays, Shinnecock and Point Lookout and Babylon and in Massachusetts were New Bedford, Barnstable, Boston, Falmouth, Hyannis, and Woods Hole. Habitat for longfin squid is sand and sand/mud along the continental shelf and slope. The primary gear type is otter trawl and approximately three-quarters of U.S. squid landings are caught by the Mid-Atlantic trawl fishery.

There is strong seasonality in the longfin squid fishery, which occurs both inshore and offshore, depending on time of the year and the availability of the resource. Much of the longfin squid fishery usually, but not always, occurs during the winter. Longfin squid is not overfished as only 54 percent of its quota was met in 2019 with the annual landing totaling 27,213,314 pounds (lbs.) (NOAA, 2020a). Compared to 2017, this represents a 42 percent higher landings total for longfin squid.

Climate change has and will continue to substantially impact the squid fishery. Waters that support the New England squid fisheries are warming to the point where squid are transitioning northward. A primary demonstration of climate change effects on the squid fishery was observed during a significant ocean heat wave in 2012; longfin squid, primarily caught in mid-Atlantic and southern New England waters, were observed in the Gulf of Maine due to the unusually warm northern ocean temperatures (Mills et al., 2013). Even though squid are moving further north as ocean temperatures rise, recent landings quota data indicate that the northward migration has not yet had an effect on fisheries south of Maine.

TABLE 2-6. LONGFIN SQUID OVERVIEW

Occurrence in Project Area	Lease Area, ECCs
Gear Used	Trawl
Seasonality	Summer-fall months
Permitted Season	Year-round
Types of Permits	Limited access permit
Common Ports	Point Judith, RI; North Kingstown, RI
Management	Mackerel, Squid, Butterfish FMP; MAFMC

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Squid fisheries are a substantial part of commercial fisheries in New England and continue to increase in economic value (NOAA Fisheries Office of Science and Technology, n.d.;) (**Table 2-7**). Longfin squid was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017). Of commercial longfin squid landings in the New England and Mid-Atlantic regions, 1.1 percent of the average total annual revenue is expected to be exposed (approximately $285,547 out of just under $25 million) (**Table 2-8**).

TABLE 2-7. LONGFIN SQUID FISHERY YIELD DATA

Year	Landings (lbs.)*	Value ($)
2019	26,997,528	$42,195,146
2018	25,435,446	$38,429,859
2017	17,956,491	$25,321,414

** Landings in MA, RI, CT, NY, and NJ; landings data combined for longfin squid*
Source: NOAA Fisheries, 2021

TABLE 2-8. LONGFIN SQUID LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	527,726	$899,919
2017	698,960	$1,014,990
2016	2,141,265	$2,658,081
2015	1,042,199	$1,286,999
2014	1,086,833	$1,048,184
2013	247,375	$302,829
2012	1,002,657	$1,183,470
2011	367,039	$449,448
2010	254,933	$270,995
2009	574,035	$518,801
2008	922,015	$877,523
Total	**8,863,957**	**$10,511,239**

2.2.1.2 Atlantic Herring

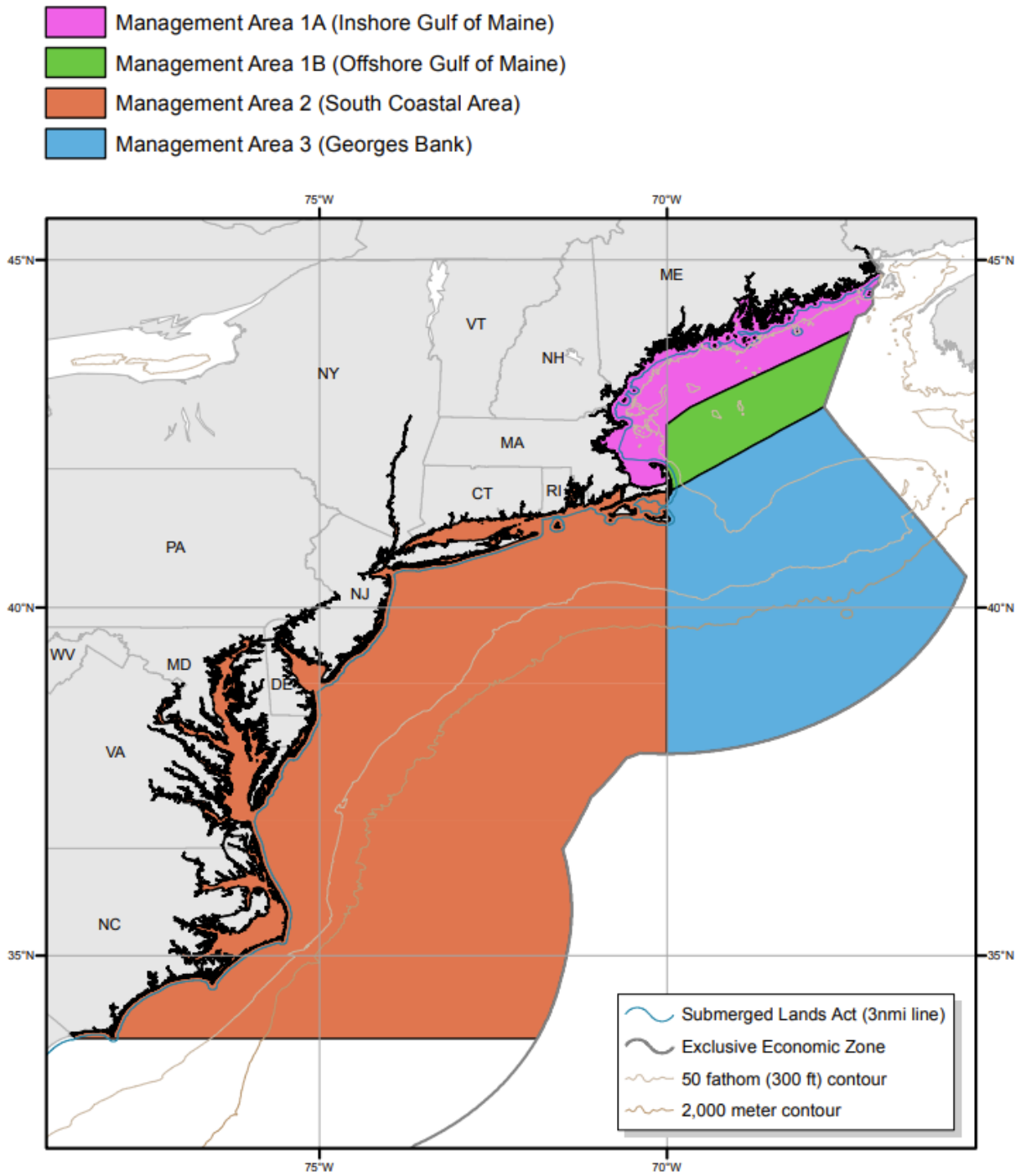
The Atlantic herring (*Clupea harengus*) fishery operates from Maine to Cape Hatteras, and from inshore to offshore waters on the edge of the continental shelf (NOAA Fisheries, n.d., b) (**Table 2-9**). This fishery is jointly managed by the NEFMC (in federal waters) and the ASMFC (in state waters where individual states being responsible for implementing recommendations put forward by the ASMFC). Management areas for the fishery are shown in **Figure 2-5**. Gear used is predominantly single and paired mid-water trawl, bottom trawl, purse seine, and to a lesser extent, gillnet gear throughout the entire range. Herring is used primarily in the U.S. as bait for the American lobster and tuna fisheries, but it is also frozen whole and canned for human consumption. The fishery has collapsed multiple times due to over-exploitation in the mid-to-late 20th century. Atlantic herring landings peaked in 1968 at 477,767 metric tons (t), crashed in the 1970s, averaged 78,164 mt in the 1980s, and have not come close to reaching peak levels with landings of 50,250 mt in 2017 (NEFSC, 2018; ASMFC, 2020b). A similar pattern has repeated in

other herring fisheries, notably in the Norwegian and Prince William Sound fisheries which crashed to record low biomass in the 1980s and 1990s and have not rebounded since (Trotcha et al., 2020). The 2018 Atlantic herring stock assessment recorded below-average recruitment for the species for the third consecutive year (NEFSC, 2018). On September 25, 2019, the NEFMC approved a buffer zone to restrict mid-water trawlers out to 12 nm (22.2 kilometers [km]) from the New England coastline (i.e., Maine, Massachusetts, New Hampshire, Rhode Island, and Connecticut). Atlantic herring has a current coast wide quota limit of just over 25 million pounds (MA DMF, 2020b). The fishery could see further catch limit reductions reflecting the stock's decline. The 2020 catch limit has been reduced by 26 percent from 2019 to 34 million pounds from 223 million pounds in 2018 (MA DMF, 2020b).

Research has shown that Atlantic herring spawn may be significantly affected by climate change effects, as the species is more sensitive to ocean acidification and warming ocean temperatures (Leo et al., 2018). Elevated ocean temperatures have been shown decreased survival rates in Atlantic herring larvae, which was determined to be caused by a decrease in food availability (Sswat et al., 2018). Areas with lower prey availability may limit Atlantic herring larvae survival since the larvae have higher energy requirements in higher water temperatures (Petitgas et al., 2013).

TABLE 2-9. ATLANTIC HERRING OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Single and paired mid-water trawl, bottom trawl, purse seine, and to a lesser extent, gillnet gear
Seasonality	Year round
Permitted Season	Year round
Types of Permits	Limited Access permit
Common Ports	Boston, MA; Gloucester, MA; New Bedford, MA; North Kingstown, RI; Point Judith, RI
Management	Atlantic Herring FMP (NEFMC); Atlantic Herring Interstate FMP (ASMFC)



Source: NMFS, n.d., c.

FIGURE 2-5. ATLANTIC HERRING MANAGEMENT AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

According to NROC VMS data, some Atlantic herring fishing occurs in the northwest sections of the Kirkpatrick Study Area, but most of the fishing activity occurs near the Rhode Island coast and in Rhode Island Sound (Shmookler, 2015) (**Table 2-10**). Atlantic herring was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017). Of commercial Atlantic herring landings in the New England and Mid-Atlantic regions, 0.6 percent of the average total annual revenue is expected to be exposed (approximately $138,193 out of just over $23 million) (**Table 2-11**).

TABLE 2-10. ATLANTIC HERRING YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	11,085,389	$3,133,247
2018	32,726,766	$6,029,658
2017	39,716,504	$8,477,518

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Atlantic herring*
Source: NOAA Fisheries, 2021

TABLE 2-11. ATLANTIC HERRING LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	16,421	$2,907
2017	20,119	$2,991
2016	402,992	$63,755
2015	180,746	$24,145
2014	684,170	$85,522
2013	2,109,571	$252,187
2012	1,109,192	$95,632
2011	119,158	$18,888
2010	1,862,616	$134,662
2009	141,325	$17,719
2008	143,457	$16,362
Total	**6,789,767**	**$714,770**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.3 Jonah Crab

Jonah crab (*Cancer borealis*) are found in the northwest Atlantic Ocean from Canada to Florida (NOAA Fisheries, n.d., d) (**Table 2-12**). Historically, Jonah crab was caught incidentally in the American lobster fishery (NOAA, 2020c). However, the ASMFC executed an FMP for the species in 2015 as southern New England landings for American lobster decreased and crab landings increased. Due to it close association with the American lobster fishery, the Jonah crab commercial fishery is regulated under the same permit and associated seasonal restrictions as the American lobster fishery (ASMFC, 2015a). Because of this and because of the nature of various permits and reporting requirements for both the American lobster and Jonah crab fisheries, landings of each species are often underreported in commonly used databases because the portion of the fleet that fishes in federal waters is not required to submit landings reports.

Gear used for American lobster, pots and traps, are also used for Jonah crab. In the last 15 years, the Jonah crab fishery has experienced a significant increase (650 percent) in landings. Jonah crab landings were approximately 2.5 million pounds in 1990, and landings were approximately 20 million pounds in 2018 (ASMFC, 2020c). Landings are predominately sourced from Massachusetts and Rhode Island as southern New England fisherman are supplementing reduced lobster catches with Jonah crab. The current stock status of Jonah crab is currently unknown due to the lack of stock assessments for the species; however, recent commercial fishery landings indicate that the fishery will continue to increase in landings and commercial value in the coming years (ACCSP, 2020).

The Jonah crab fishery has been indirectly affected by climate change through its effects on American lobster distribution. Warming ocean temperatures have caused American lobster to decrease significantly in southern New England (ASMFC, 2017a). Consequently, the Jonah crab fishery has increased as fisherman are supplementing their depleted American lobster catches. Little is known on the direct effects of climate change on Jonah crab, but the species is known to have a relative high tolerance to ocean temperature fluctuations (Chen et al., 2014). Ocean warming is not expected to have an effect on the fishery in the near future but may experience reductions if ocean temperatures exceed beyond their preferred range (2 to 24 degrees Celsius) (Lewis and Ayers, 2014).

TABLE 2-12. JONAH CRAB OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Pots/Traps
Seasonality	Year round
Permitted Season	May 1 – November 30
Types of Permits	Federal lobster permit/non-trap: incidental permit
Common Ports	New Bedford, MA; Point Judith, RI
Management	Jonah Crab Interstate FMP (ASMFC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Jonah crab was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-13**). Of commercial Jonah crab landings in the New England and Mid-Atlantic regions, 1.7 percent of the average total annual revenue is expected to be exposed (approximately $87,011 out of $5.1 million) (**Table 2-14**).

TABLE 2-13. JONAH CRAB YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	15,105,753	$12,586,082
2018	19,005,234	$17,828,717
2017	16,401,781	$15,955,171

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Jonah crab*
Source: NOAA Fisheries, 2021

TABLE 2-14. JONAH CRAB LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	207,805	$196,131
2017	160,655	$159,969
2016	188,409	$149,740
2015	92,624	$71,221
2014	167,136	$126,789
2013	108,392	$79,743
2012	92,324	$64,041
2011	59,095	$36,139
2010	74,579	$40,731
2009	85,369	$47,420
2008	91,111	$52,610
Total	**1,327,499**	**$1,024,534**

Source: NMFS, 2020c; NMFS, 2021.

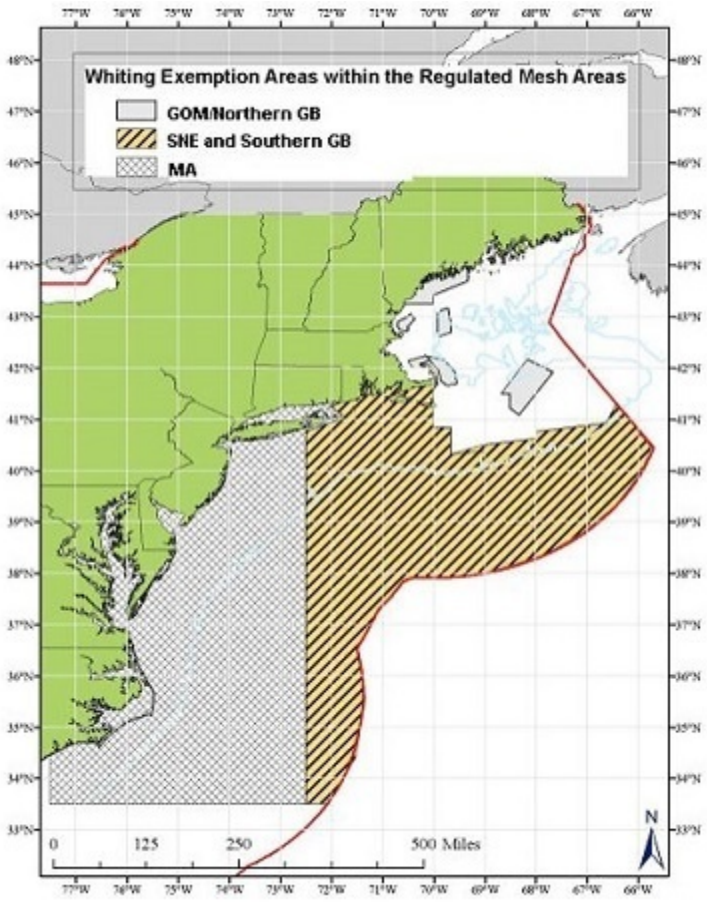
2.2.1.4 Silver Hake

The silver hake (*Merluccius bilinearis*) fishery operates from Newfoundland to South Carolina (NOAA Fisheries, n.d., e) (**Table 2-15**). The species is found in highest abundance on the Scotian Shelf and in the Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight off Long Island (Morse et al., 1999). The silver hake fishery is jointly managed under the small-mesh multispecies management plan which is regulated by the NEFMC(**Figure 2-6**). Gear used is predominantly small-mesh trawl throughout the entire range. Silver hake is often landed and sold along with offshore hake (*Merluccius albidus*) and they are both collectively referred to as whiting (NEFMC, 2012). Historically, fishery landings experienced a sharp decline between the 1960s and 1980s (from 351,000 mt in 1965 to 16,1000 mt in 1985) but have maintained relatively stable numbers since 1985 (NOAA Fisheries Office of Science and Technology, n.d).

Climate change has and is expected to continually affect the spatial distribution of silver hake stocks. Due to their sensitivity to seabed temperatures, studies have observed the species moving northward as ocean water temperatures gradually increased over the last 40 years (Nye et al., 2011). A secondary effect of rising ocean temperatures of silver hake distribution is prey availability. Reed et al. (2019) found that abundance of zooplankton was affected by seabed temperatures which, in turn, affected silver hake movement because zooplankton is primary prey for the species.

TABLE 2-15. SILVER HAKE OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Small-mesh trawl
Seasonality	Year round
Permitted Season	May 1 – April 30
Types of Permits	Open access
Common Ports	Gloucester, MA; Provincetown, MA; Point Judith, RI; Montauk, NY; New Bedford, MA
Management	Small-Mesh Multispecies (Whiting) FMP (NEFMC)



Source: NOAA Fisheries, 2012.

FIGURE 2-6. SMALL-MESH MULTISPECIES FMP MANAGEMENT AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Silver hake was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-16**). Of commercial silver hake landings in the New England and Mid-Atlantic regions, 3.4 percent of the average total annual revenue is expected to be exposed (approximately $327,355 out of $9.5 million dollars) (**Table 2-17**).

TABLE 2-16. SILVER HAKE YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	11,324,019	$8,518,976
2018	11,194,520	$9,462,725
2017	11,541,962	$8,802,856

** Landings in MA, RI, CT, NY, and NJ; landings data combined for silver hake*
Source: NOAA Fisheries, 2021

TABLE 2-17. SILVER HAKE LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	82,239	$45,879
2017	85,248	$45,189
2016	78,778	$46,277
2015	62,768	$39,093
2014	51,907	$36,961
2013	114,831	$61,898
2012	148,122	$83,466
2011	80,897	$51,555
2010	179,192	$111,766
2009	232,665	$102,616
2008	214,116	$151,231
Total	**1,330,763**	**$775,931**

Source: NMFS, 2020c; NMFS, 2021.

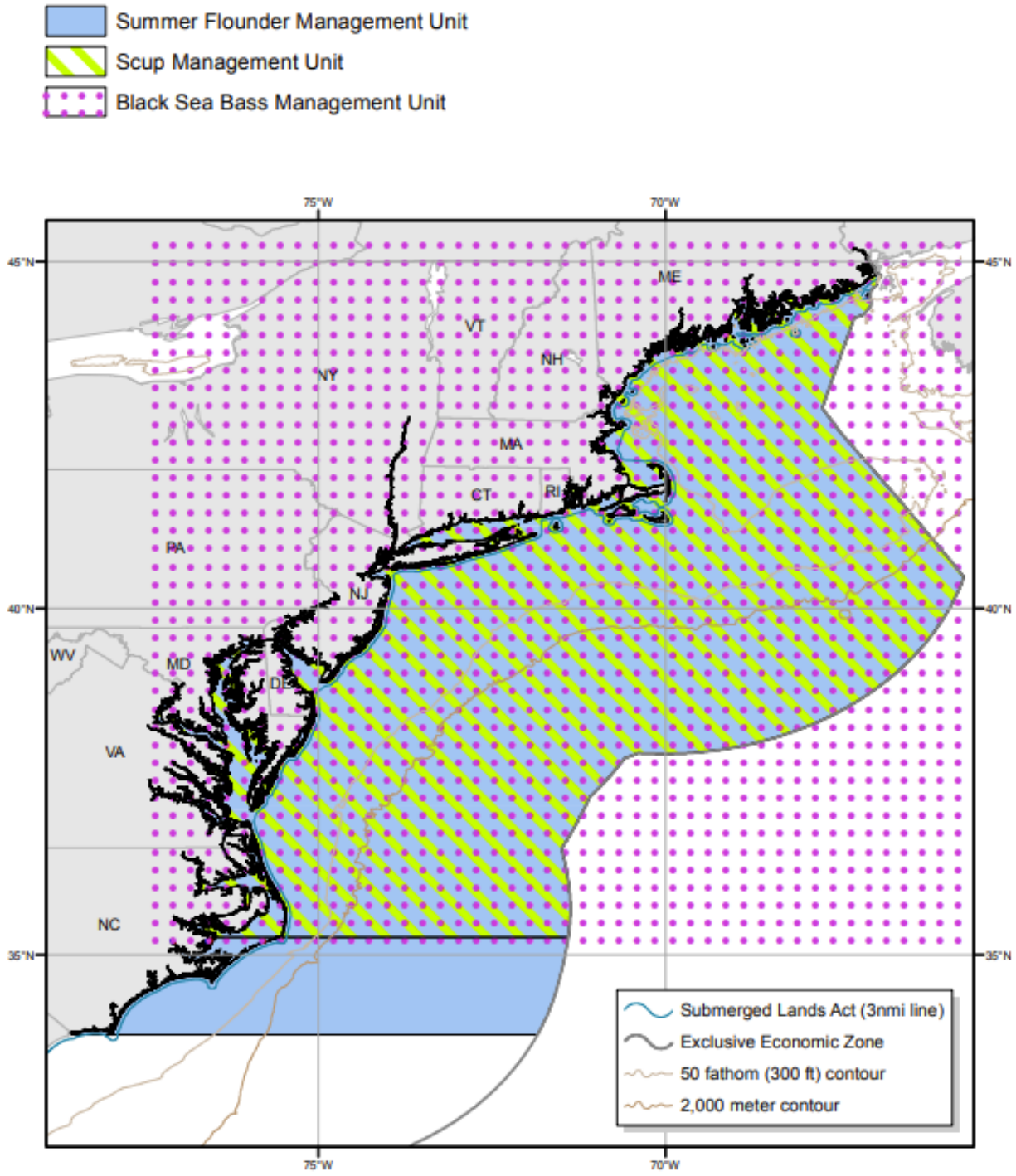
2.2.1.5 Scup

Also known as porgy, scup (*Stenotomus chrysops*) undertake extensive migrations between coastal waters in summer and offshore waters in winter, migrating north and inshore to spawn in spring (NOAA Fisheries, n.d., f) (**Table 2-18**). The scup fishery is jointly managed under the Summer Flounder, Scup, and Black Sea Bass FMP by the MAFMC and the Interstate Scup FMP by the ASMFC. Management areas for the fishery are shown in **Figure 2-7**. The principal gear type used in commercial fishing for scup is the otter trawl. Summer landings of scup in 2019 totaled 685,329 pounds, representing 34 percent of the total quota. The 2019 scup stock assessment found that the scup stock was not overfished, and overfishing was not occurring in 2018 (NEFSC, 2020). The stock has maintained landings above the maximum sustainable yield since 2013, but recruitment and subsequently the stock biomass is predicted to decrease to the targeted sustainable yield.

Studies on the effects of climate change have shown that scup are relatively insensitive to ocean acidification but are sensitive to ocean warming. A study assessing the physiological effects of ocean acidification on juvenile scup did not observe any physiological changes to the scup when exposed to increased carbon dioxide levels, likely because of their high-functioning body pH regulation (Perry et al., 2015). Higher ocean temperatures will likely result in a northward shift in distribution (Bell et al., 2015).

TABLE 2-18. SCUP OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Otter trawl
Seasonality	April through October
Permitted Season	Year round
Types of Permits	Category 1 permit
Common Ports	Boston, MA; New Bedford, MA; Point Judith, RI; Provincetown-Chatham, MA
Management	Summer Flounder, Scup, and Black Sea Bass FMP (MAFMC); Scup Interstate FMP (ASMFC)



Source: NOAA Fisheries, n.d., g.

FIGURE 2-7. SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS MANAGEMENT AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Out of the summer flounder, scup, and black sea bass fishery group, scup fishing produces the highest landing yield (**Table 2-19**); however, scup was not identified as a one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-20**).

TABLE 2-19. SCUP YIELD DATA

Fishery	Year	Landing (lbs.)*	Value ($)
Scup	2019	12,877,251	$8,824,479
	2018	12,818,009	$9,386,911
	2017	14,587,529	$9,167,619

** Landings in MA, RI, CT, NY, and NJ; landings data combined for scup*
Source: NOAA Fisheries, 2021

TABLE 2-20. SCUP LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	219,857	$135,833
2017	330,795	$223,375
2016	236,963	$167,100
2015	167,909	$121,008
2014	178,473	$105,678
2013	208,363	$135,079
2012	66,293	$42,637
2011	75,346	$37,806
2010	50,504	$38,019
2009	41,866	$32,284
2008	26,825	$35,044
Total	**1,603,194**	**$1,073,863**

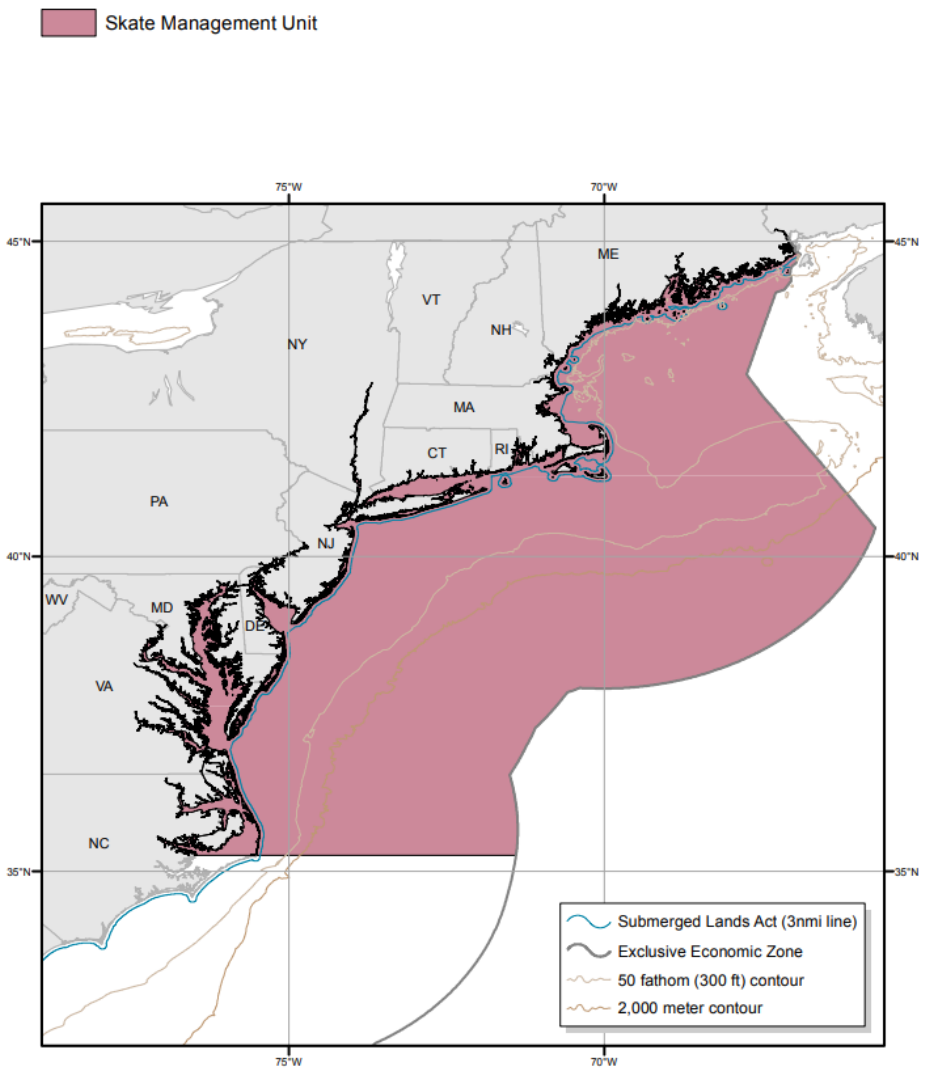
Source: NMFS, 2020c; NMFS, 2021.

2.2.1.6 Skates

The skate fishery in and around the Offshore Project Area is treated as a complex of seven species (NOAA Fisheries, n.d., h) (**Table 2-21**). Two species are primarily targeted in this fishery, the little skate (*Leucoraja erinacea*) which is primarily targeted to produce bait for other fisheries and the winter skate (*Leucoraja ocellata*) which is primarily targeted to produce skate wings for human consumption. These two species represent essentially all commercial skate landings from Massachusetts, Rhode Island, Connecticut, New York, and New Jersey from 2017 to 2019, accounting for over 99 percent of both landings and value (NOAA Fisheries, 2019b). The species in the fishery for this complex range from the Gulf of Maine to Cape Hatteras, North Carolina and at depths ranging from 0 ft to 2,230 ft (0 m to 700 m) or more. The fishery is managed by the NEFMC under the Northeast Skate Complex FMP (NOAA Fisheries, n.d, h). Northeast Skate Complex Management Areas are shown below in **Figure 2-8**.

TABLE 2-21. SKATE COMPLEX OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Bottom trawl, gillnet
Seasonality	Year round
Permitted Season	May 1 – April 30
Types of Permits	Category 1 permit
Common Ports	New Bedford, MA; Chatham, MA; Point Judith; RI
Management	Northeast Skate Complex FMP (NEFMC)



Source: NOAA Fisheries, n.d., i.

FIGURE 2-8. NORTHEAST SKATE COMPLEX MANAGEMENT AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Skates were identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-22**). Skates were also identified as one of the top 10 most impacted species in the Lease Area (NMFS, 2020b). While the little skate and winter skate comprise the majority of landings within the skate complex (**Table 2-23**), this identification in these reports groups skates as a complex.

TABLE 2-22. SKATE COMPLEX YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	26,985,769	$6,120,107
2018	29,866,584	$6,561,825
2017	29,308,706	$5,588,246

** Landings in MA, RI, CT, NY, and NJ; landings data combined for skates*
Source: NOAA Fisheries, 2021

TABLE 2-23. SKATE LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	86,849	$25,445
2017	56,806	$18,554
2016	173,177	$43,935
2015	303,725	$69,956
2014	218,297	$92,273
2013	500,353	$88,182
2012	406,838	$74,532
2011	551,273	$85,680
2010	461,679	$94,781
2009	556,222	$85,712
2008	590,464	$74,437
Total	**3,905,683**	**$753,487**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.7 Atlantic surfclam and Ocean Quahog

Because of the way the fishery operates and is managed as well as the manner in which fishery data are reported, the Atlantic surfclam and ocean quahog are discussed together in this report rather than as individual species. These species are managed together under the Atlantic Surfclam and Ocean Quahog FMP developed by the MAFMC that uses an individual transferable quota management system (**Table 2-24**).

Ocean quahogs (also referred to as hard clams) occur from Newfoundland to Cape Hatteras, North Carolina. Ocean quahogs are typically harvested in waters up to 300 ft (91 m) deep in southern New England (NOAA Fisheries, n.d., j; NOAA Fisheries, n.d., k). Outside of Maine waters, the bulk of the landings and effort typically come from the Long Island region. The resource almost entirely occurs within federal waters (3 to 200 nm from shore [5.6 to 370.4 km]) and at a depth of 65 to 260 ft (20 to 79 m). However, in the northern range, ocean quahogs inhabit waters closer to shore, such that the state of

Maine has a small commercial fishery that includes beds within state waters (less than 3 nm [5.6 km] from shore). The commercial fishery for ocean quahog in federal waters is prosecuted with large vessels and hydraulic dredges and is very different from the small Maine fishery prosecuted with small vessels (35 to 45 ft [11 to 14 m]) targeting quahogs for the local fresh, half-shell market (MAFMC, n.d.). Historically, about 50 percent of the quota for ocean quahogs has been taken in the southern area of the fishery.

TABLE 2-24. ATLANTIC SURFCLAM AND OCEAN QUAHOG OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Hydraulic clam dredges
Seasonality	Year round
Permitted Season	Year round
Types of Permits	Open access
Common Ports	Cape May, NJ; Provincetown-Chatham, MA; North Kingstown, RI
Management	Atlantic Surfclam and Ocean Quahog FMP (MAFMC)

Historically, about 50 percent of the quota for ocean quahogs has been taken in the southern area of the fishery. Atlantic surfclams are increasing in this southern area, possibly because of the faster growth rates for Atlantic surfclams settling when compared to ocean quahogs. Some of the Southern beds that were once ocean quahog beds now have Atlantic surfclam recruitment, which is contributing to a mixing of species during harvesting operations. Ocean quahog were not overfished in 2018, reaching 60 percent of their quota. For ocean quahogs, the fishing fleet primarily operates out of Pt. Pleasant and Atlantic City, New Jersey, Oceanview, New York, and New Bedford, Massachusetts (MAFMC, 2019).

Atlantic surfclams (*Spisula solidissima*) are the largest bivalves in the Western North Atlantic. They are found from the southern Gulf of St. Lawrence to Cape Hatteras, North Carolina from the beach zone to about 150 ft (46 m) water depths, but densities are lower at depths greater than 131 ft (40 m). They are most abundant on Georges Bank, the south shore of Long Island, New Jersey, and the Delmarva Peninsula offshore Delaware, Maryland, and Virginia. Commercial fisheries generally target populations off the coasts of New Jersey and the Delmarva Peninsula. Their growth rates depend on water temperature with southern surfclam populations growing more slowly in warmer water than the more northern populations. Atlantic surfclam are not overfished, reaching 62 percent of their quota in 2018. For Atlantic surfclams, the fishing fleet primarily operates out of Pt. Pleasant and Atlantic City, New Jersey, Oceanview, New York and New Bedford, Massachusetts (MAFMC, 2019).

Atlantic surfclams are managed along with ocean quahogs under the Atlantic Surfclam-Ocean Quahog FMP, which includes mandatory vessel monitoring. They represent the first federally managed fisheries conducting electronic reporting on a per vessel and trip basis (“eClams”) and this voluntary program is being used by nearly all vessels. This reporting system is still being tested and evaluated by NMFS, but data should be available closer to real time once implemented. Atlantic surfclam catch is limited on an annual basis according to each permit holder’s annual allocation. Each permit holder essentially has their own personal quota/limit for the year, and the rate at which they harvest it is up to them.

There is limited data on the effects of climate change on benthic invertebrates, including either the Atlantic surfclam or ocean quahog (Powell et al., 2020). Ocean quahogs have been shown to have relative resistance to increasing ocean temperatures due to their ability to burrow deep in the sediment, thus avoiding warmer temperature effects (Begum et al., 2009; Ragnarsson and Thórarinsdóttir, 2002). Recent studies have shown that increased ocean temperatures are having an effect on Atlantic surfclam distribution (Powell et al., 2017). Historic survey data indicate that Atlantic surfclam populations are shifting northward and towards deeper offshore waters. The shift in Atlantic surfclam distributions has resulted in socioeconomic changes in the area because landings are decreasing for some fisheries whereas they are increasing for more northward fisheries (Kuykendall et al., 2017; McCay et al., 2011).

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

According to NROC VMS data, low to high surfclam/quahog fishing activity occurs in the in the northwest sections of the Kirkpatrick Study Area (Shmookler, 2015) (**Table 2-25**). Ocean quahog, but not the Atlantic surfclam, was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017). Of commercial ocean quahog landings in the New England and Mid-Atlantic regions, 1.1 percent of the average total annual revenue is expected to be exposed (approximately $851,030 out of just over $27 million) (**Table 2-26**).

TABLE 2-25. ATLANTIC SURFCLAM AND OCEAN QUAHOG YIELD DATA

Fishery	Year	Landing (lbs.)*	Value ($)
Atlantic surfclam and ocean quahog	2019	34,362,291	$29,229,304
	2018	35,645,915	$29,800,364
	2017	20,686,246	$19,578,986

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Atlantic surfclam and ocean quahog*
Source: NOAA Fisheries, 2021

TABLE 2-26. ATLANTIC SURFCLAM AND OCEAN QUAHOG LANDINGS IN THE LEASE AREA AND FALMOUTH EXPORT CABLE CORRIDOR, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	50,573	$46,270
2017	73,603	$58,411
2016	47,627	$41,477
2015	16,331	$14,384
2014	7,454	$5,966
2013	5,443	$4,349
2012	4,114	$2,418
2011	17,547	$13,221
2010	68,043	$41,176
2009	10,825	$5,725
2008	52,465	$28,511
Total	**354,025**	**$261,908**

Source: NMFS, 2020c; NMFS, 2021.
1 NMFS did not provide FMP data for "All Others" data recordings in the custom Brayton Point export cable corridor data, therefor the current Atlantic surfclam and ocean quahog data is inclusive of the Lease Area and Falmouth export cable corridor.

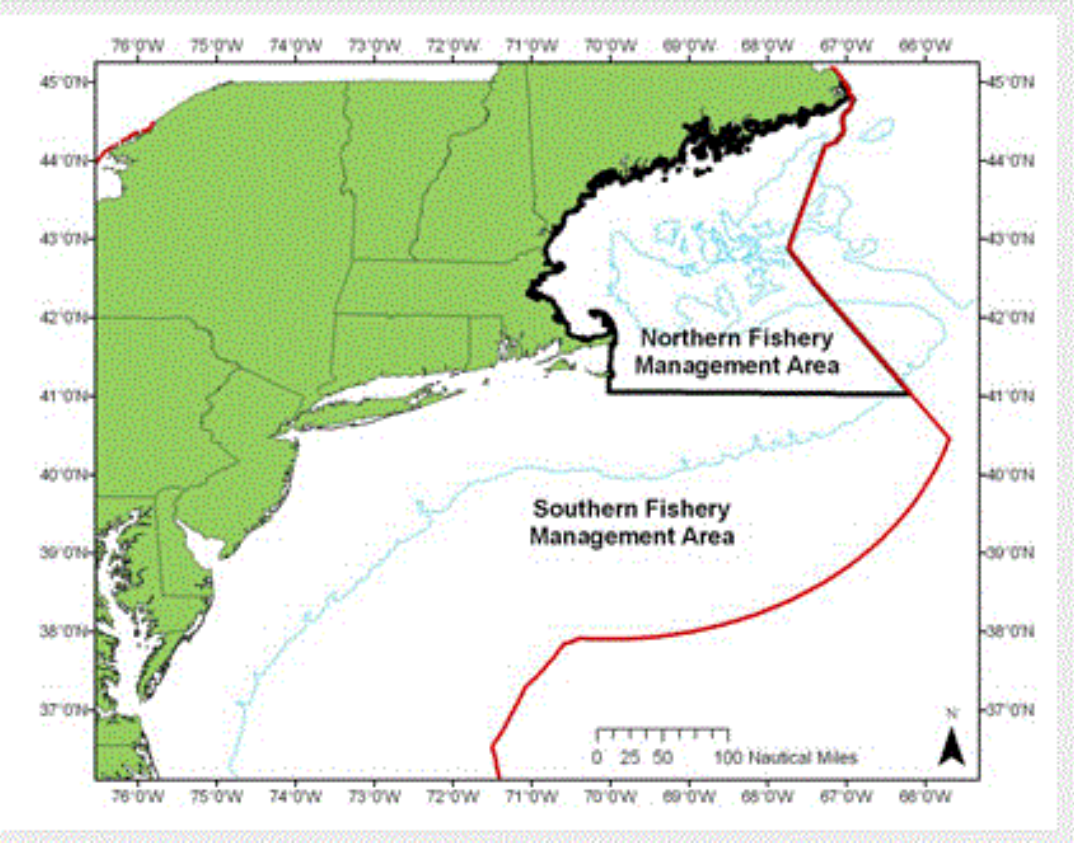
2.2.1.8 Monkfish

Also known as goosefish, monkfish (*Lophius americanus*) is a deep-water anglerfish that is often caught in conjunction with other groundfish species, generally skate, Atlantic sea scallop (*Placopecten magellanicus)*, and to a lesser extent, spiny dogfish (*Squalus acanthias)*. Monkfish occur from Maine to North Carolina from 80 to 1,000 ft (24 to 305 m) of water (NOAA Fisheries, n.d., l). Seasonal migrations occur, related to spawning and food availability. The monkfish fishery is jointly managed as two units by the NEFMC and the MAFMC (**Table 2-27**). The Northern Fishery Management Area (NFMA) covers the Gulf of Maine and the northern part of Georges Bank, where the fishery peaks from January through March. The Southern Fishery Management Area (SFMA) extends from the southern flank of Georges Bank through Southern New England and into the Mid-Atlantic Bight to North Carolina. Monkfish Management Areas are shown below in **Figure 2-9**. Landings in the SFMA peak in late spring/early summer when monkfish are migrating from deeper water. The primary gear types used in the commercial monkfish fishery are trawl and gillnet. Limited access monkfish vessels are allowed 45.2 monkfish days at sea each fishing year (NMFS, 2020a). Of this total amount, only 37 are allowed in the SFMA. Each permit holder can carry over a maximum of four unused days at sea from the previous year which can be used in either the Northern Fishery Management Area or the SFMA.

Climate change is predicted to have impacts on the spatial distribution of monkfish. Studies have shown that monkfish populations more northward as ocean temperatures rise, but will vacate their southern range once temperatures increase beyond their preferred range (Kleisner et al., 2017). These movements could, in turn, have effects on regional fishery landing compositions (Steinmetz et al., 2008). Along the U.S. Atlantic, warming ocean temperatures are projects to caused monkfish habitat to extend northward into the Gulf of Maine while mid-Atlantic Bight become less suitable for the species (Rogers et al., 2019).

TABLE 2-27. MONKFISH OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Trawl and gillnet
Seasonality	Year round
Permitted Season	45 Days-At-Sea per year
Types of Permits	Limited Access
Common Ports	Boston, MA; Gloucester, MA; New Bedford, MA; Point Judith, RI; Provincetown-Chatham, MA
Management	Monkfish FMP (NEFMC, MAFMC)



Source: NOAA Fisheries, n.d., m.

FIGURE 2-9. MONKFISH MANAGEMENT AREAS.

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Monkfish was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-28**). Of commercial monkfish landings in the New England and Mid-Atlantic regions, 1.7 percent of the average total annual revenue is expected to be exposed (approximately $340,775 out of just under $20 million) (**Table 2-29**). According to NROC VMS data, a low to high level of monkfish fishing occurs in the northwest sections of the Kirkpatrick Study Area with lower amounts of fishing activity occurring throughout the Kirkpatrick Study Area (Shmookler, 2015).

TABLE 2-28. MONKFISH YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	20,926,409	$13,275,629
2018	20,964,526	$13,580,867
2017	22,209,659	$17,085,989

** Landings in MA, RI, CT, NY, and NJ; landings data combined for monkfish*
Source: NOAA Fisheries, 2021

TABLE 2-29. MONKFISH LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	30,693	$36,971
2017	39,507	$50,328
2016	36,549	$56,042
2015	33,093	$49,825
2014	48,371	$73,076
2013	37,823	$54,943
2012	51,239	$97,996
2011	35,409	$68,773
2010	52,772	$76,138
2009	44,389	$61,883
2008	38,960	$66,697
Total	**448,805**	**$692,672**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.9 Summer Flounder

Summer flounder (*Paralichthys dentatus*) are found in inshore and offshore waters and are most abundant from Cape Cod, Massachusetts to Cape Fear, North Carolina (NOAA Fisheries, n.d, n) (**Table 2-30**). The summer flounder fishery is jointly managed by the MAFMC under the Summer Flounder, Scup, and Black Sea Bass Management Plan and the ASMFC under the Interstate FMP for Summer Flounder. Management areas for the fishery are shown in **Figure 2-7**. Two major summer flounder commercial trawl fisheries exist - a winter offshore fishery and a summer inshore fishery. The primary gear types used in the commercial summer flounder fishery are pound nets and gillnets. Summer flounder have a constant coastwide commercial quota of 12 million pounds which is applied from 2019-2021 (NMFS, 2020a). In the Massachusetts area, the 2020 quota is 786,260 pounds. This state quota has increased by 45,000 pounds from the previous year and only 73 percent of the 2019 quota was harvested (roughly 540,000 pounds).

Studies on the effects of climate change on summer flounder have indicated that climate change may in fact have positive implications for the species and the fishery. Some studies have shown that increased ocean temperatures may not negatively affect summer flounder, but may positively impact the species (Bell et al., 2015). In Bell et al. (2015), changes in summer flounder distribution were not attributed to climate changes. Warmer ocean temperatures may also result in increased recruitment (Able et al., 2011).

TABLE 2-30. SUMMER FLOUNDER OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Pound nets and gill nets
Seasonality	Year round
Permitted Season	Year round
Types of Permits	Category 1 permit
Common Ports	Boston, MA; Point Judith, RI; Provincetown-Chatham, MA
Management	Summer Flounder, Scup, and Black Sea Bass FMP (MAFMC); Summer Flounder Interstate FMP (ASMFC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Out of the summer flounder, scup, and black sea bass fishery group, summer flounder has the highest economic value (**Table 2-31**). Summer flounder was identified as a one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017). Of commercial summer flounder landings in the New England and Mid-Atlantic regions, 0.4 percent of the average total annual revenue is expected to be exposed (approximately $90,433 out of just over $22 million) (**Table 2-32**).

TABLE 2-31. SUMMER FLOUNDER YIELD DATA

Fishery	Year	Landing (lbs.)*	Value ($)
Summer Flounder	2019	4,967,943	$17,300,187
	2018	3,136,907	$14,353,159
	2017	2,904,647	$13,540,418

** Landings in MA, RI, CT, NY, and NJ; landings data combined for summer flounder*
Source: NOAA Fisheries, 2021

TABLE 2-32. SUMMER FLOUNDER LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	31,788	$148,045
2017	26,644	$124,550
2016	33,217	$142,936
2015	43,421	$162,438
2014	67,733	$222,792
2013	63,663	$167,005
2012	63,090	$191,939
2011	66,636	$178,150
2010	41,859	$109,915
2009	36,535	$98,180
2008	32,664	$100,791
Total	**507,250**	**$1,646,741**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.10 Butterfish

Butterfish *(Peprilus triacanthus*) are often unwanted bycatch in many fisheries such as squid, silver hake, and mixed groundfish(**Table 2-33**). Butterfish are primarily landed in Montauk, New York and New Bedford, Massachusetts. They are generally exported to Japan, where they are a popular menu item. Butterfish shift their distribution in response to changing bottom water temperatures; during summer, they move northward and inshore to feed and spawn, and during winter, they move southward and offshore (NOAA Fisheries, n.d., o). Butterfish, along with Atlantic mackerel, shortfin squid, and longfin squid are regulated under one FMP. Butterfish is not considered to be overfished. It did not exceed its 2018 quota, rather there was a 55 percent decline from 2017 (MAFMC, 2019).

TABLE 2-33. BUTTERFISH OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Otter trawl
Seasonality	Year round
Permitted Season	Year round
Types of Permits	Commercial (Open Access)
Common Ports	Point Judith, RI; North Kingstown, RI; Montauk, NY; New Bedford, Mass.
Management	Mackerel, Squid, Butterfish FMP (MAFMC)

Climate change is expected to cause changes in butterfish distribution due to changes in recruitment patterns (Frank et al., 1990). Using NEFSC data between 1982 and 2013, Adams (2017) found that butterfish exhibited age-specific effects to changes in ocean temperatures. There was no northward movement of butterfish as typically seen in other fish species; however, there was increased abundance of butterfish between the ages of 1 and 3 that was positively correlated with increased ocean temperatures. The results suggest that butterfish response to climate change may result in range expansion as opposed to a northward shift.

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Data indicate that butterfish landings in southern New England experience high fluctuations (ACCSP, 2020; **Table 2-34**). Of the three southern New England coastal states, Rhode Island generates the highest butterfish yield. Butterfish was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-35**).

TABLE 2-34. BUTTERFISH YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	7,535,168	$5,872,454
2018	3,642,611	$2,654,286
2017	8,064,583	$4,459,183

** Landings in MA, RI, CT, NY, and NJ; landings data combined for butterfish*
(Source: NOAA Fisheries, 2021)

TABLE 2-35. BUTTERFISH LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	34,368	$22,760
2017	43,236	$22,364
2016	20,493	$10,739
2015	20,257	$12,928
2014	24,071	$17,234
2013	34,597	$20,405

Year	Landings (lbs.)	Value ($)
2012	13,878	$8,426
2011	11,345	$9,478
2010	31,914	$16,062
2009	10,615	$5,386
2008	15,254	$8,160
Total	**260,028**	**$153,942**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.11 Spiny Dogfish

The spiny dogfish is a small shark that migrates along the eastern seaboard of the U.S. and occurs from inshore to offshore waters on the edge of the continental shelf (NOAA Fisheries, n.d., p) (**Table 2-36**). Peak landings occur from May through October, which coincides with their residency along the southern flank of Georges Bank, the Gulf of Maine, and near shore waters around Massachusetts. They move northward in the spring and summer and southward in the fall and winter, with a preferred temperature range of 45 to 55 degrees Fahrenheit, and from 36 to 1,640 ft (11 to 500 m) water depth. Gear used is predominantly bottom gillnet, with smaller amounts caught by trawl and hook gear. There is little consumer demand for spiny dogfish in the United States, but it is commonly used in Europe as the fish in "fish and chips" (NOAA, 2020a).

Climate change may cause spatial shifts in spiny dogfish distribution. Studies have found that spiny dogfish in all life stages prefer warmer waters with higher saline concentrations, thus oceanic warming could increase spiny dogfish numbers in northerly waters and result in changes in ontogenetic habitat selection (Sagarese et al., 2014). Some studies have also shown that climate change could result in higher mercury concentrations in spiny dogfish, which could have economic implications on the spiny dogfish fishery (Schartup et al., 2019). As spiny dogfish populations move northwards, prey availability is expected to decrease, leading the dogfish to consume different prey species with high mercury concentrations (Cheung et al., 2009).

TABLE 2-36. SPINY DOGFISH OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Bottom gillnet, trawl, hook and line
Seasonality	May through October
Permitted Season	May 1 through April 30
Types of Permits	Category 1 permit
Common Ports	Boston, MA, Provincetown-Chatham, MA
Management	Spiny Dogfish FMP (NEFMC, MAFMC); Spiny Dogfish Interstate FMP (ASMFC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Atlantic spiny dogfish is a relatively small commercial fishing industry operating in the region ( ). Atlantic spiny dogfish was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-37**). For the May 1, 2020 to April 30, 2021 fishing year, the coastwide commercial quota for this species has increased 13 percent to 23 million pounds. The quota for the Maine-to-Connecticut region has been set to 13,453,004 pounds which is roughly 58 percent of the total allowable limit (MA DMF, 2020b) (**Table 2-38**). Massachusetts' catch generally accounts for the largest portion of the commercial quota.

TABLE 2-37. SPINY DOGFISH YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	8,812,920	$1,987,392
2018	9,611,303	$1,961,250
2017	12,411,546	$2,498,743

** Landings in MA, RI, CT, NY, and NJ; landings data combined for spiny dogfish*
Source: NOAA Fisheries, 2021

TABLE 2-38. SPINY DOGFISH LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	9,351	$2,124
2017	17,076	$3,710
2016	6,346	$1,161
2015	24,251	$4,324
2014	46,511	$9,618
2013	28,862	$5,365
2012	85,445	$18,019
2011	131,407	$30,919
2010	51,375	$11,080
2009	31,972	$6,432
2008	17,543	$5,542
Total	**450,139**	**$98,294**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.12 American Lobster

American lobster is most abundant in inshore waters from Maine through New Jersey and in offshore waters from Maine to North Carolina (ASMFC, 2017b) (**Table 2-39**). Mature legal lobsters are generally more abundant offshore and in deeper water. The fishery is managed Interstate FMP for American lobster implemented by the ASMFC. There are seven Lobster Management Areas (LMAs) from Maine to Cape Hatteras (**Figure 2-10**). Trap limits are determined for each LMA and in 1999 NMFS established a moratorium on any new entrants into the federal lobster fishery although existing permits can be traded. Gear utilized in the commercial lobster fishery gear is primarily pots/traps, but some harvesting occurs with non-trap gear, such as trawls and gillnets. Regulations and data collection for the lobster

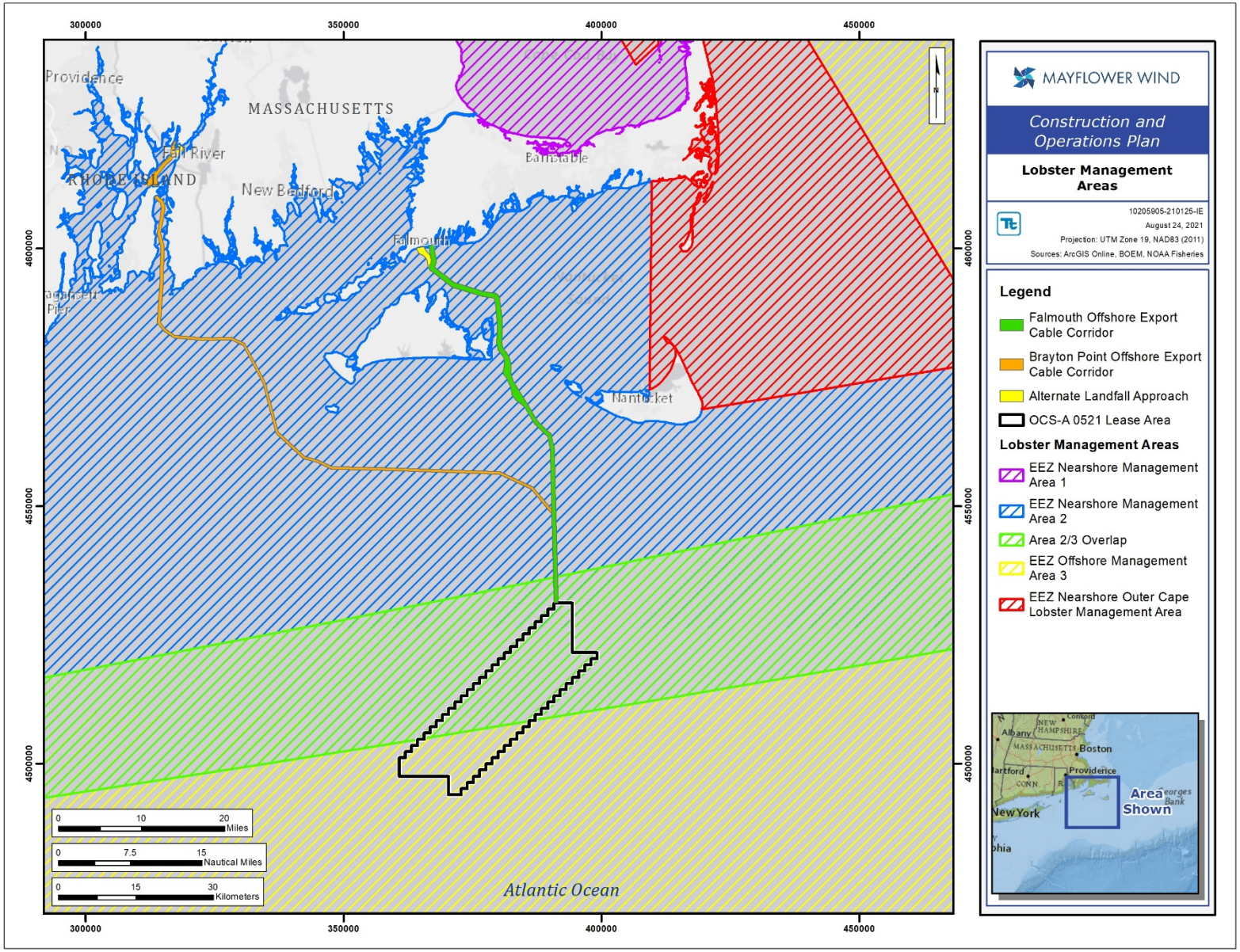
fishery are very robust (i.e., LMA-specific gear configuration and marking requirements, weekly electronic reporting requirements for federal lobster dealers). At both the local and national level, the lobster fishery is a very important economic activity, typically being the highest valued fishery in the U.S. and the second highest valued in Massachusetts (NMFS, 2020a).

TABLE 2-39. AMERICAN LOBSTER OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Pots/Traps
Seasonality	Year round
Permitted Season	May 1 – November 30
Types of Permits	Federal lobster permit
Common Ports	Gloucester MA; Plymouth MA; New Bedford MA
Management	American Lobster Interstate FMP (ASMFC)

Climate change has and will continue to significantly impact the lobster fishery. Waters that support lobster fishery are warming to the point where lobsters are transitioning to deeper and more northern waters. Generally, this has resulted in a dramatic decrease in optimum temperature conditions for the Southern New England stock (and thus abundance) while the reverse is true for the Gulf of Maine-George's Bank stock (ASMFC, 2015b; Mills et al., 2013). While other factors also impact abundance, the Southern New England stock has seen the greatest reduction in abundance during the recent period of warming due to climate change. This reduction in abundance has manifested in impacts to the lobster fishery, with landings of lobster south of Cape Cod decreasing 83 percent from 1998 to 2013 (ASMFC, 2017a).

In 2017, the number of lobster permits registered in the Greater Atlantic Regional Fisheries area was reported at 172 in Area 2 with approximately 68 of the vessels registered in Rhode Island and 63 vessels in Massachusetts. In 1999, NMFS established a moratorium on any new entrants into the federal lobster fishery.



Source: NOAA Fisheries, 2016.

FIGURE 2-10. LOBSTER MANAGEMENT AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

The lobster fishery in the region is important from economic, cultural, and historical perspectives. It is a highly visible, organized fishery that is important to the identity of the region. American lobster was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-40**). Of commercial lobster landings in the New England and Mid-Atlantic regions, 0.1 percent of the average total annual revenue is expected to be exposed (approximately $175,972 out of just over $212 million) (**Table 2-41**). A large number of small to medium-sized, often independently owned vessels fish for lobster in a coordinated fashion in the region. In addition to actively tending gear, lobster boats are known to transit through this area although for lobster boats specifically, most transiting vessels are returning from actively fishing in/near the Kirkpatrick Study Area as opposed to from farther offshore as is the case with other fisheries. The Kirkpatrick Study Area overlaps with LMAs 2 and 3 (MA DMF, 2019b).

TABLE 2-40. AMERICAN LOBSTER YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	19,181,792	$108,458,207
2018	20,170,585	$103,139,820
2017	19,213,661	$95,939,635

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Atlantic lobster*
Source: NOAA Fisheries, 2021

TABLE 2-41. AMERICAN LOBSTER LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	30,225	$178,253
2017	34,913	$197,844
2016	63,868	$335,493
2015	54,529	$285,319
2014	42,942	$202,535
2013	42,624	$197,153
2012	44,681	$202,133
2011	46,185	$213,651
2010	61,987	$61,987
2009	67,166	$262,513
2008	78,974	$372,203
Total	**568,094**	**$2,509,084**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.13 Atlantic Mackerel

In the western Atlantic Ocean, Atlantic mackerel are found from North Carolina to Labrador (NOAA Fisheries, n.d., q) (**Table 2-42**). The Atlantic mackerel (*Scomber scombrus*) fishery operates primarily between January and May in southern New England and Mid- Atlantic coastal waters, and between May and December in the Gulf of Maine. They typically spawn 10 to 30 miles offshore the Mid-Atlantic Bight.

There is substantial uncertainty regarding these species because their distribution and productivity are likely highly dependent on environmental variables. Atlantic mackerel, along with butterfish, shortfin squid, and longfin squid are regulated under one FMP. Atlantic mackerel landings in 2018 were 25 percent higher than in 2017, even with the fishery being capped at 88 percent instead of the usual 95 percent. Massachusetts landings accounted for 39 percent of the overall catch (3,414 t), followed closely by New Jersey which landed 37 percent of the overall catch (3,224 t) (MAFMC, 2019).

Climate change has and will continue to significantly impact the Atlantic mackerel fishery due to their high sensitivity to environmental fluctuations. Many studies have shown that Atlantic mackerel spawning has shifted northward to warmer waters over the past 30 years (Berge et al., 2015; Hughes et al., 2014; Beare and Reid, 2002). A secondary impact of these spatial shifts driven by climate change has also occurred – increased conflicts between fishery stakeholders. After an abrupt spatial shift in Atlantic mackerel availability in 2007, a conflict arose between fisheries in the European Union, Norway, Iceland, and the Faroe Islands over changes in fishing quotas (Spijkers and Boonstra, 2017). Increased fluctuations in Atlantic mackerel availability could have negative implications for communities that depend socioeconomically on commercial or recreational Atlantic mackerel fishing (Mendenhall et al., 2020).

TABLE 2-42. ATLANTIC MACKEREL OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Single and paired mid-water trawl, bottom trawl, purse seine
Seasonality	Spring – early summer
Permitted Season	Year round
Types of Permits	Limited access, open access (20,000 lbs.)
Common Ports	Boston, MA, Gloucester, MA, New Bedford, MA, North Kingstown, RI, Point Judith, RI
Management	Mackerel, Squid, Butterfish FMP (MAFMC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

The NROC VMS data are not specific to Atlantic mackerel, but the data does show low to moderate pelagic fishing activity in the Kirkpatrick Study Area particularly in the northwest portion of the Kirkpatrick Study Area (Shmookler, 2015) (**Table 2-43**). The highest concentrations of pelagic fishing activity occurred in the northwest sections of the Kirkpatrick Study Area, near the Rhode Island coast, and in Rhode Island Sound (Shmookler, 2015). Previous yield data indicate that Atlantic mackerel landings in the southern New England coastal area experience high fluctuations (ACCSP, 2020; **Table 2-44**). Massachusetts produced the highest Atlantic mackerel yield between 2011 and 2019. Atlantic mackerel was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017).

TABLE 2-43. ATLANTIC MACKEREL YIELD DATA

Year	Landing (lbs.)	Value ($)
2019	10,538,728	2,582,123
2018	18,802,302	4,229,078
2017	13,945,276	3,695,312

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Atlantic mackerel*
Source: NOAA Fisheries, 2021

TABLE 2-44. ATLANTIC MACKEREL LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	7,728	$2,041
2017	7,491	$2,885
2016	18,051	$6,552
2015	22,956	$8,353
2014	1,944	$693
2013	5,814	$2,418
2012	8,959	$4,257
2011	4,161	$1,399
2010	27,008	$16,944
2009	125,835	$16,219
2008	55,986	$19,691
Total	**285,933**	**$81,452**
Source: NMFS, 2020c; NMFS 2021		

2.2.1.14 Golden Tilefish

The golden tilefish (*Lopholatilus chamaeleonticeps*) fishery operates from Maine to Virginia, with a high concentration of commercial fishing between Nantucket, Massachusetts and Cape May, New Jersey (**Table 2-45**). They are found along the entire eastern U.S. coastline (NOAA Fisheries, n.d., r). Golden tilefish have distinct habitat preferences: the species prefers warm waters on the upper continental shelf slope and soft substrates in which they can burrow and excavate (Fisher et al., 2014). This fishery is jointly managed by the MAFMC under the Golden and Blueline Tilefish FMP. The fishery has operated under the individual fishing quota program since 2009 (NOAA, 2020c). Golden tilefish has a current coast individual quota limit of approximately 1.5 million pounds. Gear used is predominantly bottom longline gear with some limited otter trawl gear use. Historical data indicates that the highest commercial landings of golden tilefish was in 1979 at approximately 8.7 million pounds (MAFMC, 2020). Commercial landings experienced a drop in 1982 (four million pounds), 1989 (one million pounds) and has maintained relatively stable landings between one and 2.5 million pounds since then. The 2019 stock assessment found that the golden tilefish stock is not overfished and overfishing is not occurring (MAFMC, 2020).

Due to its sensitivity to oceanic temperatures and benthic habitat characteristics, golden tilefish have been and will continue to be affected by climate change. The spatial distribution of golden tilefish is expected to shift northwards due to its narrow, preferred ocean temperature range. Research has also shown that changes in oceanic temperatures may affect golden tilefish reproductive success (Fisher et al., 2014).

TABLE 2-45. GOLDEN TILEFISH OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Bottom longline, otter trawl
Seasonality	Year round
Permitted Season	November 1 – October 31
Types of Permits	Open Access permit
Common Ports	Point Judith, RI
Management	Tilefish FMP (MAFMC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Golden tilefish was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017; **Table 2-46**) however, the species is expected to be one of the top 10 species exposed to Project activities (NMFS, 2020b) (**Table 2-47**).

TABLE 2-46. GOLDEN TILEFISH YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	1,531,246	5,370,072
2018	1,604,618	4,886,119
2017	1,531,246	5,370,072

** Landings in MA, RI, CT, NY, and NJ; landings data combined for golden tilefish*
Source: NOAA Fisheries, 2021

TABLE 2-47. GOLDEN TILEFISH LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	12,086	$46,064
2017	4,820	$17,322
2016	798	$3,453
2015	6,425	$30,186
2014	3,307	$11,071
2013	15,178	$54,244
2012	2,094	$6,618
2011	438	$1,163
2010	3,663	$9,709
2009	13,241	$43,167
2008	2,276	$6,287
Total	**64,326**	**$229,284**
Source: NMFS, 2020c; NMFS 2021		

2.2.1.15 Black Sea Bass

Black sea bass (*Centropristis striata*) are found in coastal waters from the Gulf of Maine to the Florida Keys, concentrating in areas from Cape Cod, Massachusetts to Cape Canaveral, Florida and commonly inhabit rocky seabed areas near structural features (NOAA Fisheries, n.d., s) (**Table 2-48**). The black sea bass fishery is jointly managed by the MAFMC under the Summer Flounder, Scup and Black Sea Bass FMP and by the ASMFC under the Interstate FMP for Black Sea Bass. Management areas for the fishery are shown in **Figure 2-7**. There are two stocks of black sea bass on the Atlantic Coast with overlapping ranges. Black sea bass found near the Offshore Project Area are part of the northern stock which is defined as black sea bass located north of Cape Hatteras, North Carolina. This northern stock is characterized by seasonal migrations (as opposed to the southern stock which is not). In the summer, black sea bass in this northern stock are prevalent in inshore waters at depths of less than 120 ft. In the winter, they are prevalent in southern offshore waters at depths of 240 to 540 ft. Spawning for black sea bass in this northern stock occurs in the late summer off of the New England coast (NOAA Fisheries, n.d., s). According to a 2019 stock assessment, black sea bass in this stock are not overfished and are not subject to overfishing (NEFSC, 2020).

TABLE 2-48. BLACK SEA BASS OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Otter trawls, Pots and traps
Seasonality	Year round
Permitted Season	January 1 – December 31
Types of Permits	Year round
Common Ports	New Bedford, MA; Point Judith, RI; Cape May, NJ; Barnegat Light, NJ;
Management	Summer Flounder, Scup, and Black Sea Bass FMP (MAFMC); Black Sea Bass Interstate FMP (ASMFC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Black sea bass were not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-49**). They were also not identified as one of the top 10 most impacted species in the Lease Area (NMFS, 2020b) (**Table 2-50**).

TABLE 2-49. BLACK SEA BASS YIELD DATA

Fishery	Year	Landing (lbs.)*	Value ($)
Black Sea Bass	2019	2,006,811	$7,325,032
	2018	1,867,242	$7,147,890
	2017	2,226,669	$7,399,378

** Landings in MA, RI, CT, NY, and NJ; landings data combined for black sea bass*
Source: NOAA Fisheries, 2021

TABLE 2-50. BLACK SEA BASS LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	21,399	$81,609
2017	31,595	$105,062
2016	16,364	$59,401
2015	9,552	$32,004
2014	12,574	$49,491
2013	13,047	$51,321
2012	6,908	$25,537
2011	7,612	$28,782
2010	7,553	$27,506
2009	6,913	$25,260
2008	11,007	$37,529
Total	**144,524**	**$523,502**

Source: NMFS, 2020c; NMFS, 2021.

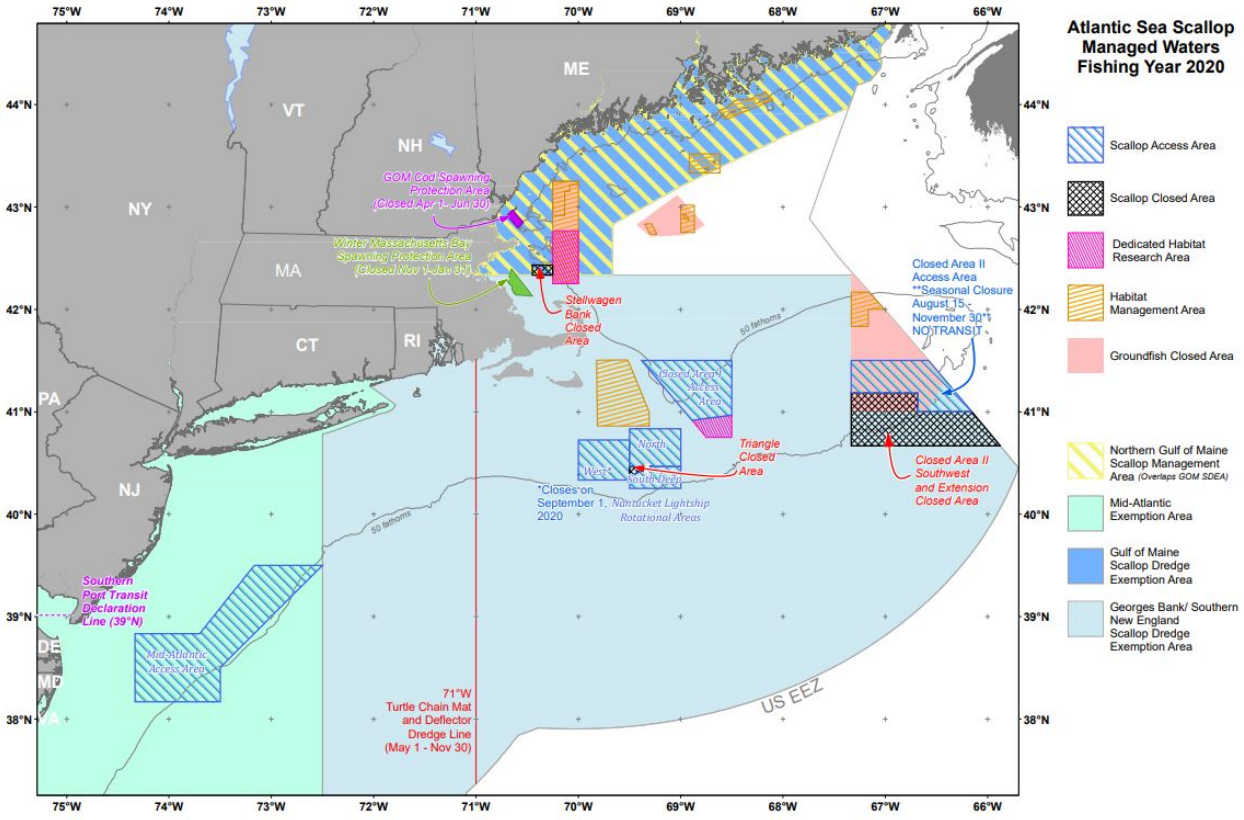
2.2.1.16 Atlantic Sea Scallop

The Atlantic sea scallop fishery is one of the most valuable fisheries in the United States (NOAA Fisheries, n.d., t) (**Table 2-51**). The principal U.S. commercial sea scallop fishery occurs in the Mid-Atlantic (from Virginia to Long Island, New York) and on Georges Bank and neighboring areas, such as the Great South Channel and Nantucket Shoals. Atlantic sea scallop areas are shown below in **Figure 2-11**. Much of the vessels are based in New Bedford, Massachusetts. Fishing is conducted year-round, mostly in the Mid-Atlantic using dredges while a small percentage employs otter trawling. All federal scallop permits are issued under limited access programs; therefore, a federal scallop permit can only be obtained by purchasing a vessel that already has one.

Climate change is expected to significantly impact the Atlantic sea scallop fishery, mainly by causing increases in ocean acidification (Doney et al., 2009). Ocean acidification lowers oceanic pH levels which has detrimental effects on marine mollusk shell development (Hare et al., 2016). Research has shown that bivalve larval mortality increases when exposed to conditions consistent with increased ocean acidification (White et al., 2014). The Atlantic sea scallop fishery is currently sustainable, but projected model studies have shown that Atlantic sea scallop biomass could decrease by 13 to 50 percent by the end of the century if climate change effects are not reversed (Rheuban et al., 2018).

TABLE 2-51. ATLANTIC SEA SCALLOP OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Dredge, otter trawling
Seasonality	Year round
Permitted Season	May 1 – November 30
Types of Permits	Limited Access and Limited Access General Category
Common Ports	New Bedford, MA
Management	Atlantic Sea Scallop FMP (NEFMC)



Source: NOAA Fisheries, n.d, t.

FIGURE 2-11. ATLANTIC SEA SCALLOP MANAGED AREAS

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

The Atlantic sea scallop industry is very lucrative in southern New England, generating well over $300,000,000 in value in the past three years (**Table 2-52**). Atlantic sea scallop was identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017). Of commercial sea scallop landings in the New England and Mid-Atlantic regions, 0.0 percent (actually, 0.05 percent) of the average total annual revenue is expected to be exposed (approximately $203,180 out of just over $428 million) (**Table 2-53**). According to NROC VMS data, the majority of sea scallop fishing occurs outside the Kirkpatrick Study Area, but there is some recorded scallop vessel activity in the northern Massachusetts lease blocks and lease blocks in Rhode Island (Shmookler, 2015). There is very limited vessel activity in the southeastern portion of the proposed Project's Lease Area and in the southwestern portion of the Kirkpatrick Study Area.

TABLE 2-52 ATLANTIC SEA SCALLOP YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	55,837,828	$525,585,155
2018	53,104,027	$488,147,389
2017	46,788,237	$462,657,251

** Landings in MA, RI, CT, NY, and NJ; landings data combined for sea scallop*
Source: NOAA Fisheries, 2021

TABLE 2-53. ATLANTIC SEA SCALLOP LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	7,546	$69,796
2017	2,963	$30,456
2016	6,564	$83,178
2015	7,423	$94,787
2014	631	$8,886
2013	2,919	$31,698
2012	3,685	$36,574
2011	2,803	$25,249
2010	4,110	$37,585
2009	19,910	$141,057
2008	18,126	$124,698
Total	**76,689**	**$683,964**

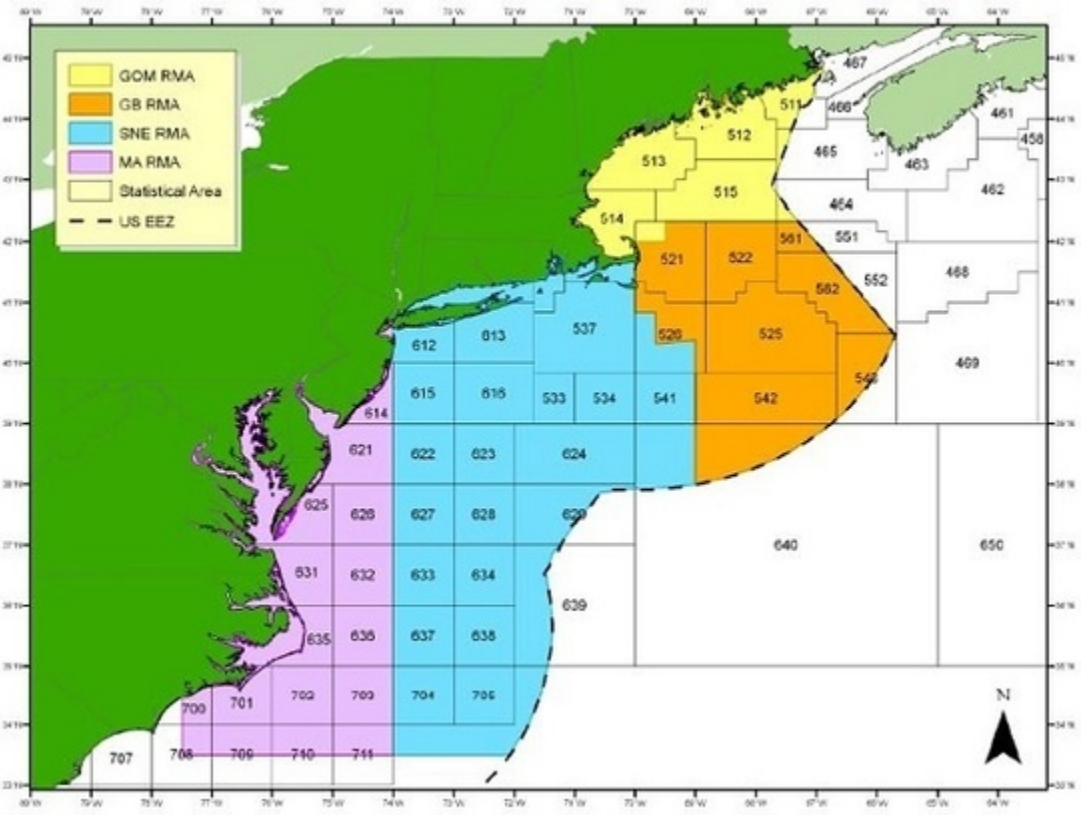
Source: NMFS, 2020c; NMFS, 2021.

2.2.1.17 Winter Flounder

There are three winter flounder stocks in U.S. waters: The Gulf of Maine, Georges Bank, and Southern New England/Mid-Atlantic (NOAA Fisheries, n.d., u) (**Table 2-54**). Winter flounder are found in estuaries and on the continental shelf from Canada to North Carolina. The stocks are jointly managed by the NEFMC and ASMFC. Regulated mesh management areas, defined as Gulf of Maine, Georges Bank, Southern New England, and Mid-Atlantic, are shown in **Figure 2-12**. These stock names refer to the geographic locations of annual, winter spawning migrations into nearshore waters. These seasonal distributions may change in colder waters at the northern extent of their range where winter flounder migrate to shallow waters in the summer and deeper waters in the winter. The commercial fishery was once a highly productive industry with annual harvests up to 40 million pounds (ASMFC, 2020d) but landings have steadily declined since the early 1980s. The bulk of the harvest is taken by bottom trawls and regulations in state waters restrict commercial harvest to bycatch only to reduce discard mortality and protect the spawning biomass. Allowable catch limits vary per stock based upon the direction from the management boards.

TABLE 2-54. WINTER FLOUNDER OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Bottom trawls
Seasonality	All year round
Permitted Season	May 1 through April 30
Types of Permits	10 Federal groundfish permit categories; 6 are limited access permits, 4 are open access
Common Ports	New Bedford, MA,
Management	Northeast Multispecies FMP (NEFMC)



Source: NOAA Fisheries, n.d., v.

FIGURE 2-12. NORTHEAST MULTISPECIES (GROUNDFISH) REGULATED MESH MANAGEMENT AREAS

Warmer temperatures associated with climate change has been shown to have a potential effect on winter flounder recruitment, especially when the population is in recovery from overfishing (Able et al., 2014). Southern New England and mid-Atlantic winter flounder populations have been steeply declining since the 1980's, with some local populations nearing extirpation (O'Leary et al., 2013). Many studies point to the higher occurrence of winter flounder egg and larval predators in warmer waters which increases predation and reduces recruitment as a potential explanation for this (Bell et al., 2014).

Alternately, some studies have concluded that the collapse may have been caused by long-term exploitation and insufficient fishery management (Frisk et al., 2018). Although the result of this stock collapse is not entirely established, there are strong correlations between increased ocean temperatures and a decline in recruitment.

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

Winter flounder was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-55**). There is no NROC VMS data specific to winter flounder occurrence, but the data does show low to moderate northeast multispecies (groundfish) fishing activity in the MA/RI WEA particularly in the northwest portion of the MA/RI WEA (Shmookler, 2015) (**Table 2-56**).

TABLE 2-55. WINTER FLOUNDER YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	1,271,193	$3,567,443
2018	1,964,078	$5,896,508
2017	2,334,714	$6,941,001

** Landings in MA, RI, CT, NY, and NJ; landings data combined for winter flounder*
Source: NOAA Fisheries, 2021

TABLE 2-56. WINTER FLOUNDER LANDINGS IN THE OFFSHORE PROJECT AREA, 2008-2018

Year	Landings (lbs.)	Value ($)
2018	2,393	$8,347
2017	3,425	$10,330
2016	3,815	$10,627
2015	6,453	$14,946
2014	10,607	$21,182
2013	4,798	$8,839
2012	543	$939
2011	561	$825
2010	866	$1,847
2009	1,889	$3,800
2008	11,211	$20,755
Total	**46,561**	**$102,437**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.18 Haddock

There are two haddock (*Melanogrammus aeglefinus*) stocks in U.S. waters: Georges Bank and Gulf of Maine (NOAA Fisheries, n.d., w) (**Table 2-57**). The NEFMC collaborates with Canada to jointly manage the fishery because the stocks span both jurisdictions. Regulated mesh management areas, defined as Gulf of Maine, Georges Bank, Southern New England, and Mid-Atlantic, are shown in **Figure 2-12**. Otter trawl fishing gear produces the majority of haddock landings, while the remainder of the catch is taken with longlines or gillnets. Adult haddock undertake seasonal movements, spending much of winter in deeper waters and moving to shoal waters, primarily on Georges Bank, to spawn from January to June. Spawning concentrations also occurred historically along the Maine coast. They are commonly found at

depths of 131 to 492 ft (40 to 150 m) and generally prefer temperatures of 36 to 48 degrees Fahrenheit. The Georges Bank stock quota has been cut in recent years to account for the decline in stock, reaching 40,000 mt in 2018, with 15,600 mt allocated to the U.S. fishery and the remainder to the Canadian fishery (NOAA Fisheries, 2018). Concerning haddock fished from the Gulf of Maine, NMFS announced 2020 catch limits for the stock to be 1,000 lbs per day at sea and up to 2,000 lbs per trip (NMFS, 2020a).

TABLE 2-57. HADDOCK OVERVIEW

Occurrence in the Offshore Project Area	Lease Area, ECCs
Gear Used	Otter trawl, longlines, gillnets
Seasonality	Year round
Permitted Season	May 1 through April 30
Types of Permits	Limited Access permit
Common Ports	Gloucester, MA, New Bedford, MA
Management	Northeast Multispecies FMP (NEFMC)

Climate change has and will continue to impact the haddock fishery. A study looking at haddock distribution data between 1977 and 2001 found that haddock populations were migrating further north and into deeper water as ocean temperature rose throughout the year (Fossheim et al., 2015; Perry et al., 2005). Research has also shown that warmer ocean temperatures could have an effect on haddock development and productivity. Using data from North Sea haddock between 1970 and 2006, Baudron et al. (2011) found that haddock were maturing earlier and reaching a smaller size as ocean temperatures increased, and individual yield was significantly reduced.

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

The NROC VMS data are not specific to haddock, but the data does show low to moderate northeast multispecies (groundfish) fishing activity in the MA/RI WEA, particularly in the northwest portion of the MA/RI WEA (Shmookler, 2015) (**Table 2-58**). Haddock was not identified as one of the top 10 exposed species in the Kirkpatrick Study Area (Kirkpatrick et al., 2017) (**Table 2-59**).

TABLE 2-58. HADDOCK YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	18,737,506	$18,267,805
2018	13,714,729	$12,480,251
2017	11,697,323	$11,358,489

** Landings in MA, RI, CT, NY, and NJ; landings data combined for haddock*
Source: NOAA Fisheries, 2021

TABLE 2-59. HADDOCK LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	2,398	$2,242
2017	6,380	$4,045
2016	1,509	$2,274
2015	1,128	$1,504
2014	2,269	$3,025
2013	1,174	$1,607
2012	365	$891
2011	633	$1,221
2010	1,462	$1,688
2009	1,265	$1,237
2008	2,847	$3,540
Total	**21,430**	**$23,274**

Source: NMFS, 2020c; NMFS, 2021.

2.2.1.19 Atlantic Deep-Sea Red Crab

The Atlantic deep-sea red crab (*Chaceon quinquedens*) fishery is a directed trap fishery occurring in the deeper canyons along Georges Bank, along the edge of the continental shelf off southern New England and the Mid-Atlantic Bight (**Table 2-60**). They are found from North Carolina to Maine (NOAA Fisheries, n.d., x). Red crabs inhabit mud, sand, and hard bottom at depths from 650 to 1,800 ft (198 to 549 m), and at water temperatures between 41 to 46 degrees Fahrenheit. In the Gulf of Maine, red crabs are found in waters as shallow as 250 ft (76 m). Adult females generally inhabit shallower water than adult males, and juveniles tend to be in deeper water than adults, suggesting a deep-to-shallow migration as the crabs mature. The red crab fishery is a small, market-driven fishery, and landings are very closely tied to market demand. When landings are low, it is often because the demand for red crabs has decreased and the fleet has targeted other, more profitable species. The gear type associated with the commercial red crab fishery is pots and traps. Male red crabs are targeted at a depth of approximately 1,300 to 2,000 ft (396 to 610 m) with landings typically highest in summer and fall. The few boats with limited access permits in the New England red crab fishery have overlapping ownership and operate as a voluntary cooperative. This cooperative relationship fosters a strong incentive to harvest red crab in a way that maximizes profits for the fleet. Furthermore, current market conditions (not the limit on landings) constrain the red crab catch, so there is no incentive for boats to land as much as they can. Although very little is known about the red crab's life history and stock status, it appears to be sustainable and the fishery is certified by the Marine Stewardship Council as sustainable. Atlantic deep-sea red crab has an annual catch limit of nearly four million pounds (NOAA Fisheries, n.d., x).

There is a paucity of research on the effects of climate change on the Atlantic deep-sea red crab (Stevens and Guida, 2016). There is limited historical survey data due to their preference for deeper waters. Climate change research on other crab species indicates that some crab species are sensitive to oceanic temperature fluctuations and ocean acidification (Shields, 2019; Alvsvåg et al., 2009). Research on deep-sea red crab temperature preferences has shown that ocean temperatures effects the distribution of male and female Atlantic deep-sea red crabs and the size of female deep-sea red crabs (Stevens and Guida, 2016). More research is needed to determine whether deep-sea red crab temperature sensitivities could be affected by increasing ocean temperatures.

TABLE 2-60. ATLANTIC DEEP-SEA RED CRAB OVERVIEW

Occurrence in the Offshore Project Area	Lease Area
Gear Used	Pots and traps
Seasonality	Year round
Permitted Season	Year round
Types of Permits	Limited access, open access
Common Ports	New Bedford, MA
Management	Atlantic Deep-Sea Red Crab FMP (NEFMC)

Commercial Fishing Activity in the Kirkpatrick Study Area and Offshore Project Area

The most recent commercial landing data for deep-sea red crab in Massachusetts was in 2017 (ACCSP, 2020; **Table 2-61**). The fishery has limited entry and the majority of red crabs are landed and processed in New Bedford, Massachusetts (**Table 2-62**). Fishing activity for Atlantic deep-sea red crab does not occur at high levels in the Kirkpatrick Study Area, but fishing vessels may transit through the Kirkpatrick Study Area to fish for the species off the continental shelf.

TABLE 2-61. ATLANTIC DEEP-SEA RED CRAB YIELD DATA

Year	Landing (lbs.)*	Value ($)
2019	-	-
2018	-	-
2017	2,722,775	$2,722,716

** Landings in MA, RI, CT, NY, and NJ; landings data combined for Atlantic deep-sea red crab*
Source: NOAA Fisheries, 2021

TABLE 2-62. ATLANTIC DEEP-SEA RED CRAB LANDINGS IN THE OFFSHORE PROJECT AREA, 2008 – 2018

Year	Landings (lbs.)	Value ($)
2018	1,819	$1,819
2017	736	$736
2016	435	$435
2015	350	$350
2014	451	$451
2013	391	$391
2012	935	$935
2011	733	$733
2010	74	$68
2009	186	$177
2008	180	$316
Total	**6,290**	**$6,411**

Source: NMFS, 2020c; NMFS, 2021.
1 NMFS did not provide FMP data for "All Others" data recordings in the custom Brayton Point export cable corridor data, therefor the current Atlantic deep-sea red crab data is inclusive of the Lease Area and Falmouth export cable corridor

2.2.2 State

As discussed above, some fisheries are either totally or in part managed by states, sometimes in partnership (i.e., the ASMFC and cooperative management) and sometimes as individual states (i.e., the MA DMF and RIDEM state-specific management). Some of the fisheries exhibiting higher commercial fishing activity in the broader region and the Offshore Project Area have already been discussed above in regard to their federal catch and management. However, there are other fisheries overseen by ASMFC FMPs in Massachusetts, Rhode Island, and the broader region that are important to the fishing industry in and around the Offshore Project Area such as Striped bass, Bluefish, Horseshoe crab, Tautog, and Weakfish (ASMFC, 2020a). There are also smaller fisheries that are not managed under FMPs but are none the less important in the area, notably the mantis shrimp (*Squilla empusa*) which is targeted in a fall fishery in Mount Hope Bay which overlaps with a portion of the Brayton Point export cable corridor (Syuhada, 2011). Elements of this and other similar fishery are overseen by RIDEM but not all are managed in the same way that species exhibiting higher commercial landings are (RIDEM, 2019).

Shellfish are targeted in wild shellfisheries both commercially and recreationally in Massachusetts, Rhode Island, and the broader region and are also produced commercially in aquaculture operations. Federally-managed commercial shellfishing is described above in relevant subsections of Section 2.2.1, Commonly Caught Commercial Species in the Region: Federal, and recreational shellfishing is discussed below in relevant subsections of Section 3.2.2, Commonly Caught Recreational Species: State, while this section broadly describes state-managed commercial shellfishing from both wild harvest and aquaculture operations. The export cable corridors are near some of the areas where this shellfishing activity occurs.

Massachusetts cities and towns manage the shellfish fisheries in all waters within their boundaries that are not closed by the MA DMF for public health or other reasons, except for the commercial harvest of surfclams and ocean quahogs that remain under federal control. The Offshore Project Area includes proposed landfall sites that may affect near-shore commercial shellfish activities in the Town of Falmouth, Massachusetts.

The Massachusetts Wetlands Protection Act Regulations (310 Code of Massachusetts Regulations 10.34) lists nine species of regulated commercial shellfish and RIDEM lists eight species of regulated shellfish (MA DEP, 2021; RIDEM, 2021c). Fisheries for seven of the species are likely to be exposed to Project activities and are further discussed in the subsections below. **Figure 2-3** and **Figure 2-4** shows aquaculture leases that exist near the proposed landfall sites in Falmouth and Brayton Point, none of which are in the Offshore Project Area. There are currently 9 private shellfish propagation permits totaling 54 acres including oyster, quahog, surfclam, and bay scallop issued in Falmouth, Massachusetts, as of the end of 2019 (MA DMF, 2019b). Mapping these habitats indicate potential shellfish habitat areas even though not all areas will support any shellfish. No mapped, permitted aquaculture areas are adjacent to Brayton Point in Somerset, Massachusetts (NOAA Office for Coastal Management, 2018).

The RIDEM Marine Fisheries Office provides regulations and stipulations for the commercial and recreational harvest of finfish, shellfish, lobsters, crabs, and other crustaceans within state waters (RIDEM, 2021c). Activities in the Offshore Project Area may impact shellfishing activity in Rhode Island along the Brayton Point export cable corridor, including the intermediate cable landfalls on Aquidneck Island, Rhode Island, and at Brayton Point. Species that may be harvested commercially and/or

recreationally in the nearshore Offshore Project Area may include oysters, bay quahogs, softshell clams, blue mussels, bay scallops, Atlantic surfclams, and whelk (250-RICR-90-00-4).

2.2.2.1 Bay Scallop

Bay scallops (*Argopecten irradians*) occur in shallow, estuarine habitats ranging from Cape Cod to Texas gulf waters (Clarke, 1965). There are three subspecies of bay scallop characterized by their shell morphology and the northern subspecies (*Argopecten irradians irradians*) range is between Cape Cod and the mid-Atlantic near New Jersey and Maryland. According to NMFS landings data, the majority of bay scallop harvesting from 1950 to 2013 has occurred in Massachusetts (54.8 percent), followed by New York (19.0 percent), and North Carolina (13.2 percent) (Robinson et al., 2016). Commercial bay scallop harvesting is very limited in the U.S. Atlantic, occurring in only these three states and are managed under FMPs or other mechanisms at the state level. The recreational fishery is more extensive than the (Robinson et al., 2016). Commercial harvesting is typically restricted to the fall and winter months. After a crash in wild stocks in 1985 mostly due to mortality from brown tide algal blooms, recovery efforts proved beneficial to bay scallops but current stock levels are much lower than historic numbers (approximately 50 mt in Massachusetts in 2013 compared to approximately 900 mt in 1980) (Robinson et al., 2016). In 2019, 717,978 pounds of bay scallops were harvested in Massachusetts, which totaled to $1,585,228 in value (ACCSP, 2020). Rhode Island historically had a productive bay scallop fishery, even inside Narragansett Bay, but declining water quality impacting bay scallop habitat has drastically reduced the productivity of this fishery (Oviatt et al., 2003).

2.2.2.2 Blue Mussel

The blue mussel (*Mytilus edulis*) is found in the Arctic, North Pacific, and North Atlantic Oceans (Newell and Moran, 1989). In the U.S. Atlantic its range extends between Labrador, Canada and Cape Hatteras, North Carolina. Blue mussels are typically found in nearshore oceanic and estuarine areas with water depths less than 325 ft (99 m). Blue mussels are harvested commercially by dredging or raking operations. In aquaculture operations, juvenile mussels (known as “mussel spat”) are collected from the wild and placed into controlled areas where they are harvested once they mature and propagate (Morse and Rice, 2010). The majority of blue mussel production occurs in Maine, but there are some small blue mussel aquaculture areas in Massachusetts, New York, and Rhode Island (Monterey Bay Aquarium, 2017). In 2019, 879,480 pounds of blue mussel were landed in Massachusetts, totaling to $167,404 in value (ACCSP, 2020).

2.2.2.3 Eastern Oyster

The Eastern oyster (*Crassostrea virginica*) is a sessile, filter-feeding shellfish that occurs from the Gulf of St. Lawrence to the Gulf of Mexico in the United States (Buroker, 1983). Eastern oysters are typically found clustered beds in shallow saltwater bays and estuaries with water depths between 8 to 25 ft (2.5 to 7.5 m). There are four techniques typically used to harvest eastern oyster, including dredging, tonging, hand collecting, and raking (Monterey Bay Aquarium, 2018). The easter oyster crashed during the mid-20th century due to overharvesting and disease, but landings have partially recovered due to increased aquaculture production. Management occurs at the state and local level, often by individual municipalities. In Massachusetts, management is overseen by the MA DMF and individual towns. The eastern oyster is one of the most valuable commercially produced species in Massachusetts with

landings totaling 10,356,503 pounds in 2019 and a value of $30,145,498 and is also highly valuable in Rhode Island with landings totaling 1,465,465 pounds and a value of $5,364,200 (ACCSP, 2020).

2.2.2.4 Northern Quahog

Northern quahogs (*Mercenaria mercenaria*, also known as a hard clam) are bivalves that occur in intertidal and subtidal waters along the Atlantic Coast from Nova Scotia to Florida (Lorio and Malone, 1995). Northern quahogs are typically found in sea grass beds, near oyster reefs, or in sandy and muddy areas with water depths less than 49 ft (15 m) (FAO, 2020). In aquaculture, northern quahogs are cultivated in nursery systems, which employ floating or land-based nursey boxes with favorable clam substrata and covered with mesh for protection (Marine-Aquaculture, 2019). The seed clams are set into the substrate where they are allowed to burrow and grow. Northern quahogs are commercially harvested at various sizes and are marketed under a different name for each size class. Between 1.5 and 2.2 inches (in) (38 and 55 millimeters [mm]) in shell length, northern quahogs are classified as littlenecks, cherrystones between 2.2-3.0 in (56-76 mm), and chowders at lengths greater than 3.0 in (76 mm) (Dacanay, 2015). As with other shellfish industries, at a regional scale, northern quahogs are mostly harvested in aquaculture and so are managed under regulations overseeing aquaculture production. However, there is limited wild capture of northern quahog. Virginia produces the most northern quahog in the U.S. (23,152,119 pounds produced in 2019, valued at $25,583,740) (ACCSP, 2020). In Massachusetts, 4,534,709 pounds of northern quahog was produced in 2019, valued at $5,492,526 while landings in Rhode Island in 2019 totaled 3,891,241 pounds, valued at $5,364,200 (ACCSP, 2020).

2.2.2.5 Softshell Clam

Softshell clam (*Mya Arenaria*) occurs in intertidal waters, coastal ponds, and estuaries on the Atlantic Coast from South Carolina to Labrador, the Pacific coast from Alaska to California, and also into Western Europe (Hare et al., 2016). Like other infaunal bivalve mollusk species, softshell calms are typically found burrowed in mud, sand, and gravel substrates between 8 and 14 in (20 and 36 mm) deep. Because of their fragile shells, softshell clams are primarily harvested using hand collection methods. Softshell clams are also grown in nursery systems in aquaculture, similarly to northern quahogs. Maine is the largest producer of softshell clams in the United States; however, landings are declined by nearly a third in Maine in 2017, likely due to increasing seawater temperatures and over predation by the invasive European green crab (*Carcinus maenas*) (McMahan, 2020). In Massachusetts, soft-shell clam is a lucrative aquaculture product. Massachusetts landings in 2019 was 3,430,406 pounds, valued at $6,542,580 while Rhode Island landings were 10,250 pounds, valued at $29,360 (ACCSP, 2020).

2.2.2.6 Razor Clam

Razor clam (*Ensis directus*), or Atlantic jack clams, is a filter-feeding bivalve mollusk native to the United States; razor clams occur along the U.S. Atlantic Coast between Labrador and South Carolina (Leavitt, 2010). Razor clams are most commonly found in interdial sand and mud flats among other infaunal clams, such as softshell clams and quahogs (Kenchington et al., 1998). Due to their ability to quickly retract into soft substrates and softs shells, razor clams are notoriously difficult to harvest and are primarily harvested using handheld tools. Similar to other shellfish harvested in similar manners, they are managed at the state and local levels, often by individual municipalities. Other techniques have been developed to ease the ability to pull razor clams from substrates, including disturbing the razor clams using salt solutions and clam guns (Pangea Shellfish Company, 2019). Razor clams account for a minor

part of the shellfish aquaculture industry in Massachusetts but razor clam harvesting has gradually increased over the past few years (Kennedy, 2015). Razor clam landings in Massachusetts in 2019 totaled 505,151 pounds, valued at $2,539,070 , but landings were not reported in Rhode Island (ACCSP, 2020).

2.2.2.7 Atlantic Surfclam

Atlantic surfclams are the largest bivalves in the Western North Atlantic. They are found from the southern Gulf of St. Lawrence to Cape Hatteras, North Carolina from the beach zone to about 150 ft (46 m) water depths, but densities are lower at depths greater than 131 ft (40m). They are most abundant on Georges Bank, the south shore of Long Island, New Jersey, and the Delmarva Peninsula offshore Delaware, Maryland, and Virginia. Commercial fisheries generally target populations off the coasts of New Jersey and the Delmarva Peninsula. Their growth rates depend on water temperature with southern surfclam populations growing more slowly in warmer water than the more northern populations. Commercial-scale aquaculture for Atlantic surfclams is not yet established but is emerging as an industry in Massachusetts. In 2019, Massachusetts landed 82,677,778 pounds, valued at $16,616,040, but landings were not reported in Rhode Island (ACCSP, 2020).

2.2.2.8 Whelk

Two species of whelk (also known locally as conch) are commercially fished in Massachusetts and Rhode Island, the knobbed whelk (*Busycon carica*) and the channeled whelk (*Busycotypus canaliculatus*) (MA DMF, 2020c; RIDEM, 2020). Whelk are benthic, nearshore species that range from Florida to the southern coast of Massachusetts. They live in shallow waters meaning that in the Offshore Project Area they are primarily located in the export cable corridors (especially Muskeget Channel and the Sakonnet River historically). Whelk are slow growing, perform very small seasonal migrations, and spawn in the late summer.

A 2018 stock assessment of the Massachusetts whelk fishery reported channeled whelk species to be overfished with overfishing occurring (Nelson et al., 2018). In Massachusetts, management is overseen by the MA DMF and Marine Fisheries Advisory Commission, using daily harvest limits, minimum shell widths, and trap limits. These trap limits have resulted in fishing occurring via approximately 90 active whelk permits in Massachusetts waters since 2000.

A 2020 description of the Rhode Island whelk fishery including analysis of recent stock assessment, shows that, after a peak of the whelk fishery in 2012, there has been a similar declining trend which led to similar management strategies being enacted by RIDEM. In 2019 there were 856 total eligible licenses for whelk but only 113 of these licenses reported any landings in that year (RIDEM, 2020).

Regionally, the whelk fishery has increased in the last few decades, peaking in 2013 with landings of 1,758,542 pounds of channeled whelk and knobbed whelk in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey but generally declining since with 815,905 pounds landed in 2019 (ACCSP, 2020). Over the 11-year period from 2008 to 2018, a total of 272,927 pounds (an average of 24,812 pounds per year) valued at $1,861,420 (an average of $169,220) originates in the Offshore Project Area. Of that, essentially all (over 99 percent) originates in the export cable corridors with a negligible catch being associated with the Lease Area (NMFS, 2020c).

2.3 COMMERCIAL FISHING PORTS

This section provides an overview of commercial fishing ports in region associated with fishing activity the Kirkpatrick Study Area and/or the Offshore Project Area that are potentially most exposed to Project activities.

There are a number of sources that provide data on values and landings for ports (see Section 1.1.1, Fisheries Data Sources and Descriptions). If ports are not listed, this implies that landings and value data are unavailable. The time series of data for each port may also vary, indicating data are either unavailable or data on values and landings was not reported in a given year implying that there was no catch in the Offshore Project Area in a that year. The following tables (**Table 2-63** through **Table 2-69**) describe all fishing activity in ports that is available. For years in a specific table where no fish were landed, this is denoted by '-'. If no data were provided for a particular data source, this is denoted by a 'X'. It should be noted that this list does not include ports where records with fewer than three unique dealers or three unique permits are represented. This category noted as "All Others" is due to confidentiality restraints, therefore this category may contain the composite landings representing other smaller ports within the region.

The ports discussed individually in the below subsections were identified using the Kirkpatrick et al. study (2017), the NMFS socioeconomic studies (2020b), the NMFS-provided Mayflower Wind-specific data (2020c), or based on outreach to the fishing community conducted by Mayflower Wind ports that has identified them as particularly relevant to the proposed Project. The ports that are discussed in individual subsections below do not represent a comprehensive list of all ports that utilize or land fish from the Kirkpatrick Study Area and/or the Offshore Project Area. If a port is not discussed individually, it does not mean that it is not associated with fishing activity in these areas. Similarly, the list of ports that are discussed do not represent the totality of fishing activity tied to ports that utilize or land fish from these areas. Instead, these ports have been identified for discussion based on their presence in some or all of the data sources used in this report.

While there is broad agreement between these datasets in regard to which ports may be most exposed/impacted by the proposed Project, ranking via exposure in the Kirkpatrick et al. (2017) data versus ranking via impact (as measured by landings, revenue, etc.) in the NMFS data (2020b, 2020c, 2020d, 2021) (as well as other assumptions including geographic range) results in different ports being represented in the Kirkpatrick "most exposed" lists and the NMFS "most impacted" lists. The NMFS-provided Mayflower Wind-specific data are the only one of these three datasets to represent the export cable corridors in addition to the Lease Area (NMFS, 2020c, 2021). Differences between the NMFS socioeconomic data summaries and the NMFS-provided Mayflower Wind-specific data for the same temporal and spatial extents are mostly minor and are likely due to rounding or the treatment of confidential data (see Section 1.1.1.1). The NMFS 'data download site' that presents the modeled VTR data used to create the socioeconomic data summaries is, however, identical to the NMFS-provided Mayflower Wind-specific data (NMFS, 2020d).

TABLE 2-63. SUMMARY TABLE OF KEY COMMERCIAL FISHING PORTS

State	Port	Species Commonly Landed	Landings (lbs.; 2019)	Value ($; 2019)
Massachusetts	Port of New Bedford	Atlantic sea scallop, skate, American lobster, monkfish, Atlantic mackerel, Butterfish, scup, black sea bass, red and Jonah crabs, haddock, Silver Hake, Atlantic herring	115,800,000	$450,800,000
	Martha's Vineyard - Nantucket	Black sea bass, Eastern oyster, bay scallops, and whelk	No data	No data
	Provincetown - Chatham	American lobster, scallops, skate, monkfish, dogfish, summer flounder, scup, black sea bass, Atlantic surfclams, and ocean quahog	18,800,000	$32,000,000
Rhode Island	Point Judith	Squid, American lobster, summer flounder, Atlantic sea scallop, scup, monkfish, silver hake, Jonah crab, Atlantic herring, and yellowtail flounder	48,100,000	$65,900,000
	Newport	American lobster, Jonah crab, and monkfish	4,900,000	$7,800,000
	Tiverton	Monkfish, summer flounder, Atlantic surfclam	No data	No data
	Little Compton	Monkfish, American lobster, scup	3,900,000	$3,400,000
Connecticut	Stonington	Fluke, scup, black sea bass, butterfish, Atlantic mackerel, and squid	2,800,000	$4,400,000
	New London	Atlantic sea scallop, whiting, butterfish, mackerel, and squid	4,000,000	$3,600,000
New York	Montauk	Longfin squid, sea scallops, golden tilefish, Jonah crab, and butterfish	11,500,000	$17,800,000
North Carolina	Beaufort – Morehead City	Summer flounder, black sea bass, scup, monkfish, spiny dogfish, and skates	9,900,000	$24,700,000

Source: NOAA Fisheries Office of Science and Technology n.d.

For commercial fisheries, the Kirkpatrick Study Area is relied on primarily by Rhode Island ports fishing with gillnet, pot, bottom trawl, and midwater trawl gear (see , which shows the most affected ports based on percent total revenue exposed). Landings from the Kirkpatrick Study Area consist mainly of small mesh species (hake, squid), ocean quahogs, skates, monkfish, and Jonah crab). Four other ports are also exposed but to a lesser degree (less than 1 percent of revenue exposed, with revenue sourced from the Kirkpatrick Study Area ranging from $53,000 to $83,000): Chatham, Massachusetts; Newport, Rhode Island; Fairhaven, Massachusetts; and Gloucester, Massachusetts (**Table 2-64**).

TABLE 2-64. COMMERCIAL PORTS 'MOST EXPOSED' TO THE KIRKPATRICK STUDY AREA SHOWN BY DECREASING TOTAL REVENUE EXPOSED (PERCENT)

Port	Average Annual Revenue from Kirkpatrick Study Area	Average Total Annual Revenue	Total Revenue Exposed to Kirkpatrick Study Area (Percent)
Warren, RI	Not Disclosable	Not Disclosable	-
Tiverton, RI	$64,543	$834,891	7.7
Little Compton, RI	$59,391	$1,734,344	3.4
Narragansett, RI	$666,623	$32,122,869	2.1
Montauk, NY	$211,825	$16,077,058	1.3
New Bedford, MA	$1,416,869	$292,229,242	0.5

Source: Kirkpatrick et al., 2017.

The below tables provide comparison of ports based on NMFS Socioeconomic Data available to the public (2020b) and that was provided by NMFS to Mayflower (2020c, 2021). For NMFS (2020c, 2021) data, not all ports reported landings in the range (2008 to 2018) for the data. The years of data reported for each port are shown in **Table 2-65**.

TABLE 2-65. NMFS SOCIOECONOMIC PORTS FOR YEARS LANDINGS REPORTED

Port	Years Reported
All others	2008 - 2018
Barnegat	2012
Barnstable	2008, 2012, 2014
Beaufort	2014- 2018
Boston	2008 – 2010, 2012 - 2016
Cape May	2012 – 2013, 2018
Chatham	2008 - 2018
Chilmark	2008 – 2010, 2012
Chincoteague	2012
Davisville	2013
Edgartown	2017
Fairhaven	2008 – 2012, 2014 – 2015, 2017 - 2018
Fall River	2008, 2011, 2013
Falmouth	2008 – 2012, 2015 - 2018
Gloucester	2008 - 2018
Hampton	2012 - 2018
Hampton Bay	2012, 2014 – 2015, 2017
Harwichport	2008 - 2018
Hyannis	2012 - 2018
Little Compton	2009 - 2018
Menemsha	2014 - 2018
Montauk	2008 - 2018
Nantucket	2008 - 2015
New Bedford	2008 - 2018
New London	2012 - 2018
Newport	2008 - 2018
Newport News	2011 – 2014, 2017 - 2018

Port	Years Reported
North Kingstown	2009 - 2011
Point Judith	2008 - 2018
Point Pleasant	2013 - 2018
Sandwich	2013
Shinnecock	2008 – 2012, 2017
Stonington	2008 - 2018
Tisbury	2010
Tiverton	2008, 2011, 2017
Vineyard Haven	2015 - 2017
Wanchese	2008, 2014, 2016 - 2017
Westport	2008 - 2018
Woods Hole	2008 – 2009, 2011

Source: NMFS, 2020b.

TABLE 2-66. NMFS SOCIOECONOMIC PORTS SHOWN BY DECREASING VALUE IN THE MAYFLOWER WIND LEASE AREA (2008 – 2018)

Port	Value ($)
Point Judith, RI	$1,313,000
New Bedford, MA	$1,092,000
Montauk, NY	$522,000
Newport, RI	$314,000
Chatham, MA	$251,000
Fairhaven, MA	$213,000
Westport, MA	$79,000
Little Compton, RI	$71,000
New London, CT	$50,000
Sandwich, MA	$33,000
Gloucester, MA	$32,000
Beaufort, NC	$20,000

Source: NMFS, 2020b.

TABLE 2-67. NMFS CUSTOM LANDINGS AND VALUE IN THE MAYFLOWER WIND OFFSHORE PROJECT AREA SHOWN BY RANK (2008 – 2018)

Rank	Port	Landings (lbs.)	Port	Value ($)
1	New Bedford	9,591,243	Point Judith	$9,201,998
2	Point Judith	9,013,605	New Bedford	$4,937,433
3	All Others	2,164,719	All Others	$2,596,186
4	Newport	1,547,655	Montauk	$1,607,004
5	Montauk	1,392,942	Little Compton	$1,418,273
6	Little Compton	1,106,747	Hyannis	$925,239
7	Gloucester	688,166	Newport	$671,080
8	Hyannis	673,949	Barnstable	$564,801
9	Fall River	635,484	Westport	$485,338
10	Barnstable	519,011	Chilmark	$396,665
11	Chatham	349,785	Fairhaven	$374,354

Rank	Port	Landings (lbs.)	Port	Value ($)
12	Boston	327,173	Chatham	$324,890
13	Westport	264,106	Falmouth	$264,935
14	Fairhaven	208,466	Menemsha	$250,092
15	New London	199,422	New London	$204,671
16	Falmouth	170,590	Fall River	$154,985
17	Tiverton	133,756	Boston	$153,578
18	Stonington	121,001	Stonington	$139,458
19	Chilmark	93,503	Woods Hole	$117,389
20	North Kingston	90,457	Gloucester	$111,153
21	Woods Hole	58,970	Vineyard Haven	$98,072
22	Menemsha	46,836	Harwichport	$89,177
23	Hampton	37,394	Nantucket	$80,486
24	Point Pleasant	29,147	Hampton	$75,350
25	Nantucket	28,708	Edgartown	$75,042
26	Beaufort	21,370	Tiverton	$69,717
26	Harwichport	21,163	Beaufort	$66,986
26	Davisville	16,331	Tisbury	$55,695
26	Newport News	15,163	Point Pleasant	$48,996
26	Cape May	14,121	Cape May	$46,150
26	Edgartown	13,780	North Kingston	$37,750
26	Vineyard Haven	12,648	Newport News	$25,717
26	Tisbury	12,297	Hampton Bay	$13,236
26	Shinnecock	5,867	Davisville	$8,086
26	Hampton Bay	5,651	Barnegat	$7,773
26	Wanchese	2,076	Shinnecock	$7,626
26	Jamestown	1,936	Jamestown	$6,601
26	Barnegat	1,139	Wanchese	$4,490
26	Chincoteague	1,023	Sandwich	$2,252
26	Sandwich	1,009	Chincoteague	$1,731
26	Bristol	434	Bristol	$603

Source: NMFS, 2020c; NMFS, 2021.

Table 2-68 shows average annual landings and value for all ports in the Mayflower Wind Offshore Project Area (NMFS 2020c). Point Judith, New Bedford, and All Others are the top three ports in the Offshore Project Area based on average landings, whereas the value of Point Judith and New Bedford swap when considering dollar landings. Landings across each port vary annually, often with large deviations in pounds and dollars between years. For instance, Point Judith has largest deviation in value of fish, but New Bedford has the largest deviation in pounds landed of fish.

TABLE 2-68. AVERAGE ANNUAL LANDINGS AND VALUE FOR ALL PORTS REPORTING LANDINGS IN THE MAYFLOWER WIND OFFSHORE PROJECT AREA

Port	Rank by Average Landings	Average Landings (lbs.)	Standard Deviation (SD)	Average Value ($)	Standard Deviation (SD)
New Bedford	1	871,931	±331,927	$448,858	±$106,110
Point Judith	2	819,419	±202,476	$836,545	±$233,068
All Others	3	196,793	±49,821	$236,017	±$68,529
Newport	4	140,696	±56,431	$61,007	±$15,485
Montauk	5	126,631	±27,455	$146,091	±$32,843
Little Compton	6	100,613	±46,785	$128,934	±$62,246
Gloucester	7	62,561	±53,982	$10,105	±$7,294
Hyannis	8	61,268	±67,699	$84,113	±$88,519
Fall River	9	57,771	±68,497	$14,090	±$15,809
Barnstable	10	47,183	±55,595	$51,346	±$60,012
Chatham	11	31,799	±10,602	$29,535	±$8,004
Boston	12	29,743	±43,471	$13,962	±$10,892
Westport	13	24,010	±9,299	$44,122	±$17,146
Fairhaven	14	18,951	±8,206	$34,032	±$16,314
New London	15	18,129	±12,349	$18,606	±$12,419
Falmouth	16	15,508	±13,930	$24,085	±$21,067
Tiverton	17	12,160	±12,015	$6,338	±$3,659
Stonington	18	11,000	±5,303	$12,678	±$6,650
Chilmark	19	8,500	±5,939	$36,060	±$27,494
North Kingstown	20	8,223	±9,205	$3,432	±$4,694
Woods Hole	21	5,361	±7,257	$10,672	±$6,714
Menemsha	22	4,258	±5,234	$22,736	±$27,201
Hampton	23	3,399	±1,270	$6,850	±$2,167
Point Pleasant	24	2,650	±2,333	$4,454	±$3,697
Nantucket	25	2,610	±2,361	$7,317	±$5,901
Beaufort	26	1,943	±791	$6,090	±$3,148
Harwichport	27	1,924	±664	$8,107	±$3,419
Davisville	28	1,485	±227	$735	±$79
Newport News	29	1,378	±1,014	$2,338	±$1,525
Cape May	30	1,284	±1,993	$4,195	±$6,535
Edgartown	31	1,253	N/A	$6,822	N/A
Vineyard Haven	32	1,150	±3,108	$8,916	±$24,507
Tisbury	33	1,118	N/A	$5,063	N/A
Shinnecock	34	533	±571	$693	$631
Hampton Bay	35	514	±387	$1,203	±$1,370
Wanchese	36	189	±192	$408	±$399
Jamestown	37	176	N/A	$600	N/A
Barnegat	38	104	N/A	$707	N/A
Chincoteague	39	93	±250	$157	±$406
Sandwich	40	92	±170	$205	±$453
Bristol	41	39	N/A	$55	N/A

Source: NMFS, 2020c; NMFS, 2021.

Table 2-69 shows average annual ranked landings and value for all ports reporting landings in the Lease Area and the export cable corridors. Standard deviations for the annual averages are also included to show the inter-annual variability of catches (and the value of that catch) in the Lease Area and the export cable corridors. When standard deviations equal or exceed the averages, this indicates that annual variability is substantial between years, i.e., a year with greater landings or value for a fish species caught in the Lease Area indicating the trend between years is not consistent. If the standard deviation is relatively small, this indicates that there is not substantial variability across years for fish landed (or valued) in a port. It should be noted that the inter-annual variability can be a result of a number of factors, such as changes in fishing activity, abundance of the resource, market factors, etc. The annual variations in species caught and the value of those species in a given year can be found in the individual species discussions in Section 2.2, Commonly Caught Commercial Species in the Region. Also, it is important to note that in Table 2-69, landings and values associated with ports are different when looking at fishing activity in the Lease Area versus the export cable corridors. As shown in Table 2-69 below as in Section 2.4, Commercial Fishing Activity in the Offshore Project Area, there are higher relative landings and value from the export cable corridors than from the Lease Area. Ports that do not report landings or value in either the Lease Area or export cable corridors are denoted with a "-."

Table 2-69 indicates that catch landed in ports is variable between the Lease Area and the export cable corridors. Fishermen landing their catch in ports, such as Point Judith, fish in both the Lease Area and the export cable corridors but the landings differ substantially, with more fish (over nine times more) caught in the export cable corridors compared to the Lease Area. The differentiation between ports, the type of fish landed in those ports, and the potential impacts of the Project considering either the Lease Area or export cable corridors will vary. . The value of the catch landed may vary between years, as indicated by the wide deviations in landings and value of those fish. A number of ports have either not reported ('-') or not landed (N/A, more than two years of data) fish in either the Lease Area or the export cable corridors in multiple years. For the rows of Table 2-69 from Vineyard Haven to North Kingstown, the landings from the export cable corridors are not consistent in pounds or value compared to other ports in Massachusetts or the region, again emphasizing the variability of fishing activity in the Offshore Project Area.

TABLE 2-69. AVERAGE ANNUAL RANKED LANDINGS AND VALUE FOR ALL PORTS REPORTING LANDINGS IN THE MAYFLOWER WIND LEASE AREA AND EXPORT CABLE CORRIDORS

Rank	Port	Lease Area Landings (lbs.) Average (Std Dev)	Lease Area Value ($) Average (Std Dev)	Port	ECCs Landings (lbs.) Average (Std Dev)	ECCs Value ($) Average (Std Dev)
1	New Bedford	165,235	$100,033	New Bedford	706,696	$348,824
		±230,332	±$56,651		±403,377	±$118,689
2	Point Judith	136,844	$119,538	Point Judith	682,575	$717,008
		±43,410	±$32,975		±209,050	±$252,307
3	All Others	51,339	$45,341	All Others	145,453	$190,675
		±25,219	±$22,773		±59,654	±$80,945
4	Gloucester	45,223	$5,887	Newport	119,327	$41,759
		±99,205	±$12,496		±68,364	±$18,507
5	Montauk	40,886	$47,652	Little Compton	91,760	$121,491
		±28,807	±$26,404		±54,295	±$71,394
6	Chatham	24,702	$22,327	Montauk	85,745	$98,439
		±16,496	±$12,353		±31,977	±$39,537
7	Newport	23,506	$21,173	Hyannis	61,105	$83,904
		±13,888	±$13,920		±70,307	±$91,464
8	Fairhaven	22,291	$20,530	Fall River	56,161	$13,358
		±13,340	±$15,924		±63,168	±$14,633
9	Little Compton	10,821	$9,097	Barnstable	47,183	$51,346
		±10,697	±$9,798		±55,595	±$60,012
10	New London	6,923	$6,465	Gloucester	37,893	$6,894
		±2,488	±$2,339		±43,813	±$6,396
11	Fall River	5,906	$2,681	Boston	27,376	$11,709
		±3,822	±$856		±55,210	±$13,723
12	Westport	5,882	$7,233	Westport	18,127	$36,888
		±4,512	±$5,448		±12,202	±$21,705
13	Tiverton	5,051	$1,851	Falmouth	15,508	$24,085
		±5,199	±$350		±13,930	±$21,067
14	Boston	4,339	$4,130	New London	14,353	$15,080
		±4,413	±$4,360		±16,300	±$16,035
15	Stonington	2,726	$2,271	Fairhaven	10,846	$26,567

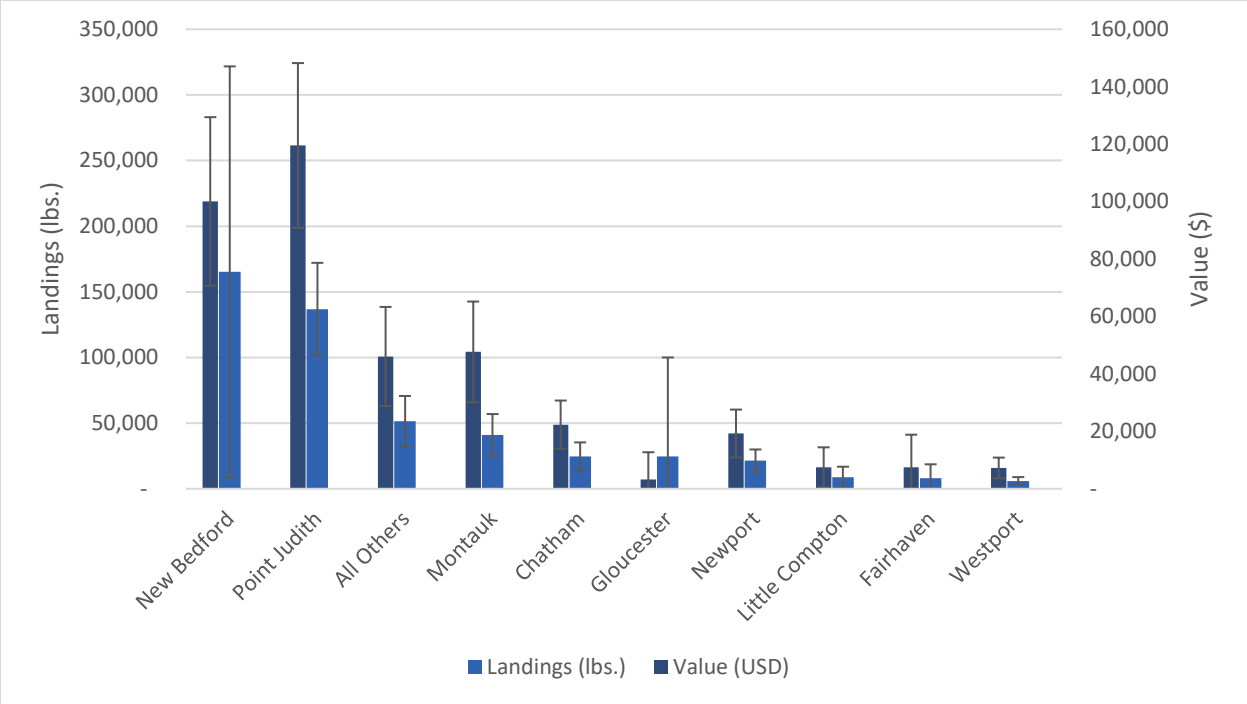
Rank	Port	Lease Area Landings (lbs.) Average (Std Dev)	Lease Area Value ($) Average (Std Dev)	Port	ECCs Landings (lbs.) Average (Std Dev)	ECCs Value ($) Average (Std Dev)
		±3,214	±$1,872		±6,696	±$18,003
16	Beaufort	2,437	$6,918	Tiverton	10,782	$5,833
		±671	±$3,379		±13,653	±$3,589
17	Hampton	2,349	$4,745	Stonington	8,522	$10,614
		±1,871	±$2,609		±6,659	±$8,462
18	Point Pleasant	2,267	$3,504	Chilmark	8,482	$35,987
		±2,723	±$3,801		±5,702	±$46,573
19	Newport News	1,422	$2,608	Chatham	7,097	$7,208
		±1,977	±$3,131		±8,516	±$5,677
20	Hampton Bay	797	$1,685	Woods Hole	5,361	$10,672
		±165	±$465		±7,257	±$6,714
21	Cape May	712	$5,466	North Kingstown	5,084	$2,368
		±975	±$7,722		±11,942	±$5,627
22	Shinnecock	691	$1,004	Menemsha	4,258	$22,736
		±636	±$810		±5,234	±$27,201
23	Wanchese	369	$770	Nantucket	2,610	$7,317
		±469	±$953		±2,361	±$5,901
24	Barnstable	-	-	Hampton	1,905	$3,830
		-	-		±1,561	±$2,720
25	Edgartown	-	-	Harwichport	1,815	$7,979
		-	-		±642	±$3,052
26	Falmouth	-	-	Point Pleasant	1,413	$2,543
		-	-		±3,078	±$5,134
27	Sandwich	-	-	Edgartown	1,253	$6,822
		-	-		-	-
28	Tisbury	-	-	Vineyard Haven	1,150	$8,916
		-	-		±3,108	±$24,507
29	Vineyard Haven	-	-	Tisbury	1,118	$5,063
		-	-		-	-
30	Woods Hole	-	-	Cape May	1,090	$2,705
		-	-		±2,403	±$7,960
31	Barnegat	N/A	N/A	Beaufort	835	$2,945

Rank	Port	Lease Area Landings (lbs.) Average (Std Dev)	Lease Area Value ($) Average (Std Dev)	Port	ECCs Landings (lbs.) Average (Std Dev)	ECCs Value ($) Average (Std Dev)
					±1,084	±$4,212
32	Chilmark	N/A	N/A	Newport News	603	$915
					±1,121	±$1,622
33	Chincoteague	N/A	N/A	Hampton Bay	239	$564
					±530	±$2,200
34	Davisville	N/A	N/A	Jamestown	176	$600
					-	-
35	Harwichport	N/A	N/A	Shinnecock	156	$146
					±831	±$707
36	Hyannis	N/A	N/A	Sandwich	92	$205
					±170	±$453
37	Menemsha	N/A	N/A	Wanchese	54	$128
					±87	±$214
38	Nantucket	N/A	N/A	Bristol	39	$55
					-	-
39	North Kingstown	N/A	N/A	Chincoteague	6	$12
					-	-

**Averages and standard deviations based on years for landings reports (see Table 2-65). Ports reporting two years or less were not calculated and are denoted with 'N/A'. Ports that did not report data are indicated by "-."*
Source: NMFS, 2020c, 2021

Figure 2-13 and **Figure 2-14** compare the NMFS custom data (2020c, 2021) average value and landings in the Lease Area and export cable corridors for the 10 ports respectively. The data were averaged for years that fish were landed (). Included is a comparison of variability in annual values and landings by ports in each part of the Offshore Project Area. It should be noted that the Top 10 ports by Lease Area and export cable corridors fluctuate year-to-year and by port based on target species fished by fishermen in those ports.

Figure 2-13 shows the Top 10 ports in the Lease Area (NMFS, 2020c) with average landings and value by port. Note that data available for each port is not consistent, meaning that not each port reports value and landings for all years between 2008 and 2018. The top ports fishing in the Lease Area are New Bedford, Point Judith, and Montauk. There are skews in annual average landings and values at each port, as shown by the standard deviation bars on **Figure 2-13**, indicating that variability regarding value and landings at ports fluctuates in any given year and that value and landings at ports are not predictable year-to-year from fishing activity in the Lease Area. For instance, the port exhibiting the highest average landings in the Lease Area - New Bedford - has reported value and landings from 2008 and 2018, but those value and landings range between approximately $5,500 and $56,000 and 2,500 and 40,000 pounds per year.

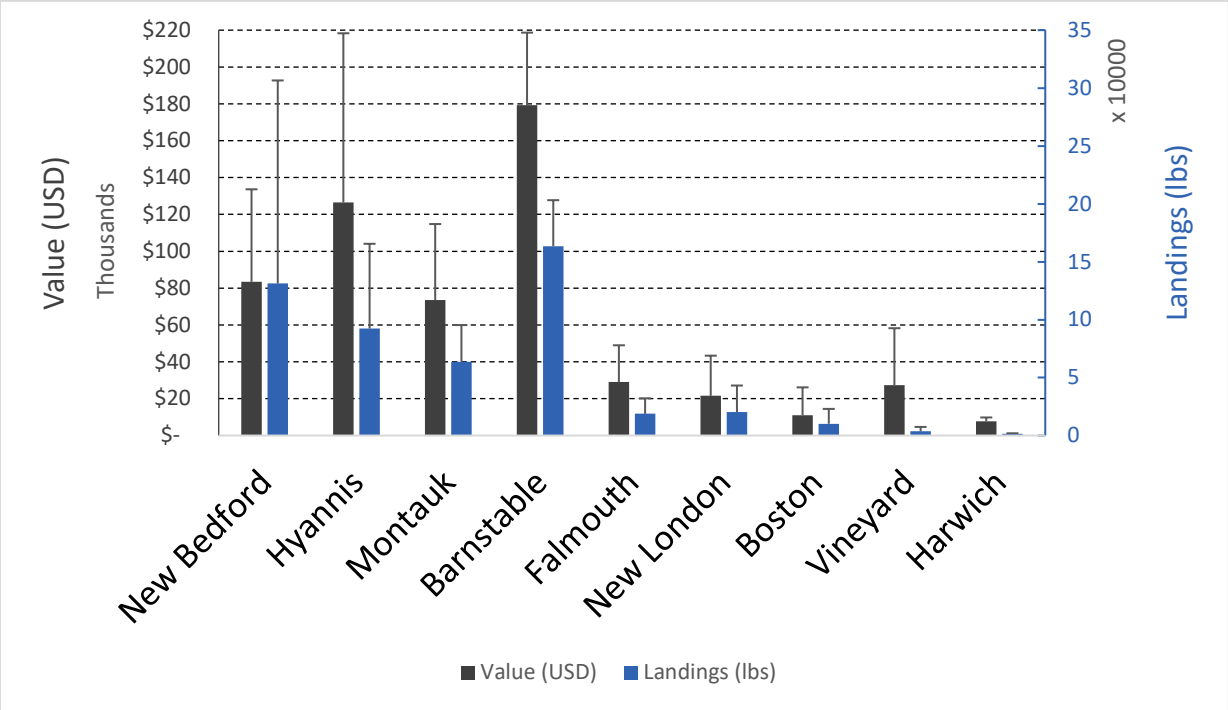


Source: NMFS, 2020c.

FIGURE 2-13. AVERAGE VALUE AND LANDINGS FOR NMFS TOP 10 PORTS IN THE LEASE AREA

Figure 2-14 shows the Top 10 ports in the Falmouth export cable corridor (NMFS, 2020b) with average landings and value by port. Note that data available for each port is not consistent, meaning that not each port reports value and landings for all years between 2008 and 2018. The top ports fishing in the export cable corridor are Point Judith (not shown on **Figure 2-14**), Hyannis, Barnstable, and New Bedford. There are skews in annual average landings and values in each port, as shown by the standard

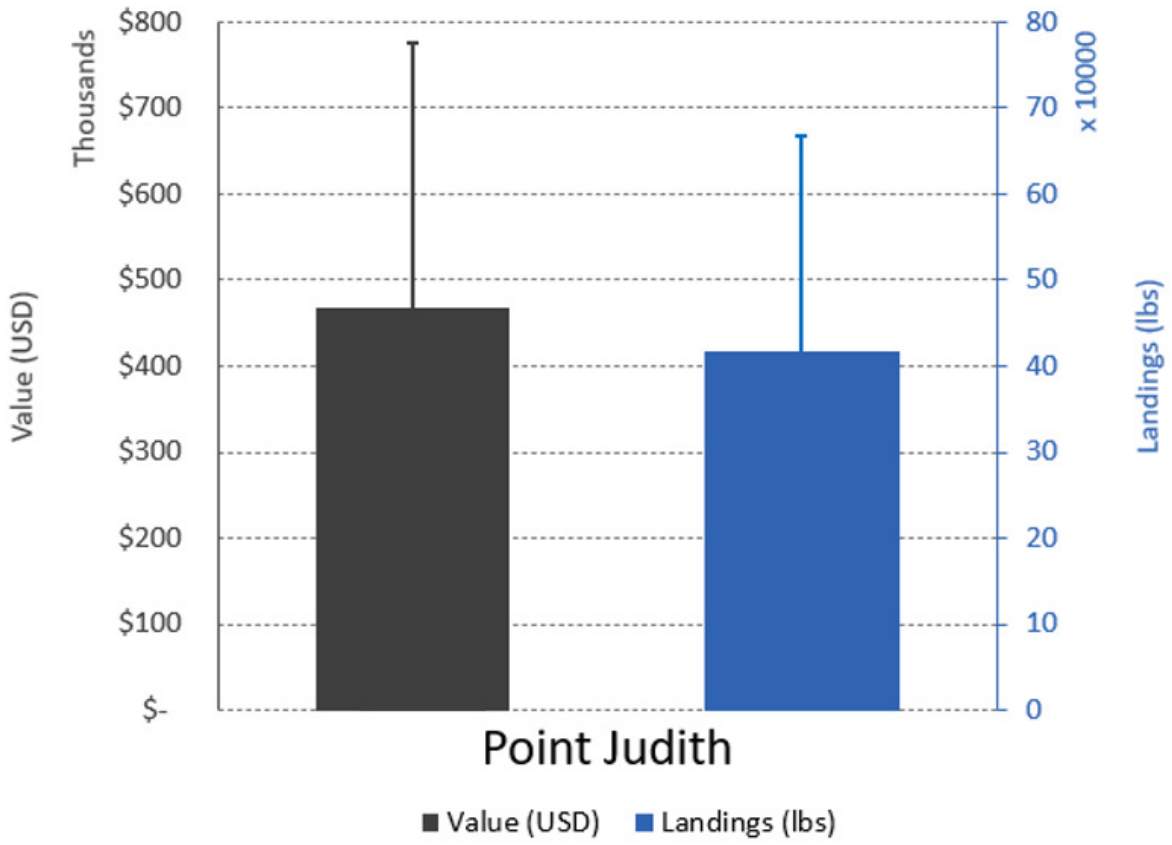
deviation bars on **Figure 2-14** indicating that variability regarding value and landings at ports fluctuates in any given year and that value and landings at ports are not predictable year-to-year from fishing activity in the Falmouth export cable corridor. For instance, the value and landings reported from 2008 to 2018 by the top fishing port in the Falmouth export cable corridor—Point Judith (**Figure 2-14**)—exhibit a standard deviation of approximately $300,000 and 250,000 pounds, respectively, between years. For the top nine ports, not including Point Judith, the value and landings range between approximately less than $10,000 and $126,000 and 2,000 and 91,000 pounds annually.



Source: NMFS, 2020b.

FIGURE 2-14. AVERAGE VALUE AND LANDINGS FOR TOP 10 PORTS IN THE FALMOUTH EXPORT CABLE CORRIDOR

Point Judith is the top port for fishing activity in the Falmouth export cable corridor based on location of squid common to area south of Muskeget Channel, Nantucket, and Martha's Vineyard. The average value and landing for Point Judith based on NMFS (2020b) data is shown in **Figure 2-15**.



Source: NMFS, 2020b

FIGURE 2-15. AVERAGE VALUE AND LANDINGS FOR POINT JUDITH IN THE FALMOUTH EXPORT CABLE CORRIDOR

Figure 2-16 shows the average value and landings from 2008 to 2018 for the top ten ports in the Brayton Point export cable corridor (NMFS, 2021). Note that the availability of data for each port is not consistent (e.g., each port may not report value and landings for every year between 2008 and 2018). The ports that exhibited the highest value and landings in the Brayton Point export cable corridor were from fishermen based in New Bedford, Point Judith, Newport, and Little Compton. The collective landings in all other ports were on average 85,044 pounds per year and a value of $40,282.

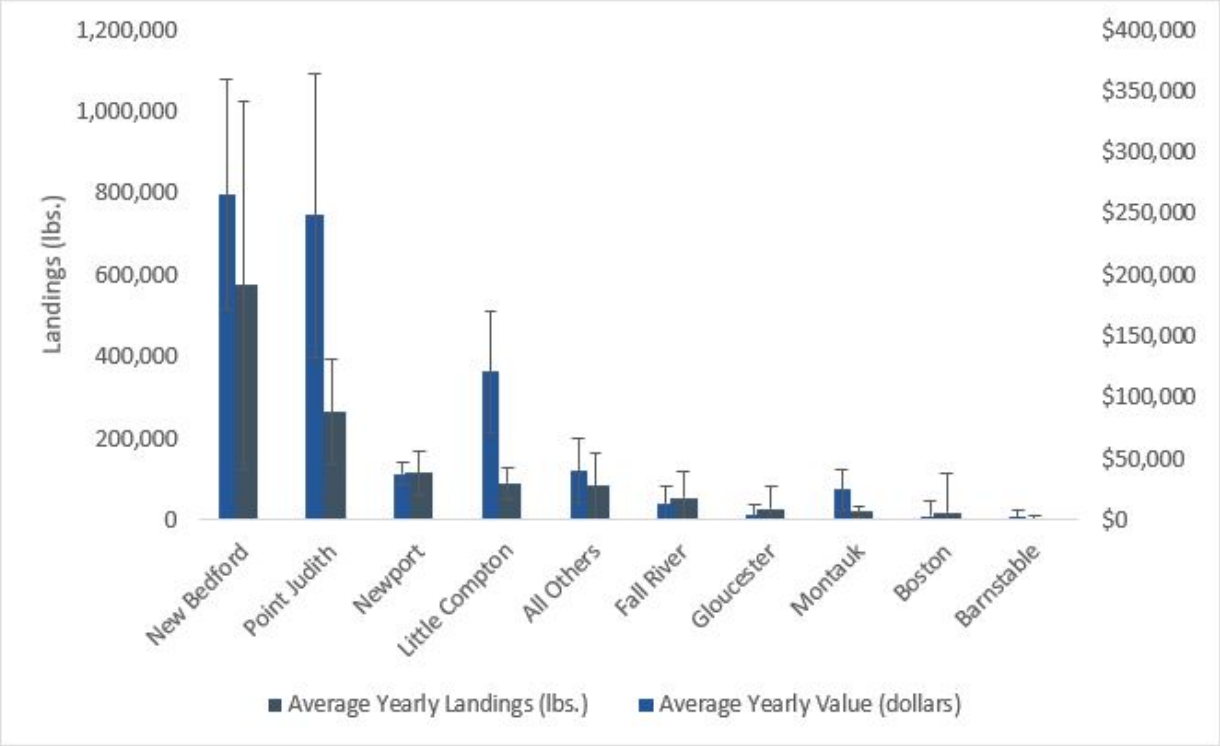


FIGURE 2-16. AVERAGE VALUE AND LANDINGS FOR TOP 10 PORTS IN THE BRAYTON POINT EXPORT CABLE CORRIDOR

2.3.1 Massachusetts Commercial Fishing Ports

Massachusetts ports are some of the most valuable in terms of landings and revenue in the United States. In 2019, Massachusetts' landings revenue reached $673,649,744 and 234,304,306 pounds (NOAA Fisheries, 2019b). Sea scallops generate the highest commercial landings in Massachusetts. Other top revenue-producing species include American lobster, clams (excluding ocean quahog), eastern oyster, cod and haddock, ocean quahog clam, monkfish, Atlantic herring, and Atlantic mackerel. However, there is significant variability in how fishing activity associated with these ports is carried out, as noted previously. Section 11 of the Mayflower Wind COP describes how Project activities may affect fishing activities associated with these ports. There are several ports in Massachusetts with comparatively small landings either overall, from the Offshore Project Area, or both that are not detailed specifically below. In the NMFS socioeconomic data (2020b), Fairhaven, Westport, Sandwich, and Gloucester are listed while in the NMFS-provided Mayflower Wind-specific data (2020c), Hyannis, Barnstable, Gloucester, and Falmouth are listed in the top 10 ports with landings originating in the Offshore Project Area from 2008 – 2018.

2.3.1.1 Port of New Bedford

The Port of New Bedford is a deep-water commercial port with easy access to the maritime corridor from the Massachusetts coast, located on the north-western side of Buzzard's Bay. The Port is approximately nine miles (mi) (14.5 km) southwest of the Cape Cod shipping canal, 83 mi (134 km) south of Boston, and 166 mi (267 km) north of New York City (Port of New Bedford, 2020). An average of one million pounds of seafood enters and exits the port by truck, rail, and boat every day. In 2014 the Port

handled 140 million pounds of domestic seafood. The Port of New Bedford has been the nation's number one most valuable fishing port since 2001 (NMFS, 2020a) (**Table 2-70**). The shore-side economy has over 40 fish wholesale companies, over 65 seafood processors, and some 200 shore side industries (Hall-Arber et al., 2001).

Much of New Bedford's commercial fishing revenue comes from the sale of sea scallops. Commercial fishermen landed 41.8 million pounds of sea scallops in Massachusetts worth almost $400 million in 2019 (NMFS, 2020a). In total, New Bedford landed over 107 million pounds of fish in 2016, worth an estimated $327 million. New Bedford and the Commonwealth of Massachusetts have been preparing for the offshore wind industry for the past several years. In 2015 the state completed the 2-year construction of the Marine Commerce Terminal, a 29-acre facility built specifically for the construction, assembly, and deployment of offshore wind turbines (Port of New Bedford, 2020). The Port houses a fishing fleet of over 500 vessels, including approximately 239 federally permitted vessels in 2017.

TABLE 2-70. PERCENTAGE OF NEW BEDFORD COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	82,964	825,094	908,058	0.7%
2009	80,625	499,210	579,835	0.4%
2010	843,238	1,174,141	2,017,379	1.6%
2011	468,426	69,039	537,465	0.5%
2012	55,242	1,151,327	1,206,569	0.9%
2013	91,099	1,675,382	1,766,481	1.4%
2014	64,469	639,511	703,980	0.5%
2015	61,333	368,773	430,106	0.4%
2016	177,169	619,556	796,725	0.8%
2017	144,391	184,827	329,218	0.3%
2018	183,911	131,516	315,427	0.3%
		Total	**9,591,243**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.1.2 Provincetown and Chatham

Provincetown and Chatham, which are combined in landings reports, landed over 23 million pounds of fish in 2018 worth an estimated $35 million (NOAA, 2020b) (**Table 2-71**). Top species landed in Provincetown and Chatham include American lobster, scallops, skate, monkfish, dogfish, summer flounder, scup, black sea bass, Atlantic surfclams, and ocean quahog.

TABLE 2-71. PERCENTAGE OF CHATHAM* COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	31,781	633	32,414	0.5%
2009	21,291	678	21,969	0.3%
2010	71,199	4,205	75,404	1.0%
2011	19,907	758	20,665	0.2%
2012	23,853	4,043	27,896	0.3%
2013	6,893	7,223	14,116	0.2%
2014	17,659	39,753	57,412	0.5%
2015	22,361	2,493	24,854	0.2%
2016	18,191	3,225	21,416	0.1%
2017	18,786	8,447	27,233	0.2%
2018	19,801	6,605	26,406	0.2%
		Total	**349,785**	

**Data for Provincetown landings from the Offshore Project Area were not provided in this data set.*
Source: NMFS, 2020c; NMFS, 2021.

2.3.1.3 Martha's Vineyard and Nantucket

Martha's Vineyard, and to a lesser extent, Nantucket, have commercial fishing and recreational fishing fleets active in the Offshore Project Area (**Table 2-72**).

TABLE 2-72. PERCENTAGE OF NANTUCKET* COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	-	1,601	1,601	0.3%
2009	-	2,903	2,903	0.5%
2010	-	5,036	5,036	0.6%
2011	-	7,356	7,356	1.7%
2012	-	4,387	4,387	2.1%
2013	-	4,389	4,389	1.4%
2014	-	1,241	1,241	0.9%
2015	-	629	629	1.6%
2016	-	1,166	1,166	-
2017	-	-	-	-
2018	-	-	-	-
		Total	**28,708**	

**Data for Martha's Vineyard landings from the Offshore Project Area were not provided in this data set.*
Source: NMFS, 2020c; NMFS, 2021.

2.3.2 Rhode Island Commercial Fishing Ports

Commercial fishermen operating in and around the Offshore Project Area and offshore wind leases in the Atlantic OCS may also port in Rhode Island, among other states. The commercial fishing industry drives economic activity in Rhode Island beyond the activity of commercial fishing, generating a total economic impact of $419 million in 2016 (Sproul and Michaud, 2018). In 2019, Rhode Island's landing revenue reached $109,253,832 and 78,773,826 pounds (NOAA Fisheries, 2019b). Landings from these vessels consist mainly of small mesh species (hake, squid, mackerel, and butterfish), ocean quahogs, skates, monkfish, and Jonah crab (Hasbrouck et al., 2011; Kirkpatrick et al., 2017). There may be additional ports apart from the ones described below associated with fishing vessels and landings in the broader region and Offshore Project Area.

There are a number of smaller ports in Rhode Island that are identified by either Kirkpatrick et al. (2017) as being amongst the most exposed to the Kirkpatrick Study Area, by NMFS (2020b) as being the most impacted by offshore wind development in the Lease Area, or by NMFS (2020c) as reporting landings from within the Offshore Project Area. These ports exhibit relatively low landings and revenue both overall and associated with the Offshore Project Area relative to other ports in Rhode Island and in the region. Tiverton and Little Compton are listed as the two ports with the highest percentage of total revenue exposed to the Kirkpatrick Study Area (7.7 percent and 3.4 percent respectively), but are estimated to receive revenue from fishing conducted within the Offshore Project Area totaling $87,524 and $5,533 respectively over the 11-year period from 2008 to 2018 (Kirkpatrick et al., 2017, NMFS 2020c). Warren was also listed as one of the most exposed ports by Kirkpatrick et al. (2017) but all landings from that port for the purposes of that study were non-disclosable and no landings were reported in the NMFS data specific to the Offshore Project Area (NMFS, 2020c).

2.3.2.1 Point Judith

The Port of Galilee in Point Judith is the most active fishing port in Rhode Island. In 2018, Point Judith ranked 18th in landings (48 million pounds) and 11th, in revenue ($64 million) of all major ports in the U.S (NOAA, 2020b) (**Table 2-73**). In the New England Region, Point Judith ranked third in both pounds and dollar value landed. In 2017, 120 federally permitted vessels docked in Point Judith. Ninety-two of these vessels possessed a federal permit for squid, mackerel, and butterfish. Most of Point Judith fishing revenue comes from the sale of squid, American lobster, summer flounder, Atlantic sea scallop, scup, monkfish, silver hake, Jonah crab, Atlantic herring, and yellowtail flounder (Hasbrouck et al., 2011).

TABLE 2-73. PERCENTAGE OF POINT JUDITH COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	217,316	677,682	894,998	2.3%
2009	116,372	509,932	626,304	1.6%
2010	138,515	234,401	372,916	1.1%
2011	95,961	333,180	429,141	1.2%
2012	114,995	728,568	843,563	2.0%
2013	93,668	502,564	596,232	1.2%
2014	105,994	1,084,531	1,190,525	2.3%
2015	101,874	962,488	1,064,362	2.6%

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2016	179,091	1,452,930	1,632,021	3.3%
2017	197,598	563,293	760,891	1.9%
2018	143,900	458,752	602,652	1.4%
		Total	**9,013,605**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.2.2 Newport

Newport, Rhode Island is the second largest port in Rhode Island behind the Point Judith, Rhode Island. Principal species landed include lobster, Jonah crab, and monkfish (Hasbrouck et al., 2011) (**Table 2-74**). Gear types utilized primarily include pot and trap and dredges. Newport shows relatively higher landings than other, smaller ports in Rhode Island but relatively lower landings overall compared to other ports in the region. Newport was not identified by Kirkpatrick et al. (2017) as one of the ports with the highest percentage of total revenue exposed to the Kirkpatrick Study Area. It was, however, identified by NMFS (2020b) as one of the most impacted ports (4th most impacted port, $314,000 landed from the Lease Area over the 11-year period from 2008 to 2018) and it is shown by NMFS (2020c) to be the port with the 28th highest landings revenue from the Offshore Project Area with an 11-year total of $253,876. As a note, the fact that Newport shows lower revenues from the larger Offshore Project Area in the NMFS Mayflower Wind-specific data than in the smaller Lease Area in the NMFS socioeconomic data can be attributed to how some confidential landings data were treated and aggregated.

TABLE 2-74. PERCENTAGE OF NEWPORT COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	15,718	181,530	197,248	2.6%
2009	11,153	95,431	106,584	1.4%
2010	39,338	105,734	145,072	2.2%
2011	18,225	137,371	155,596	2.1%
2012	16,011	221,271	237,282	2.7%
2013	28,419	146,233	174,652	2.3%
2014	-	112,372	112,372	1.9%
2015	15,264	131,875	147,139	2.6%
2016	16,307	111,051	127,358	2.4%
2017	55,518	18,247	73,765	1.9%
2018	19,109	51,478	70,587	1.6%
		Total	**1,547,655**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.2.3 Other Rhode Island Fishing Ports

There are several other commercial fishing ports in Rhode Island that are important to the fishing industry but either exhibit relatively low landings or are not represented in the lists of most exposed ports (Hasbrouck et al., 2011). As discussed above, the ports of Warren, Tiverton, and Little Compton exhibit relatively low landings but are identified as ports by either Kirkpatrick et al. (2017) as being

among the most exposed to the Kirkpatrick Study Area, by NMFS (2020b) as being the most impacted by offshore wind development in the Lease Area, or by NMFS (2020c) as reporting landings from within the Offshore Project Area. Additionally, fisheries such as the mantis shrimp fishery in Mount Hope Bay or the whelk fishery in the Sakonnet River which largely use the ports of Warren and Tiverton/Little Compton, respectively, are not represented in these datasets but have been identified as being important to the local fishing industry and overlapping with the Offshore Project Area through outreach to the local fishing community by the Mayflower Wind FLO. The port of North Kingstown (Wickford) exhibits higher landings, totaling 19.2 million pounds landed in 2019 valued at $14.1 million but low landings from the Offshore Project Area (NOAA Fisheries, 2021; NMFS 2020c, 2021).

2.3.3 Connecticut Commercial Fishing Ports

Commercial fishermen operating in and around offshore wind leases in the Atlantic OCS may also port or land their catch in Connecticut among other states. In 2019, the value and landings of Connecticut ports was $16,598,477 and 9,190,481 pounds (NOAA Fisheries, 2019b).

2.3.3.1 Stonington

Stonington is the largest fishing port in the state of Connecticut. In 2016 it was reported that vessels landed nine million pounds of catch worth approximately $5 million (**Table 2-75**). This economic valuation of the area makes Stonington the 111th most valuable port in the U.S. There is limited data available on the commercial fishing fleets that operate out of Stonington, but it is thought that the boats are small in numbers but diversified with gillnetters, trawlers, and lobster fishermen (Hall-Arber et al., 2001).

TABLE 2-75. PERCENTAGE OF STONINGTON COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	1,191	2,509	3,700	0.0%
2009	280	1,547	1,827	0.0%
2010	9,239	858	10,097	0.1%
2011	-	6,043	6,043	0.1%
2012	1,465	7,256	8,721	0.1%
2013	639	-	639	0.0%
2014	751	10,690	11,441	0.1%
2015	1,686	4,831	6,517	0.1%
2016	3,246	36,226	39,472	0.5%
2017	811	11,382	12,193	0.2%
2018	7,956	12,395	20,351	0.3%
		Total	**121,001**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.3.2 Port of New London

The New London fishing fleet is the second most productive in Connecticut. New London vessels landed two million pounds of catch in 2016 worth $5 million, making New London the 116th most valuable port

in the U.S. New London's most valuable landings in 2014, as reported by NOAA, are scallops, whiting, butterfish, mackerel, and squid (**Table 2-76**).

TABLE 2-76. PERCENTAGE OF PORT OF NEW LONDON COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	-	-	-	-
2009	-	-	-	-
2010	-	-	-	-
2011	-	-	-	-
2012	5,397	72,885	78,282	1.7%
2013	8,175	7,488	15,663	0.4%
2014	9,481	8,486	17,967	0.4%
2015	8,843	34,280	43,123	0.7%
2016	-	19,803	19,803	0.3%
2017	2,821	-	2,821	0.1%
2018	6,820	14,943	21,763	0.5%
		Total	**199,422**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.4 Ports in Other States

2.3.4.1 Montauk, New York

Montauk is the largest fishing port in the state of New York. In 2019, it was reported that vessels landed 11.5 million pounds with a total revenue of $17.8 million. Primary species landed include longfin squid, sea scallops, golden tilefish, Jonah crab, and butterfish (**Table 2-77**).

TABLE 2-77. PERCENTAGE OF MONTAUK COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	81,877	81,779	163,656	1.6%
2009	96,755	75,059	171,814	1.7%
2010	59,979	32,616	92,595	0.8%
2011	8,981	38,627	47,608	0.4%
2012	41,200	116,541	157,741	1.1%
2013	51,079	42,511	93,590	0.7%
2014	12,421	107,043	119,464	1.0%
2015	31,936	111,159	143,095	1.4%
2016	19,042	177,225	196,267	1.7%
2017	26,413	109,558	135,971	1.5%
2018	20,066	51,075	71,141	0.7%
		Total	**1,392,942**	

Source: NMFS, 2020c; NMFS, 2021.

2.3.4.2 Beaufort, North Carolina

Beaufort, North Carolina was identified by NMFS as the 12th most impacted port from the development of offshore wind in the Lease Area. However, Beaufort has relatively low landings from the Lease Area, totaling $47,570 of revenue and 15,728 pounds over the 11-year period from 2008 to 2018 (NMFS, 2020c) (**Table 2-78**).

TABLE 2-78. PERCENTAGE OF BEAUFORT COMMERCIAL LANDINGS SOURCED FROM THE OFFSHORE PROJECT AREA

Year	Landings (lbs.)		Total Landings (lbs.)	Port Landed Percentage
	Lease Area	ECCs		
2008	-	-	-	-
2009	-	-	-	-
2010	-	-	-	-
2011	-	-	-	-
2012	-	-	-	-
2013	-	-	-	-
2014	2,673	230	2,903	0.3%
2015	1,660	242	1,902	0.1%
2016	1,867	1,478	3,345	0.3%
2017	2,675	4,611	7,286	0.5%
2018	3,308	2,626	5,934	0.4%
		Total	**21,370**	

Source: NMFS, 2020c; NMFS, 2021.

2.4 COMMERCIAL FISHING ACTIVITY IN THE OFFSHORE PROJECT AREA

This section provides an overview of the historic and current commercial fishing activity and exposure of commercial fishing to the Offshore Project Area. This overview includes the volume and value of fishing activity but also fishing ports, fleets, and activity. Exposure is defined as the potential for a fishery to see an impact from offshore wind development, but exposure does not measure economic impact or loss (Kirkpatrick et al., 2017). This subsection describes the fishing that occurs in the Offshore Project Area using information primarily sourced from NMFS's Fisheries Statistics Division, the ACCSP, the MA DMF, and RIDEM. As previously shown, fishing activity in the region varies by year and by species type and this pattern continues in the Offshore Project Area.

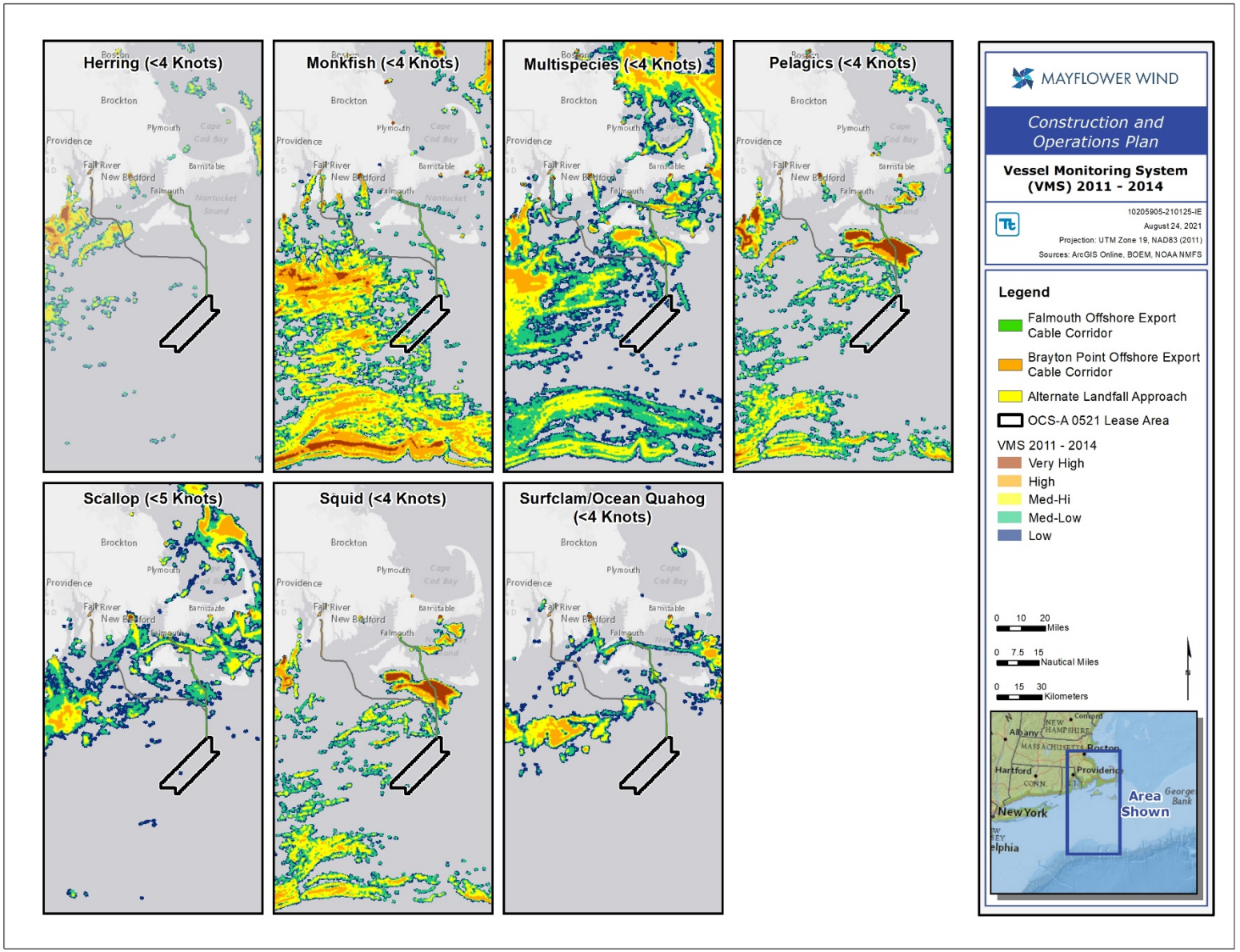
Figure 2-17 and **Figure 2-18** show a varying density of commercial fishing vessel activity within the squid, Northeast multispecies, monkfish, Atlantic herring, Atlantic sea scallop, Atlantic surfclam/ocean quahog, and Atlantic mackerel fisheries in the Northeast and Mid-Atlantic regions based on NROC VMS data for two time periods (2011-2014, 2015-2016) (Shmookler, 2015). There is a comparatively higher density of fishing activity in the export cable corridors due to their variety of favorable benthic habitat characteristics (for more information on benthic characterization of the export cable corridors, see Section 6.6 Benthic and Shellfish Resources and Appendix M, Benthic and Shellfish Resources Characterization Report). Overall, these maps show primarily low densities with some medium densities in the southwest portion of the Lease Area.

Fishing activity in the Lease Area was assessed using public fisheries data, state and federal reports, AIS data, and field survey data (see Section 1.1.1, Fisheries Data Resources and Descriptions). The primary bottom-contact commercial fishery found within the Lease Area is bottom trawling (primarily for squid and various groundfish) (MARCO, n.d). Unlike the scallop fleets or other commercial vessels that primarily transit through the leases, the squid fleets fish within or very near to the Lease Area. This can be seen in the fishing activity maps shown in **Figure 2-18** and **Figure 2-19** in the northwest corner of the Lease Area from 2011-2014 and outside of it from 2015-2016. The majority of VMS activity observed was comprised of registered commercial fishing vessels that were likely transiting through the Lease Area, as described in the NSRA.

VTR visualization tools regarding commercial fishing data were obtained through MARCO's Data Portal from 2006 to 2016 to describe commercial fish density per species type in the Offshore Project Area. **Figure 2-19** and **Figure 2-20** below also list the various fishing gear utilized and coinciding fishing effort in and around the Lease Area from 2006 to 2015.

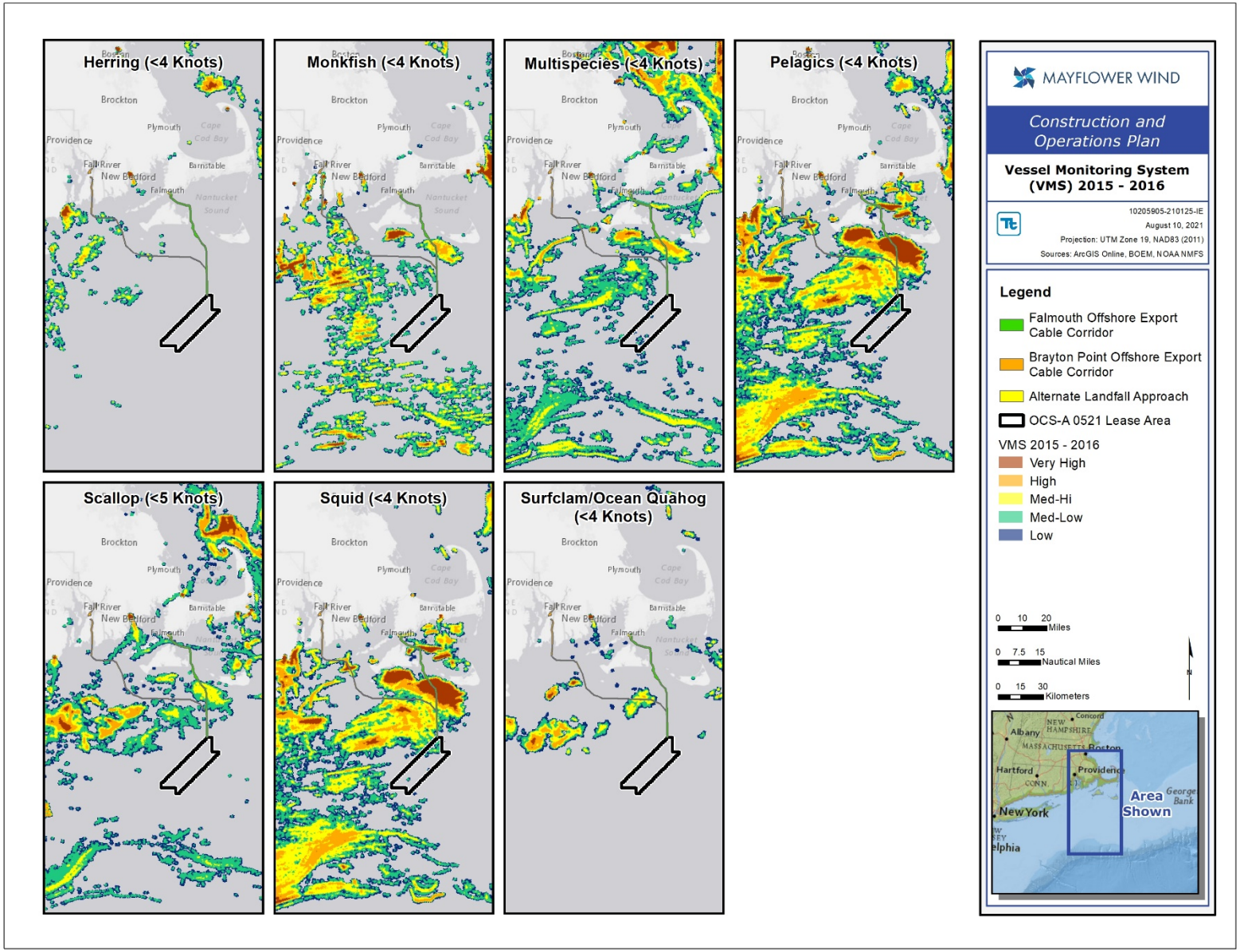
Kirkpatrick et al.'s 2017 report, *Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic,* describes affects offshore wind developments in WEAs from Massachusetts to North Carolina could potentially have on commercial and recreational fisheries and shoreside dependents (defined as bait shops, seafood dealers, etc.). This report, conducted by NOAA's Northeast Fisheries Center and funded by BOEM, details yearly averages of landings, port locations, and further describes fisheries' target species, densities, distributions, and gear types in these WEAs between 2007 and 2012. Between 2007 and 2012, of the approximately $966 million in revenue generated per year from federally managed commercial fisheries in the New England and Mid-Atlantic regions, just over $14 million was sourced from all WEAs along the Atlantic coastline. This means that 1.45 percent of all commercial fishing revenue in the New England and Mid-Atlantic regions was sourced from within the WEAs. Commercial fishing revenue from the Kirkpatrick Study Area in which the Project is sited, is estimated at just over $3 million which represents 0.31 percent of the total of the $966 million in commercial fishing revenue generated in the New England and Mid-Atlantic regions. For the gear types analyzed in that study, exposure ranged from a high of 1.31 percent for gillnets to a low of 0.03 percent for handgear with all other gear types (dredge, longline, pot, lobster pot, bottom trawl, and midwater trawl) ranging from 0.05 percent to 0.85 percent (Kirkpatrick et al., 2017).

For the commonly caught commercial species discussed above, when landings of each species from 2008 to 2018, the timeframe covered by the NMFS-provided Mayflower Wind-specific data, from the Offshore Project Area are expressed as a percentage of the total landings for that species for the same timeframe in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey (the region considered earlier to place Offshore Project Area fishing activity in context), longfin squid show the highest percentage at 3.29 percent (NMFS, 2020c, 2021; NOAA Fisheries, 2021). This means that for longfin squid, 3.10 percent of all longfin squid landings from 2008 to 2018 in the region (as shown in NMFS landing statistics [NOAA Fisheries, 2021]) are from the Offshore Project Area (as shown in the NMFS-provided Mayflower Wind-specific data [2020c, 2021]). The species with lowest percentage for a commonly caught commercial species using this metric is sea scallops with 0.01 percent of landings in the region coming from the Offshore Project Area. All other commonly caught commercial species discussed above range from 0.01 percent to 2.17 percent.



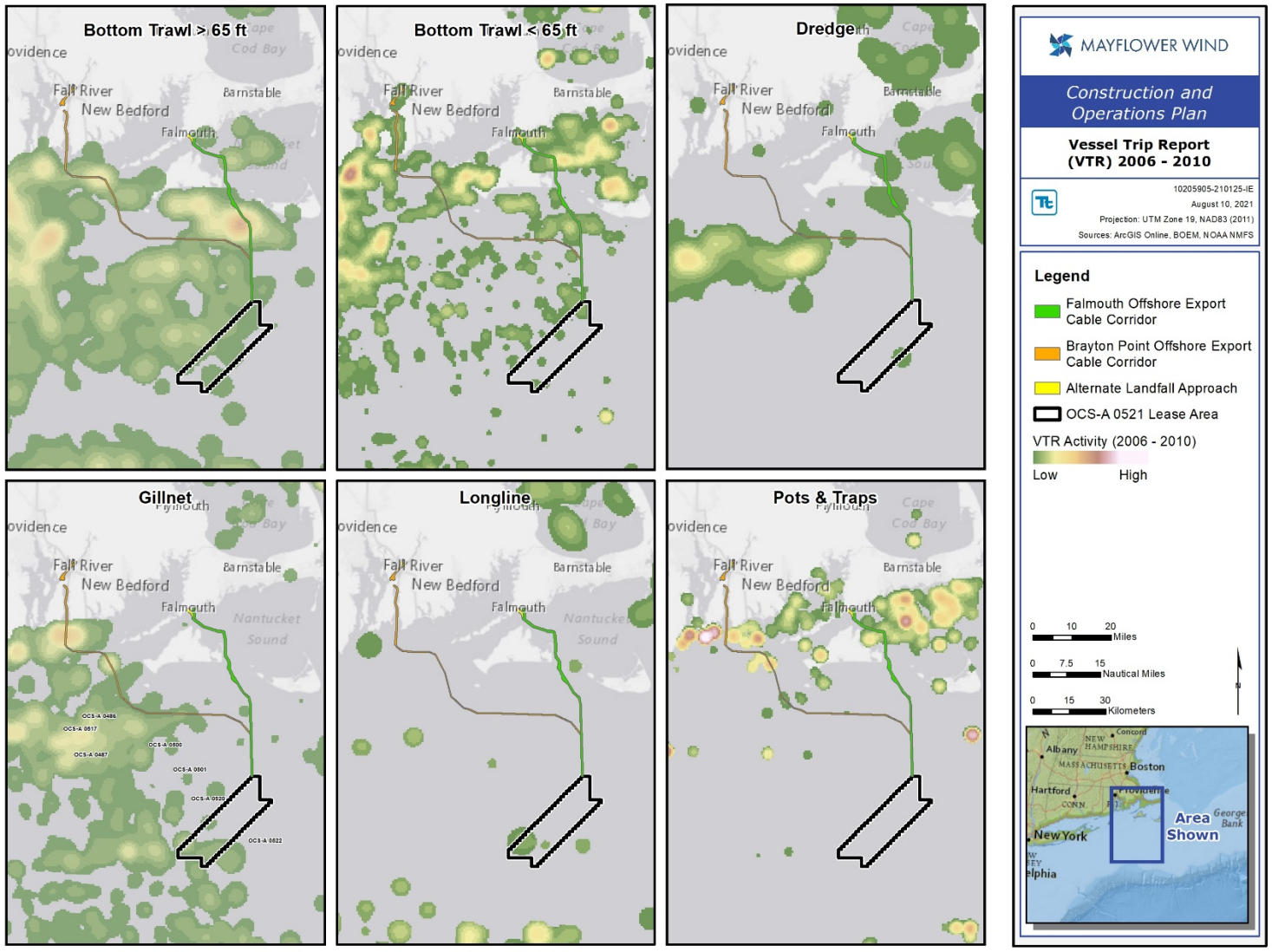
Source: NROC, 2018

FIGURE 2-17. VMS FISHING DENSITY FOR THE YEARS 2011-2014



Source: NROC, 2018

FIGURE 2-18. VMS FISHING DENSITY FOR THE YEARS 2015-2016



Source: NOAA NMFS, 2016

FIGURE 2-19. VTR FISHING EFFORT FOR THE YEARS 2006-2010

Source: NOAA NMFS, 2016

FIGURE 2-20. VTR FISHING EFFORT FOR THE YEARS 2011-2015

2.4.1 Commercial Fishing Activity – Lease Area

This section describes commercial fishing activity in the Lease Area targeting the commonly caught commercial species previously identified. The same species that were discussed previously in Section 2.2.1 in the context of the entire Offshore Project Area are discussed below (**Table 2-79**). The order in which those species would be ranked based on landings differs between the Offshore Project Area, which was discussed previously, the Lease Area, which is discussed below, and the export cable corridors, which are discussed later. This is due to variations in species distribution, habitat types, and other factors influencing fisheries and fishing activity.

TABLE 2-79. NMFS MAYFLOWER WIND-SPECIFIC DATA MOST IMPACTED SPECIES IN THE LEASE AREA SHOWN BY DECREASING LANDINGS

Rank	Species	Pounds (lbs.)	Species	Dollars ($)
1	Atlantic herring	1,113,353	Jonah crab	$ 836,311
2	Jonah crab	1,061,098	Longfin squid	$ 750,432
3	Silver hake	655,697	Monkfish	$ 448,625
4	Longfin squid	649,608	Scup	$ 402,710
5	Scup	560,844	Silver hake	$ 395,571
6	Skates	469,346	American Lobster	$ 306,603
7	Monkfish	303,202	Summer Flounder	$ 260,396
8	All Others	112,579	Skates	$ 226,727
9	Summer Flounder	94,426	Golden Tilefish	$ 216,847
10	Red Hake	83,981	Scallops	$ 179,140
11	Butterfish	78,713	Atlantic herring	$ 90,803
12	American Lobster	71,740	All Others	$ 83,787
13	Rock Crab	71,703	Butterfish	$ 42,189
14	Spiny Dogfish	67,266	Rock Crab	$ 34,128
15	Golden Tilefish	60,757	Red Hake	$ 23,914
16	Shortfin Squid	31,549	Yellowtail Flounder	$ 19,283
17	Atlantic Mackerel	20,615	Black Sea Bass	$ 18,322
18	Scallops	19,386	Spiny Dogfish	$ 14,649
19	Kingfish	16,057	Winter Flounder	$ 13,899
20	Bluefish	14,337	Shortfin Squid	$ 13,344
21	Yellowtail Flounder	12,464	Kingfish	$ 12,577
22	Offshore Hake	10,596	Bluefish	$ 10,333
23	Winter Flounder	6,229	Atlantic Mackerel	$ 9,055
24	Haddock Roe	5,542	Channeled Whelk	$ 8,274
25	Black Sea Bass	5,414	Offshore Hake	$ 6,568
26	Smooth Dogfish	4,131	Cod	$ 4,770
27	Cod	2,422	Haddock Roe	$ 4,026
28	White Hake	2,161	White Hake	$ 2,985
29	Channeled Whelk	1,336	Smooth Dogfish	$ 2,764
30	Conger Eel	1,026	John Dory	$ 793
31	John Dory	732	Conger Eel	$ 605
32	Fourspot Flounder	689	Weakfish	$ 604
33	Pollock	363	Witch Flounder	$ 550
34	American Plaice Flounder	329	American Plaice Flounder	$ 457
35	Witch Flounder	302	Striped Bass	$ 320
36	Weakfish	295	Pollock	$ 315

Rank	Species	Pounds (lbs.)	Species	Dollars ($)
37	Atlantic Croaker	228	Fourspot Flounder	$ 206
38	Redfish	218	Eel	$ 189
39	Eel	196	Atlantic Croaker	$ 166
40	Sea Robins	94	Redfish	$ 147
41	Striped Bass	92	Tautog	$ 71
42	American Eel	40	Atlantic Halibut	$ 60
43	Sand-Dab Flounder	26	Knobbed Whelk	$ 49
44	Tautog	21	Blueline Tilefish	$ 38
45	Blueline Tilefish	19	American Eel	$ 32
46	Seatrout	16	Sea Robins	$ 23
47	Knobbed Whelk	10	Mahi Mahi	$ 12
48	Atlantic Halibut	8	Sand-Dab Flounder	$ 11
49	Bonito	7	Bonito	$ 11
50	Triggerfish	7	Seatrout	$ 9
51	Crab	6	Triggerfish	$ 9
52	Horseshoe crab	5	Crab	$ 5
53	Other finfish	4	Horseshoe crab	$ 3
54	Mahi Mahi	4	Other finfish	$ 3
55	Wolffish	3	Wolffish	$ 3
56	Cusk	2	Cusk	$ 1
57	Mullets	2	Mullets	$ 1
58	Tilefish	1	Tilefish	$ 1

Levels of commercial fishing vessel activity in and around the Offshore Project Area have been measured using both VMS and VTR data (NMFS Office of Law Enforcement, 2020; NMFS, 2020b). While both VMS and VTR data have limitations that have previously been discussed, together, the NMFS polar histograms, which include vessel counts based on VMS data, and the NMFS socioeconomic studies, which include vessel and trip counts based on VTR data, provide a picture of the relative level of commercial fishing vessel presence in the Lease Area. Because the number of vessels in the Lease Area represented in the polar histograms are based on VMS data, double counting is likely because a vessel may declare for multiple VMS fisheries on the same trip. These polar histograms are particularly useful in showing the predictable and consistent directionality of both transiting and fishing patterns in the Lease Area and also have some utility in establishing relative levels of vessel presence but likely overstate the true number of vessels in this dataset because of the nature of VMS reporting. An important limitation of this VMS data are that not all commercial fishing vessels are represented since some vessels, notably those fishing for lobster or crab, are excluded from VMS reporting requirements. The number of vessels reported to be either actively transiting or actively fishing in the Lease Area from 2014 to 2018 according to the polar histograms are shown in **Table 2-80** and **Table 2-81**. Vessel and transit counts are provided for an aggregated category of 'All VMS Vessels' and also for FMPs for which vessels declared.

TABLE 2-80. TOTAL NUMBER OF COMMERCIAL FISHING VESSELS REPORTED AS ACTIVELY FISHING IN THE LEASE AREA IN NMFS POLAR HISTOGRAMS, 2014 - 2018

Year	All VMS Vessels	Monkfish FMP	Northeast Multispecies FMP	Atlantic Surfclam/ Ocean Quahog FMP	Sea Scallop FMP	Mackerel Squid Butterfish FMP	Atlantic Herring FMP
2018	51	5	4	-	16	15	-
2017	46	5	-	-	-	28	-
2016	24	4	-	-	-	7	-
2015	34	4	4	-	-	13	-
2014	33	-	5	-	2	-	-

Source: NMFS Office of Law Enforcement, 2020

TABLE 2-81. TOTAL NUMBER OF COMMERCIAL FISHING VESSELS IN VMS FISHERIES REPORTED AS ACTIVELY TRANSITING IN THE LEASE AREA, 2014 - 2018

Year	All VMS Vessels	Monkfish FMP	Northeast Multispecies FMP	Atlantic Surfclam/ Ocean Quahog FMP	Sea Scallop FMP	Mackerel Squid Butterfish FMP	Atlantic Herring FMP
2018	268	7	5	4	213	22	-
2017	138	12	9	-	51	33	9
2016	78	18	12	-	14	12	7
2015	86	10	16	-	14	17	7
2014	105	19	15	-	24	9	8

Source: NMFS Office of Law Enforcement, 2020

Vessel and trip counts from the NMFS socioeconomic data are for two separate parcels that, for the purposes of this report, have been combined to reflect the full extent of the Lease Area. Because a single vessel could have been reported in each of the two parcels used to create this dataset, double counting is likely given that the parcels have been combined. This likely overstates the true number of vessel and trip counts in this dataset. The number of vessels and trips in the Lease Area from 2008 to 2018 according to the NMFS socioeconomic data are shown in **Table 2-82**. Vessel and trip counts presented in **Table 2-82** were calculated by summing the vessel and trip counts for the two parcels that comprise the Lease Area.

TABLE 2-82. TOTAL NUMBER OF COMMERCIAL FISHING TRIPS AND VESSELS AS REPORTED BY VTRS IN THE LEASE AREA, 2008 – 2018

Year	Number of Trips	Number of Vessels
2018	2,232	371
2017	2,967	323
2016	3,239	399
2015	3,078	358
2014	3,190	389
2013	2,866	417
2012	2,705	417
2011	2,010	351
2010	2,204	335
2009	2,701	344
2008	2,889	394
Total	**30,081**	**4,098**

Source: NMFS, 2020c.

2.4.1.1 Longfin Squid

According to NROC VMS data, there is limited squid fishing activity in the Lease Area between 2011 and 2016; fishing activity primarily occurred in the northeastern corner of the Lease Area in low to medium low concentrations between 2015 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, longfin squid landings in the Lease Area totaled 649,608 pounds (an average of 59,055 pounds per year) with a total value of $750,432 (an average of $68,221 per year) (NMFS, 2020c). The pounds of longfin squid landed from the Lease Area from 2008 to 2018 are equal to 0.24 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.2 Atlantic Herring

According to NROC VMS data, no Atlantic herring fishing activity occurred in the Lease Area between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018 (data from 2012, 2014, 2017, and 2018 unavailable), Atlantic herring fishery landings in the Lease Area totaled 1,113,353 pounds (an average of 159,050 pounds per year) with a total value of $90,803 (an average of $12,971 per year) (NMFS, 2020c). The pounds of Atlantic herring landed from the Lease Area from 2008 to 2018 are equal to 0.12 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.3 Jonah Crab

Jonah crab fishery landings in the Lease Area totaled 1,061,098 pounds (an average of 96,463 pounds per year) with a total value of $836,311 (an average of $76,028 per year) between 2008 and 2018 (NMFS, 2020c). The pounds of Jonah crab landed from the Lease Area from 2008 to 2018 are equal to 0.74 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.4 Silver Hake

For the 11-year period between 2008 and 2018, silver fishery landings in the Lease Area totaled 655,697 pounds (an average of 59,609 pounds per year) with a total value of $395,571 (an average of $35,961 per year) (NMFS, 2020c). The pounds of Silver hake landed from the Lease Area from 2008 to 2018 are equal to 0.41 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.5 Scup

For the 11-year period between 2008 and 2018, scup landings totaled 560,844 pounds (an average of 50,986 pounds per year) with a total value of $404,710 (an average of $36,792 per year) (NMFS, 2020c). The pounds of scup landed from the Lease Area from 2008 to 2018 are equal to 0.40 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.6 Skates

Landings from the Northeast skate complex fishery in the Lease Area between 2008 and 2018 totaled 469,346 pounds (an average of 42,668 pounds per year) with a total value of $226,727 (an average of $20,612 per year) (NMFS, 2020c). The pounds of species managed under the Northeast skate complex FMP landed from the Lease Area from 2008 to 2018 are equal to 0.19 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.7 Atlantic Surfclam / Ocean Quahog

According to NROC VMS data, there was no Atlantic surfclam /ocean quahog fishing activity shown in the Lease Area between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). However, relatively low amounts of landings for Atlantic surfclam and ocean quahog (aggregated by the Atlantic Surfclam and Ocean Quahog FMP) were shown in the Lease Area in the Offshore Project Area-specific data provided by NMFS (2020c). For the 11-year period between 2008 and 2018, Atlantic surfclam and ocean quahog landings in the Lease Area totaled 78,126 pounds (an average of 8,681 pounds per year) with no landings shown in 2009 or 2011 (NMFS, 2020c). The pounds of Atlantic surfclam / ocean quahog landed from the Lease Area from 2008 to 2018 are equal to 0.01 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.8 Monkfish

According to NROC VMS data, a low to medium high amount of monkfish fishing activity occurred in the Lease Area between 2011 and 2016, primarily in the southwestern corner of the Lease Area between 2011 and 2014 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, monkfish fishery landings in the Lease Area totaled 303,202 pounds (an average of 27,564 pounds per year) with a total value of $448,625 (an average of $40,784 per year) (NMFS, 2020c). The pounds of monkfish landed from the Lease Area from 2008 to 2018 are equal to 0.15 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.9 Summer Flounder

For the 11-year period between 2008 and 2018, summer flounder fishery landings in the Lease Area totaled 94,426 pounds (an average of 8,584 pounds per year) with a total value of $260,396 (an average of $23,672 per year) (NMFS, 2020c). The pounds of summer flounder landed from the export cable corridors from 2008 to 2018 are equal to 0.16 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.10 Butterfish

For the 11-year period between 2008 and 2018, butterfish fishery landings in the Lease Area totaled 78,713 pounds (an average of 3,5787,156 pounds per year) with a total value of $42,189 (an average of $1,9183,835 per year) (NMFS, 2020c). The pounds of butterfish landed from the Lease Area from 2008 to 2018 are equal to 0.23 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.11 Spiny Dogfish

For the 11-year period between 2008 and 2018, Atlantic spiny dogfish fishery landings in the Lease Area totaled 67,266 pounds (an average of 6,115 pounds per year) with a total value of $14,649 (an average of $1,332 per year) (NMFS, 2020c). The pounds of spiny dogfish landed from the export cable corridors from 2008 to 2018 are equal to 0.06 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.12 American Lobster

The Lease Area overlaps LMAs 2 and 3 and as of 2017, there were 172 lobster permits registered in Area 2 and in 107 in Area 3 (MA DMF, 2019b). However, the portion of Area 3 that overlaps the Lease Area is very small and the number of unique lobster vessels actively fishing in the Lease Area is similarly small. The fishing effort for lobster in the Lease Area is carried out by a small number of medium-sized vessels fishing long sets of pot and trap gear laid in a well-established, well-organized pattern. This pattern has been informally determined and agreed upon as part of a well-known “gentlemen’s agreement” between fixed gear and mobile gear fishermen in the area as communicated to the Mayflower Wind FLO by lobstermen that fish in the area. This results in lobster gear being set on predetermined lines that run approximately east-west in order to decrease interactions between fixed gear fishermen and mobile gear fishermen and may also potentially decrease interactions between fixed gear fishermen and the placement of WTGs. These predetermined lines are a vestige of LORAN (Long Range Navigation), a now-defunct navigational system. Fixed gear fishermen targeting species such as lobster (but also crab) set their gear on what are known as the 0 and 5 LORAN TD (Time Difference) lines with mobile gear fishermen fishing in an east-west pattern between these lines. These vessels typically fish on overnight trips, are at sea for multiple days, and tend their gear approximately weekly. For the 11-year period between 2008 and 2018, lobster landings from the fishery in the Lease Area totaled 71,740 pounds (an average of 6,522 pounds per year) with a total value of $306,603 (an average of $27,873 per year) (NMFS, 2020c). The pounds of lobster landed from the Lease Area from 2008 to 2018 are equal to 0.04 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.13 Atlantic Mackerel

According to NROC VMS data, there is low pelagic fishing activity in the Lease Area between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, Atlantic mackerel fishery landings in the Lease Area totaled 20,615 pounds (an average of 1,874 pounds per year) with a total value of $9,055 (an average of $412 823 per year) (NMFS, 2020c). The pounds of Atlantic mackerel landed from the Lease Area from 2008 to 2018 are equal to 0.01 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.14 Golden Tilefish

For the 11-year period between 2008 and 2018, golden tilefish fishery landings in the Lease Area totaled 60,757 pounds (an average of 5,523 pounds per year) with a total value of $216,847 (an average of $19,713 per year) (NMFS, 2020c). The pounds of golden tilefish landed from the Lease Area from 2008 to 2018 are equal to 0.33 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.15 Black Sea Bass

For the 11-year period between 2008 and 2018, black sea bass landings in the Lease Area totaled 5,414 pounds (an average of 492 pounds per year) with a total value of $18,322 (an average of $1,666 per year) (NMFS, 2020c). The pounds of black sea bass landed from the Lease Area from 2008 to 2018 are equal to 0.04 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.16 Atlantic Sea Scallop

The Lease Area overlaps with the Southern New England Scallop Dredge Exemption Area (**Figure 2-11**). According to NROC VMS data, very limited areas of low sea scallop fishing activity occurred in the Lease Area between 2011 and 2014, but no scallop fishing activity was recorded between 2015 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, Atlantic sea scallop fishery landings in the Lease Area totaled 19,386 pounds (an average of 1,762 pounds per year) with a total value of $179,140 (an average of $16,285 per year) (NMFS, 2020c). The pounds of sea scallop landed from the Lease Area from 2008 to 2018 are equal to 0.004 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.17 Winter Flounder

According to NROC VMS data, there is low northeast multispecies fishing activity in the southwest portion and the northeast corner of the Lease Area between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, winter flounder fishery landings in the Lease Area totaled 6,229 pounds (an average of 566 pounds per year) with a total value of $13,899 (an average of $1,264 per year) (NMFS, 2020c). The pounds of winter flounder landed from the Lease Area from 2008 to 2018 are equal to 0.01 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.18 Haddock

According to NROC VMS data, there is low northeast multispecies fishing activity in the southwest portion and the northeast corner of the Lease Area between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, haddock fishery landings in the Lease Area totaled 5,542 pounds (an average of 504 pounds per year) with a total value of $4,026 (an average of $366 per year) (NMFS, 2020c). The pounds of haddock from the Lease Area from 2008 to 2018 are equal to 0.004 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021).

2.4.1.19 Atlantic Deep-Sea Red Crab

Due to the low fishing effort for deep-sea red crab, very limited data were available for review. Deep-sea red crab fishery landings in the Lease Area between 2008 and 2018 (data from 2010 unavailable) totaled to 6,146 pounds (an average of 559 pounds per year) with a total value of $6,267 (an average of $570 per year) (NMFS, 2020c). The pounds of Atlantic deep-sea red crab from the Lease Area from 2008 to 2018 are equal to 0.07 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c; NOAA Fisheries, 2021). Vessels are more likely to transit through the Lease Area to fish for the species off the continental shelf.

2.4.2 Commercial Fishing Activity – Export Cable Corridors

This section describes commercial fishing activity in the export cable corridors targeting the commonly caught commercial species previously identified and discussed. The same species that were discussed previously in Section 2.2.1 in the context of the entire Offshore Project Area and Section 2.4.1 in the context of the Lease Area, are discussed below in the context of the export cable corridors (**Table 2-83**). The order in which those species would be ranked based on landings differs between the Offshore Project Area and the Lease Area which were discussed previously and the export cable corridors which are discussed below. This is due to variations in species distribution, habitat types, and other factors influencing fisheries and fishing activity. Species are listed below in order of both decreasing aggregate landings and value associated with commercial fishing activity in the export cable corridors from 2008 to 2018. (NMFS, 2020c, 2021).

TABLE 2-83. NMFS MAYFLOWER WIND-SPECIFIC DATA MOST IMPACTED SPECIES IN THE EXPORT CABLE CORRIDORS SHOWN BY DECREASING LANDINGS

Rank	Species	Pounds (lbs.)	Species	Dollars ($)
1	Longfin Squid	8,215,349	Longfin Squid	$ 9,760,807
2	Atlantic Herring	5,676,414	American Lobster	$ 2,395,761
3	Skate Wings	3,436,337	Channeled Whelk	$ 1,751,449
4	All Others	1,504,038	Summer Flounder	$ 1,386,345
5	Scup	1,042,350	All Others	$ 994,048
6	Silver Hake	675,066	Scup	$ 671,153
7	American Lobster	496,354	Atlantic Herring	$ 623,967
8	Summer Flounder	412,824	Skate Wing	$ 526,760
9	Spiny Dogfish	382,873	Black Sea Bass	$ 505,180
10	Bluefish	278,444	Sea Scallops	$ 504,824
11	Jonah Crab	266,401	Silver Hake	$ 380,360
12	Atlantic Mackerel	265,318	Monkfish	$ 244,047

Rank	Species	Pounds (lbs.)	Species	Dollars ($)
13	Channeled Whelk	239,698	Jonah Crab	$ 188,223
14	Butterfish	181,315	Bluefish	$ 150,224
15	Monkfish	145,603	Butterfish	$ 111,753
16	Black Sea Bass	139,110	Knobbed Whelk	$ 101,648
17	Red Hake	99,313	Winter Flounder	$ 88,538
18	Sea Scallops	57,303	Spiny Dogfish	$ 83,645
19	Rock Crab	41,487	Atlantic Mackerel	$ 72,397
20	Winter Flounder	40,332	Yellowtail Flounder	$ 57,885
21	Shortfin Squid	36,413	Striped Bass	$ 56,331
22	Yellowtail Flounder	36,270	Cod	$ 48,665
23	Smooth Dogfish	34,254	Bonito	$ 37,402
24	Knobbed Whelk	31,883	Tautog	$ 33,993
25	Surfclam	25,763	Red Hake	$ 28,819
26	Cod	22,933	Rock Crab	$ 24,477
27	Little Tuna	19,642	Surfclam	$ 24,006
28	Kingfish	16,465	Haddock Roe	$ 19,248
29	Haddock Roe	15,888	Smooth Dogfish	$ 17,656
30	Bonito	15,049	Shortfin Squid	$ 14,724
31	Striped Bass	13,808	Kingfish	$ 12,660
32	Tautog	12,263	Golden Tilefish	$ 12,437
33	Offshore Hake	10,614	Albacore Tuna	$ 11,753
34	Horseshoe Crab	9,458	Horseshoe Crab	$ 11,344
35	Albacore Tuna	8,792	White Hake	$ 10,231
36	White Hake	7,770	Little Tuna	$ 9,352
37	Blue Crab	7,573	Lightning Whelk	$ 7,778
38	Pollock	7,412	Offshore Hake	$ 7,294
39	Redfish	4,195	Pollock	$ 6,997
40	Lightning Whelk	3,907	Weakfish	$ 6,515
41	Golden Tilefish	3,569	Blue Crab	$ 5,611
42	Weakfish	3,290	Witch Flounder	$ 4,824
43	Sea Robins	3,156	American Plaice	$ 4,448
44	American Plaice	2,985	Redfish	$ 2,510
45	Witch Flounder	2,526	Cunner	$ 1,505
46	Conger Eel	2,101	Conger Eel	$ 1,121
47	Seatrout	1,499	Sea Robin	$ 821
48	Blueback Herring	1,096	John Dory	$ 681
49	Cunner	867	Triggerfish	$ 664
50	John Dory	641	Blueback Herring	$ 582
51	Triggerfish	548	Seatrout	$ 523
52	Menhaden	519	American Eel	$ 445
53	Sand-dab Flounder	393	Atlantic Halibut	$ 353
54	Crab	251	Thresher Shark	$ 195
55	Thresher Shark	233	Sea Raven	$ 193
56	Sea Raven	163	Windowpane Flounder	$ 192
57	Atlantic Croaker	162	Crab	$ 128
58	Fourspot Flounder	111	Menhaden	$ 127
59	Eel	86	Hard Quahog	$ 126
60	Spot	58	Blueline Tilefish	$ 104
61	Chub Mackerel	54	Eel	$ 81

Rank	Species	Pounds (lbs.)	Species	Dollars ($)
62	American Eel	48	Atlantic Croaker	$ 69
63	Atlantic Halibut	47	Fourspot Flounder	$ 43
64	Blueline Tilefish	44	Cusk	$ 40
65	Ocean Pout	42	Chub Mackerel	$ 37
66	Cusk	40	Wolffish	$ 31
67	Wolffish	35	Spanish Mackerel	$ 27
68	Spanish Mackerel	25	Spot	$ 23
69	Hard Quahog	19	Ocean Pout	$ 20
70	Other Finfish	7	Mahi Mahi	$ 19
71	Mahi Mahi	6	American Shad	$ 4
72	American Shad	5	Cobia	$ 3
73	Cobia	1	Other Finfish	$ 2
74	King Mackerel	1	King Mackerel	$ 2

Source: NMFS, 2020c; NMFS, 2021.

2.4.2.1 Longfin Squid

According to NROC VMS data, there were very high concentrations of squid fishing activity along the export cable corridors, particularly just south of Muskeget Channel, Nantucket, and Martha's Vineyard (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). High concentrations of activity were also recorded in the Falmouth export cable corridor in Nantucket Sound but there was limited activity near the Falmouth landfall site and no activity near the Brayton Point landfall site. For the 11-year period between 2008 and 2018, longfin squid landings in the export cable corridors totaled 8,215,349 pounds (an average 746,850 pounds per year) with a total value of $9,760,807 (an average of $887,346 per year) (NMFS, 2020c). The pounds of longfin squid landed from the export cable corridors from 2008 to 2018 are equal to 2.87 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.2 Atlantic Herring

According to NROC VMS data, no Atlantic herring fishing activity occurred in the Falmouth export cable corridor or near the proposed landfall sites between 2011 and 2016 but low to medium high did occur during that timeframe in the Brayton Point export cable corridor (Shmookler, 2015; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, Atlantic herring fishery landings in the export cable corridors totaled 5,676,414 pounds (an average of 516,038 pounds per year) with a total value of $623,967 (an average of $56,724 per year) (NMFS, 2020c). The pounds of Atlantic herring landed from the export cable corridors from 2008 to 2018 are equal to 0.28 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.3 Jonah Crab

For the 11-year period between 2008 and 2018, Jonah crab landings in the export cable corridors totaled 266,401 pounds (an average of 24,218 pounds per year) with a total value of $188,223 (an average of $17,111 per year) (NMFS, 2020c). The pounds of Jonah crab landed from the export cable corridors from 2008 to 2018 are equal to 0.2 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.4 Silver Hake

For the 11-year period between 2008 and 2018, silver hake landings in the export cable corridors totaled 675,066 pounds (an average of 61,370 pounds per year) with a total value of $380,360 (an average of $34,578 per year) (NMFS, 2020c). The pounds of Silver hake landed from the export cable corridors from 2008 to 2018 are equal to 0.44 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.5 Scup

Scup landings totaled 1,042,350 pounds (an average of 94,759 pounds per year) with a total value of $671,153 (an average of $61,014 per year) (NMFS, 2020c). The pounds of scup landed from the export cable corridors from 2008 to 2018 are equal to 0.83 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.6 Skates

For the 11-year period between 2008 and 2018, landings of species of skate managed under the Northeast Skate Complex FMP in the export cable corridors totaled 3,436,337 pounds (an average of 312,394 pounds per year) with a total value of $526,760 (an average of $47,887 per year) (NMFS, 2020c). The pounds of species managed under the Northeast skate complex FMP landed from the export cable corridors from 2008 to 2018 are equal to 1.38 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.7 Atlantic surfclam / ocean quahog

According to NROC VMS data, there was no Atlantic surfclam or ocean quahog fishing activity from 2015 to 2016 but low to medium high activity from 2011 to 2014 in the Falmouth export cable corridor south of Muskeget Channel and there was low to medium high activity from 2011 to 2016 in the Brayton Point export cable corridor (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). As explained above, data for Atlantic surfclams and ocean quahogs is only available for the Lease Area and Falmouth export cable corridor (see Table 2-83). Landings of Atlantic surfclam / ocean quahog in the Falmouth export cable corridor between 2008 and 2018 totaled to 275,899 pounds (an average of 25,082 pounds per year) with a total value of $204,437 (an average of $18,585 per year) (NMFS, 2020c). The pounds of Atlantic surfclam / ocean quahog landed from the Falmouth export cable corridor from 2008 to 2018 are equal to 0.04 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.8 Monkfish

According to NROC VMS data, there was low to very high monkfish fishing activity occurred in the export cable corridors and near the proposed landfall sites between 2011 and 2016, particularly in the Sakonnet River in the Brayton Point export cable route and south of Muskeget Channel in the Falmouth export cable corridor (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, monkfish fishery landings in the export cable corridors totaled 145,603 pounds (an average of 13,237 pounds per year) with a total value of $244,047 (an average of $22,186 per year)

(NMFS, 2020c). The pounds of monkfish landed from the export cable corridors from 2008 to 2018 are equal to 0.14 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.9 Summer Flounder

For the 11-year period between 2008 and 2018, summer flounder fishery landings in the export cable corridors totaled 412,824 pounds (an average of 37,529 pounds per year) with a total value of $1,386,345 (an average of $126,031 per year) (NMFS, 2020c). The pounds of summer flounder landed from the export cable corridors from 2008 to 2018 are equal to 0.40 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.10 Butterfish

For the 11-year period between 2008 and 2018, butterfish fishery landings in the export cable corridors totaled 181,315 pounds (an average of 16,483 pounds per year) with a total value of $111,753 (an average of $10,159 per year) (NMFS, 2020c). The pounds of butterfish landed from the export cable corridors from 2008 to 2018 are equal to 0.79 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.11 Spiny Dogfish

For the 11-year period between 2008 and 2018, spiny dogfish fishery landings in the export cable corridors totaled 382,873 pounds (an average of 34,807 pounds per year) with a total value of $83,645 (an average of $7,604 per year) (NMFS, 2020c). The pounds of spiny dogfish landed from the export cable corridors from 2008 to 2018 are equal to 0.29 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.12 American Lobster

In the export cable corridors and nearer to the landfall areas there is a larger number of small-sized vessels fishing smaller gear sets while operating as day boats (i.e., returning to their home ports which are close to where they are fishing). In 2018 Massachusetts issued 1,056 Coastal Lobster Permits, which is effectively inshore and nearer to the export cable corridors and landfall areas. This is in comparison to the 295 Offshore Lobster Permits issued to vessels that fish outside of Massachusetts coastal waters pursuant to their holding a federal lobster permit, which is effectively offshore and nearer to the Lease Area (MA DMF, 2019b). Because of the reporting requirements for lobster in much of the export cable corridors and near landfall areas, detailed landings data is limited; however, state and port level data provide insight showing that this fishery remains important. From the 11-year period between 2008 and 2018, lobster landings in the fishery in the export cable corridors and landfall areas totaled 496,354 pounds (an average of 45,123 pounds per year) with a total value of $2,395,761 (an average of $217,796 per year) (NMFS, 2020c). The pounds of lobster landed from the export cable corridors from 2008 to 2018 are equal to 0.24 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.13 Atlantic Mackerel

According to NROC VMS data, there was high to very high pelagic fishing activity in the Falmouth export cable corridor immediately south of Muskeget Channel between 2011 and 2016 while in the Brayton Point export cable corridor, there was medium low activity from 2011 to 2014 and medium high to very high activity from 2015 to 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). There was no to a low amount of pelagic fishing activity near the proposed landfall sites. From the 11-year period between 2008 and 2018, Atlantic mackerel fishery landings in the export cable corridors totaled 265,318 pounds (an average of 24,120 pounds per year) with a total value of $72,397 (an average of $6,582 per year). The pounds of Atlantic mackerel landed from the export cable corridors from 2008 to 2018 are equal to 0.04 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.14 Golden Tilefish

For the 11-year period between 2008 and 2018, golden tilefish landings in the export cable corridors totaled 3,569 pounds (an average of 325 pounds per year) with a total value of $12,437 (an average of $1,131 per year) (NMFS, 2020c). The pounds of golden tilefish landed from the export cable corridors from 2008 to 2018 are equal to 0.02 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.15 Black Sea Bass

For the 11-year period between 2008 and 2018, black sea bass fishery landings in the export cable corridors totaled 139,110 pounds (an average of 12,646 pounds per year) with a total value of $505,180 (an average of $45,925 per year) (NMFS, 2020c). The pounds of black sea bass landed from the export cable corridors from 2008 to 2018 are equal to 0.99 percent of the total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.16 Atlantic Sea Scallop

The export cable corridors and proposed landfall sites overlap with the Southern New England Scallop Dredge Exemption Area (NOAA Fisheries, 2020). According to NROC VMS data, primarily low sea scallop fishing activity occurred in the in the export cable corridors and near the proposed landfall sites between 2011 and 2016 with some areas of medium high activity, particularly south of Muskeget Channel (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). For the 11-year period between 2008 and 2018, Atlantic sea scallop fishery landings in the export cable corridors totaled 57,303 pounds (an average of 5,209 pounds per year) with a total value of $504,824 (an average of $45,893 per year) (NMFS, 2020c). The pounds of sea scallop landed from the export cable corridors from 2008 to 2018 are equal to 0.01 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.17 Winter Flounder

According to NROC VMS data, there is medium to high northeast multispecies fishing activity in the Falmouth export cable corridor and low to medium low activity in the Brayton Point export cable corridor between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). There is also low

fishing activity near the proposed landfall sites. For the 11-year period between 2008 and 2018, winter flounder fishery landings in the export cable corridors totaled 40,332 pounds (an average of 3,667 pounds per year) with a total value of $88,538 (an average of $8,049 per year) (NMFS, 2020c). The pounds of winter flounder landed from the export cable corridors from 2008 to 2018 are equal to 0.22 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.18 Haddock

According to NROC VMS data, there is medium to high northeast multispecies fishing activity in the Falmouth export cable corridor and low to medium low activity in the Brayton Point export cable corridor between 2011 and 2016 (NROC, 2018; see **Figure 2-17** and **Figure 2-18**). There is also low fishing activity near the proposed landfall sites. For the 11-year period between 2008 and 2018, haddock landings in the export cable corridors totaled 15,888 pounds (an average of 1,444 pounds per year) with a total value of $19,248 (an average of $1,750 per year) (NMFS, 2020c). The pounds of haddock landed from the export cable corridors from 2008 to 2018 are equal to 0.02 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021).

2.4.2.19 Atlantic Deep-Sea Red Crab

Because deep-sea red crabs occur off the U.S. Atlantic continental shelf edge, fishing activity for the species in the Lease Area is relatively low. In 2012, 2016, and 2018, deep-sea red crab landings in the export cable corridors totaled 144 pounds (an average of 48 pounds per year) with a total value of $144 (an average of $48 per year) (NMFS, 2020c). The pounds of Atlantic deep-sea red crab from the export cable corridors from 2008 to 2018 are equal to 0.002 percent of total pounds landed in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey over the same period (NMFS, 2020c, 2021; NOAA Fisheries, 2021). Vessels are more likely to transit through the Lease Area to fish for the species off the continental shelf.

3 RECREATIONAL FISHERIES

Saltwater recreational fishing takes place from shore, aboard private or rented boats, and on boats that take passengers for-hire. For-hire boats include charter boats, which generally carry six or fewer passengers and charge a boat rental fee, as well as head boats (also known as party boats), which generally carry 10 or more passengers and charge by the person. Both for-hire and private angler recreational fishing is an important economic activity in Massachusetts and Rhode Island and throughout the region and at associated onshore facilities. For-hire recreational fishing can be assessed from either a boat level or angler level. Boat-level recreational fishing activity is assessed in terms of the average annual number and percentage of exposed boats, trips, and revenues while angler-level recreational fishing activity is assessed in terms of average annual number and percentage of exposed angler trips and expenditures. Approximately 430 such boats are ported in Massachusetts and 96 are registered in Rhode Island (Steinback and Brinson, 2013). In 2016, 7,244,235 angler trips were estimated to occur in state and federal waters off the coast of Massachusetts and 2,998,761 were estimated to occur in state and federal waters off the coast of Rhode Island (NOAA Fisheries, 2019a). Recreational fishing also includes private anglers involved in not-for-hire fishing activity from the shore or private vessels in the area. Species targeted by this fishing community exist throughout the entire near coastal region and also within the MA/RI WEA. Commonly caught species for recreational fishing include Atlantic cod, Atlantic mackerel, bluefish, haddock, scup, striped bass, summer flounder, and tautog (NOAA Fisheries, 2020b; MA DMF 2021; RIDEM 2020d).

In 2016, across New England, for-hire fishing trip expenditures brought in around $48 million and made about 226,000 angler trips (NMFS, 2018). Shore and private boat recreational fishing trip expenditures in New England generated around $215 million in 2016 and made approximately six million angler trips (for further socioeconomic data, see **Table 3-1**). Sales in 2016 (encompassing direct sales from anglers (for-hire and private) and indirect sales resulting from the original angler sale) for Massachusetts, Connecticut, and Rhode Island were about $1 billion, $430 million, and $412 million, respectively (NMFS, 2018).

TABLE 3-1. RECREATIONAL FISHERY TRIPS AND JOBS GENERATED IN SOUTHERN NEW ENGLAND IN 2016

State	Trips	Jobs Generated
For-Hire		
Massachusetts	93,000	350
Rhode Island	45,000	113
Connecticut	38,000	63
Shore and Private Anglers		
Massachusetts	2,000,000	1,109
Rhode Island	1,000,000	198
Connecticut	1,000,000	295

Source: NMFS, 2018

Subsection 3.1 below provides an overview of commonly caught recreational species (MA DMF, 2020a; RIDEM 2021d). Some recreational finfish and shark fishing activities are federally regulated under the

Consolidated Atlantic Highly Migratory Species FMP and are reviewed in . Potential occurrence of recreational fishing activity in the Offshore Project Area is estimated using abundance and distribution and habitat characterization data of species known to occur in Offshore Project Area (NOAA, 2020c). This occurrence is also assessed more broadly using estimates of exposure using the Kirkpatrick et al. study (2017). Section 6.7 of the Mayflower Wind COP and Appendix N provide further detailed information on the different life stages of commonly caught fish species in the Offshore Project Area; Section 6.6 of the Mayflower Wind COP and Appendix M provide further detailed information on commonly caught shellfish species in the Offshore Project Area.

Similar to commercial fisheries, climate change effects are expected to have major implications on recreational fishing activity and management due to changes in abundance and distribution for fish and shellfish species vulnerable to increasing fluctuations in oceanic conditions (Townhill, et al., 2019; Szuwalski and Hollowed, 2016; Doney, et al., 2012). Species vulnerable to increasing ocean temperatures are expected to shift northward to colder, deeper waters and recruitment is expected to decrease for species that require specific habitat characteristics during their early life stages that are altered as a result of climate change.

A secondary impact of climate change is expected to arise as recreational fishery resources, and thus fishing activity, are redistributed, which could have negative implications for communities that depend socioeconomically on recreational fisheries (Mendenhall et al., 2020). Mayflower Wind will continually coordinate with researchers and fishing associations to monitor potential changes to commercial and recreational fishing in the region throughout the life of the Project.

3.1 MANAGEMENT

3.1.1 Federal

For-hire and private angling recreational fishing activities are managed on a federal level by the National Saltwater Recreational Fisheries Program in the Greater Atlantic Region in conjunction with the MAFMC and the NEFMC (NOAA Fisheries, 2020b). Relevant federal regulations cover the U.S. Atlantic Coast 3 to 200 nm (5.6 to 370.4 km) from shore from Maine to North Carolina. The National Saltwater Recreational Fisheries Program is responsible for monitoring recreational catch and VMS reporting, and implementing restrictions to conserve the fishery stocks. While most recreational fishing permits are regulated on a state-level, there are some exceptions. Recreational and for-hire fishing of Atlantic HMS require a federal permit. For-hire captain fishing in federal waters requires a Greater Atlantic Region Vessel Charter/Party Permit; the permit allows fishing of several federally regulated species, such as summer flounder, black sea bass, Atlantic mackerel, bluefish, lobster, and New England groundfish.

3.1.2 State

Many recreational fisheries occurring in state waters are managed by FMPs developed by the ASMFC with oversight and input from the state level via representation on Species Management Boards and Sections, Advisory Panels, and other bodies that inform FMP decisions (ASMFC, 2021). Relevant FMPs for recreational fisheries include the American Lobster, Atlantic Striped Bass, Black Sea Bass, Bluefish, Scup, Summer Flounder, Tautog, and Winter Flounder FMPs. State-level for-hire and private angling recreational fishing activities are managed in Massachusetts by the MA DMF under 322 Code of Massachusetts Regulations and in Rhode Island by RIDEM under Title 250, Chapter 90 of the Rhode

Island Code of Regulations (MA DMF, 2020a; RIDEM, 2021e, 2021f). Relevant regulations for both Massachusetts and Rhode Island state-managed recreational fisheries extend to 3 nm (5.6 km) from each of the respective shorelines. Similar to Greater Atlantic Region National Saltwater Recreational Fisheries Program regulations, MA DMF and RIDEM both monitor recreational catch and implements restrictions on fishing seasons, catch sizes, and catch limits. MA DMF and RIDEM also oversee saltwater fishing permitting for recreational fisheries that are not federally regulated, particularly for private anglers not fishing for Atlantic HMS.

3.2 COMMONLY CAUGHT RECREATIONAL SPECIES

The subsections below review commonly caught recreational species in and around the Offshore Project Area.

3.2.1 Federal

TABLE 3-2. RECREATIONAL FINFISH/SQUID - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
American plaice	Lease Area	Year round
Atlantic cod	Lease Area, ECCs	Year round
Atlantic herring	Lease Area, ECCs	Year round
Atlantic mackerel	Lease Area, ECCs	Year round
Black sea bass	Lease Area, ECCs	Feb 1-28/29; May 14-Dec 31
Bluefish	Lease Area, ECCs	Year round
Blueline tilefish	Lease Area, ECCs	May 1-Oct 31
Butterfish	Lease Area, ECCs	Year round
Cusk	Lease Area, ECCs	Year round
Golden tilefish	Lease Area, ECCs	Year round
Monkfish	Lease Area, ECCs	Year round
Haddock	Lease Area, ECCs	Year round
Hake (red, white, silver)	Lease Area, ECCs	Year round
Longfin squid	Lease Area, ECCs	Year round
Offshore hake	Lease Area, ECCs	Year round
Pollock	Lease Area, ECCs	Year round
Scup	Lease Area, ECCs	Year round
Shortfin squid	Lease Area, ECCs	Year round
Tautog	Lease Area, ECCs	Year round
Weakfish	Lease Area, ECCs	Year round
Winter flounder	Lease Area, ECCs	Year round
Witch flounder	Lease Area, ECCs	Year round
Yellowtail flounder	Lease Area, ECCs	Year round

Source: NOAA Fisheries, 2021

TABLE 3-3. RECREATIONAL SHARKS/SKATES (NON-ATLANTIC HMS) - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Skate (clearnose, little, rosette, winter)	Lease Area, ECCs	Year round
Spiny dogfish	Lease Area, ECCs	Year round

Source: NOAA Fisheries, 2021

TABLE 3-4. RECREATIONAL ATLANTIC HMS – OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Albacore tuna	Lease Area, ECCs	Year round
Atlantic bigeye tuna	Lease Area, ECCs	Year round
Atlantic sharpnose shark	Lease Area, ECCs	Year round
Blue marlin	Lease Area	Year round
Hammerhead shark[1]	Varied – see Mayflower Wind COP Section 6.7	Year round
Skipjack tuna	Lease Area, ECCs	Year round
Smoothhead shark	Lease Area, ECCs	Year round
Swordfish	Lease Area	Year round
White marlin	Lease Area	Year round
Yellowfin tuna	Lease Area, ECCs	Year round

1 Hammerhead shark recreational permitting regulations also include shortfin mako, blacktip, bull, lemon, nurse, spinner, tiger, blacknose, finetooth, blue, oceanic whitetip, porbeagle, and thresher sharks.
Source: NOAA 2020

TABLE 3-5. RECREATIONAL SHELLFISH - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Atlantic surfclam	Lease Area, ECCs	Year round
Ocean quahog	Lease Area, ECCs	Year round

TABLE 3-6. RECREATIONAL LOBSTER – OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
American lobster	Lease Area, ECCs	Year round

3.2.2 State

TABLE 3-7. RECREATIONAL FINFISH - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
American eel	ECCs, Lease Area	Year round
American plaice	Lease Area	Year round
American shad	Lease Area	Year round
Atlantic cod	Lease Area, ECCs	Year round
Black sea bass	Lease Area, ECCs	May 18 – Sep 8 in MA; Jun 24 – Aug 31 and Sep 1 – Dec 31 in RI
Bluefish	Lease Area, ECCs	Year round
Monkfish	Lease Area, ECCs	Year round
Haddock	Lease Area, ECCs	Year round
Halibut	Lease Area	Year round
Pollock	Lease Area, ECCs	Year round
Scup	Lease Area, ECCs	Year round
Striped bass	Lease Area, ECCs	Year round
Summer flounder	Lease Area, ECCs	May 23 - Oct 9 in MA; May 3 – Dec 31 in RI
Tautog	Lease Area, ECCs	Apr 1- Dec 31
Weakfish	ECCs	Year round
White perch	ECCs	Year round
Winter flounder	Lease Area, ECCs	Mar 1 - Dec 31
Witch flounder	Lease Area, ECCs	Year round
Yellowtail flounder	Lease Area, ECCs	Year round

Source: RIDM, 2021c; MA DMF, 2020a

TABLE 3-8. RECREATIONAL SHARKS/SKATES – OVERVIEW[1]

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Atlantic sharpnose shark	Lease Area, ECCs	Year round
Finetooth shark	Lease Area, ECCs	Year round
Hammerhead shark	Varied – see Mayflower Wind COP Section 6.7	Year round
Shortfin mako	Lease Area, ECCs	Year round
Smooth dogfish	Lease Area, ECCs	Year round
Spiny dogfish	Lease Area, ECCs	Year round

1 Federal regulations may differ from state regulations
Source: RIDM, 2021c; MA DMF, 2020a

TABLE 3-9. RECREATIONAL SHELLFISH - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Bay scallop	ECCs	Oct 1 – Apr 1 in MA, Nov 1 – Dec 31 in RI but can vary by town
Whelk	ECCs	Varies by town
Oyster	ECCs	Varies by town, Sep 15 -May 15 in RI
Northern Quahog	ECCs	Varies by town
Atlantic sea scallop	Lease Area, ECCs	Oct 1 – Mar 31
Softshell clam	ECCs	Varies by town
Atlantic surfclam	Lease Area, ECCs	Varies by town

Source: RIDM, 2021c; MA DMF, 2020a

TABLE 3-10. RECREATIONAL LOBSTER - OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
American lobster	ECCs	Varies by area and harvest method

Source: RIDM, 2021c; MA DMF, 2020a

TABLE 3-11. RECREATIONAL CRAB – OVERVIEW

Species	Potential Occurrence in the Offshore Project Area	Permitted Season
Blue crab	ECCs	Varies by area and harvest method
Other edible crabs[1]	ECCs	Varies by area and harvest method
Invasive crabs[2]	ECCs	Varies by area and harvest method

1 Other edible crabs include rock crab, Jonah crab, etc.
2 Invasive crabs include green crabs.
Source: RIDM, 2021c; MA DMF, 2020a

3.2.3 Recreational Fishing Activity in the Kirkpatrick Study Area

Similar to the discussion of commercial fishery exposure, Kirkpatrick et al. (2017) discusses recreational fishery exposure. Recreational fishing aboard for-hire and private boats is considered to be exposed if it occurred within 1 nm (1.9 km) of Kirkpatrick Study Area. As shown in , the average annual exposure to Massachusetts-based for-hire angler trips, private angler trips, and for-hire private angler trips to total expenditures between 2007-2012 equals 0.1 percent, 1.0 percent, and 4.4 percent, respectively while the average annual exposure to Rhode Island-based trips of the same categories are 0.6 percent, 0.1 percent, and 0.4 percent in the same order (Kirkpatrick et al., 2017).

TABLE 3-12. STATE-LEVEL AVERAGE ANNUAL EXPOSURE OF RECREATIONAL FISHERIES TO THE KIRKPATRICK STUDY AREA, 2007–2012

State	Total For-Hire Boat Trips	Percent Total For-Hire Boat Trips Exposed	Total For-Hire Angler Trips	Percent Total For-Hire Angler Trips Exposed	Total Private Angler Trips	Percent Total Private Angler Trips Exposed	Total Angler Expenditures (Private and For-Hire)	Percent Total Expenditures Exposed
MA	3,972	0.6	54,118	0.1	1,912,662	1	$27,192,915	4.4
NH	1,992	~0	49,449	~0	158,473	~0	$3,717,740	~0
NY	7,027	0.2	128,062	0.1	2,652,092	~0	$23,166,177	0.1
RI	2,264	0.5	23,558	0.6	542,768	0.1	$13,400,145	0.4

Source: Kirkpatrick et al., 2017

TABLE 3-13. STUDY AREA AVERAGE ANNUAL PRIVATE AND FOR-HIRE RECREATIONAL EXPOSURE BY PORT GROUP, 2007–2012

State	Port Group	Exposed For-Hire Boat Trips	Percent For-Hire Boat Trips Exposed	Exposed For-Hire Angler Trips	Exposed Private Angler Trips	Percent Total Angler Trips Exposed	Total Angler Expenditures (Private and For-Hire)	Percent Total Expenditures Exposed
MA	Barnstable	2	0.6	10	0	~0	$10,871,936	~0
	Chilmark	0	0	0	293	10	$186,517	10
	Edgartown	~0	8.3	1	344	10	$221,693	10
	Falmouth	1	0.9	7	10,150	9.8	$7,155,353	9.1
	Nantucket	1	2.4	3	3,775	10	$2,441,297	9.9
	New Bedford	~0	0.3	0	0	~0	$3,180,682	~0
	Oak Bluffs	1	33.3	4	624	10	$401,243	10.2
	Onset	1	1.8	7	0	0.2	$567,858	0.4
	Other Dukes	0	0	0	291	10	$185,329	10
	Tisbury	~0	25	1	3,109	10	$1,981,008	10
NY	City Island	~0	0.2	11	0	~0	$2,472,905	0.1
	Greenport	~0	0.6	1	0	~0	$3,627,097	~0
	Montauk	16	0.5	79	0	~0	$17,066,175	0.1
RI	Little Compton	0	0	0	486	4	$483,178	4
	Narragansett	8	0.4	130	0	0.1	$7,788,984	0.3

State	Port Group	Exposed For-Hire Boat Trips	Percent For-Hire Boat Trips Exposed	Exposed For-Hire Angler Trips	Exposed Private Angler Trips	Percent Total Angler Trips Exposed	Total Angler Expenditures (Private and For-Hire)	Percent Total Expenditures Exposed
	New Shoreham	0	0	0	47	3.1	$108,699	1.7
	Newport	~0	0.8	~0	0	~0	$1,179,298	~0
	South Kingstown	2	2	11	0	~0	$2,369,047	0.1
	Tiverton	~0	1.9	1	0	~0	$255,127	0.1
	Westerly	1	1.4	7	0	~0	$1,215,813	0.1
Total		**34**	**0.6**	**271**	**19,119**	**1.8**	**$67,476,977**	**1.9**

Source: Kirkpatrick et al., 2017

Recreational fishing locations do exist in and around the Offshore Project Area. below lists commonly targeted locations, their relative location, and species targeted (Steinback and Brinson, 2013). **Figure 3-1** shows their location relative to the Offshore Project Area.

TABLE 3-14. RECREATIONAL FISHING LOCATIONS WITHIN OR NEAR THE MA/RI WEA

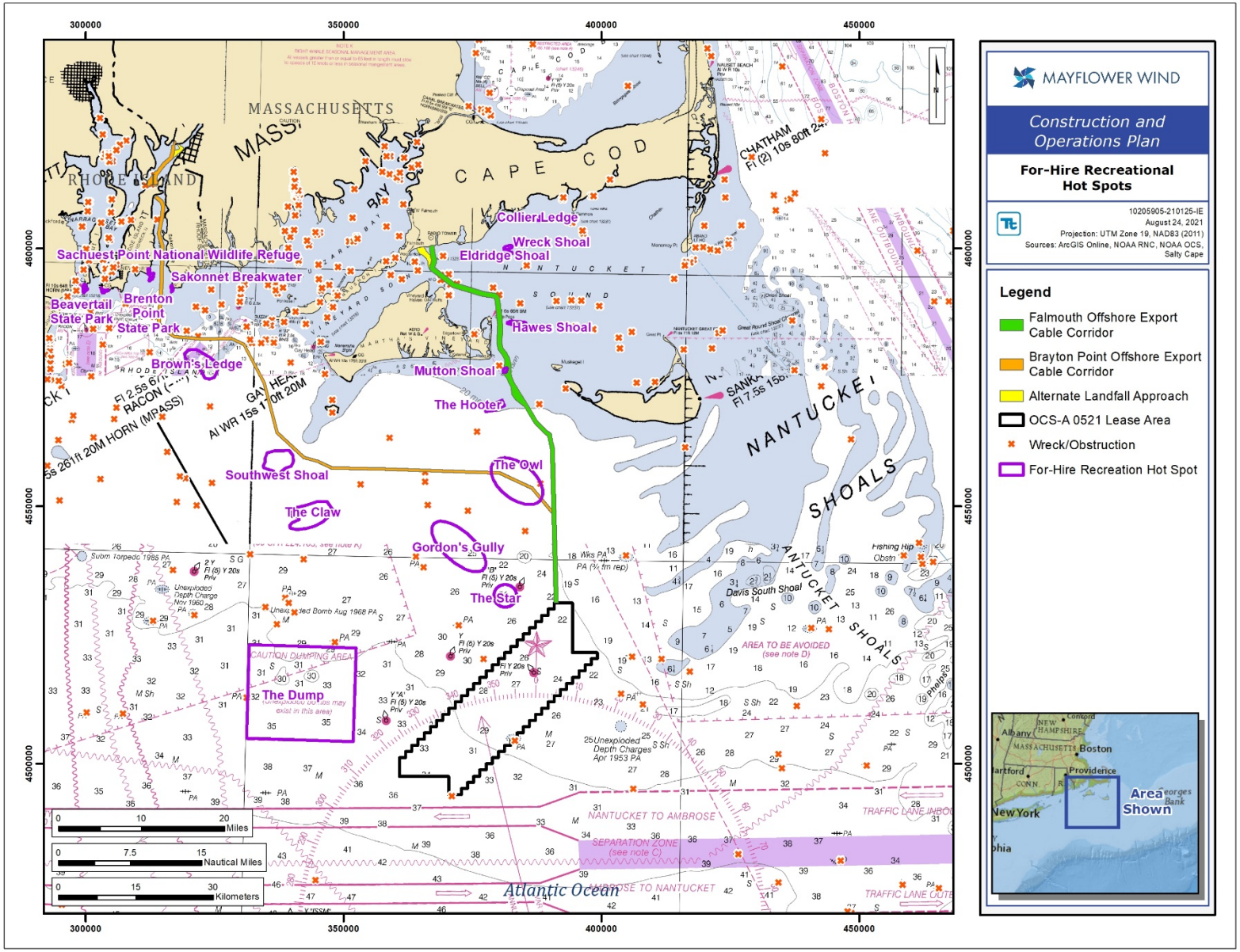
Name of Fishing Location	Location	Fish species commonly caught
The Dump	Approximately 100 mi^2 (260 km^2) in size. According to NOAA charts located southerly end of the MA/RI WEA	Yellowfin tuna, albacore tuna, and mahi mahi
The Star	Along 25 fathom line outside the Offshore Project Area	Yellowfin tuna
Gordon's Gully	Along 25 fathom line outside the Offshore Project Area	Late June/early July bluefin tuna, Mako, and thresher sharks
The Owl	Along 20 fathom line outside the Offshore Project Area	Late June/early July bluefin tuna, Mako, and thresher sharks
Mutton Shoal	Located in Muskeget Channel	Striped bass, bluefish, false albacore, bonito, summer flounder, black sea bass, and scup.
Hawes Shoal	North of Muskeget Channel	
Eldridge Shoal	In Nantucket Sound	
Wreck Shoal	In Nantucket Sound	
Colliers Ledge	In Nantucket Sound	
The Hooter	Marker for the end of Muskeget Channel southwest of Martha's Vineyard	Striped bass, bluefish in mid-May, bonito, and false albacore
Beavertail State Park	Southern tip of Jamestown, RI	Striped bass, bluefish, summer flounder, black sea bass, and scup.
The Breakwater at Sakonnet Point	Southwestern tip of Little Compton, RI; entry to Sakonnet Harbor	
Brenton Point State Park	Southwestern tip of Newport, RI	
Brown's Ledge	South of Sakonnet Point in Rhode Island Sound	Striped bass, bluefish, scup, black sea bass, tautog, bonito, and Atlantic cod
Southwest Shoal	Southwest of Nomans Land	Striped bass, bluefish, and bonito

NOAA's MRIP data for 2016 indicate that, for recreational fisheries, cod, hake, striped bass, and mackerel were the most caught species within Massachusetts while black sea bass, scup, and summer flounder were the most caught species within Rhode Island. The for-hire recreational fishing fleets contribute to the overall economy in the broader region, not just through direct employment, income, and gross revenues of the for-hire businesses, but also through spending on products and services to maintain and operate their vessels, triggering further indirect multiplier effects that are dependent upon the initial demands of the for-hire fleet (Steinback and Brinson, 2013). Other species previously mentioned such as bluefish, bonito, and false albacore are commonly targeted on both for-hire and private angler trips. Recreational shellfishing, often conducted by private individuals from shore, is also prevalent in Massachusetts, Rhode Island, and the broader region.

3.2.4 Recreational Fishing Activity in the Offshore Project Area

Spatial recreational fishing activity data are limited in comparison to commercial fisheries largely due to decreased reporting requirements. Based on known recreational fishing locations near the Offshore Project Area and the habitat preferences for commonly caught recreational species (**Figure 3-1**),

recreational fishing occurs in the Lease Area and in the export cable corridors, with higher concentrations of recreational fishing in the export cable corridors and near the landfall sites. Species targeted and fishing methods used are consistent with those used in the broader region (MA DMF, 2021; RIDEM, 2021d). Differences in habitat composition and distance from shore largely account for the Lease Area and the export cable corridors exhibiting lower and higher concentrations, respectively, of recreational fishing activity relative to each other. For species-specific information on fish and invertebrate species abundance and distribution, see Chapter 6, Section 6.9 of the Mayflower Wind COP and Appendix N.



Sources: NOAA Office of Coast Survey, 2009 and 2011; Salty Cape, n.d.

FIGURE 3-1. RECREATIONAL FISHING LOCATIONS

4 OUTREACH ACTIVITIES WITH THE COMMERCIAL AND RECREATIONAL FISHING INDUSTRIES

Mayflower Wind has been and remains actively engaged in outreach and two-way communication with the commercial and recreational fishing industries and maintains productive relationships with fishing organizations in the area. Mayflower Wind's FLO and other members of the Fisheries Communication Team talk directly with fishermen, sit on boards and working groups of organizations alongside fishermen, and engage directly with fishermen in scientific research and other efforts. Project development and design has been and will continue to incorporate input from stakeholders in the fishing industry in a way that allows it to minimize interference with fishermen that have been fishing in the region area for hundreds of years. Mayflower Wind will continue to strengthen existing and build new relationships with fishing organizations throughout Project development, construction, and operations.

Those in the fishing community that Mayflower Wind has communicated with range from individuals to fishing captains to large businesses, and the organizations with whom Mayflower Wind has communicated range from federal agencies to non-profits to task forces. Mayflower Wind's work with fishing organizations extends beyond just outreach and extends into the support of research on and the understanding of the overlap of fisheries and offshore wind. However, in addition to those goals, Mayflower Wind's involvement in organizations such as the Responsible Offshore Science Alliance (ROSA), the Fisheries Technical Working Group of the New York State Renewable Energy Development Authority, and the Commonwealth of Massachusetts Fisheries and Habitat Working Groups on Offshore Wind Energy has also proven to be a productive outreach opportunity to gain knowledge and perspective from the fishing industry. Mayflower Wind worked alongside the fishing industry and other offshore wind developers to establish ROSA to advance regional research and monitoring of fisheries and offshore wind interactions in federal waters. Mayflower Wind was an initial funder of ROSA to advance regional research and monitoring of fisheries and offshore wind interactions through collaboration and cooperation. Mayflower Wind was an early supporter in providing more structured input and communication processes to explore improved approaches to project siting, design, and operations between the fishing and offshore wind industries. A notable accomplishment of this effort was the guidance schemes on marking and numbering of offshore WTGs that have been applied by MA-RI developers, including Mayflower Wind.

Mayflower Wind is currently working with three Fisheries Representatives (FRs), the Massachusetts Lobstermen's Association (MLA), the New Bedford Port Authority (NBPA), and the Commercial Fisheries Center of Rhode Island (CFCRI). Mayflower Wind's FRs collaborate on initiatives that minimize impacts to fisheries in the Offshore Project Area, provide information to Mayflower Wind from the fishing industry, and disseminate information from Mayflower Wind to the fishing industry.

The MLA is a member-driven organization that accepts and supports the interdependence of species conservation and the members' collective economic interests (MLA, 2021). Mayflower Wind scientists and MLA will work together to identify potential impacts to the lobstering community in the Offshore Project Area and collaborate on science initiatives that will help to better understand natural impacts to

lobster in the region and to investigate potential impacts or changes to lobster populations with the introduction of WTGs.

The NBPA focuses on industry outreach and collaboration by implementing the best management practices over port resources and developing economic growth strategies for New Bedford (NBPA, 2021). The number of boats utilizing the port provides strong representation of the local commercial fishing industry and Mayflower Wind's relationship with the Port and its vessels is critical to collaboratively minimizing potential impacts to fishermen.

The CFCRI was founded to preserve commercial fishing as a profession, culture, and way of life through promoting the sustainability of the resource. The CFCRI brings fishermen, scientists, managers, and elected officials together in a collaborative effort to improve fisheries and the understanding of the marine environment (CFCRI, 2021).

Outreach from the Mayflower FLO has and will continue to include direct communication with fishing vessels that operate in and around the Offshore Project Area on a one-on-one basis and also by conducting group information sharing forums, known as port hours. Port hours, where the Mayflower Wind FLO, along with MA/RI FLOs listen to and gather information from fishermen while also disseminating information to fishermen, were held throughout 2020 and are ongoing in 2021, primarily in New Bedford, Massachusetts and Point Judith, Rhode Island.

Additional information on outreach conducted by the Mayflower Wind Fisheries Communication Team and FLO, particularly as it pertains to Project design, geotechnical and geophysical survey design and coordination, the understanding of potential effects of the Project, and avoidance, minimization, and mitigation measures is provided in Section 11 of the COP.

4.1 Fisheries Communication Plan

Mayflower Wind has developed a Fisheries Communication Plan (FCP) for the Project, Appendix W of the COP. The FCP was developed per BOEM's 2020 guidance that includes Best Management Practices and mitigation measures to address potential conflicts that may arise between commercial offshore wind energy developments and commercial fisheries (BOEM, 2020). The FCP outreach and engagement strategy includes interviews with fishermen, meetings with groups of fishermen who operate in the Offshore Project Area, participation in regional and state coordination efforts, and regular communication with FRs to provide additional feedback to and from the fishing industry.

4.2 Other Forms of Communication

Mayflower Wind's FCP also includes a description of Project research which will take place in collaboration with research organizations, including the Anderson Cabot Center for Ocean Life at the New England Aquarium, ROSA,, the Commonwealth of Massachusetts Fisheries Working Groups on Offshore Wind Energy and academic institutions such as the University of Massachusetts, Dartmouth School for Marine Science and Technology. The Project will also foster continued stakeholder engagement and community outreach via public hearings, newsletters, and updates on the Project website.

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