Sunrise Wind Farm Project

Appendix N1
Essential Fish Habitat Assessment

Prepared for:

Sunrise Wind | Powered by Ørsted & Eversource

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Revision 1 – October 28, 2021

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Essential Fish Habitat Assessment

Sunrise Wind Project

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LIST OF ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
AC	alternating current
ASMFC	Atlantic States Marine Fisheries Commission
BMP	best management practices
BOEM	Bureau of Ocean Energy Management
CFE	Controlled Flow Excavation
COP	Construction and Operations Plan
dB	decibels
DC	direct current
DP	dynamic positioning
EEZ	exclusive economic zone
EFH	essential fish habitat
ELMR	Estuarine Living Marine Resources
EMF	electromagnetic field
ERP	Emergency Response Plan
ESA	Endangered Species Act
FMP	fisheries management plan
ft	feet
g	gram(s)
HAPC	Habitat Area of Particular Concern
HDD	horizontal directional drilling
HVDC	high-voltage direct current
hertz	Hz
IAC	Inter-Array Cables
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICW	Intracoastal Waterway
IMO	International Maritime Organization
INSPIRE	INSPIRE Environmental, LLC
IPF	Impact Producing Factor
IUCN	International Union for the Conservation of Nature
km	kilometer(s)
Lease Area	BOEM-designated Renewable Energy Lease Area OCS-A 0487
LIPA	Long Island Power Authority
m	meter(s)
MAFMC	Mid-Atlantic Fishery Management Council
MARMAP	Marine Resources Monitoring, Assessment, and Prediction

MARPOL	International Convention for the Prevention of Pollution from Ships
MHWL	Mean High Water Line
mi	statute mile(s)
MMS	Minerals Management Service
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
nm	nautical mile(s)
NOAA Fisheries	National Marine Fisheries Service
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
OCS–DC	Offshore Converter Station
OnCS–DC	Onshore Converter Station
OREC	offshore wind renewable energy certificate
OSRP	Oil Spill Response Plan
O&M	Operations and Maintenance
PK	zero-to-peak sound pressure level
ppt	parts per thousand
PTM	Particle Tracking Model
PTS	permanent threshold shift
PV	Plan View
RI-MA WEA	Rhode Island-Massachusetts Wind Energy Area
SAFE	Stock Assessment and Fisheries Evaluation
SAV	submerged aquatic vegetation
SEDAR	Southeast Data Assessment and Review
SEL	sound exposure level
SFW	South Fork Wind
SFWF	South Fork Wind Farm
SPCC	spill prevention, control, and countermeasure
SPI	Sediment Profile Imaging
SPL	sound pressure level
SRW	Sunrise Wind
SRWEC	Sunrise Wind Export Cable
SRWEC–OCS	Sunrise Wind Export Cable – Outer Continental Shelf
SRWEC–NYS	Sunrise Wind Export Cable – New York State Waters
SRWF	Sunrise Wind Farm
Sunrise Wind	Sunrise Wind LLC

TJB	transition joint bay
US	United States
U.S.C.	United States Code
USCG	United States Coast Guard
WEA	Wind Energy Area
WTG	wind turbine generator
YOY	Young-of-the-Year

1.0 INTRODUCTION

1.1 DESCRIPTION OF PROPOSED ACTION

Sunrise Wind LLC (Sunrise Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct, own, and operate the Sunrise Wind Farm (SRWF) Project (the Project). The Project consists of the SRWF and the Sunrise Wind Export Cable (SRWEC) (Figure 1.1-1). The SRWF will be located in federal waters on the Outer Continental Shelf (OCS) in the designated Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0487[1], approximately 18.9 statute miles (mi) (16.4 nautical miles [nm], 30.4 kilometers [km]) south of Martha's Vineyard, Massachusetts, and approximately 30.5 mi (26.5 nm, 48.1 km) east of Montauk, New York (NY). The Lease Area contains portions of areas that were originally awarded through the BOEM competitive renewable energy lease auctions of the Wind Energy Areas (WEAs) off the shores of Rhode Island and Massachusetts, portions of which were subsequently assigned to Sunrise Wind. Components of the Project will be located in federal waters on the OCS, in state waters of New York, and onshore in the Town of Brookhaven, Long Island, NY.

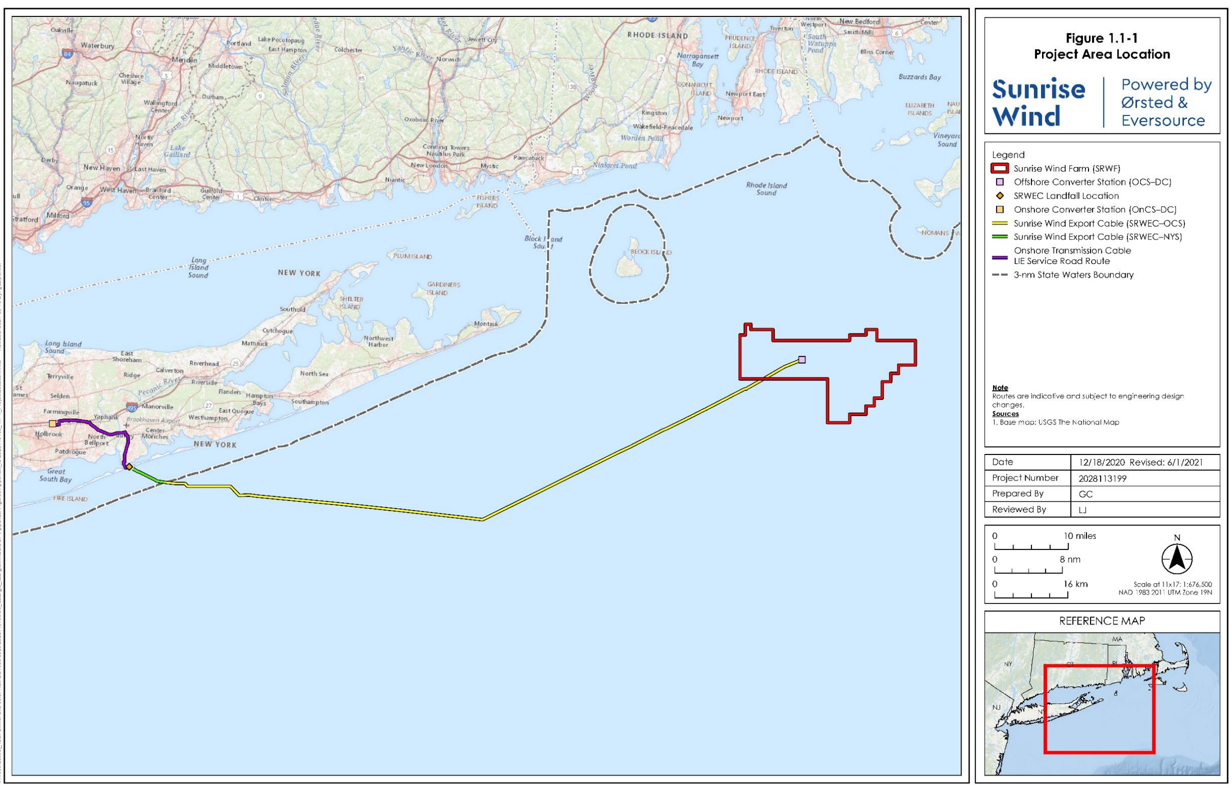

Figure 1.1-1 Map of the Project Area, including the Potential Export Cable Route and Sunrise Wind Farm

[1] A portion of Lease Area OCS-A 0500 (Bay State Wind LLC) and the entirety of Lease Area OCS-A 0487 (formerly Deepwater Wind New England LLC) were assigned to Sunrise Wind LLC on September 3, 2020, and the two areas were merged and a revised Lease OCS-A 0487 was issued on March 15, 2021. Thus, in this report, the term "Lease Area" refers to the new merged Lease Area.

The proposed interconnection location is the Holbrook Substation, which is owned and operated by Long Island Power Authority (LIPA). Sunrise Wind executed a contract with the New York State Energy Research and Development Authority (NYSERDA) for a 25-year Offshore Wind Renewable Energy Certificate (OREC) Agreement in October 2019.

The Project will be comprised of the following onshore and offshore infrastructure:

- Onshore:
    - Onshore Transmission Cable, transition joint bay (TJB), and concrete and/or direct buried joint bays and associated components;
    - Onshore Interconnection Cable;
    - Fiber optic cable co-located with the Onshore Transmission and Onshore Interconnection Cables; and
    - One Onshore Converter Station (OnCS–DC).
- Offshore:
    - Up to 94 WTGs at 102 potential positions;
    - Up to 95 foundations (for WTGs and one Offshore Converter Station ([OCS–DC]);
    - Up to 180 mi (290 km) of Inter-Array Cables (IAC);
    - One OCS–DC; and
    - One DC SRWEC located within an up to 104.6-mi (168.4-km)-long corridor.

Discussion of the Project as it relates to Essential Fish Habitat (EFH) is categorized into four general regions: the SRWF, inclusive of the WTGs, OCS–DC, and IAC; the SRWEC–OCS, inclusive of up to 100 mi (161 km) of the SRWEC in federal (OCS) waters; the SRWEC–NYS, inclusive of approximately 5.2 mi (8.4 km) of the SRWEC in New York State (NYS) waters and the Landfall Horizontal Directional Drill (HDD); and Onshore Facilities, inclusive of the Onshore Transmission Cable, which will also be installed via HDD under the Intracoastal Waterway (ICW HDD) and Carmans River. More details about the Project components follows.

Power from the Project will be delivered to the electric grid via an Onshore Converter Station (OnCS–DC), to be constructed in the Town of Brookhaven, Long Island, New York. Electrical transmission facilities for the Project will be comprised of both onshore and offshore cable systems. Specifically, power from the SRWF will be delivered to the electric grid via distinct transmission cable segments: the SRWEC; the Onshore Transmission Cable that will carry the power from the OCS–DC; and the Onshore Interconnection Cable that will inject the power to the existing grid.

The Onshore Transmission Cable would originate at the Landfall HDD TJB on the eastern portion of Smith Point County Park. From there, the Onshore Transmission Cable will run parallel to Fire Island Beach Road within the paved Smith Point County Park parking lot, crossing under the William Floyd Parkway to a recreational area located to the west of William Floyd Parkway. The Onshore Transmission Cable will then be routed across the ICW via an HDD (approximate length of 2,222 feet [ft] [667 meters (m)]) to a paved parking lot within the Smith Point Marina along East Concourse Drive. A temporary landing structure will be installed at Smith Point County Park to aid in the offloading of equipment/materials. The temporary landing structure will be up to approximately 4,800 sq ft (446 sq m) and may consist of a floating module(s), bridge sections, and/or a ramp or transition pad connecting the landing structure to shore. The temporary landing structure will be secured to the seabed with up to 24 spuds, piles, or anchors. Some minimal seafloor disturbance would occur along the northern shoreline of Smith Point County Park, from the spuds for the temporary landing structure as well as the spuds from the barge as it arrives to offload equipment. Additionally, depending on the tides and water depths at the selected location, a portion of the temporary floating pier may be grounded at times, particularly closer to the shoreline. The tidal range in the ICW is approximately 2 ft. The temporary floating pier may need to remain in place year-round but the use would be limited to fall and spring. The temporary landing structure may be used during two construction periods since the Landfall HDD and ICW HDD may be done in different years. The Onshore Transmission Cable will also cross Carmans River (approximate HDD length of 2,177 ft [664 m]).

The SRWEC will transfer the electricity from the SRWF and will be jointed with the Onshore Transmission Cable at the TJB located at the landfall location at Smith Point, Brookhaven, New York. The SRWEC will be comprised of one distinct cable bundle and will transfer the electricity from the OCS–DC to the TJB located within the Landfall Work Area at Smith Point County Park. The SRWEC will consist of one cable bundle comprised of two cables traversing through both federal and NYS waters. Each subsea cable is connected to one pole of the OCS–DC and cables are bundled together during installation. A fiber optic cable will be bundled together with the two main conductors. The survey corridor width varies between approximately 1,312 ft (400 m) and 2,625 ft (800 m) depending on water depth.

The Landfall HDD will involve drilling a horizontal bore underneath the seafloor surface. The process uses drilling heads and reaming tools of various sizes controlled from the onshore HDD drilling rig to create a passage that is wide enough to accommodate the cable duct. Drilling fluid, comprised of bentonite, drilling additives, and water, is pumped to the drilling head during the drilling process to stabilize the hole preventing collapse, and to return the cuttings to the rig site where the cuttings will be separated from the drilling fluids and the fluid recycled for re-use. Once the bore has been sufficiently enlarged and cleansed, the duct is connected to the drill string with the assistance of divers and the Marine Support Spread and pulled into the prepared hole by the onshore HDD rig from offshore. To support HDD installation, an HDD exit pit may be excavated offshore within the surveyed corridor and outside of the Fire Island National Seashore boundary. One HDD exit pit may be excavated where the drill will reach the seafloor surface and to support installation of the duct. The depth and actual length of the HDD will depend on the soil conditions and final cable specifications. A barge or jack-up vessel may be used at this location to assist the drilling process, excavate the exit pit, and handle the duct for pull in.

Offshore, the SRWEC will be installed within a survey corridor ranging in width from 1,312 to 2,625 ft (400 to 800 m), depending on water depth. The total width of the disturbance corridor for installation of the SRWEC will be up to 148 ft (45 m), inclusive of any required sand wave leveling and boulder clearance. Dynamic Positioning (DP) vessels will generally be used for cable burial activities. Burial of the SRWEC will typically target a depth of 3 to 7 ft (1 to 2 m). The target burial depth for the SRWEC will be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors. Where burial cannot occur, sufficient burial depth cannot be achieved, or protection is required due to cables crossing other existing cables, additional cable protection methods may be used.

The SRWF will include WTGs sited in a uniform east-west/north-south grid with approximately 1.15 mi (1 nm) by 1.15 mi (1 nm) spacing that aligns with other proposed adjacent offshore wind projects in the RI-MA WEA and MA WEA. Designing and optimizing the layout of WTGs and OCS–DC is a complex, iterative process taking into account a large number of inputs and constraints including, but not necessarily limited to: site conditions (e.g., wind speed and direction, water depth, seafloor conditions, environmental constraints, existing telecommunication cables, and seafloor obstructions); design considerations (e.g., WTG type, installation set-up, foundation design, and electrical design); and stakeholder considerations (e.g., safe navigation and commercial and recreational fishing). In accordance with 30 CFR § 585.634(c)(6), micro-siting of some foundations will occur within a 500 ft (152 m) radius around locations identified in the indicative layout scenario. Final engineering design of WTGs may indicate that scour protection is necessary for the selected foundation type, although every individual foundation may not require scour protection. Scour protection is designed to prevent foundation structures from being undermined by hydrodynamic and sedimentary processes, resulting in seafloor erosion and subsequent scour hole formation.

The offshore platform utilized for the Project will include one OCS–DC. The purpose of the OCS–DC is to collect the power generated by the WTGs, transform it to a higher voltage for transmission, and transport that power to the Project's onshore electrical infrastructure (via the SRWEC). The OCS–DC will be lit and marked in accordance with FAA, BOEM, and USCG requirements for aviation and navigation obstruction lighting.

The IAC will carry the electrical current produced by the WTGs to the OCS–DC. The length of the entire network of IAC will be up to 180 mi (290 km). The network of AC IAC will be comprised of a series of cable "strings" that interconnect a small grouping of WTGs to the OCS–DC. The IAC will be installed within surveyed corridors ranging approximately 328 ft to 1,608 ft (100 m to 490 m) in width. Burial of the IAC will typically target a depth of 3 to 7 ft (1 to 2 m).

At the end of the Project's operational life, it will be decommissioned in accordance with a detailed Project decommissioning plan that will be developed in compliance with applicable laws, regulations, and best management practices (BMPs) at that time. All facilities will need to be removed to a depth of 15 ft (4.6 m) below the mudline, unless otherwise authorized by BOEM (30 CFR § 585.910(a)). Care will be taken to handle waste in a hierarchy that prefers re-use or recycling, and leaves waste disposal as the last option. Absent permission from BOEM, Sunrise Wind will complete decommissioning within two years of termination of the Lease.

1.2 REGULATORY CONTEXT AND RESOURCE DEFINITION

Coastal and marine natural resources in the United States (US) are governed and managed by multiple entities at the federal, state, interstate, and tribal level. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), passed in 1976, established eight regional fishery management councils for the conservation and management of fisheries from 3 to 200 nm (5.6 to 370.4 km) off the US coast. Fisheries and stocks within 3 nm (5.6 km) of shore are managed by state governments. In the greater Atlantic region, management of certain fisheries that are shared coastal resources is coordinated through the Atlantic States Marine Fisheries Commission (ASMFC). The MSFCMA was revised and amended in 1996 with the passage of the Sustainable Fisheries Act to strengthen conservation and increase the focus on sustainability, in part by requiring the identification of essential fish habitat (EFH) (16 United States Code [U.S.C.] 1801-1884). The MSFCMA was again revised and reauthorized in 2007, with additional conservation and management requirements to further the effort to reduce overfishing, support conservation, and improve fisheries science research (16 U.S.C. 1801-1884).

The MSFCMA was established, along with other goals, to promote the protection of EFH in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. EFH is defined in the MSFCMA as those waters (e.g., aquatic areas and their associated physical, chemical, and biological properties used by fish) and substrate (e.g., sediment, hard bottom, underlying structures, and associated biological communities) necessary for the spawning, feeding, or growth to maturity of managed fish species (50 CFR § 600.10). Managed species include marine, estuarine, and anadromous finfish; mollusks; and crustaceans. In the Northeastern US, the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC), along with the National Oceanic Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), identify and describe EFH in published fisheries management plans (FMPs).

1.3 REGULATORY COORDINATION AND REQUIRED PERMITS

Federal agencies that authorize, fund, or undertake activities that may adversely affect EFH must consult with NOAA Fisheries. An adverse effect includes direct or indirect physical, chemical, or biological alterations, including changes to waters or substrate, species and their habitat, other ecosystem components, or the quality and/or quantity of EFH. Although absolute criteria have not been established for conducting EFH consultations, the guidelines issued by NOAA Fisheries recommend consolidated EFH consultations with interagency coordination procedures required by other statutes, such as the National Environmental Policy Act (NEPA) or the Endangered Species Act (ESA), to reduce duplication and improve efficiency (50 CFR § 600.920(e)(1)). Generally, the EFH consultation process includes the following steps:

1. Notification – The action agency provides notification of the action to NOAA Fisheries.
2. EFH Assessment – The action agency prepares and submits an EFH Assessment that includes both identification of affected EFH and an assessment of effects. Required elements of the assessment include a description of the proposed action; an analysis of the potential adverse effects of that action on EFH and the managed species; the federal action agency's conclusions regarding the effects of the action on EFH; and proposed environmental protection measures, if applicable.
3. EFH Conservation Recommendations – After reviewing the EFH Assessment, NOAA Fisheries provides recommendations to the action agency regarding measures that can be taken by that agency to conserve EFH.
4. Agency Response – Within 30 days of receiving the recommendations, the action agency must respond to NOAA Fisheries with information on how it will proceed with the action. The response must include a description of measures proposed by the agency to avoid, mitigate, or offset the impact of the activity on EFH. For any conservation recommendation that is not adopted, the action agency must explain its reason to NOAA Fisheries for not following the recommendation.

This technical report was prepared to provide federal permitting authorities (e.g., BOEM, Army Corps of Engineers) with the information necessary to complete EFH consultation with NOAA Fisheries, as well as to facilitate BOEM's review of the Project under NEPA.

1.4 CONTENTS OF THIS TECHNICAL REPORT

Section 2.0 of this technical report describes the species and life stages with designated EFH, as well as Habitat Areas of Particular Concern (HAPCs), that may occur within the SRWF, the SRWEC corridor, and/or the Onshore Transmission Cable route. Section 3.0 is an assessment of the potential impacts from construction and operation and maintenance (O&M) of the Project. The Project is categorized into the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Facilities. For the decommissioning phase of the Project, impacts are anticipated to be similar to or less adverse than those described for construction; therefore, impacts from decommissioning are not addressed separately in this report.

2.0 AFFECTED ENVIRONMENT

2.1 METHODOLOGY

EFH data and text descriptions were downloaded from the NOAA Habitat Conservation EFH Mapper, an online mapping application (NOAA Fisheries 2020a) and supplemented with additional literature sources where necessary. EFH data were queried using GIS software based on the boundaries of the SRWF, the SRWEC, and the Onshore Transmission Cable Project components (see Figure 1.1-1) and manually verified. A 0.5-mi (800-m) buffer around the SRWEC route centerline was assumed in order to query the data.

2.2 BASELINE CONDITIONS

2.2.1 Offshore

The Rhode Island-Massachusetts WEA (RI-MA WEA) and the Massachusetts WEA are located offshore on the northeastern Atlantic continental shelf in Rhode Island Sound. The waters in the vicinity of the SRWF and SRWEC are transitional waters that separate Narragansett Bay and Long Island Sound from the OCS. Organisms that inhabit these areas are diverse and adapted to survive in this dynamic environment. Pelagic communities within the WEA are diverse and include the planktonic early life stages of most EFH species in the region, as well as early and late life stages of many highly migratory species (e.g., sharks and tunas). Pelagic habitats in the Rhode Island-Massachusetts WEA (RI-MA WEA) undergo substantial seasonal shifts in temperature, which is a major driver of seasonal fish migrations and may substantially influence ichthyoplankton settlement (Guida et al. 2017). Annual water column temperatures in the region can fluctuate seasonally from as much as 68 °F (20 °C) at the surface and as much as 54 °F (12 °C) at the bottom (Guida et al. 2017). Zooplankton communities within the region are diverse with more than 100 species identified in Northeast Fisheries Science Center (NEFSC) surveys, including the copepod *Calanus finmarchicus* (NEFSC 2021). This species is considered an important food source for many larval and juvenile fish species and can be found in greatest abundance in late spring and early summer (NEFSC 2021). An important food source for larval cod specifically is the copepod *Pseudocalanus* spp., which follows similar seasonal trends in abundance to *C. finmarchicus* (NEFSC 2021). Additional important copepod species in the region include *Centropages hamatus, Centropages typicus* and *Temora longicornis*. Ichthyoplankton is further discussed in the Sunrise Wind Ichthyoplankton Entrainment Assessment (TRC 2022).

The RI-MA WEA and the Massachusetts WEA are composed of a mix of soft and hard bottom environments defined by dominant sediment grain size and composition. Seven benthic macrohabitat types (*sensu* Greene et al. 2007) were documented during the site-specific sediment profile imaging/plan view (SPI/PV) survey as characterized based on the observed physical and biological attributes of the environment: (1) *sand and mud*, (2) *sand*, (3) *sand and mud with ripples,* (4) *sand with ripples,* (5) *sand with mobile gravel*, (6) *patchy cobbles and boulders on sand*, and (7) *cobbles and boulders on sand.* These habitats are described, and distributions mapped, in two separate reports that present Project-specific surveys in the OCS (INSPIRE Environmental, LLC [INSPIRE] 2020a) and NYS (INSPIRE 2020b) waters. These benthic macrohabitats vary spatially across the region, differing in sediment composition as well as benthic community assemblages and resources. The frequency and magnitude of hydrodynamic forcing on the seabed also varied across these macrohabitat types with *sand and mud with ripples, sand with ripples,* and *sand with mobile gravel* having attributes indicative of a mobile and relatively high energy environment (e.g., sand ripples and washed gravel). While *sand and mud* without ripples (or indistinct ripples) is presumed to have lower hydrodynamic energy, creating a more stable benthic environment, suggested by the lack of small-scale bedforms (e.g., ripples). The hydrodynamic energy associated with macrohabitats with small and large gravels with attached epifaunal growth is less clear. The growth (e.g., *Tubularia* hydroids) on small gravels (i.e., pebbles/granules) may suggest lower energy as these small gravels are stable enough for organisms to grow (movement of the gravel or sand will abrade the organisms). While larger gravels (i.e., cobbles and boulders) with extensive growth of encrusting organisms (e.g., bryozoa, hydroids, northern star coral) are more likely to suggest a high energy setting, with the size of the gravels preventing the physical movement of these substrata.

The soft sediment macrohabitats (i.e., *mud* and *sand,* with and without small-scale bedforms [i.e., ripples]) were the primary benthic macrohabitats observed across the SRWF, although, *sand with mobile gravel* and *patchy cobbles and boulders on sand* were two habitat types that were generally observed in the northwest corner of the SRWF, interspersed with the soft sediment macrohabitats. A video survey was conducted in August 2020 in areas where complex bottom, specifically large gravel (i.e., boulders and cobbles), was observed during the SPI/PV survey and indicated by the high-resolution acoustic data. The results from this video survey will be used to inform habitat mapping efforts and provided in a separate report.

In general, soft sediment benthic macrohabitats were observed along the SRWEC during the site-specific SPI/PV surveys, with low frequency of gravel observations. The western portion of the SRWEC–OCS was composed primarily of *sand with ripples* macrohabitat. Sand ripples were frequently observed here, suggesting high sediment mobility (INSPIRE 2020a). *Mud and sand* without ripples was observed along the eastern portion of the SRWEC–OCS, transitioning to *sand with ripples* and *sand and mud with ripples* approaching the SRWF. No boulders were observed at any of the stations along the SRWEC–OCS. Small gravel (maximum size of pebble/granule) was observed at only two stations along the SRWEC–OCS, one of which was near the center of the SRWEC–OCS and the other was near the boundary of the SRWF. Nearshore benthic assessment surveys were conducted in August 2020 at stations distributed every 1,000 ft along the SRWEC–NYS, results of which are presented in detail in INSPIRE (2020b). Similar to the western portion of the SRWEC–OCS, the primary macrohabitats observed along the SRWEC–NYS were *sand* and *sand with ripples* (INSPIRE 2020b).

Benthic communities have experienced increased water temperatures in the Project Area in the past several decades, and average pH is expected to continue to decline as seawater becomes more saturated with carbon dioxide (Saba et al. 2016). Acidification of seawater is associated with decreased survival and health of organisms with calcareous shells (such as the Atlantic scallop, blue clam, and hard clam), but less is known about direct effects of acidification on cartilaginous and bony fishes.

Modeled scenarios of decreasing seawater pH predict a substantial decline in the harvestable stock of the Atlantic scallop, with collateral loss of economic value (Rheuban et al. 2018). Numerous benthic and pelagic species are predicted to shift their ranges northward and into deeper waters in response to increasing water temperatures (Tanaka et al. 2020; Selden et al. 2018; Kleisner et al. 2017). The ranges of dozens of groundfish species in New England waters have shifted northward and into deeper waters in response to increasing water temperatures (Pinsky et al. 2013; Nye et al. 2009) and more species are predicted to follow (Selden et al. 2018; Kleisner et al. 2017). The black sea bass, identified as particularly sensitive to habitat alteration (Guida et al. 2017), has been increasing in abundance over the past several years, and is expected to continue its expansion in southern New England as water temperatures increase (Kuffner 2018; McBride et al. 2018). Several pelagic forage species have been increasing in the Project Area and the surrounding waters, including butterfish, scup, squid (Collie et al. 2008) and Atlantic mackerel (McManus et al. 2018).

In contrast to the species mentioned above, distributions of other species are reported to be shifting southward, including spiny dogfish, little skate, and silver hake (Walsh et al. 2015). It has been suggested that the spiny dogfish may replace the Atlantic cod as a major predator in southern New England as the cod is driven north by warm waters that the spiny dogfish tolerates well (Selden et al. 2018).

Further temperature increases in southern New England are expected to exceed the global ocean average by at least a factor of two, and ocean circulation patterns are projected to change (Saba et al. 2016). Distributional shifts are occurring in both demersal and pelagic species, perhaps mediated by changes in spawning periods and locations (Walsh et al. 2015). Recent modeling predicts that changes in bottom temperature and salinity in southern New England may reduce available suitable habitat for commercially important benthic species, specifically lobster and sea scallop, potentially causing their distributions to shift offshore and/or northward (Tanaka et al. 2020). Southern species, including some highly migratory species that prefer warmer waters, are expected to follow the warming trend and become more abundant in the Project Area (Walsh et al. 2015; South Atlantic Fishery Management Council 2003). Climate change may also be affecting the migrations of anadromous fish in the region. Herring have been identified as having high biological sensitivity to adverse effects of climate change (Hare et al. 2016). In addition to physiological effects of temperature and pH, anadromous fishes face a physical risk caused by flooding in their spawning rivers due to increased rainfall amounts.

2.2.2 Coastal and Inland

As outlined in Section 1.1, the SRWEC–NYS will make landfall at the HDD TJB on the eastern portion of Smith Point County Park and then run parallel to Fire Island Beach Road within the paved Smith Point County Park parking lot, crossing under the William Floyd Parkway to a recreational area located to the west of William Floyd Parkway. The cable will then be routed across the ICW (Great South Bay) via an HDD, avoiding impacts to tidal wetlands and submerged aquatic vegetation (SAV), to a paved parking lot within the Smith Point Marina along East Concourse Drive. The Onshore Transmission Cable will also cross Carmans River.

Great South Bay lies between Fire Island and Long Island, where it is connected to the Atlantic Ocean through breachways in the barrier beaches of Fire Island. Great South Bay is the largest protected, shallow, coastal bay in NYS, and is utilized as forage and nursery habitat for a variety of species identified as commercially or recreational important, including summer flounder, winter flounder, bluefish, and black sea bass (USFWS 1991).

Significant natural community types defined and identified by the New York Natural Heritage Program within the coastal and inland Project areas include Maritime Beach and Maritime Intertidal Gravel/Sand Beach, Marine Eelgrass Meadow, Marine Back-Barrier Lagoon, Red Maple – Blackgum Swamp (freshwater non-tidal wetlands), and Brackish Tidal Marsh. The Marine Eelgrass Meadow located in Narrow Bay between Smith Point County Park and Smith Point Marina is dominated by eelgrass (*Zostera marina*) along with occurrences of wigeon grass (*Ruppia maritima*) and supports a diverse array of attached and suspended marine algae (NYNHP 2020). These areas are highly productive and provide spawning and foraging habitat for many species of mollusks, crustaceans, and juvenile fish (NYSDEC 2008; Edinger at al. 2014).

Submerged aquatic vegetation (SAV) beds are limited to shallow depths and areas with low energy (i.e., low turbidity) and are found in parts of Bellport Bay, the eastern part of Great South Bay, NY, near the proposed ICW HDD of the Onshore Transmission Cable (NYSDOS 2020). The Onshore Transmission Cable will be located west of the Smith Point Bridge, between Bellport Bay and Narrow Bay, through the planned ICW HDD, to protect the sensitive SAV beds that have been documented in the region, then crossing the Carmans River (Figure 2.2-1). Two SAV beds were documented in 2018 in the vicinity of the proposed ICW HDD based on data from NOAA Office for Coastal Management, NY Department of State, and Dewberry Engineers (NYSDOS 2020). A SAV survey of the ICW HDD route was performed in August 2020, the results of which are provided in INSPIRE (2020b). No SAV beds were observed during the video survey within 328 ft (100 m) of the ICW HDD, although there were several instances where single SAV shoots were observed within dense macroalgal beds on the north side of the navigation channel. EFH is designated within the tidal portions of the Carmans River; however, the Onshore Transmission Cable will cross Carmans River in areas that are designated as freshwater, and thus do not have designated EFH.

The Sunrise Wind: Onshore Ecological Assessment and Field Survey Report identified estuarine, intertidal wetland systems in the vicinity of the landfall work area, along the northeastern edge of the Smith Point County Park on the backslope of Fire Island abutting Great South Bay. These wetland systems were dominated by common reed (*Phragmites australis*), rambler rose (*Rosa multiflora*) and Jesuit's bark (*Iva frutescens*) (Stantec 2021). These wetland habitats occur above mean high water, and therefore are not considered EFH. Additional tidal wetlands (consisting of the salt marshes, non-vegetated and vegetated flats, and shorelines subject to tides) that may be utilized as EFH have been identified by New York State Department of Environmental Conservation (NYSDEC) in the vicinity of the landfall work area and are mapped in Figure 2.2-1.

Benthic invertebrates such as crustaceans, polychaetes, and bivalves serve as forage for EFH species within the Bay. Although little information is available relating to the distribution and abundance of these species within Great South Bay, natural hard clam populations in Bellport Bay are evaluated biannually by the Town of Brookhaven; most recent data show densities range from 0 to 16 clams per m^2 within the Bay. More detailed information on shellfish distribution within Great South Bay is provided in COP Section 4.4.2.2 Benthic and Shellfish Resources.

Nearshore benthic assessment surveys were conducted in August 2020 at stations along the Onshore Transmission Cable route across the ICW, results of which are presented in detail in INSPIRE (2020b). Within the ICW, the benthic substrate was generally sandy on the north and south side of the navigation channel perpendicular to the Onshore Transmission Cable route, with sandy gravel observed within the channel.

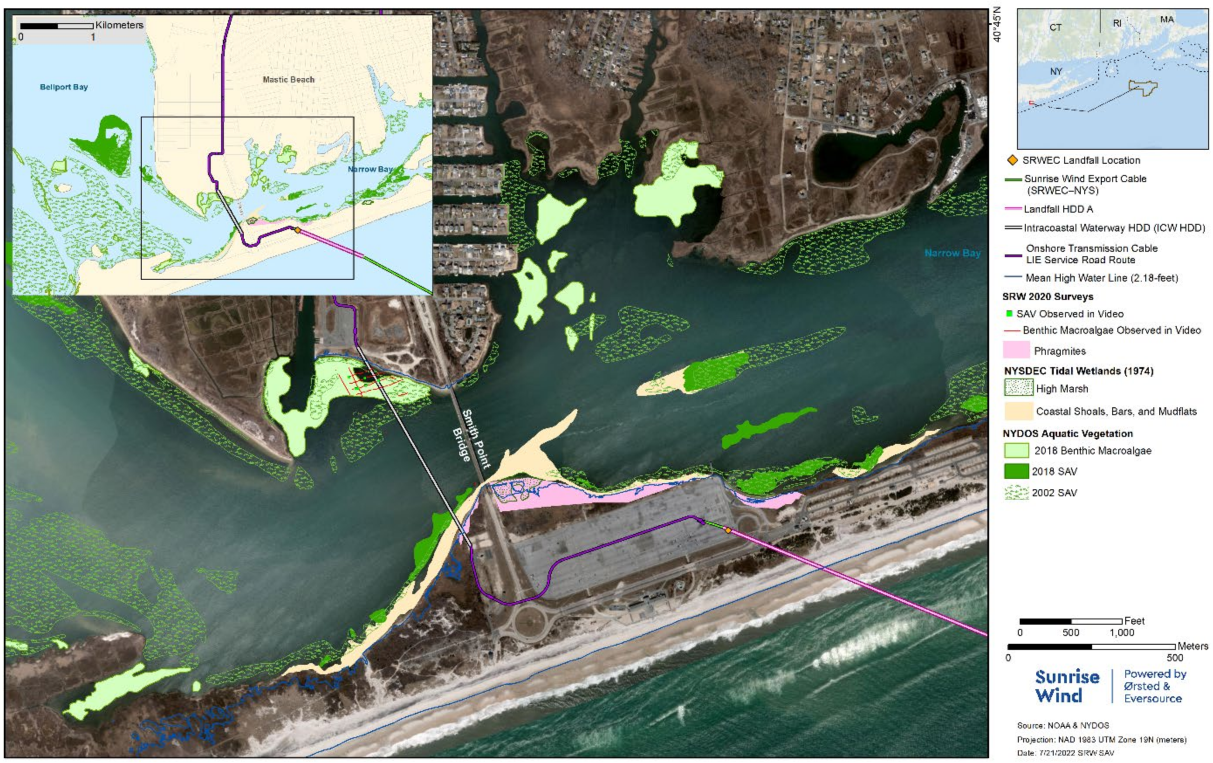

Figure 2.2-1 Long Island South Shore Tidal Wetland and SAV Habitat

2.2.3 Essential Fish Habitat Designations

Within the SRWF area, 42 species of fish and invertebrates have designated EFH for various life stages (Table 2.2.3-1). Within the 0.5-mi (800-m) corridor around the SRWEC centerline, 45 species of fish and invertebrates have designated EFH within the SRWEC–OCS, 32 species have designated EFH within the SRWEC–NYS, and 17 species have designated EFH within the Onshore Transmission Cable. Full descriptions of each of these species and life stages with EFH within the Project Area are provided in Section 2.2.3.

Table 2.2.3-1 EFH Designations for Species in the SRWF, SRWEC, and Onshore Transmission Cable

Table 2.2.3-1				
Species	**Life Stages within SRWF**	**Life Stages within SRWEC–OCS**	**Life Stages within SRWEC–NYS**	**Life Stages within Onshore Transmission Cable**
New England Finfish				
American Plaice *(Hippoglossoides platessoides)*	-	Larvae	-	-
Atlantic Cod (*Gadus morhua*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Adult	-
Atlantic Herring (*Clupea harengus*)	Egg, Larvae, Juvenile, Adult	Larvae, Juvenile, Adult	Larvae, Juvenile, Adult	Juvenile, Adult
Atlantic Wolffish (*Anarhichas lupus*)	Egg, Larvae, Juvenile, Adult	-	-	-
Haddock (*Melanogrammus aeglefinus*)	Larvae, Juvenile	Larvae, Juvenile, Adult	Larvae	-
Monkfish (*Lophius americanus*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Adult	-
Ocean Pout (*Zoarces americanus*)	Egg, Juvenile, Adult	Egg, Juvenile, Adult	-	-
Offshore Hake (*Merluccius albidus*)	-	Larvae	-	-
Pollock (*Pollachius virens*)	Egg, Larvae, Juvenile	Egg, Larvae, Juvenile	Larvae, Juvenile	Juvenile
Red Hake (*Urophycis chuss*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	-
Silver Hake (*Merluccius bilinearis*)	Egg, Larvae, Juvenile	Egg, Larvae, Juvenile, Adult	Egg, Larvae	-
White Hake (*Urophycis tenuis*)	Juvenile	Juvenile, Adult	Juvenile	-
Windowpane Flounder (*Scophthalmus aquosus*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult
Winter Flounder (*Pseudopleuronectes americanus*)	Larvae, Juvenile, Adult	Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult
Witch Flounder (*Glyptocephalus cynoglossus*)	Egg, Larvae, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Adult	-
Yellowtail Flounder (*Limanda ferruginea)*	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Adult	-
Mid-Atlantic Finfish				
Atlantic Butterfish (*Peprilus triacanthus*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Juvenile, Adult	-
Atlantic Mackerel (*Scomber scombrus*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult
Black Sea Bass (*Centropristis striata*)	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult
Bluefish (*Pomatomus saltatrix*)	Egg, Larvae, Adult	Egg, Larvae, Juvenile, Adult	Juvenile, Adult	Juvenile, Adult
Scup (*Stenotomus chrysops*)	Juvenile, Adult	Juveniles, Adult	Juvenile, Adult	Juvenile, Adult
Summer Flounder (*Paralichthys dentatus*)	Egg, Larvae, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Juvenile, Adult
Invertebrates				
Atlantic Sea Scallop (*Placopecten magellanicus*)	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	Egg, Larvae, Juvenile, Adult	-
Atlantic Surfclam (*Spisula solidissima*)	-	Juvenile, Adult	-	-

Table 2.2.3-1				
Species	**Life Stages within SRWF**	**Life Stages within SRWEC–OCS**	**Life Stages within SRWEC–NYS**	**Life Stages within Onshore Transmission Cable**
Longfin Inshore Squid (*Doryteuthis pealeii*)	Juvenile, Adult	Egg, Juvenile, Adult	Egg, Juvenile	Egg, Juvenile
Northern Shortfin Squid (*Illex illecebrosus*)	-	Adult	-	-
Ocean Quahog (*Arctica islandica*)	Juvenile, Adult	Juvenile, Adult	-	-
Highly Migratory Species				
Albacore Tuna (*Thunnus alalunga*)	Juvenile, Adult	Juvenile, Adult	Juvenile	-
Bluefin Tuna (*Thunnus thynnus*)	Juvenile, Adult	Juvenile, Adult	Juvenile	-
Skipjack Tuna (*Katsuwonus pelamis*)	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult	-
Yellowfin Tuna (*Thunnus albacares*)	Juvenile, Adult	Juvenile, Adult	-	-
Skates				
Barndoor Skate (*Dipturis laevis*)	Juvenile, Adult	Juvenile, Adult	-	-
Little Skate (*Leucoraja erinacea*)	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult
Winter Skate (*Leucoraja ocellata*)	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult	Juvenile, Adult
Sharks				
Basking Shark (*Cetorhinus maximus*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-	-
Blue Shark (*Prionace glauca*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-	-
Common Thresher Shark (*Alopias vulpinus*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-
Dusky Shark (*Carcharhinus obscurus*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-
Porbeagle Shark (*Lamna nasus*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-	-
Sandbar Shark (*Carcharhinus plumbeus*)	Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Juvenile, Adult
Sand Tiger Shark (*Carcharias taurus*)	Neonate, Juvenile	Neonate, Juvenile	Neonate, Juvenile	Neonate, Juvenile
Shortfin Mako Shark (*Isurus oxyrinchus*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	-	-
Smoothhound Shark Complex (Atlantic stock) (*Mustelus canis*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult
Spiny Dogfish (*Squalus acanthias*)	Sub-Adult Female, Adult Male, Adult Female	Juvenile, Sub-Adult Female, Sub-Adult Male, Adult Female, Adult Male	Sub-Adult Female, Adult Male	Sub-Adult Female, Adult Male
Tiger Shark (*Galeocerdo cuvier*)	Juvenile, Adult	Juvenile, Adult	-	-
White Shark (*Carcharodon carcharias*)	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate, Juvenile, Adult	Neonate

2.2.4 Habitat Areas of Particular Concern

Within the areas designated as EFH for various species, Habitat Areas of Particular Concern (HAPCs) are also identified. HAPCs are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation, but this designation does not confer any specific protections (MAFMC 2016). The councils identify HAPCs based on one or more of the following considerations: (1) the importance of the ecological function provided by the habitat, (2) the extent to which the habitat is sensitive to human-induced environmental degradation, (3) whether, and to what extent, development activities are, or will be, stressing the habitat type, and (4) the rarity of the habitat type (MAFMC 2016).

Summer flounder is the only species with designated HAPC in the vicinity of the SRW Project Area (Bellport Bay). The MAFMC has identified HAPC for summer flounder as “All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH” (MAFMC 2016).

These areas have been identified as important for shelter, predation, nursery habitat, and, potentially, reproduction (MAFMC 1998a). Lascara (1981) demonstrated an increased ability of summer flounder to effectively capture prey by utilizing the seagrass as a “blind” to ambush prey. SAV and macroalgae have been shown to attract common summer flounder prey for both adults and juveniles (Packer et al. 1999). Additionally, it has been concluded that any loss of areas containing SAV and macroalgae along the Atlantic Seaboard may negatively affect summer flounder stocks (Laney 1997). The Onshore Transmission Cable corridor may cross some portion of mapped HAPC for summer flounder in NYS waters. There are areas of mapped SAV in Bellport Bay, but disturbance of these important habitats will be avoided by use of HDD. During the site-specific video survey within the ICW, high density of macroalgae was observed on the northside of the navigation channel perpendicular to the ICW HDD, with several instances of single SAV shoots within that macroalgal bed. See INSPIRE (2020a,b) for a detailed description of benthic habitats in the Project Area.

HAPC for juvenile Atlantic cod can be found in the region and occur between the mean high-water line and a depth of 66 ft (20 m) in rocky habitats, in SAV, or in sandy habitats adjacent to rocky and SAV habitats for foraging from Maine through Rhode Island (NEFMC 2017). Juvenile cod HAPC does not occur within the footprint of the SRW Project Area, nor in its immediate vicinity so impacts to juvenile cod HAPC are not anticipated from this project and not discussed further in this assessment.

2.2.5 Essential Fish Habitat Species and Life Stages

2.2.5.1 New England Finfish Species

2.2.5.1.1 American Plaice

American plaice are found along the continental shelves from southern Labrador to Rhode Island in relatively deep water (NOAA Fisheries 2020b). In US waters, including the Gulf of Maine and Georges Bank, the species is managed as a single stock (NOAA Fisheries 2020b). Plaice are generally found between 131 and 980 ft (40 and 300 m) and are known to spawn near the ocean bottom (NOAA Fisheries 2020b). Plaice diets are dominated by echinoderms, arthropods, annelids, and mollusks (Johnson et al. 1999a). According to the 2017 operational stock assessment, American plaice are not overfished and not currently experiencing overfishing (NOAA Fisheries 2020b). The American plaice EFH designation for the life stage found within the Project Area is reproduced from NEFSC (2017) below.

Larvae: EFH includes pelagic habitats in the Gulf of Maine, on Georges Bank, and in southern New England, as shown on Map 35 of the Final Omnibus EFH Amendment 2 (NEFMC 2017), including the high salinity zones of the bays and estuaries listed in Table 18 of the Final Omnibus EFH Amendment 2 (NEFMC 2017). EFH for plaice larvae has been identified in the SRWEC–OCS.

2.2.5.1.2 Atlantic Cod

Atlantic cod range from Greenland to Cape Hatteras, North Carolina, but are most common on Georges Bank and in the western Gulf of Maine (NOAA Fisheries 2020c). Atlantic cod can be found at depths between 32 and 492 ft (10 and 150 m), and spawn near the seafloor from winter to early spring (NOAA Fisheries 2020c). They are top predators in demersal habitats, and feed on a variety of invertebrates and fish. They prefer muddy, gravelly, or rocky substrates. Atlantic cod have two separate stocks managed by NOAA Fisheries: the Gulf of Maine stock and the Georges Bank stock. Cod in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the Georges Bank stock. Atlantic cod are historically an important commercial and recreational species and are still fished at low levels; however, as of the 2017 stock assessment, both stocks are considered overfished, and are currently subject to overfishing (Northeast Fisheries Science Center [NEFSC] 2017a). Atlantic cod EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 38 of the Final Omnibus EFH Amendment 2 (NEFMC 2017), and in the high salinity zones of the bays and estuaries listed in Table 19 of NEFMC (2017). EFH for cod eggs has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Larvae: EFH includes pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 39 of NEFMC (2017), and in the high salinity zones of the bays and estuaries listed in Table 19 of NEFMC (2017). EFH for cod larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes intertidal and subtidal benthic habitats in the Gulf of Maine, southern New England, and on Georges Bank, to a maximum depth of 394 ft (120 m) (see Map 40 in NEFMC 2017), including high salinity zones in the bays and estuaries listed in Table 19 of NEFMC (2017). Structurally complex habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna, are essential habitats for juvenile cod. In inshore waters, young-of-the-year juveniles prefer gravel and cobble habitats and eelgrass beds after settlement, but in the absence of predators also utilize adjacent unvegetated sandy habitats for feeding. Survival rates for young-of-the-year cod are higher in more structured rocky habitats than in flat sand or eelgrass; growth rates are higher in eelgrass. Older juveniles move into deeper water and are associated with gravel, cobble, and boulder habitats, particularly those with attached organisms. Gravel is a preferred substrate for young-of-the-year juveniles on Georges Bank and they have also been observed along the small boulders and cobble margins of rocky reefs in the Gulf of Maine. EFH for cod juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes subtidal benthic habitats in the Gulf of Maine, south of Cape Cod, and on Georges Bank, between 98 and 525 ft (30 and 160 m) (see Map 41 in NEFMC 2017), including high salinity zones in the bays and estuaries listed in Table 19 of NEFMC (2017). Structurally complex hard bottom habitats composed of gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae are essential habitats for adult cod. Adult cod are also found on sandy substrates and frequent deeper slopes of ledges along shore. South of Cape Cod, spawning occurs in nearshore areas and on the continental shelf, usually in depths less than 230 ft (70 m). EFH for adult cod has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.1.3 Atlantic Herring

Atlantic herring are a small schooling fish found on both sides of the North Atlantic. In the western North Atlantic, Atlantic herring range from Labrador, Canada to Cape Hatteras, North Carolina (NOAA Fisheries 2020d) and are highly concentrated in Georges Bank, the Gulf of Maine, and Nantucket Shoals (Reid et al. 1999). In the region of interest, Atlantic herring are typically present in the winter at average depths of about 120 to 360 ft (36 to 110 m) (Collette and Klein-MacPhee 2002). They feed on zooplankton, krill, and fish larvae, and are an important species in the food web of the northwest Atlantic (NOAA Fisheries 2020d). Spawning grounds are limited to rocky, gravelly, or pebbly bottom and on clay, at depths of 12 to 180 ft (3 to 55 m) (Collette and Klein-MacPhee 2002). Atlantic herring are managed as one stock complex encompassing Georges Bank and the Gulf of Maine, with two major spawning components. Atlantic herring are an important commercial fishery in New England and their stock biomass is currently well above target levels (NOAA Fisheries 2020d). According to the 2018 stock assessment, Atlantic herring are not overfished, and not currently subject to overfishing (NEFSC 2018a). The Atlantic herring EFH designations are reproduced from NEFSC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes inshore and offshore benthic habitats in the Gulf of Maine and on Georges Bank and Nantucket Shoals in depths of 16 to 295 ft (5 to 90 m) on coarse sand, pebbles, cobbles, and boulders and/or macroalgae at the locations shown in Map 98 of NEFMC (2017). Eggs adhere to the bottom, often in areas with strong bottom currents, forming egg “beds” that may be many layers deep. EFH for herring eggs has been identified in the SRWF.

Larvae: EFH includes inshore and offshore pelagic habitats in the Gulf of Maine, on Georges Bank, and in the upper Mid-Atlantic Bight, as shown on Map 99 of NEFMC (2017), and in the bays and estuaries listed in Table 30 of NEFMC (2017). Atlantic herring have a very long larval stage, lasting 4 to 8 months, and are transported long distances to inshore and estuarine waters where they metamorphose into early stage juveniles in the spring. EFH for herring larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes intertidal and subtidal pelagic habitats to 984 ft (300 m) throughout the region, as shown on Map 100 of NEFMC (2017), including the bays and estuaries listed in Table 30 of NEFMC (2017). One and two-year old juveniles form large schools and make limited seasonal inshore-offshore migrations. Older juveniles are usually found in water temperatures of 37 to 59 °F (3 to 15 °C) in the northern part of their range and as high as 72 °F (22 °C) in the Mid-Atlantic. Young-of-the-year juveniles can tolerate low salinities, but older juveniles avoid brackish water. EFH for herring juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes subtidal pelagic habitats with maximum depths of 984 ft (300 m) throughout the region, as shown on Map 100 of NEFMC (2017), including the bays and estuaries listed in Table 30 of NEFMC (2017). Adults make extensive seasonal migrations between summer and fall spawning grounds on Georges Bank and the Gulf of Maine and overwintering areas in southern New England and the Mid-Atlantic region. They seldom migrate beyond a depth of about 328 ft (100 m) and—unless they are preparing to spawn—usually remain near the surface. They generally avoid water temperatures above 50 °F (10 °C) and low salinities. Spawning takes place on the bottom, generally in depths of 41 to 194 ft (5 to 90 m) on a variety of substrates. EFH for herring adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.1.4 Atlantic Wolffish

The Atlantic wolffish is found on both sides of the North Atlantic and infrequently in the Arctic. In the northwestern Atlantic, they range from Davis Strait, Canada, to Cape Hatteras, North Carolina (Fisheries and Oceans Canada 2018a). Atlantic wolffish prefer colder water temperatures and prey mainly on brittle stars, sea urchins, crabs, and shrimp (Fisheries and Oceans Canada 2018a). Adult Atlantic wolffish generally move inshore to spawn during the spring and summer, establishing nesting sites on boulders and in rocky crevices, which are guarded by the males until the eggs hatch in late summer and early fall (Fisheries and Oceans Canada 2018a). In US waters, the species is managed as a single stock. According to the 2017 stock assessment, Atlantic wolffish are overfished but not currently experiencing overfishing (NEFSC 2017a). The Atlantic wolffish EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes subtidal benthic habitats at depths less than 328 ft (100 m) within the geographic area shown on Map 43 of NEFMC (2017). Wolffish egg masses are hidden under rocks and boulders in nests. EFH for wolffish eggs has been identified in the SRWF.

Larvae: EFH includes pelagic and subtidal benthic habitats within the geographic area shown on Map 43 of NEFMC (2017). Atlantic wolffish larvae remain near the bottom for up to six days after hatching, but gradually become more buoyant as the yolk sac is absorbed. EFH for wolffish larvae has been identified in the SRWF.

Juveniles: EFH includes subtidal benthic habitats at depths of 230 to 604 ft (70 to 184 m) within the geographic area shown on Map 43 of NEFMC (2017). Juvenile Atlantic wolffish do not have strong substrate preferences. EFH for wolffish juveniles has been identified in the SRWF.

Adults: EFH includes subtidal benthic habitats at depths less than 568 ft (173 m) within the geographic area shown on Map 43 of NEFMC (2017). Adult Atlantic wolffish have been observed spawning and guarding eggs in rocky habitats in less than 98 ft (30 m) of water in the Gulf of St. Lawrence and Newfoundland and in deeper (164 to 328 ft [50 to 100 m]) boulder reef habitats in the Gulf of Maine. Egg masses have been collected on the Scotian Shelf in depths of 328 to 426 ft (100 to 130 m), indicating that spawning is not restricted to coastal waters. Adults are distributed over a wider variety of sand and gravel substrates once they leave rocky spawning habitats, but are not caught over muddy bottom. EFH for wolffish adults has been identified in the SRWF.

2.2.5.1.5 Haddock

In the western North Atlantic, haddock range from Newfoundland to Cape May, New Jersey, with the highest abundance on Georges Bank and in the Gulf of Maine (NOAA Fisheries 2020e). Haddock are found at depths ranging from 59 to 1,148 ft (15 to 350 m) and there is a very minimal seasonal difference between depths aside from a slightly wider range of depths in the fall (Cargnelli et al. 1999a). Haddock prefer gravely, pebbly, clay, and sandy substrates and avoid ledges and large rocks (Collette and Klein-MacPhee 2002). They spawn on eastern Georges Bank, to the east of Nantucket Shoals, and along the Maine coast between January and June (NOAA Fisheries 2020e). Haddock prey items include mollusks, worms, crustaceans, sea stars, sea urchins, sand dollars, brittle stars, fish eggs, and occasionally small fish such as herring (NOAA Fisheries 2020e). Adults sometimes eat small fish, especially herring. Haddock in US waters are managed as two stocks: the Gulf of Maine stock and the Georges Bank stock, and haddock in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the Georges Bank stock. As of the 2017 stock assessment, the Georges Bank and Gulf of Maine stocks are not overfished and are not subject to overfishing (NEFSC 2017a). The haddock EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Larvae: EFH includes pelagic habitats in coastal and offshore waters in the Gulf of Maine, the Mid-Atlantic, and on Georges Bank, as shown on Map 45 of NEFMC (2017). EFH for haddock larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes subtidal benthic habitats between 131 and 459 ft (40 and 140 m) in the Gulf of Maine, on Georges Bank and in the Mid-Atlantic region, and as shallow as 66 ft (20 m) along the coast of Massachusetts, New Hampshire, and Maine, as shown on Map 46 of NEFMC (2017). Young-of-the-year juveniles settle on sand and gravel on Georges Bank, but are found predominantly on gravel pavement areas within a few months after settlement. As they grow, they disperse over a greater variety of substrate types on the bank. Young-of-the-year haddock do not inhabit shallow, inshore habitats. EFH for haddock juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes sub-tidal benthic habitats between 164 and 525 ft (50 and 160 m) in the Gulf of Maine, on Georges Bank, and in southern New England, as shown on Map 47 of NEFMC (2017). Essential fish habitat for adult haddock occurs on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel substrates. They also are found adjacent to boulders and cobbles along the margins of rocky reefs in the Gulf of Maine. EFH for haddock adults has been identified in the SRWEC–OCS.

2.2.5.1.6 Monkfish

Monkfish are found in the northwest Atlantic Ocean from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, NC. Monkfish can tolerate a wide range of temperatures and depths and migrate seasonally to spawn and feed (NOAA Fisheries 2020f). Monkfish are present from summer to fall from the tideline down to 2,160 ft (658 m) (Collette and Klein-MacPhee 2002). Monkfish prefer hard sand, pebbly bottom, gravel, and broken shells for their habitats (Collette and Klein-MacPhee 2002). Monkfish spawn from February to October, producing very large buoyant mucoidal egg "veils." They are opportunistic feeders with prey including a wide range of benthic and pelagic fish and invertebrate species along with sea birds, and diving ducks. Monkfish ambush their prey through rapidly opening their mouth, creating a vacuum, and sucking the prey into their needle-like, backward curving teeth (NOAA Fisheries 2020f). They also have a small, dangling appendage in the back of their mouth to attract small fish. In US waters, the monkfish fishery is divided into two management areas, north and south of Georges Bank. Monkfish in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the southern stock. According to the 2019 operational stock assessment, no stock status determination was possible, however stock abundance is increasing in the northern management area and has remained stable in the southern management area (NEFSC 2020). The monkfish EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs and Larvae: EFH includes pelagic habitats in inshore areas, and on the continental shelf and slope throughout the Northeast region, as shown on Map 82 of NEFMC (2017). Monkfish larvae are more abundant in the Mid-Atlantic region and occur over a wide depth range, from the surf zone to depths of 3,281 to 4,921 ft (1,000 to 1,500 m) on the continental slope. Monkfish egg veils and larvae are most often observed during the months from March to September. EFH for monkfish eggs and larvae have been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes subtidal benthic habitats in depths of 164 to 1,312 ft (50 to 400 m) in the Mid-Atlantic, between 66 and 1,312 ft (20 and 400 m) in the Gulf of Maine, and to a maximum depth of 3,281 ft (1,000 m) on the continental slope, as shown on Map 83 of NEFMC (2017). A variety of habitats are essential for juvenile monkfish, including hard sand, pebbles, gravel, broken shells, and soft mud; they also seek shelter among rocks with attached algae. Juveniles collected on mud bottom next to rock-ledge and boulder fields in the western Gulf of Maine were in better condition than juveniles collected on isolated mud bottom, indicating that feeding conditions in these edge habitats are better. Young-of-the-year juveniles have been collected primarily on the central portion of the shelf in the Mid-Atlantic, but also in shallow nearshore waters off eastern Long Island, up the Hudson Canyon shelf valley, and around the perimeter of Georges Bank. They have also been collected as deep as 2,953 ft (900 m) on the continental slope. EFH for monkfish juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes subtidal benthic habitats in depths of 164 to 1,312 ft (50 to 400 m) in southern New England and Georges Bank, between 66 and 1,312 ft (20 and 400 m) in the Gulf of Maine, and to a maximum depth of 3,281 ft (1,000 m) on the continental slope, as shown on Map 84 of NEFMC (2017). EFH for adult monkfish is composed of hard sand, pebbles, gravel, broken shells, and soft mud. They seem to prefer soft sediments (fine sand and mud) over sand and gravel, and, like juveniles, utilize the edges of rocky areas for feeding. EFH for monkfish adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.1.7 Ocean Pout

The ocean pout ranges from Labrador, Canada to Virginia and is typically present in southern New England from late summer to winter (Steimle et al. 1999a). Ocean pout are found in habitats that contain sandy mud, "sticky" sand, broken bottom, or pebbles and gravel (Collette and Klein-MacPhee 2002). Juveniles and adults feed by filtering sediment for prey items, which include polychaetes, mollusks, crustaceans, and echinoderms (Steimle et al. 1999a). They spawn in protected habitats, such as rock crevices and man-made artifacts, where they lay eggs and engage in nest-guarding behavior (Steimle et al. 1999a). Ocean pout is managed as a single stock in US waters; and according to the 2017 stock assessment, ocean pout is overfished but is not currently experiencing overfishing (NEFSC 2017a). The ocean pout EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes hard bottom habitats on Georges Bank, in the Gulf of Maine, and in the Mid-Atlantic Bight (see Map 48 in NEFMC 2017), as well as the high salinity zones of the bays and estuaries listed in Table 20 of NEFMC (2017). Eggs are laid in gelatinous masses, generally in sheltered nests, holes, or rocky crevices. EFH for ocean pout eggs occurs in depths less than 328 ft (100 m) on rocky bottom habitats. EFH for ocean pout eggs has been identified in the SRWF and SRWEC–OCS.

Juveniles: EFH includes intertidal and subtidal benthic habitats in the Gulf of Maine and on the continental shelf north of Cape May, New Jersey, on the southern portion of Georges Bank, and in the high salinity zones of a number of bays and estuaries north of Cape Cod, extending to a maximum depth of 394 ft (120 m) (see Map 49 and Table 20 in NEFMC 2017). EFH for juvenile ocean pout occurs on a wide variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel. EFH for ocean pout juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes subtidal benthic habitats between 66 and 459 ft (20 and 140 m) in the Gulf of Maine, on Georges Bank, in coastal and continental shelf waters north of Cape May, New Jersey, and in the high salinity zones of a number of bays and estuaries north of Cape Cod (see Map 50 and Table 20 in NEFMC 2017). EFH for adult ocean pout includes mud and sand, particularly in association with structure-forming habitat types; i.e., shells, gravel, or boulders. In softer sediments, they burrow tail first and leave a depression on the sediment surface. Ocean pout congregate in rocky areas prior to spawning and frequently occupy nesting holes under rocks or in crevices in depths less than 328 ft (100 m). EFH for ocean pout adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.1.8 Offshore Hake

Offshore hake range over the continental shelf and slope of the northwest Atlantic Ocean to the Caribbean and Gulf of Mexico at depths of 196 to 557 ft (80 to 170 m) (Bigelow and Schroeder 1955). There is little information available on offshore hake reproduction and it is thought to occur over a protracted period, or potentially throughout the year, from the Scotian Shelf through the Mid-Atlantic Bight (Chang et al. 1999a). Offshore hake primarily feed on fish and invertebrates, with juveniles preferring small fish, shrimps and other crustaceans, and adults primarily consuming small fish (Bigelow and Schroeder 1955). The offshore hake EFH designation is reproduced from NEFMC (2017) below for the life stage found within the Project Area.

Larvae: EFH includes pelagic habitats along the outer continental shelf and slope between 197 and 4.921 ft (60 and 1,500 m) as shown on Map 80 of NEFMC (2017). EFH for offshore hake larvae has been identified in the SRWEC–OCS.

2.2.5.1.9 Pollock

Pollock range throughout the northwestern Atlantic Ocean and are most commonly found on the western Scotian Shelf and in the Gulf of Maine (NOAA Fisheries 2020f). They spawn multiple times per season between November through February over hard, stony, or rocky ocean bottoms in the Gulf of Maine and on Georges Bank. Smaller pollock in inshore waters prey on small crustaceans and fish, and larger pollock prey predominantly on fish, but their diet also includes euphausiids and mollusks (NOAA Fisheries 2020f; Cargnelli et al. 1999b). Pollock are a schooling species with a semi-pelagic lifestyle, and they can be found throughout the water column (Cargnelli et al. 1999b). Pollock are managed as a single stock, and according to the 2017 stock assessment, they are not overfished and are not currently subject to overfishing (NEFSC 2017a). The pollock EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in southern New England, as shown on Map 51 of NEFMC (2017), including the bays and estuaries listed in Table 21 of NEFMC (2017). EFH for pollock eggs has been identified in the SRWF and SRWEC–OCS.

Larvae: EFH includes pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 52 of NEFMC (2017), including the bays and estuaries listed in Table 21 of NEFMC (2017). EFH for pollock larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes inshore and offshore pelagic and benthic habitats from the intertidal zone to 591 ft (180 m) in the Gulf of Maine, in Long Island Sound, and Narragansett Bay, between 131 and 591 ft (40 and 180 m) on western Georges Bank and the Great South Channel (see Map 53 in NEFMC 2017), and in mixed and full salinity waters in a number of bays and estuaries north of Cape Cod (Table 21 in NEFMC 2017). EFH for juvenile pollock consists of rocky bottom habitats with attached macroalgae (rockweed and kelp) that provide refuge from predators. Shallow water eelgrass beds are also essential habitats for young-of-the-year pollock in the Gulf of Maine. Older juveniles move into deeper water into habitats also occupied by adults. EFH for pollock juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.1.10 Red Hake

Red hake range from Newfoundland to North Carolina but are most abundant from the western Gulf of Maine through southern New England waters (NOAA Fisheries 2020g). During warmer seasons, red hake are common at depths greater than 328 ft (100 m), and during colder months, their depth range is from 90 to 1,214 ft (30 to 370 m) (Steimle et al. 1999b). Red hake prey consists primarily of crustaceans and fish such as haddock, silver hake, sea robins, sand lance, mackerel, and small red hake (NOAA Fisheries 2020g). This groundfish species prefers deep water environments with bottom habitat consisting of both soft and pebbly substrate. Spawning occurs from Georges Bank to Nova Scotia and typically occurs nearshore as early as June and continues through fall (Collette and Klein-MacPhee 2002). Red hake are managed as two stocks, the Gulf of Maine and Northern Georges Bank (northern) stock, and the Southern Georges Bank and Mid-Atlantic (southern) stock (Steimle et al. 1999b; NOAA Fisheries 2019g). Red hake in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the southern stock. According to the 2017 stock assessment, the northern stock is not considered overfished and is not currently subject to overfishing; however, the southern stock is overfished and experiencing overfishing (Alade and Traver 2018). The red hake EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs and Larvae: EFH includes pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, as shown on Map 77 of NEFMC (2017), and in the bays and estuaries listed in Table 27 of NEFMC (2017). EFH for red hake eggs and larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes intertidal and subtidal benthic habitats throughout the region on mud and sand substrates, to a maximum depth of 262 ft (80 m), as shown on Map 77 of NEFMC (2017), including the bays and estuaries listed in Table 27 of NEFMC (2017). Bottom habitats providing shelter are essential for juvenile red hake, including mud substrates with biogenic depressions, substrates providing biogenic complexity (e.g., eelgrass, macroalgae, shells, anemone and polychaete tubes), and artificial reefs. Newly settled juveniles occur in depressions on the open seabed. Older juveniles are commonly associated with shelter or structure and often found inside live bivalves. EFH for red hake juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes benthic habitats in the Gulf of Maine and the outer continental shelf and slope in depths of 164 to 2,461 ft (50 to 750 m) (see Map 78 in NEFMC 2017) and as shallow as 66 ft (20 m) in a number of inshore estuaries and embayments (see Table 27 in NEFMC 2017) as far south as Chesapeake Bay. Shell beds, soft sediments (mud and sand), and artificial reefs provide essential habitats for adult red hake. They are usually found in depressions in softer sediments or in shell beds and not on open sandy bottom. In the Gulf of Maine, they are much less common on gravel or hard bottom, but they are reported to be abundant on hard bottoms in temperate reef areas of Maryland and northern Virginia. EFH for red hake adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.1.11 Silver Hake

Silver hake are found from Cape Sable, Nova Scotia to Cape Hatteras, North Carolina and are concentrated in deep basins in the Gulf of Maine and along the continental slope in winter and spring. White hake are voracious nocturnal feeders, preying on fish, crustaceans and squid (NOAA Fisheries 2020h; Lock and Packer 2004). White hake spawn along the coast of the Gulf of Maine from Cape Cod to Grand Manan Island, on southern and southeastern Georges Bank, and in southern New England to the south of Martha's Vineyard (NOAA Fisheries 2020h). Peak spawning occurs from May to June in the southern area of their range, and from July to August in the northern area of their range (NOAA Fisheries 2020h). Two stocks of silver hake are managed in US waters, the Gulf of Maine and Northern Georges Bank (northern) stock and the Southern Georges Bank and Mid-Atlantic (southern) stock, which includes southern silver hake and offshore hake (NOAA Fisheries 2020h). Silver hake in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the southern stock. The 2017 stock assessment concluded that both the northern and southern stock are not overfished and are not currently subject to overfishing (Alade and Traver 2018). The silver hake EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs and Larvae: EFH includes pelagic habitats from the Gulf of Maine to Cape May, New Jersey, including Cape Cod and Massachusetts Bays (see Map 74 and Table 26 in NEFMC 2017). EFH for silver hake eggs and larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes pelagic and benthic habitats in the Gulf of Maine, including the coastal bays and estuaries listed in Table 26, and on the continental shelf as far south as Cape May, New Jersey, at depths greater than 10 m in coastal waters in the Mid-Atlantic and between 40 and 400 m in the Gulf of Maine, on Georges Bank, and in the middle continental shelf in the Mid-Atlantic, on sandy substrates (see Map 75). Juvenile silver hake are found in association with sand-waves, flat sand with amphipod tubes, and shells, and in biogenic depressions. Juveniles in the New York Bight settle to the bottom at mid-shelf depths on muddy sand substrates and find refuge in amphipod tube mats. EFH for silver hake juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes pelagic and benthic habitats at depths greater than 35 m in the Gulf of Maine and the coastal bays and estuaries listed in Table 26, between 70 and 400 m on Georges Bank and the outer continental shelf in the northern portion of the Mid-Atlantic Bight, and in some shallower locations nearer the coast, on sandy substrates (see Map 76). Adult silver hake are often found in bottom depressions or in association with sand waves and shell fragments. They have also been observed at high densities in mud habitats bordering deep boulder reefs, resting on boulder surfaces, and foraging over deep boulder reefs in the southwestern Gulf of Maine. This species makes greater use of the water column (for feeding, at night) than red or white hake. EFH for silver hake adults has been identified in the SRWEC–OCS.

2.2.5.1.12 White Hake

White hake range from the Gulf of St. Lawrence to the Mid-Atlantic Bight, with the population divided into two stocks: a Canadian stock primarily occurring in the Gulf of St. Lawrence and Scotian Shelf, and a US stock primarily occurring in the Gulf of Maine and on Georges Bank. Their range also includes estuaries along the continental shelf to the submarine canyons of the upper continental slope, as well as the deep, muddy basins of the Gulf of Maine (Chang et al. 1999b). Early juveniles are pelagic before settling to muddy and fine-grained sandy bottom or eelgrass habitats. Older juveniles feed on polychaetes, shrimps, and other crustaceans. Adults are demersal, prefer fine grained, muddy substrates, and feed predominantly on fish (Chang et al. 1999b). The timing and extent of spawning in southern New England waters is not well defined, but is thought to occur in early spring in deep waters along the continental slope (Chang et al. 1999b). The 2017 stock assessment for the US stock of white hake concluded that the stock is not overfished and not currently subject to overfishing (NEFSC 2017a). EFH designations for the US stock of white hake are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes intertidal and subtidal estuarine and marine habitats in the Gulf of Maine, on Georges Bank, and in southern New England, including mixed and high salinity zones in a number of bays and estuaries north of Cape Cod (see Table 22 in NEFMC 2017), to a maximum depth of 984 ft (300 m) (see Map 57 in NEFMC 2017). Pelagic phase juveniles remain in the water column for about 2 months. In nearshore waters, EFH for benthic phase juveniles occurs on fine-grained, sandy substrates in eelgrass, macroalgae, and un-vegetated habitats. In the Mid-Atlantic, most juveniles settle to the bottom on the continental shelf, but some enter estuaries, especially those in southern New England. Older young-of-the-year juveniles occupy the same habitat types as the recently settled juveniles but move into deeper water (>164 ft [50 m]). EFH for white hake juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes sub-tidal benthic habitats in the Gulf of Maine, including depths greater than 82 ft (25 m) in certain mixed and high salinity zones portions of a number of bays and estuaries (see Table 22 in NEFMC 2017), between 328 and 1,312 ft (100 and 400 m) in the outer gulf, and between 1,312 and 2,953 ft (400 and 900 m) on the outer continental shelf and slope (see Map 58 in NEFMC 2017). EFH for adult white hake occurs on fine-grained, muddy substrates and in mixed soft and rocky habitats. Spawning takes place in deep water on the continental slope and in Canadian waters. EFH for white hake adults has been identified in the SRWEC–OCS.

2.2.5.1.13 Windowpane Flounder

The windowpane flounder range extends from the Gulf of St. Lawrence to Florida, but the species is most abundant from Georges Bank to Chesapeake Bay (Chang et al. 1999c). Windowpane flounder spawning is thought to begin in February or March in inshore waters, peaking in the Mid-Atlantic Bight in May, and extending into Georges Bank during the summer (Chang et al. 1999c). Windowpane flounder typically prefer sandy bottom habitats and range from just below the tide line to 150 ft (46 m) deep (Collette and Klein-MacPhee 2002). They feed on small crustaceans and various fish larvae, including hakes and tomcod (Chang et al. 1999c). Windowpane flounder is managed as two stocks: the Gulf of Maine-Georges Bank (northern) stock and the Southern New England-Middle Atlantic Bight (southern) stock. Windowpane flounder in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable are managed as part of the southern stock. The 2017 stock assessments concluded that the northern stock of windowpane flounder is overfished, but not currently experiencing overfishing, and the southern stock is not overfished and not experiencing overfishing (NEFSC 2017a). The windowpane flounder EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs and Larvae: EFH includes pelagic habitats on the continental shelf from Georges Bank to Cape Hatteras and in mixed and high salinity zones of coastal bays and estuaries throughout the region (see Map 59, Map 60, and Table 23 in NEFMC 2017). EFH for windowpane eggs and larvae has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Juveniles: EFH includes intertidal and subtidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to northern Florida, as shown on Map 61 of NEFMC (2017), including mixed and high salinity zones in the bays and estuaries listed in Table 23 of NEFMC (2017). EFH for juvenile windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 197 ft (60 m). Young-of-the-year juveniles prefer sand over mud. EFH for windowpane juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes intertidal and subtidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to Cape Hatteras, as shown on Map 62 of NEFMC (2017), including mixed and high salinity zones in the bays and estuaries listed in Table 23 of NEFMC (2017). EFH for adult windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 230 ft (70 m). EFH for windowpane adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.1.14 Winter Flounder

Winter flounder range from the Gulf of St. Lawrence to North Carolina and are found in estuaries and on the continental shelf. Winter flounder prefer muddy, sandy, cobbled, gravelly, or boulder substrate in mostly nearshore environments (Pereira et al. 1999). Winter flounder spawn over sandy bottoms and algal mats in shallow nearshore habitats during the winter and spring (NOAA Fisheries 2020i). They are opportunistic feeders, and prey items include polychaetes, amphipods, shrimp, clams, capelin eggs, and fish (Pereira et al. 1999; NOAA Fisheries 2020i). Winter flounder is managed as three stocks: the Gulf of Maine stock, Georges Bank stock, and the Southern New England/Mid-Atlantic stock (NOAA Fisheries 2020i). Winter flounder in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable are managed as part of the Southern New England/Mid-Atlantic stock. The 2017 stock assessment concluded that spawning stock biomass of the Georges Bank stock has been increasing since 2005, and the stock is not overfished and not subject to overfishing (NEFSC 2017a). The Southern New England/Mid-Atlantic stock is overfished, but not currently experiencing overfishing (NEFSC 2017a). The results for the Gulf of Maine stock were highly uncertain. The authors were unable to determine an abundance estimate for the Gulf of Maine stock, but concluded that it is not currently subject to overfishing (NEFSC 2017a). The winter flounder EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes subtidal estuarine and coastal benthic habitats from mean low water to 16 ft (5 m) from Cape Cod to Absecon Inlet (39° 22’ N), and as deep as 230 ft (70 m) on Georges Bank and in the Gulf of Maine (see Map 63 in NEFMC 2017), including mixed and high salinity zones in the bays and estuaries listed in Table 24 of NEFMC (2017). The eggs are adhesive and deposited in clusters on the bottom. Essential habitats for winter flounder eggs include mud, muddy sand, sand, gravel, macroalgae, and submerged aquatic vegetation. Bottom habitats are unsuitable if exposed to excessive sedimentation which can reduce hatching success. EFH for winter flounder eggs has been identified in the SRWEC–NYS and Onshore Transmission Cable.

Larvae: EFH includes estuarine, coastal, and continental shelf water column habitats from the shoreline to a maximum depth of 230 ft (70 m) from the Gulf of Maine to Absecon Inlet (39° 22’ N), and including Georges Bank, as shown on Map 65 of NEFMC (2017), including mixed and high salinity zones in the bays and estuaries listed in Table 24 of NEFMC (2017). Larvae hatch in nearshore waters and estuaries or are transported shoreward from offshore spawning sites where they metamorphose and settle to the bottom as juveniles. They are initially planktonic but become increasingly less buoyant and occupy the lower water column as they get older. EFH for winter flounder larvae has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Juveniles: EFH includes estuarine, coastal, and continental shelf benthic habitats from the Gulf of Maine to Absecon Inlet (39° 22’ N), and includes Georges Bank, as shown on Map 64 of NEFMC (2017), and in mixed and high salinity zones in the bays and estuaries listed in Table 24 of NEFMC (2017). Essential fish habitat for juvenile winter flounder extends from the intertidal zone (mean high water) to a maximum depth of 197 ft (60 m) and occurs on a variety of bottom types, such as mud, sand, rocky substrates with attached macroalgae, tidal wetlands, and eelgrass. Young-of-the-year juveniles are found inshore on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks. They tend to settle to the bottom in soft-sediment depositional areas where currents concentrate late-stage larvae and disperse into coarser-grained substrates as they get older. EFH for winter flounder juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes estuarine, coastal, and continental shelf benthic habitats extending from the intertidal zone (mean high water) to a maximum depth of 230 ft (70 m) from the Gulf of Maine to Absecon Inlet (39° 22’ N), and including Georges Bank, as shown on Map 65 of NEFMC (2017), and in mixed and high salinity zones in the bays and estuaries listed in Table 24 of NEFMC (2017). EFH for adult winter flounder occurs on muddy and sandy substrates, and on hard bottom on offshore banks. In inshore spawning areas, EFH includes a variety of substrates where eggs are deposited on the bottom. EFH for winter flounder adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.1.15 Witch Flounder

Witch flounder are managed as a single stock and in US waters, ranging from the Gulf of Maine to Cape Hatteras, North Carolina (Cargnelli et al. 1999c). Witch flounder spawn from April to November in the Gulf of Maine/Georges Bank region, and from April to August in the Mid-Atlantic Bight, peaking in the summer in both regions (Cargnelli et al. 1999c). Primary prey items include polychaetes, crustaceans, mollusks, and echinoderms. As of the 2017 stock assessment, witch flounder is overfished, overfishing status is unknown, and the condition of the stock is poor (NEFSC 2017a). The witch flounder EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs and Larvae: EFH includes pelagic habitats on the continental shelf throughout the Northeast region, as shown on Map 66 and Map 67 of NEFMC (2017). EFH for witch flounder eggs and larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes sub-tidal benthic habitats between 164 and 1,312 ft (50 and 400 m) in the Gulf of Maine and as deep as 4,921 ft (1,500 m) on the outer continental shelf and slope, with mud and muddy sand substrates, as shown on Map 68 of NEFMC (2017). EFH for witch flounder juveniles has been identified in the SRWEC–OCS.

Adults: EFH includes sub-tidal benthic habitats between 115 and 1,312 ft (35 and 400 m) in the Gulf of Maine and as deep as 4,921 ft (1,500 m) on the outer continental shelf and slope, with mud and muddy sand substrates, as shown on Map 69 of NEFMC (2017). EFH for witch flounder adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.1.16 Yellowtail Flounder

Yellowtail flounder range from Newfoundland to Chesapeake Bay (NOAA Fisheries 2020j). These bottom-dwelling finfish prefer habitats with a mixture of sand and mud (Collette and Klein-MacPhee 2002; Johnson et al. 1999b), and spawn during the spring and summer (NOAA Fisheries 2020j). Adult prey items consist mainly of benthic macrofauna such as crustaceans and worms (NOAA Fisheries 2020j; Johnson et al. 1999b). In US waters, yellowtail flounder are managed as three stocks: the Gulf of Maine/Cape Cod stock, the Georges Bank stock, and the Southern New England/Mid-Atlantic stock, and yellowtail flounder in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the Southern New England/Mid-Atlantic stock. As of the 2017 stock assessment (NEFSC 2017a), all three stocks are overfished, currently subject to overfishing, and drastically below the biomass target level. The yellowtail flounder EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes coastal and continental shelf pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as the upper Delmarva peninsula, as shown on Map 70 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 25 of NEFMC (2017). EFH for yellowtail flounder eggs has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Larvae: EFH includes coastal marine and continental shelf pelagic habitats in the Gulf of Maine, and from Georges Bank to Cape Hatteras, as shown on Map 71 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 25 of NEFMC (2017). EFH for yellowtail flounder larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes subtidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic as shown on Map 72 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 25 of NEFMC (2017). EFH for juvenile yellowtail flounder occurs on sand and muddy sand between 66 and 262 ft (20 and 80 m). In the Mid-Atlantic, young-of-the-year juveniles settle to the bottom on the continental shelf, primarily at depths of 131 to 230 ft (40 to 70 m), on sandy substrates. EFH for yellowtail flounder juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes subtidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic as shown on Map 73 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 25 of NEFMC (2017). EFH for adult yellowtail flounder occurs on sand and sand with mud, shell hash, gravel, and rocks at depths between 82 and 295 ft (25 and 90 m). EFH for yellowtail flounder adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.2 Mid-Atlantic Finfish Species

2.2.5.2.1 Atlantic Butterfish

The Atlantic butterfish is a semi-pelagic fish that tends to form loose schools and ranges from Newfoundland to Florida (NOAA Fisheries 2020k). They are most commonly found from the Gulf of Maine to Cape Hatteras, North Carolina (Cross et al. 1999; NOAA Fisheries 2020k). Butterfish are present in New England waters from spring to fall and are found from the surface to 180 ft (54 m) deep in the summer, but as deep as 690 ft (210 m) in the winter (Collette and Klein-MacPhee 2002). Butterfish prefer sandy bottom environments rather than rocky environments. Spawning occurs on the continental shelf and in nearshore areas in waters above 59 °F (15 °C), and is very common in Long Island Sound and the New York Bight (Cross et al. 1999). Butterfish are managed as one stock in the northern region (New England to Cape Hatteras) and two stocks south of Cape Hatteras. As of the 2018 stock assessment (Adams 2018), Atlantic butterfish are not overfished and not subject to overfishing. The Atlantic butterfish EFH designations are reproduced from MAFMC (2011) below for the life stages found within the Project Area.

Eggs: EFH includes pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to the south shore of Long Island, New York, in Chesapeake Bay, and on the continental shelf and slope, primarily from Georges Bank to Cape Hatteras, North Carolina. EFH for Atlantic butterfish eggs is generally found over bottom depths of 4,921 ft (1,500 m) or less where average temperatures in the upper 656 ft (200 m) of the water column are 43.7 to 70.7 °F (6.5 to 21.5 °C). EFH for butterfish eggs has been identified in the SRWF and SRWEC–OCS.

Larvae: EFH includes pelagic habitats in inshore estuaries and embayments in Boston Harbor, from the south shore of Cape Cod to the Hudson River, and in Delaware and Chesapeake Bays, and on the continental shelf from the Great South Channel (western Georges Bank) to Cape Hatteras, North Carolina. EFH for Atlantic butterfish larvae is generally found over bottom depths between 134 and 1,148 ft (41 and 350 m) where average temperatures in the upper 656 ft (200 m) of the water column are 47 to 71 °F (8.5 to 21.5 °C). EFH for butterfish larvae has been identified in the SRWF and SRWEC–OCS.

Juveniles: EFH include pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to Pamlico Sound, North Carolina, in inshore waters of the Gulf of Maine and the South Atlantic Bight, and on the inner continental shelf and OCS from southern New England to South Carolina. EFH for juvenile Atlantic butterfish is generally found over bottom depths between 32 and 918 ft (10 and 280 m) where bottom water temperatures are between 43 and 80 °F (6.5 and 27 °C) and salinities are above 5 parts per thousand (ppt). EFH for butterfish juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to Pamlico Sound, North Carolina, inshore waters of the Gulf of Maine and the South Atlantic Bight, on Georges Bank, on the inner continental shelf south of Delaware Bay, and on the OCS from southern New England to South Carolina. EFH for adult Atlantic butterfish is generally found over bottom depths between 32 and 820 ft (10 and 250 m) where bottom water temperatures are between 40 and 81 °F (4.5 and 27.5 °C) and salinities are above 5 ppt. EFH for butterfish adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.2.2 Atlantic Mackerel

Atlantic mackerel are a pelagic, schooling species, that ranges from Labrador to North Carolina in the northwestern Atlantic (NOAA Fisheries 2020l). Mackerel spawn off the coast in deeper waters in two groups, southern and northern. The southern group primarily spawns in the Mid-Atlantic Bight from April to May, and the northern group spawns in the Gulf of St. Lawrence in June and July (NOAA Fisheries 2020l). There is no known preferred breeding habitat, though spawning occurs at temperatures above 45 °F (7 °C), with a peak between 48 and 57 °F (9 and 14 °C) (Collette and Klein-MacPhee 2002). Atlantic mackerel prey on crustaceans (e.g., copepods, krill, and shrimp), fish, and ascidians (sea squirts) (NOAA Fisheries 2020l). Prior to the 2018 stock assessment, the status of Atlantic mackerel was unknown (NOAA Fisheries 2020l). Atlantic mackerel are managed as a single stock in the Northwest Atlantic. The 2018 stock assessment concluded that Atlantic mackerel are overfished, subject to overfishing, and have been overfished for nearly a decade (NEFSC 2018b). The Atlantic mackerel EFH designations are reproduced from MAFMC (2011) below for the life stages found within the Project Area.

Eggs: EFH includes pelagic habitats in inshore estuaries and embayments from Great Bay, New Hampshire to the south shore of Long Island, New York, inshore and offshore waters of the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina (mostly north of 38°N). EFH for Atlantic mackerel eggs is generally found over bottom depths of 328 ft (100 m) or less with average water temperatures of 43 to 54 °F (6.5 to 12.5 °C) in the upper 59 ft (15 m) of the water column. EFH for mackerel eggs has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Larvae: EFH includes pelagic habitats in inshore estuaries and embayments from Great Bay, New Hampshire to the south shore of Long Island, New York, inshore waters of the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina (mostly north of 38°N). EFH for Atlantic mackerel larvae is generally found over bottom depths between 68 and 328 ft (21 and 100 m) with average water temperatures of 42 to 52 °F (5.5 to 11.5 °C) in the upper 656 ft (200 m) of the water column. EFH for mackerel larvae has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Juveniles: EFH includes pelagic habitats in inshore estuaries and embayments from Passamaquoddy Bay and Penobscot Bay, Maine to the Hudson River, in the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina. EFH for juvenile Atlantic mackerel is generally found over bottom depths between 32 and 360 ft (10 and 110 m) and in water temperatures of 41 to 68 °F (5 to 20 °C). EFH for mackerel juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes pelagic habitats in inshore estuaries and embayments from Passamaquoddy Bay, Maine to the Hudson River, and on the continental shelf from Georges Bank to Cape Hatteras, North Carolina. EFH for adult Atlantic mackerel is generally found over bottom depths less than 558 ft (170 m) and in water temperatures of 41 to 68 °F (5 to 20 °C). EFH for mackerel adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.2.3 Black Sea Bass

The black sea bass is a demersal finfish species that range from Nova Scotia to Florida and spend the summer in northern inshore waters at depths of less than 120 ft (37 m) and spend the winter in southern offshore waters at depths of 240 to 540 ft (73 to 165 m) (ASMFC 2020a). Black sea bass prefer structured habitats such as reefs, pilings, jetties, shipwrecks, and lobster pots along the continental shelf (Steimle et al. 1999c; ASMFC 2020a). Black sea bass spawn in May along the North Carolina coast, then spawn from the middle of May until the end of June in New Jersey, New York, and southern New England waters (Collette and Klein-MacPhee 2002). Black sea bass consume a variety of prey items, but prefer crabs, shrimp, worms, small fish, and clams (NOAA Fisheries 2020m). Black sea bass is managed as two stocks: Mid-Atlantic and South-Atlantic (NOAA Fisheries 2020m). Black sea bass in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission

Cable are managed as part of the Mid-Atlantic stock. The 2017 and 2018 stock assessments for black sea bass concluded that both the Mid-Atlantic and South Atlantic stocks are not overfished and not subject to overfishing (NEFSC 2017b; Southeast Data Assessment and Review [SEDAR] 2018). The black sea bass EFH designations are reproduced from MAFMC (1998a) below for the life stages found within the Project Area.

Juveniles: Offshore, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the exclusive economic zone [EEZ]), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked squares of the area where juvenile black sea bass are collected in the NEFSC trawl survey. Inshore, EFH includes the estuaries where black sea bass are identified as being common, abundant, or highly abundant in the Estuarine Living Marine Resources (ELMR) database for the "mixing" and "seawater" salinity zones. Juveniles are found in the estuaries in the summer and spring. Generally, juvenile black sea bass are found in waters warmer than 43 °F (6 °C) with salinities greater than 18 ppt and coastal areas between Virginia and Massachusetts, but winter offshore from New Jersey and south. Juvenile black sea bass are usually found in association with rough bottom, shellfish and eelgrass beds, and man-made structures in sandy-shelly areas; offshore clam beds and shell patches may also be used for over-wintering. EFH for sea bass juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: Offshore, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares of the area where adult black sea bass are collected in the NEFSC trawl survey. Inshore, EFH is the estuaries where adult black sea bass were identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. Black sea bass are generally found in estuaries from May through October. Wintering adults (November through April) are generally offshore, south of New York to North Carolina. Temperatures above 43 °F (6 °C) seem to be the minimum requirements. Structured habitats (natural and man-made), sand, and shell are usually the substrate preference. EFH for sea bass adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.2.4 Bluefish

Bluefish are a migratory species that is found in US waters from Maine to eastern Florida (NOAA Fisheries 2020n). Bluefish generally school by size, concentrating between Maine and Cape Hatteras, North Carolina in the summer, and offshore between Cape Hatteras and Florida in the winter (ASMFC 2020b). Bluefish spawn multiple times in spring and summer, with discrete groups spawning at different times (NOAA Fisheries 2020n; ASMFC 2020b). Bluefish are voracious, opportunistic predators, preying on squid and fish, particularly menhaden and smaller fish such as silversides (NOAA Fisheries 2020n; ASMFC 2020b). Bluefish are managed as a single stock in the US and based on the 2019 stock assessment, bluefish are overfished, but not currently subject to overfishing (NOAA Fisheries 2020n). The EFH designations are reproduced from MAFMC (1998b) below for the life stages found within the Project Area.

Eggs: North of Cape Hatteras, EFH includes pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) at mid-shelf depths, from Montauk Point, New York south to Cape Hatteras in the highest 90 percent of the area where bluefish eggs were collected in the Marine Resources Monitoring, Assessment, and Prediction (MARMAP) surveys. Bluefish eggs are generally not collected in estuarine waters and thus there is no EFH designation inshore. Generally, bluefish eggs are collected between April through August in temperatures greater than 64 °F (18 °C) and normal shelf salinities (>31 ppt). EFH for bluefish eggs has been identified in the SRWF and SRWEC–OCS.

Larvae: North of Cape Hatteras, EFH includes pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) most commonly above 59 ft (15 m), from Montauk Point, New York south to Cape Hatteras, in the highest 90 percent of the area where bluefish larvae were collected during the MARMAP surveys. EFH also includes the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N. Bluefish larvae are not generally collected inshore so there is not EFH designation inshore for larvae. Generally, bluefish larvae are collected April through September in temperatures greater than 64 °F (18 °C) in normal shelf salinities (>30 ppt). EFH for bluefish larvae has been identified in the SRWF and SRWEC–OCS.

Juveniles: North of Cape Hatteras, EFH includes pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from Nantucket Island, Massachusetts south to Cape Hatteras, in the highest 90 percent of the area where juvenile bluefish are collected in the NEFSC trawl survey. EFH also includes the "slope sea" and Gulf Stream between latitudes 29° 00 N and 40° 00 N. Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Generally juvenile bluefish occur in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones. Distribution of juveniles by temperature, salinity, and depth over the continental shelf is undescribed. EFH for bluefish juveniles has been identified in the SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: North of Cape Hatteras, EFH includes the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from Cape Cod Bay, Massachusetts south to Cape Hatteras, in the highest 90 percent of the area where adult bluefish were collected in the NEFSC trawl survey. Inshore, EFH is all major estuaries between Penobscot Bay, Maine and St. Johns River, Florida. Adult bluefish are found in North Atlantic estuaries from June through October, Mid-Atlantic estuaries from April through October, and in South Atlantic estuaries from May through January in the "mixing" and "seawater" zones. Bluefish adults are highly migratory, and distribution varies seasonally and according to the size of the individuals comprising the schools. Bluefish are generally found in normal shelf salinities (>25 ppt). EFH for bluefish adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.2.5 Scup

Scup are a migratory, schooling species found in the northwest Atlantic Ocean, primarily between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina (NOAA Fisheries 2020o). Scup spend the winter in offshore waters between southern New Jersey and Cape Hatteras, migrating to more northern and inshore waters when water temperatures begin to rise in spring and summer (ASMFC 2020c). Scup are known to congregate in nearshore areas of New England from early April to December, at depths between 270 and 420 ft (82 to 128 m) (Collette and Klein-MacPhee 2002). Scup spawn over weedy or sandy areas in southern New England between Massachusetts Bay and the New York Bight between May and August, with peak spawning activity taking place in June (NOAA Fisheries 2020o). Scup prefer smooth to rocky bottom habitats and usually form schools around such bottoms, feeding on demersal invertebrates. Scup are currently managed as two stocks, the Mid-Atlantic/New England stock, and the South Atlantic stock. Scup in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable are managed as part of the Mid-Atlantic/New England stock. The 2017 stock assessment for the Mid-Atlantic/New England stock indicated that scup are not overfished and not currently subject to overfishing (NEFSC 2017c). The population status of the South Atlantic stock has not been assessed (NOAA Fisheries 2020o). The scup EFH designations are reproduced from MAFMC (1998a) below for the life stages found within the Project Area.

Juveniles: Offshore, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares of the area where juvenile scup are collected in the NEFSC trawl survey. Inshore, EFH includes the estuaries where scup has been identified as common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. In general, juvenile scup are found during the summer and spring in estuaries and bays between Virginia and Massachusetts, in association with various sands, mud, mussel, and eelgrass bed type substrates and in water temperatures greater than 45 °F (7 °C) and salinities greater than 15 ppt. EFH for scup juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: Offshore, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares of the area where adult scup are collected in the NEFSC trawl survey. Inshore, EFH includes the estuaries where scup has been identified as common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. Generally, wintering adults (November through April) are usually offshore, south of New York to North Carolina, in waters above 45 °F (7 °C). EFH for scup adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.2.6 Summer Flounder

Summer flounder are found in inshore and offshore waters from Nova Scotia to the east coast of Florida, concentrating in the Mid-Atlantic region from Cape Cod, Massachusetts to Cape Fear, North Carolina (NOAA Fisheries 2020p; ASMFC 2020d). Summer flounder move offshore in the fall to depths of 120 to 600 ft (37 to 183 m) to spawn (ASMFC 2020d). Spawning peaks in October and November, and larvae migrate to inshore coastal and estuarine nursey areas (NOAA Fisheries 2020p; ASMFC 2020d). Adult summer flounder prefer sandy habitats, but can be found in a variety of habitat with both mud and sand substrates (Packer et al. 1999). Summer flounder are ambush predators, and prey opportunistically on fish and invertebrates including sea worms, squid, shrimp, and other crustaceans (ASMFC 2020d). Summer flounder are managed as a single stock, and according to the 2019 stock assessment, summer flounder are not overfished and not subject to overfishing (NEFSC 2019). The summer flounder EFH designations are reproduced from MAFMC (1998a) below for the life stages found within the Project Area.

Eggs: North of Cape Hatteras, EFH includes the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of the all the ranked 10-minute squares for the area where summer flounder eggs are collected in the MARMAP survey. In general, summer flounder eggs are found between October and May, being most abundant between Cape Cod and Cape Hatteras, with the heaviest concentrations within 9 mi (14.5 km, 7.8 nm) of shore off New Jersey and New York. Eggs are most commonly collected at depths of 30 to 360 ft (9 to 110 m). EFH for summer flounder eggs has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Larvae: North of Cape Hatteras, EFH includes the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares for the area where summer flounder larvae are collected in the MARMAP survey. Inshore, EFH is all the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database, in the "mixing" (defined in ELMR as 0.5 to 25.0 ppt) and "seawater" (defined in ELMR as greater than 25 ppt) salinity zones. In general, summer flounder larvae are most abundant nearshore (12 to 50 mi [19 to 80.5 km, 10.4 to 43.4 nm] from shore) at depths between 30 to 230 ft (9 to 70 m). They are most frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May. EFH for summer flounder larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: North of Cape Hatteras, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares for the area where juvenile summer flounder are collected in the NEFSC trawl survey. Inshore, EFH is all the estuaries where summer flounder were identified as being present (rare, common, abundant, or highly abundant) in the ELMR database for the "mixing" and "seawater" salinity zones. In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37 °F (3 °C) and salinities from 10 to 30 ppt range. EFH for summer flounder juveniles has been identified in the SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: North of Cape Hatteras, EFH includes the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, North Carolina, in the highest 90 percent of all the ranked 10-minute squares for the area where adult summer flounder are collected in the NEFSC trawl survey. Inshore, EFH is the estuaries where summer flounder were identified as being common, abundant, or highly abundant in the ELMR database for the "mixing" and "seawater" salinity zones. Generally, summer flounder inhabit shallow coastal and estuarine waters during warmer months and move offshore on the outer continental shelf at depths of 500 ft (152 m) in colder months. EFH for summer flounder adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.3 Invertebrates

2.2.5.3.1 Atlantic Sea Scallop

The Atlantic sea scallop ranges from Newfoundland to Cape Hatteras, North Carolina (NOAA Fisheries 2020q). Atlantic sea scallop occur along the continental shelf, typically at depths ranging from 59 to 360 ft (18 to 110 m), and are generally found in seabed areas with coarse substrates consisting of firm sand, gravel, shells, and rocks (Hart and Chute 2004). The sea scallop spawning season is usually in the late summer or early fall, and spawning may also occur in the spring in the Mid-Atlantic Bight (NOAA Fisheries 2020q). Atlantic sea scallop are managed as a single stock. The 2018 stock assessment concluded that Atlantic sea scallop are not overfished and are not subject to overfishing (NEFSC 2018a). The Atlantic sea scallop EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Eggs: EFH includes benthic habitats in inshore areas and on the continental shelf as shown on Map 97 of NEFMC (2017), in the vicinity of adult scallops. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage. EFH for scallop eggs has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Larvae: EFH includes benthic and water column habitats in inshore and offshore areas throughout the region, as shown on Map 97 of NEFMC (2017). Any hard surface can provide an essential habitat for settling pelagic larvae (“spat”), including shells, pebbles, and gravel. They also attach to macroalgae and other benthic organisms such as hydroids. Spat attached to sedentary branching organisms or any hard surface have greater survival rates; spat that settle on shifting sand do not survive. EFH for scallop larvae has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles: EFH includes benthic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, as shown on Map 97 of NEFMC (2017), in depths of 59 to 361 ft (18 to 110 m). Juveniles (0.2 to 0.5 inch [5 to 12 mm] shell height) leave the original substrate on which they settle (see spat, above) and attach themselves with byssal threads to shells, gravel, and small rocks (pebble, cobble), preferring gravel. As they grow older, they lose their byssal attachment. Juvenile scallops are relatively active and swim to escape predation. While swimming, they can be carried long distances by currents. Bottom currents stronger than 10 cm/sec retard feeding and growth. In laboratory studies, maximum survival of juvenile scallops occurred between 34 and 59 °F (1.2 and 15 °C) and above salinities of 25 ppt. On Georges Bank, age 1 juveniles are less dispersed than older juveniles and adults and are mainly associated with gravel-pebble deposits. EFH for older juvenile scallops are the same as for the adults (gravel and sand). EFH for scallop juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes benthic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, as shown on Map 97 of NEFMC (2017). Essential habitats for older juvenile and adult sea scallops are found on sand and gravel substrates in depths of 59 to 361 ft (18 to 110 m), but they are also found in shallower water and as deep as 591 ft (180 m) in the Gulf of Maine. In the Mid-Atlantic they are found primarily between 148 and 246 ft (45 and 75 m) and on Georges Bank they are more abundant between 197 and 295 ft (60 and 90 m). They often occur in aggregations called beds which may be sporadic or essentially permanent, depending on how suitable the habitat conditions are (temperature, food availability, and substrate) and whether oceanographic features (fronts, currents) keep larval stages in the vicinity of the spawning population. Bottom currents stronger than 25 cm/sec inhibit feeding. Growth of adult scallops is optimal between 50 and 59 °F (10 and 15 °C) and they prefer full strength seawater. EFH for scallop adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.3.2 Atlantic Surfclam

The Atlantic surfclam ranges from the southern Gulf of St. Lawrence to Cape Hatteras, North Carolina. The species prefers sandy habitats along the continental shelf (Cargnelli et al. 1999d), and is most abundant on Georges Bank, the south shore of Long Island, and along the coasts of New Jersey and the Delmarva Peninsula (NOAA Fisheries 2020r). Atlantic surfclam spawn in the late spring through the early fall (NOAA Fisheries 2020r). According to the 2016 stock assessment, Atlantic surfclam are not overfished and not subject to overfishing (NEFSC 2016). The Atlantic surfclam EFH designations are reproduced from MAFMC (1998c) below for the life stages found within the Project Area.

Juveniles and Adults: EFH is throughout the substrate, to a depth of 3 ft (1 m) below the water/sediment interface, within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90 percent of all the ranked 10-minute squares for the area where surfclams were caught in the NEFSC surfclam and ocean quahog dredge surveys. Surfclams generally occur from the beach zone to a depth of about 200 ft (61 m), but beyond about 125 ft (38 m) abundance is low. EFH for surfclam juveniles and adults has been identified in the SRWEC–OCS.

2.2.5.3.3 Longfin Inshore Squid

The longfin squid is a pelagic, schooling species that ranges from Newfoundland to the Gulf of Venezuela. In US waters, longfin inshore squid are managed as a single stock and are most abundant between Georges Bank and Cape Hatteras, North Carolina (NOAA Fisheries 2020s). Longfin inshore squid have a very short life span (less than 1 year), and spawn year-round with peak productions in winter and summer (NOAA Fisheries 2020s). Juvenile longfin inshore squid feed on plankton, and adults are aggressive hunters that feed on fish, crustaceans, and their own species (NOAA Fisheries 2020s). The 2017 stock assessment concluded that longfin inshore squid are not overfished, but there was not enough information to determine whether the stock is experiencing overfishing (Hendrickson 2017). The longfin inshore squid EFH designations are reproduced from MAFMC (2011) below for the life stages found within the Project Area.

Eggs: EFH for longfin inshore squid eggs includes inshore and offshore bottom habitats from Georges Bank southward to Cape Hatteras. EFH for eggs is generally found where bottom water temperatures are between 50 and 73 °F (10 and 23 °C), salinities are between 30 and 32 ppt and depth is less than 164 ft (50 m). Longfin inshore squid eggs have also been collected in bottom trawls in deeper water at various places on the continental shelf. Like most loliginid squids, longfin inshore squid egg masses or “mops” are demersal and anchored to the substrates on which they are laid, which include a variety of hard bottom types (e.g., shells, lobster pots, piers, fish traps, boulders, and rocks), submerged aquatic vegetation (e.g., *Fucus* sp.), sand, and mud. EFH for longfin squid eggs has been identified in the SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Juveniles (Pre-Recruits): EFH includes pelagic habitats in inshore and offshore continental shelf waters from Georges Bank to South Carolina, in the southwestern Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, and Raritan Bay. EFH is generally found over bottom depths between 20 and 525 ft (6 and 160 m) where bottom water temperatures are 47 to 76 °F (8.5 to 24.5 °C) and salinities are 28.5 to 36.5 ppt. Pre-recruits migrate offshore in the fall where they overwinter in deeper waters along the edge of the shelf. They make daily vertical migrations, moving up in the water column at night and down in the daytime. Small immature individuals feed on planktonic organisms while larger individuals feed on crustaceans and small fish.

EFH for longfin squid juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults (Recruits): EFH includes pelagic habitats in inshore and offshore continental shelf waters from Georges Bank to South Carolina, in inshore waters of the Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, Raritan Bay, and Delaware Bay. EFH is generally found over bottom depths between 20 and 656 ft (6 and 200 m) where bottom water temperatures are 47 to 57 °F (8.5 to 14 °C) and salinities are 24 to 36.5 ppt. Recruits inhabit the continental shelf and upper continental slope to depths of 1,312 ft (400 m). They migrate offshore in the fall and overwinter in warmer waters along the edge of the shelf. Like the pre-recruits, they make daily vertical migrations. Individuals larger than 4.7 inches (12 cm) feed on fish and those larger than 6.3 inches (16 cm) feed on fish and squid. Females deposit eggs in gelatinous capsules which are attached in clusters to rocks, boulders, and aquatic vegetation and on sand or mud bottom, generally in depths less than 164 ft (50 m). EFH for longfin squid adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.3.4 Northern Shortfin Squid

The northern shortfin squid is a highly migratory species found in the northwest Atlantic Ocean between the Labrador Sea and the Florida Straits (Hendrickson and Holmes 2004). Northern shortfin squid have a very short life span (less than 1 year). The species migrates onto the continental shelf in the spring, and migrates offshore in the late autumn, presumably to a winter spawning site (Hendrickson and Holmes 2004). Winter habitats of the species are not well known, and the only confirmed spawning area is located in the Mid-Atlantic Bight at depths of 371 to 1,237 ft (113 to 377 m) (Hendrickson and Holmes 2004). In US waters, northern shortfin squid are managed as a single stock. It is unknown whether the stock of northern shortfin squid is overfished or experiencing overfishing, as relative abundance and biomass indices are highly variable and lacking a trend (MAFMC and NOAA Fisheries 2018). The northern shortfin squid EFH designation for adults is reproduced from MAFMC (2011) below; this is the only life stage with EFH within the Project Area.

Adults (Recruits): EFH includes pelagic habitats on the continental shelf and slope from Georges Bank to South Carolina, and in inshore and offshore waters of the Gulf of Maine. EFH for adult northern shortfin squid is generally found on the shelf over bottom depths between 135 and 1,312 ft (41 and 400 m) where bottom temperatures are 40.1 to 58.1 °F (4.5 to 14.5 °C) and salinities are 34.5 to 36.5 ppt. They have also been caught in bottom trawls as deep as 8,202 ft (2,500 m) in waters beyond the edge of the shelf and on Bear Seamount. Adults make daily vertical migrations, moving up in the water column at night and down in the daytime. They feed primarily on fish and euphausiids and are also cannibalistic (larger females consume smaller males). EFH for shortfin squid adults has been identified in the SRWEC–OCS.

2.2.5.3.5 Ocean Quahog

Ocean quahog are found from Newfoundland to Cape Hatteras, with the highest concentrations found in offshore waters between Nantucket and the Delmarva Peninsula (Cargnelli et al. 1999e). The species prefers medium- to fine-grain sand, sandy mud, and silty sand (Cargnelli et al. 1999e). Ocean quahogs spawn once a year in the summer or fall, but the spawning season can be extended over several months (NOAA Fisheries 2020t). They are managed as a single stock and the 2017 stock assessment concluded that ocean quahog are not overfished and not subject to overfishing (NEFSC 2017d). The ocean quahog EFH designations are reproduced from MAFMC (1998c) below for the life stages found within the Project Area.

Juveniles and Adults: EFH is throughout the substrate, to a depth of 3 ft (1 m) below the water/sediment interface, within federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ, in areas that encompass the top 90 percent of all the ranked 10-minute squares for the area where ocean quahogs were caught in the NEFSC surfclam and ocean quahog dredge surveys. Distribution in the western Atlantic ranges in depths from 30 ft (9 m) to about 800 ft (244 m). Ocean quahogs are rarely found where bottom water temperatures exceed 60 °F (16 °C) and occur progressively further offshore between Cape

Cod and Cape Hatteras. EFH for ocean quahog juveniles and adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.4 Highly Migratory Species

2.2.5.4.1 Albacore Tuna

Albacore tuna is a circumglobal, epipelagic species that travels in large schools that are sometimes mixed with other tuna species (NOAA Fisheries 2020u). Albacore tuna forage down to depth of 1,640 ft (500 m), preying opportunistically on a wide variety of fishes and invertebrates (NOAA Fisheries 2017). Albacore tuna spawn in the spring and summer in the western tropical areas of the Atlantic, and then they move northward and use the central and northern portions of the Atlantic as their wintering area (NOAA Fisheries 2017). Albacore tuna is managed in three stocks: North Atlantic, South Atlantic, and Mediterranean, the 2016 stock assessment concluded that the North Atlantic stock of albacore tuna is not overfished, has rebuilt to target population levels, and is not subject to overfishing (International Commission for the Conservation of Atlantic Tunas [ICCAT] 2016a). The albacore tuna EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Juveniles and Adults: EFH includes offshore, pelagic habitats of the Atlantic Ocean from the outer edge of the US EEZ through Georges Bank to pelagic habitats south of Cape Cod, and from Cape Cod to Cape Hatteras, North Carolina. EFH also includes offshore pelagic habitats near the outer US EEZ between North Carolina and Florida, and offshore pelagic habitats associated with the Blake Plateau. EFH also includes offshore pelagic habitats in the western and central Gulf of Mexico. EFH for albacore juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS and EFH for albacore adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.4.2 Bluefin Tuna

Bluefin tuna are a highly migratory, epipelagic species. (NOAA Fisheries 2017). In the western Atlantic, bluefin tuna range from Newfoundland to the Gulf of Mexico (NOAA Fisheries 2020v). Bluefin tuna are thought to forage off the eastern US and Canadian coasts from June through March, migrating to spawning grounds in the Gulf of Mexico, Bahamas, and the Straits of Florida in April and May, and then generally moving back to foraging grounds of the Gulf Stream and North American continental shelf and slope waters, including the South and Mid-Atlantic Bight, the Gulf of Maine, and the Nova Scotia Shelf (NOAA Fisheries 2017). Adult bluefin tuna feed opportunistically on a variety of schooling fish, cephalopods, and benthic invertebrates, including silver hake, Atlantic mackerel, Atlantic herring, krill, sandlance, and squid (NOAA Fisheries 2017). Bluefin tuna are managed in two stocks: western and eastern, separated by the 45° W meridian, the 2017 stock assessment concluded that the western Atlantic bluefin tuna stock is not subject to overfishing, but the information was insufficient to determine whether the stock status is overfished (ICCAT 2017; NOAA Fisheries 2020v). The bluefin tuna EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes coastal and pelagic habitats of the Mid-Atlantic Bight and the Gulf of Maine, between southern Maine and Cape Lookout, from shore (excluding Long Island Sound, Delaware Bay, Chesapeake Bay, and Pamlico Sound) to the continental shelf break. EFH in coastal areas of Cape Cod are located between the Great South Passage and shore. EFH follows the continental shelf from the outer extent of the US EEZ on Georges Bank to Cape Lookout. EFH is associated with certain environmental conditions in the Gulf of Maine (61 to 66 °F (16 to 19 °C); 0 to 131 ft (0 to 40 m) deep). EFH in other locations associated with temperatures ranging from 39 to 79 °F (4 to 26 °C), often in depths of less than 66 ft (20 m) (but can be found in waters that are 131–328 ft (40–100 m) in depth in winter). EFH for bluefin juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes located in offshore and coastal regions of the Gulf of Maine the mid-coast of Maine to Massachusetts; on Georges Bank; offshore pelagic habitats of southern New England; from southern New England to coastal areas between the mouth of Chesapeake Bay and Onslow Bay, North Carolina; from coastal North Carolina south to the outer extent of the US EEZ, inclusive of pelagic habitats of the Blake Plateau, Charleston Bump, and Blake Ridge. EFH also consists of pelagic waters of the central Gulf of Mexico from the continental shelf break to the seaward extent of the US EEZ between Apalachicola, Florida and Texas. EFH for bluefin adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.4.3 Skipjack Tuna

The skipjack tuna is a circumglobal, epipelagic species (NOAA Fisheries 2017). In the western Atlantic range skipjack tuna are found in tropical and warm-temperate waters from Newfoundland to Brazil (NOAA Fisheries 2017). They are a schooling species, and have been known to associate with birds, drifting objects, whales, sharks, and other tunas (NOAA Fisheries 2017). Skipjack tuna feed opportunistically on a variety of fishes, cephalopods, crustaceans, mollusks, and sometimes other skipjack tuna (NOAA Fisheries 2017; NOAA Fisheries 2020w). The species spawns throughout the year in warm equatorial waters and from spring to early fall in subtropical waters (NOAA Fisheries 2017). The species is managed as two stocks, eastern and western. Skipjack tuna in the SRWF, SRWEC–OCS, and SRWEC–NYS are managed as part of the western stock. Based on the 2014 stock assessment, western Atlantic skipjack tuna are not overfished and not subject to overfishing (ICCAT 2014). The skipjack tuna EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the US EEZ boundary on Georges Bank (off Massachusetts), coastal and offshore habitats between Massachusetts and South Carolina, localized areas off Georgia and South Carolina, and from the Blake Plateau through the Florida Straits. EFH also includes offshore waters in the central Gulf of Mexico from Texas through the Florida Panhandle. In all areas, juveniles are found in waters greater than 66 ft (20 m). EFH for skipjack juveniles has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Adults: EFH includes coastal and offshore habitats between Massachusetts and Cape Lookout, North Carolina and localized areas in the Atlantic off South Carolina and Georgia, and the northern east coast of Florida. EFH in the Atlantic Ocean is also located on the Blake Plateau, in the Florida Straits through the Florida Keys, and areas in the central Gulf of Mexico, offshore in pelagic habitats seaward of the southeastern edge of the West Florida Shelf to Texas. EFH for skipjack adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.4.4 Yellowfin Tuna

The yellowfin tuna is a circumglobal, epipelagic species found in tropical and temperate waters (NOAA Fisheries 2017). In the western Atlantic, yellowfin tuna spawn from May to August in the Gulf of Mexico and from July to November in the southeastern Caribbean (NOAA Fisheries 2020x). The species travel in schools, with juveniles found at the surface in mixed schools with other tuna species (NOAA Fisheries 2017). Yellowfin tuna feed primarily in surface waters down to a depth of 328 ft (100 m), preying on a wide variety of fish and invertebrates (NOAA Fisheries 2017). In the western Atlantic, yellowfin tuna is managed as a single stock, and according to the 2016 stock assessment, Atlantic yellowfin tuna are not overfished and are not currently subject to overfishing (ICCAT 2016b). The yellowfin tuna EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the US EEZ boundary on Georges Bank and Cape Cod, Massachusetts. EFH also includes offshore and coastal habitats from Cape Cod to the mid-east coast of Florida and the Blake Plateau, locally distributed areas in the Florida Straits and off the southwestern edge of the West Florida Shelf, the central Gulf of Mexico from the Florida Panhandle to southern Texas, and localized areas southeast of Puerto Rico. EFH for yellowfin juveniles has been identified in the SRWF and SRWEC–OCS.

Adults: EFH includes offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the US EEZ boundary on Georges Bank and Cape Cod, Massachusetts. EFH also includes offshore and coastal habitats from Cape Cod to North Carolina, offshore pelagic habitats of the Blake Plateau. EFH in the Gulf of Mexico spans throughout much of the offshore pelagic habitat from the West Florida Shelf to the continental shelf off southern Texas. EFH for yellowfin adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.5 Skates

2.2.5.5.1 Barndoor Skate

Barndoor skate is a large marine skate species found from Newfoundland to North Carolina (Packer et al. 2003). Maturity is reached after 8-11 years and individuals are estimated to produce approximately 47 eggs per year (McEachran 2002; Packer et al. 2003a). Spawning is believed to occur in winter, with eggs hatching in spring or early summer (Packer et al. 2003). Barndoor skate are often co-located with little skate and winter skate in muddy, sandy, and gravelly substrate across a range of depths and temperatures (McEachran 2002; Packer et al. 2003a). Juvenile diet consists mainly of polychaetes, copepods, amphipods, isopods, shrimp, and euphausiids, but as they grow larger, their diet expands to include more mobile prey, such as gastropods, mollusks, squids, crustaceans, and fish (McEachran 2002; Packer et al. 2003a). Barndoor skate are managed as a single stock as part of the Northeast Skate Complex, along with six other species of skate, by the NEFMC. Possession and landing of barndoor skate has been prohibited since 2003, however, the barndoor skate stock was declared rebuilt in 2016 and limited retention of barndoor skate is now allowed in the directed wing fishery. According to the 2016 stock status update, barndoor skates are not overfished and overfishing is not occurring (Sosebee 2017). The barndoor skate EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Juveniles and Adults: EFH includes benthic habitats on the continental shelf, primarily on Georges Bank and in southern New England, in depths of 131 to 1,312 ft (40 to 400 m), and on the continental slope to a maximum depth of 2,460 ft (750 m), as shown on Map 89 of NEFMC (2017). EFH for juvenile and adult barndoor skates occurs on mud, sand, and gravel substrates. Both life stages are usually found on the continental shelf in depths less than 525 ft (160 m), but the adults also occupy benthic habitats between 984 and 1,312 ft (300 and 400 m) on the outer shelf. EFH for barndoor juveniles and adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.5.2 Little Skate

The little skate is a demersal species that ranges from Nova Scotia to Cape Hatteras and is most abundant in the northern Mid-Atlantic Bight and on Georges Bank (Packer et al. 2003b). The little skate is present in New England year-round, and mating may take place at any time throughout the year, although there is evidence that most egg cases are found fully or partially developed from late October to January and from June to July (Packer et al. 2003b). Little skate primarily prey on decapod crustaceans, amphipods, and polychaetes, and to a lesser extent, isopods, bivalves, and fishes (Packer et al. 2003b). Little skate are managed as a single stock as part of the Northeast Skate Complex. According to the 2016 stock status update, little skate are not overfished and not experiencing overfishing (Sosebee 2017). The little skate EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes intertidal and subtidal benthic habitats in coastal waters of the Gulf of Maine and in the Mid-Atlantic region as far south as Delaware Bay, and on Georges Bank, extending to a maximum depth of 262 ft (80 m), as shown on Map 90 of NEFMC (2017), and including high salinity zones in the bays and estuaries listed in Table 28 of NEFMC (2017). EFH for juvenile little skates occurs on sand and gravel substrates, but they are also found on mud. EFH for little skate juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes intertidal and subtidal benthic habitats in coastal waters of the Gulf of Maine and in the Mid-Atlantic region as far south as Delaware Bay, and on Georges Bank, extending to a maximum depth of 328 ft (100 m), as shown on Map 91 of NEFMC (2017), and including high salinity zones in the bays and estuaries listed in Table 28 of NEFMC (2017). EFH for adult little skates occurs on sand and gravel substrates, but they are also found on mud. EFH for little skate adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.5.3 Winter Skate

Winter skate range from the Gulf of St. Lawrence in Canada to Cape Hatteras, North Carolina, and have concentrated populations on Georges Bank and the northern section of the Mid-Atlantic Bight (Packer et al. 2003c; NOAA Fisheries 2020y). Mating is thought to take place year-round, though female winter skates with fully formed egg capsules are more abundant in summer and fall (Packer et al. 2003c). Winter skate primarily prey on polychaetes and amphipods, followed by decapod crustaceans, isopods, bivalves, and fishes (Packer et al. 2003c). Winter skate are managed as a single stock as part of the Northeast Skate Complex (NOAA Fisheries 2020y). According to the 2016 stock status update, winter skate are not overfished and not experiencing overfishing (Sosebee 2017). The winter skate EFH designations are reproduced from NEFMC (2017) below for the life stages found within the Project Area.

Juveniles: EFH includes subtidal benthic habitats in coastal waters from eastern Maine to Delaware Bay and on the continental shelf in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 295 ft (90 m), as shown on Map 92 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 28 of NEFMC (2017). EFH for juvenile winter skates occurs on sand and gravel substrates, but they are also found on mud. EFH for winter skate juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH includes subtidal benthic habitats in coastal waters in the southwestern Gulf of Maine, in coastal and continental shelf waters in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 262 ft (80 m), as shown on Map 93 of NEFMC (2017), including the high salinity zones of the bays and estuaries listed in Table 28 of NEFMC (2017). EFH for adult winter skates occurs on sand and gravel substrates, but they are also found on mud. EFH for winter skate adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.6 Sharks

2.2.5.6.1 Basking Shark

The basking shark is a large, migratory species found in subpolar and cold temperate seas throughout the world (NOAA Fisheries 2017). In the western Atlantic, basking sharks are found in coastal regions from April to October, with the highest abundance in May through August (NOAA Fisheries 2017). Basking shark are filter-feeders that feed swimming forward with an opened mouth to filter planktonic prey. Little is known about the reproductive habits of basking shark, though aggregations of basking shark displaying courtship behaviors are thought to associate with persistent thermal fronts in areas of high prey density (NOAA Fisheries 2017). Harvest of basking shark is prohibited in the US, and the species is listed as “Vulnerable” on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (Fowler 2009). A stock assessment has not been conducted for basking shark (NOAA Fisheries 2017). The basking shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/Young-of-the-Year (YOY), Juveniles and Adults: At this time, insufficient data are available to differentiate EFH between size classes; therefore, EFH designations for all life stages have been combined and are considered the same. EFH includes the Atlantic east coast from the Gulf of Maine to the northern Outer Banks of North Carolina, and from mid-South Carolina to coastal areas of northeast Florida. Aggregations of basking sharks were observed from the south and southeast of Long Island, east of Cape Cod, and along the coast of Maine, in the Gulf of Maine and near the Great South Channel, approximately 59 mi (95 km) southeast of Cape Cod, Massachusetts as well as approximately 47 mi (75 km) south of Martha's Vineyard and 56 mi (90 km) south of Moriche's Inlet, Long Island. These aggregations tend to be associated with persistent thermal fronts within areas of high prey density. EFH for all life stages of basking shark has been identified in the SRWF and SRWEC–OCS.

2.2.5.6.2 Blue Shark

The blue shark is a common pelagic shark that ranges widely in tropical, subtropical, and temperate waters (NOAA Fisheries 2017). In the western Atlantic Ocean, they range from Newfoundland to Argentina (Fisheries and Oceans Canada 2018b). Blue sharks migrate great distances and prefer deep, clear, blue waters, usually with temperatures between 50 and 68 °F (10 and 20 °C) and depths greater than 591 ft (180 m) (NOAA Fisheries 2017). Blue sharks are thought to have an annual reproductive cycle, and nursery areas appear to be in open oceanic waters in the higher latitudes of its range (NOAA Fisheries 2017). Blue shark prey mostly on squid and pelagic schooling fishes and are known to feed opportunistically on marine mammal (Fisheries and Oceans Canada 2018b). According to the 2019 Stock Assessment and Fisheries Evaluation Report (SAFE) blue shark are not overfished and likely not experiencing overfishing (NOAA Fisheries 2019). The blue shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonates/YOY: EFH includes the Atlantic in areas offshore of Cape Cod through New Jersey, seaward of the 98 foot (30 m) bathymetric line (and excluding inshore waters such as Long Island Sound). EFH follows the continental shelf south of Georges Bank to the outer extent of the US EEZ in the Gulf of Maine. EFH for blue shark neonates has been identified in the SRWF and SRWEC–OCS.

Juveniles and Adults: EFH includes localized areas in the Atlantic Ocean in the Gulf of Maine, from Georges Bank to North Carolina, South Carolina, Georgia, and off Florida. EFH for blue shark juveniles and adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.6.3 Common Thresher Shark

The common thresher shark is a pelagic shark found in warm and temperate coastal and oceanic waters around the world, with higher abundance near land (NOAA Fisheries 2017). In the northwest Atlantic Ocean, they are found from Newfoundland to Cuba. Common thresher shark prey on squid, pelagic crabs, and small fishes such as anchovy, sardines, hakes, and small mackerels (NOAA Fisheries 2017). Common thresher shark mating is thought to occur in the late summer and fall, with females giving birth in spring (NOAA Fisheries 2017; NOAA Fisheries 2020z). A stock assessment has not been conducted for common thresher shark (NOAA Fisheries 2019z). The common thresher shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY, Juveniles, and Adults: At this time, insufficient data are available to differentiate EFH between the juvenile and adult size classes; therefore, EFH is the same for those life stages. EFH includes the Atlantic Ocean, from Georges Bank (at the offshore extent of the US EEZ boundary) to Cape Lookout, North Carolina; and from Maine to locations offshore of Cape Ann, Massachusetts. EFH occurs with certain habitat associations in nearshore waters of North Carolina, especially in areas with temperatures from 65 to 70 °F (18.2 to 20.9 °C) and at depths from 15 to 45 ft (4.6 to 13.7 m). EFH for all life stages of common thresher shark has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.6.4 Dusky Shark

The dusky shark is a migratory species found in warm and temperate waters over the continental shelf throughout the Atlantic, Pacific, and Indian Oceans (NOAA Fisheries 2017). The reproductive habits of dusky shark are not well known, but the species is thought to give birth in Bulls Bay, South Carolina in April and May, and in the Chesapeake Bay, Maryland in June and July (NOAA Fisheries 2017). The shallow, coastal waters of Massachusetts serve as nursery habitat for young dusky sharks. Dusky shark prey on a variety of fishes, squid, and other elasmobranchs such as dogfish, catsharks, skates, and rays (Fisheries and Oceans Canada 2018c; Musick et al. 2009a). Harvest of dusky shark is prohibited in the US, and the species is listed as “Vulnerable” on the IUCN Red List of Threatened Species (Musick et al. 2009a). According to the 2019 SAFE Report dusky sharks are overfished and currently experiencing overfishing, (NOAA Fisheries 2019). The dusky shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY: EFH includes the Atlantic Ocean includes offshore areas of southern New England to Cape Lookout, North Carolina. Specifically, EFH is associated with habitat conditions including temperatures from 65 to 72 °F (18.1 to 22.2 °C), salinities of 25 to 35 ppt and depths at 14 to 51 ft (4.3 to 15.5 m). The seaward extent of EFH for this life stage in the Atlantic is 197 ft (60 m) in depth. EFH for dusky shark neonates has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

Juveniles and Adults: EFH includes the coastal and pelagic waters inshore of the continental shelf break (< 656 ft [200 m] in depth) along the Atlantic east coast from habitats offshore of southern Cape Cod to Georgia, including the Charleston Bump and adjacent pelagic habitats. The inshore extent for these life stages is the 66 foot (20 m) bathymetric line, except in habitats of southern New England, where EFH is extended seaward of Martha’s Vineyard, Block Island, and Long Island. EFH also includes pelagic habitats of southern Georges Bank and the adjacent continental shelf break from Nantucket Shoals and the Great South Channel to the eastern boundary of the US EEZ. Adults are generally found deeper (to 6,562 ft [2,000 m]) than juveniles; however, there is overlap in the habitats utilized by both life stages. In the Gulf of Mexico, EFH includes offshore waters of the western and north Gulf, at and seaward of the continental shelf break, and in proximity to numerous banks along the continental shelf edge (e.g., Ewing and Sackett Bank). The continental shelf edge habitat from Desoto Canyon west to the Mexican border is important habitat for adult dusky sharks. EFH for dusky shark juveniles and adults has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.2.5.6.5 Porbeagle Shark

The porbeagle shark is a lamnid shark common in deep, cold temperate waters of the North Atlantic, South Atlantic, and South Pacific Oceans that is valued as food (NOAA Fisheries 2017). Porbeagles have a protracted fall mating period from September to November and it is hypothesized that pupping may occur in the Sargasso Sea (Campana et al. 2010b; Jensen et al. 2002). Post pupping the pups and mature females follow the Gulf Stream back to northern feeding habitats (Campana et al. 2010b). The porbeagle shark is primarily an opportunistic piscivore, their diet is made up of a wide range of species and in the Northwest Atlantic consists mainly of teleost fishes and cephalopods (Joyce et al. 2002; NOAA Fisheries 2017). Porbeagle sharks may be commercially retained but trade is controlled under the Convention on International Trade in Endangered Species. According to the 2019 SAFE Report porbeagle sharks are overfished, but not currently experiencing overfishing (NOAA Fisheries 2019). The porbeagle shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY (≤106 cm total length), Juvenile (106 to 196 cm total length), and Adult (≥196 cm total length): At this time, available information is insufficient for the identification of EFH by life stage, therefore all life stages are combined in the EFH designation. EFH in the Atlantic Ocean includes offshore and coastal waters of the Gulf of Maine (not including Cape Cod Bay and Massachusetts Bay) and offshore waters of the Mid-Atlantic

Bight from Georges Bank to New Jersey. EFH for all life stages of porbeagle shark has been identified in the SRWF and SRWEC–OCS.

2.2.5.6.6 Sand Tiger Shark

Sand tiger shark are a large, coastal species found in tropical and warm temperate waters around the world, often in very shallow water (13 ft [4 m]) (NOAA Fisheries 2017). In the northwestern Atlantic, mature sand tiger shark males and juveniles are found between Cape Cod and Cape Hatteras, and mature and pregnant females are found between Cape Hatteras and Florida (NOAA Fisheries 2017). Sand tiger reproductive habits are not well known, but in the northwestern Atlantic they are thought to give birth in March and April. In the southern portions of its range, females are believed to give birth in the winter, with neonates migrating northward to summer nurseries such as Narragansett Bay (NOAA Fisheries 2017). Sand tiger sharks feed on a variety of bony fishes, as well as other elasmobranchs. Harvest of sand tiger shark is prohibited in the US, and the species is listed as “Vulnerable” on the IUCN Red List of Threatened Species (Pollard and Smith 2009). The sand tiger shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY and Juveniles: Neonate EFH ranges from Massachusetts to Florida, specifically the Plymouth, Kingston, Duxbury Bay system, Sandy Hook, and Narragansett Bays as well as coastal sounds, lower Chesapeake Bay, Delaware Bay (and adjacent coastal areas), Raleigh Bay and habitats surrounding Cape Hatteras. Juvenile EFH includes habitats between Massachusetts and New York (Plymouth, Kingston, Duxbury Bay system), and between mid-New Jersey and the mid-east coast of Florida. EFH can be described via known habitat associations in the lower Chesapeake Bay and Delaware Bay (and adjacent coastal areas) where temperatures range from 66 to 77 °F (19 to 25 °C), salinities range from 23 to 30 ppt at depths of 9 to 23 ft (2.8 to 7.0 m) in sand and mud areas, and in coastal North Carolina habitats with temperatures from 66 to 81 °F (19 to 27 °C), salinities from 30 to 31 ppt, depths of 27 to 45 ft (8.2 to 13.7 m), in rocky and mud substrate or in areas surrounding Cape Lookout that contain benthic structure. EFH for sand tiger neonates and juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.6.7 Sandbar Shark

The sandbar shark is a large, coastal species found in subtropical and warm temperate waters. In the northwestern Atlantic, sandbar sharks range from Cape Cod to the western Gulf of Mexico (NOAA Fisheries 2017). Sandbar sharks prefer bottom habitats and are most commonly found in 66 to 180 ft (20 to 55 m) of water, and occasionally at depths of about 656 ft (200 m) (NOAA Fisheries 2017). The species preys on a variety of bony fishes, other elasmobranchs, mollusks, and crustaceans (Musick et al. 2009b). Sandbar sharks migrate seasonally, and males and females segregate during most of the year (NOAA Fisheries 2017). Mating and birthing activities are thought to peak between April and July, with most near-term pregnant and postpartum females observed in the Florida Keys (NOAA Fisheries 2017). In US waters, sandbar shark nursery areas consist of shallow coastal waters from Cape Canaveral, Florida to Martha’s Vineyard, Massachusetts. According to the 2019 SAFE Report sandbar sharks are overfished, but not currently experiencing overfishing (NOAA Fisheries 2019). The sandbar shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY (<66 cm fork length): EFH includes Atlantic coastal areas from Long Island, New York to Cape Lookout, North Carolina, and from Charleston, South Carolina to Amelia Island, Florida. Important neonate/YOY EFH includes: Delaware Bay (Delaware and New Jersey) and Chesapeake Bay (Virginia and Maryland), where the nursery habitat is limited to the southeastern portion of the estuaries (salinity is greater than 20.5 ppt and depth is greater than 18 ft [5.5 m]); Great Bay, New Jersey; and the waters off Cape Hatteras, North Carolina. In all nursery areas between New York and North Carolina, unless otherwise noted, EFH is associated with water temperatures that range from 59 to 86 °F (15 to 30 °C); salinities that vary from 15 to 35 ppt; water depths that range from 2.6 to 75 ft (0.8 to 23 m); and sand, mud, shell, and rocky sediments/benthic habitat. EFH for sandbar shark neonates has been identified in the SRWEC–OCS and SRWEC–NYS.

Juveniles: EFH includes coastal portions of the Atlantic Ocean between southern New England (Nantucket Sound, Massachusetts) and Georgia in water temperatures ranging from 68 to 75 °F (20 to 24 °C) and depths from 7.9 to 21 ft (2.4 to 6.4 m). Important nurseries include Delaware Bay, Delaware, and New Jersey; Chesapeake Bay, Virginia; Great Bay, New Jersey; and the waters off Cape Hatteras, North Carolina. For all EFH, water temperatures range from 59 to 86 °F (15 to 30 °C), salinities range from 15 to 35 ppt, water depth ranges from 2.6 to 75 ft (0.8 to 23 m), and substrate includes sand, mud, shell, and rocky habitats. EFH in the Gulf of Mexico includes localized areas off Apalachicola Bay, Florida. EFH for sandbar shark juveniles has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Adults: EFH in the Atlantic Ocean includes coastal areas from southern New England to the Florida Keys, ranging from inland waters of Delaware Bay and the mouth of Chesapeake Bay to the continental shelf break. EFH in the Gulf of Mexico includes coastal areas between the Florida Keys and Anclote Key, Florida; areas offshore of the Big Bend region; coastal areas of the Florida panhandle and Gulf coast between Apalachicola and the Mississippi River; and habitats surrounding the continental shelf between Louisiana and south Texas. Adults commonly use habitats in the West Florida Shelf, off Cape San Blas, and cool, deep, clear water offshore of Texas and Louisiana. EFH for sandbar shark adults has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.6.8 Shortfin Mako Shark

The shortfin mako shark is a highly migratory, pelagic species found in warm and warm-temperate waters around the world. In eastern US waters, shortfin mako sharks are found from New England to Florida, in the Gulf of Mexico, and in the Caribbean Sea. Shortfin mako prey on fast-moving fishes such as swordfish, tuna, and other sharks, as well as other bony fishes, marine mammals, crustaceans, and cephalopods (NOAA Fisheries 2017; NOAA Fisheries 2020aa). Shortfin mako reproductive habits and mating grounds are not well known, but mating is thought to occur from summer to fall and pregnant females have only been captured between 20 and 30° N or S latitude (NOAA Fisheries 2017; NOAA Fisheries 2020aa). According to the 2019 SAFE Report shortfin mako sharks are overfished and currently experiencing overfishing (NOAA Fisheries 2019). The shortfin mako shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY, Juveniles, and Adults: At this time, available information is insufficient for the identification of EFH by life stage, therefore all life stages are combined in the EFH designation. EFH in the Atlantic Ocean includes pelagic habitats seaward of the continental shelf break between the seaward extent of the US EEZ boundary on Georges Bank (off Massachusetts) to Cape Cod (seaward of the 656-ft [200-m] bathymetric line); coastal and offshore habitats between Cape Cod and Cape Lookout, North Carolina; and localized habitats off South Carolina and Georgia. EFH in the Gulf of Mexico is seaward of the 656-foot (200 m) isobaths in the Gulf of Mexico, although in some areas (e.g., northern Gulf of Mexico by the Mississippi delta) EFH extends closer to shore. EFH in the Gulf of Mexico is located along the edge of the continental shelf off Fort Myers to Key West (southern West Florida Shelf), and extends from the northern central Gulf of Mexico around Desoto Canyon and the Mississippi Delta to pelagic habitats of the western Gulf of Mexico that are roughly in line with the Texas/Louisiana border. EFH for all life stages of shortfin mako has been identified in the SRWF and SRWEC–OCS.

2.2.5.6.9 Smoothhound Shark Complex (Atlantic Stock)

The smoothhound shark complex consists of three species: smooth dogfish (*Mustelus canis*), Florida smoothhound (*Mustelus norrisi*), and Gulf smoothhound (*Mustelus sinusmexicanus*). Due to the difficulty in differentiating these three species, EFH is designated for these sharks as a complex. However, smooth dogfish is the only smoothhound shark complex species found in the Atlantic, so for the purposes of this report, we focus solely on smooth dogfish.

Smooth dogfish is a common, demersal coastal shark species that ranges from Massachusetts to northern Argentina, typically inhabiting inshore waters down to 656 ft (200 m) (NOAA Fisheries 2017). Smooth dogfish migrate seasonally, congregating between the Chesapeake Bay and southern North Carolina in the winter, and moving along the coast in the spring as waters warm (NOAA Fisheries 2017). Smooth dogfish primarily consume large crustaceans such as crabs and American lobster. During the spring in New England waters, smooth dogfish are also known to feed on small bony fishes (NOAA Fisheries 2017). Mating is through to occur between May and September, and research suggests that estuaries are critically-important nursery habitats in the Mid-Atlantic Bight (NOAA Fisheries 2017). According to the 2019 SAFE Report Atlantic smooth dogfish are not overfished and not currently experiencing overfishing (NOAA Fisheries 2019). The smoothhound shark complex EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY, Juveniles, and Adults: At this time, available information is insufficient for the identification of EFH for this life stage, therefore all life stages are combined in the EFH designation. Smoothhound shark EFH identified in the Atlantic is exclusively for smooth dogfish. EFH includes Atlantic coastal areas from Cape Cod Bay, Massachusetts to South Carolina, inclusive of inshore bays and estuaries (e.g., Pamlico Sound, Core Sound, Delaware Bay, Long Island Sound, Narragansett Bay, etc.). EFH also includes continental shelf habitats between southern New Jersey and Cape Hatteras, North Carolina. EFH for all life stages of smoothhound shark has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.6.10 Spiny Dogfish

The spiny dogfish is found in temperate and subarctic areas of the North Atlantic and North Pacific Oceans. In the northwest Atlantic, their range extends from Labrador to Florida, which the highest concentrations between Nova Scotia and Cape Hatteras, North Carolina (NOAA Fisheries 2020ab). Spiny dogfish migrate seasonally, moving north in the spring and summer and south in the fall and winter (ASMFC 2020e). In Southern New England, spiny dogfish abundance is highest in the fall (ASMFC 2019e). Mating and birthing take place during the winter on offshore wintering grounds (ASMFC 2020e; NOAA Fisheries 2020ab). Spiny dogfish are opportunistic feeders, with smaller individuals primarily preying on crustaceans, and larger individuals preying on jellyfish, squid, and schooling fishes (NOAA Fisheries 2020ab). The 2018 stock assessment concluded that Atlantic spiny dogfish are not overfished and not subject to overfishing (NOAA Fisheries 2020ab). The spiny dogfish EFH designations are reproduced from MAFMC (2014) below for the life stages found within the Project Area.

Juveniles: EFH includes pelagic and epibenthic habitats, primarily in deep water on the outer continental shelf and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine. EFH for juvenile spiny dogfish has been identified in the SRWEC–OCS.

Sub-Adult Females: EFH includes pelagic and epibenthic habitats throughout the region. Sub-adult females are found over a wide depth range in full salinity seawater (32–35 ppt) where bottom temperatures range from 44.6 to 59 °F (7 to 15 °C). Sub-adult females are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 59 °F (15 °C). EFH for sub-adult female dogfish has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Sub-Adult Males: EFH includes pelagic and epibenthic habitats, primarily in the Gulf of Maine and on the outer continental shelf from Georges Bank to Cape Hatteras. Sub-adult males are found over a wide depth range in full salinity seawater (32-35 ppt) where bottom temperatures range from 44.6 to 59 °F (7 to 15°C). Sub-adult males are not as widely distributed over the continental shelf as the females and are generally found in deeper water. They are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 59 °F (15°C). EFH for sub-adult male dogfish has been identified in the SRWEC–OCS.

Adult Females: EFH includes pelagic and epibenthic habitats throughout the region. Adults are found over a wide depth range in full salinity seawater (32–35 ppt) where bottom temperatures range from 44.6 to 59 °F (7 to 15 °C). They are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 59 °F (15 °C). EFH for adult female dogfish has been identified in the SRWF and SRWEC–OCS.

Adult Males: EFH includes pelagic and epibenthic habitats throughout the region. Adults are found over a wide depth range in full salinity seawater (32–35 ppt) where bottom temperatures range from 44.6 to 59 °F (7 to 15 °C). They are widely distributed throughout the region in the winter and spring when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 59 °F (15 °C). EFH for adult male dogfish has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

2.2.5.6.11 Tiger Shark

The tiger shark is a pelagic, highly migratory shark with a range that is within warm waters in both deep oceanic and shallow coastal regions. Tiger sharks prefer coastal and offshore waters from approximately 0°N to 40°N and have been known to make transoceanic migrations (NOAA Fisheries 2017). They are rarely encountered north of the Mid-Atlantic Bight. Nurseries for the tiger shark appear to be in offshore areas but have not been well documented. Neonate sharks have been caught frequently in the northern portion of the Gulf of Mexico, but specific pupping areas have not been identified (NOAA 2009). The tiger shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Juveniles and Adults: EFH in the Atlantic Ocean extends from offshore pelagic habitats associated with the continental shelf break at the seaward extent of the US EEZ boundary (south of Georges Bank, off Massachusetts) to the Florida Keys, inclusive of offshore portions of the Blake Plateau. EFH for juveniles and adults has been identified in the SRWF and SRWEC–OCS.

2.2.5.6.12 White Shark

The white shark is a large species found in coastal and offshore waters of cold and temperate seas (NOAA Fisheries 2017). In the northwestern Atlantic, white shark range sporadically from Newfoundland to the Gulf of Mexico but are most abundant on the continental shelf between Cape Hatteras and Cape Cod (NOAA Fisheries 2017). White sharks are seasonally common in some locations, including New England in the summer (NOAA Fisheries 2017). Juvenile white sharks prey primarily on fish but shift to a diet of mostly marine mammals as they grow (NOAA Fisheries 2017). The reproductive habits of white sharks and locations of nursery areas are not well known. Harvest of white shark is prohibited in the US, and the species is listed as "Vulnerable" on the IUCN Red List of Threatened Species (Fergusson et al. 2009). The white shark EFH designations are reproduced from NOAA Fisheries (2017) below for the life stages found within the Project Area.

Neonate/YOY: EFH includes inshore waters out to 65 mi (105 km) from Cape Cod, Massachusetts, to an area offshore of Ocean City, New Jersey. EFH for neonate white sharks has been identified in the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Transmission Cable.

Juveniles and Adults: Known EFH includes inshore waters to habitats 65 mi (105 km) from shore, in water temperatures ranging from 48 to 82 °F (9 to 28 °C), but more commonly found in water temperatures from 57 to 73 °F (14 to 23 °C) from Cape Ann, Massachusetts, including parts of the Gulf of Maine, to Long Island, New York, and from Jacksonville to Cape Canaveral, Florida. EFH for juvenile and adult white sharks has been identified in the SRWF, SRWEC–OCS, and SRWEC–NYS.

2.3 SUMMARY OF EFH IN THE PROJECT AREA

Tables 2.3-1 and 2.3-2, respectively, summarize early (i.e., eggs, larvae) and late (i.e., neonate, juveniles, adults) benthic life stages of species with designated EFH in the Project Area, provide a description of preferred habitat, and provide an assessment of whether the preferred habitat is present in the Project Area. Tables 2.3-3 and 2.3-4, respectively, summarize early and late pelagic life stages of species with designated EFH in the Project Area.

Table 2.3-1 Habitat Preferences of Early Benthic Life Stages with EFH in the Project Area

Table 2.3-1				
Species	**Life Stage**	**Location**	**Description of Preferred Habitat**	**Preferred Habitat Present in Project Area?**
Finfish				
Atlantic Herring	Egg	SRWF	Benthic habitats with coarse sand, pebbles, cobbles, and boulders and/or macroalgae, often in areas with strong bottom currents.	Limited
Atlantic Wolffish	Egg	SRWF	Subtidal benthic habitats. Egg masses are hidden under rocks and boulders in nests.	Limited
	Larvae	SRWF	Pelagic and subtidal benthic habitats.	Limited
Ocean Pout	Egg	SRWF, SRWEC–OCS	Hard bottom habitats – sheltered nests, holes, and crevices.	Yes
Winter Flounder	Egg	SRWEC–NYS, Onshore Transmission Cable	Bottom habitats with a substrate of mud, muddy sand, sand, gravel, macroalgae, and submerged aquatic vegetation.	Yes
	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Pelagic and bottom habitats.	Yes
Invertebrates				
Atlantic Sea Scallop	Egg	SRWF, SRWEC–OCS, SRWEC–NYS	Coarse substrates of gravel, shells, and rocks.	Yes
	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS	Hard surfaces for pelagic larvae to settle, including shells, pebbles, and gravel. Larvae also attach to macroalgae and other benthic organisms such as hydroids.	Yes
Longfin Inshore Squid	Egg	SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Egg masses or “mops” are laid on a variety of substrates, including hard bottom (shells, lobster pots, fish traps, boulders, and rocks), submerged aquatic vegetation (e.g. *Fucus*), sand, and mud.	Yes

Table 2.3-2 Habitat Preferences of Late Benthic Life Stages with EFH in the Project Area

Species	Life Stage	Location	Description of Preferred Habitat	Preferred Habitat Present in Project Area?
Finfish				
Atlantic Cod	Juvenile	SRWF, SRWEC–OCS	Bottom habitats with a substrate of gravel or cobble, and boulder habitats, especially those with attached organisms.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Bottom habitats with a substrate of rocks, pebbles, gravel, or boulders. Also found on sandy substrates.	Yes
Atlantic Wolffish	Juvenile	SRWF	Subtidal benthic habitats. Juveniles do not have strong substrate preferences	Limited
	Adult	SRWF	Subtidal benthic habitats, including a wide variety of sand and gravel substrates. Rocky spawning habitats.	Limited
Black Sea Bass	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Usually found in association with rough-bottom, shellfish and eelgrass beds, and man-made structures in sandy-shelly areas. Offshore clam beds and shell patches may also be used during the winter.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Usually structured habitats (natural and man-made), sand, and shell substrates.	Yes
Haddock	Juvenile	SRWF, SRWEC–OCS	Young-of-the-year juveniles settle on sand and gravel but are found predominantly on gravel pavement areas. As they grow, they disperse over a greater variety of substrate types.	Yes
	Adult	SRWEC–OCS	Bottom habitats with substrate of hard sand, mixed sand and shell, gravelly sand, and gravel substrates.	Yes
Monkfish	Juvenile	SRWF, SRWEC–OCS	Bottom habitats with substrates of hard sand, pebbles, gravel, broken shells, soft mud, and rocks with attached algae.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Bottom habitats with substrates of hard sand, pebbles, gravel, broken shells, and soft mud.	Yes
Ocean Pout	Juvenile	SRWF, SRWEC–OCS	Bottom habitats on a wide variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel.	Yes
	Adult	SRWF, SRWEC–OCS	Mud and sand, particularly in association with structure-forming habitat types (i.e., shells, gravel, boulders).	Yes
Pollock	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Rocky bottom habitats with attached macroalgae (rockweed and kelp).	Yes
Red Hake	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS	Intertidal and subtidal benthic habitats on mud and sand substrates. Bottom habitats providing shelter, including mud substrates with biogenic depressions, substrates providing biogenic complexity (e.g., eelgrass, macroalgae, shells, anemone and polychaete tubes), and artificial reefs. Newly settled juveniles occur in depressions on the open seabed. Older juveniles are commonly associated with shelter or structure and often found inside live bivalves.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Shell beds, soft sediments (mud and sand), and artificial reefs. Usually found in depressions in softer sediments or in shell beds and not on open sandy bottom.	Yes

Table 2.3-2

Species	Life Stage	Location	Description of Preferred Habitat	Preferred Habitat Present in Project Area?
Scup	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Associated with various sands, mud, mussel, and eelgrass bed substrates	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Prefer smooth to rocky bottom habitats.	Yes
Silver Hake	Juvenile	SRWF, SRWEC–OCS	Sandy substrates; found in association with sand waves, flat sand with amphipod tubes, and shells, and in biogenic depressions.	Yes
	Adult	SRWEC–OCS	Pelagic and benthic habitats, including sandy substrates, bottom depressions, mud habitats bordering deep boulder reefs, boulder habitat, and associated with sand waves and shell fragments.	Yes
Summer Flounder	Juvenile	SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Prefer sandy or muddy bottom habitats. Use estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Prefer sandy or muddy bottom habitats. Inhabit shallow coastal and estuarine waters.	Yes
White Hake	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS	Fine-grained, sandy substrates in eelgrass, macroalgae, and unvegetated habitats.	Yes
	Adult	SRWEC–OCS	Fine-grained, muddy substrates and in mixed soft and rocky habitats.	Limited
Windowpane Flounder	Juvenile and Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Bottom habitats with a substrate of mud or sand.	Yes
Winter Flounder	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Variety of bottom types such as mud, sand, rocky substrates with attached macroalgae, tidal wetlands, and eelgrass. Young-of-the-year juveniles are found inshore on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks. They tend to settle to the bottom in soft-sediment depositional areas and disperse into coarser-grained substrates as they get older.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Muddy and sandy substrates, and on hard bottom on offshore banks.	Yes
Witch Flounder	Juvenile	SRWEC–OCS	Bottom habitats with mud and muddy sand	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Bottom habitats with mud and muddy sand	Yes
Yellowtail Flounder	Juvenile	SRWF, SRWEC–OCS	Sand and muddy sand.	Yes
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Sand and sand with mud, shell hash, gravel, and rocks.	Yes
Invertebrates				
Atlantic Sea Scallop	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS	Bottom habitats with a substrate of shells, gravel, and small rocks (pebble, cobble), preferring gravel.	Yes

Table 2.3-2				
Species	**Life Stage**	**Location**	**Description of Preferred Habitat**	**Preferred Habitat Present in Project Area?**
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS	Bottom habitats with sand and gravel substrates.	Yes
Atlantic Surfclam	Juvenile and Adult	SRWEC–OCS	Sandy habitats along the continental shelf.	Yes
Ocean Quahog	Juvenile and Adult	SRWF, SRWEC–OCS	Prefers medium to fine sandy bottom with mud and silt.	Yes
Skates				
Barndoor Skate	Juvenile and Adult	SRWF, SRWEC–OCS	Bottom habitats with mud, sand, and gravel substrates.	Yes
Little Skate	Juvenile and Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Bottom habitats with a sandy or gravelly substrate, or mud.	Yes
Winter Skate	Juvenile and Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Bottom habitats with a substrate of sand and gravel or mud.	Yes
Sharks [1]				
Sand Tiger Shark	Neonate and Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Coastal benthic and pelagic habitats with a substrate of mud, sand and rock.	Yes
Sandbar Shark	Neonate	SRWEC–OCS, SRWEC–NYS	Coastal benthic and pelagic habitats with a substrate of sand, mud, shell, and rock.	Yes
	Juvenile and Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Coastal benthic and pelagic habitats with a substrate of sand, mud, shell, and rock.	Yes
Smoothhound Shark (Atlantic stock)	Neonate, Juvenile, and Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Coastal benthic and pelagic habitats from Cape Cod to South Carolina, and continental shelf habitats from New Jersey to Cape Hatteras.	Yes
Spiny Dogfish	Juvenile, Sub-adult male,	SRWEC–OCS	Pelagic and epibenthic habitats.	Yes
	Sub-adult female, Adult male	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable	Pelagic and epibenthic habitats.	Yes
	Adult female	SRWF, SRWEC–OCS	Pelagic and epibenthic habitats.	Yes

[1] The neonate/young-of-the year life stage for shark species is more similar to a juvenile life stage than a larval life stage. Thus, neonate / young-of-the year is considered to be a “late” life stage for the purpose of this analysis.

Table 2.3-3 Early Pelagic Life Stages with EFH in the Project Area

Table 2.3-3		
Species	**Life Stage**	**Location**
Finfish		
American Plaice	Larvae	SRWEC–OCS
Atlantic Butterfish	Egg, Larvae	SRWF, SRWEC–OCS
Atlantic Cod	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Atlantic Herring	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Atlantic Mackerel	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Atlantic Wolffish	Larvae	SRWF
Bluefish	Egg, Larvae	SRWF, SRWEC–OCS
Haddock	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Monkfish	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Offshore Hake	Larvae	SRWEC–OCS
Pollock	Egg	SRWF, SRWEC–OCS
	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Red Hake	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Silver Hake	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Summer Flounder	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Windowpane Flounder	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Winter Flounder	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Witch Flounder	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Yellowtail Flounder	Egg, Larvae	SRWF, SRWEC–OCS, SRWEC–NYS
Invertebrates		
Atlantic Sea Scallop	Larvae	SRWF, SRWEC–OCS, SRWEC–NYS

Table 2.3-4 Late Pelagic Life Stages with EFH in the Project Area

Species	Life Stage	Location
Finfish		
Atlantic Butterfish	Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS
Atlantic Herring	Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Atlantic Mackerel	Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Bluefish	Juvenile	SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
	Adult	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Pollock	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
Silver Hake	Juvenile	SRWF, SRWEC–OCS
	Adult	SRWEC–OCS
White Hake	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS
Invertebrates		
Longfin Inshore Squid	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
	Adult	SRWF, SRWEC–OCS
Northern Shortfin Squid	Adult	SRWEC–OCS
Highly Migratory Species		
Albacore Tuna	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS
	Adult	SRWF, SRWEC–OCS
Bluefin Tuna	Juvenile	SRWF, SRWEC–OCS, SRWEC–NYS
	Adult	SRWF, SRWEC–OCS
Skipjack Tuna	Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS
Yellowfin Tuna	Juvenile, Adult	SRWF, SRWEC–OCS
Sharks [1]		
Basking Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS
Blue Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS
Common Thresher Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS
Dusky Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS
Porbeagle Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS
Shortfin mako Shark	Neonate, Juvenile, Adult	SRWF, SRWEC–OCS
Tiger Shark	Juvenile, Adult	SRWF, SRWEC–OCS
White Shark	Neonate	SRWF, SRWEC–OCS, SRWEC–NYS, Onshore Transmission Cable
	Juvenile, Adult	SRWF, SRWEC–OCS, SRWEC–NYS

[1] The neonate/young-of-the year life stage for shark species is more similar to a juvenile life stage than a larval life stage. Thus, neonate/young-of-the year is considered to be a "late" life stage for the purpose of this analysis.

3.0 ASSESSMENT OF POTENTIAL IMPACTS

This section summarizes all potential Impact Producing Factors (IPFs) associated with construction and Operation & Maintenance (O&M) of the Project. This section focuses on those IPFs that have the potential to impact the EFH resources discussed above. IPFs that may result in direct or indirect impacts to EFH are depicted in Figure 3.0-1. Impacts will vary by habitat, species, and life stage, with some species/life stages being more vulnerable than others. All IPFs with potential to result in negligible or greater impacts on EFH are evaluated in this section. The analysis of impacts on EFH are discussed separately for the SRWF, SRWEC–OCS, SRWEC–NYS, and Onshore Facilities in the following sections. For the decommissioning phase of the Project, impacts are anticipated to be similar to or less adverse than those described for construction; therefore, impacts from decommissioning are not addressed separately in this section, with one exception. The Project's introduction of complex habitat may result in beneficial impacts for some EFH species, which would then be reversed at the time of decommissioning. This reversal of beneficial effects is discussed briefly below.

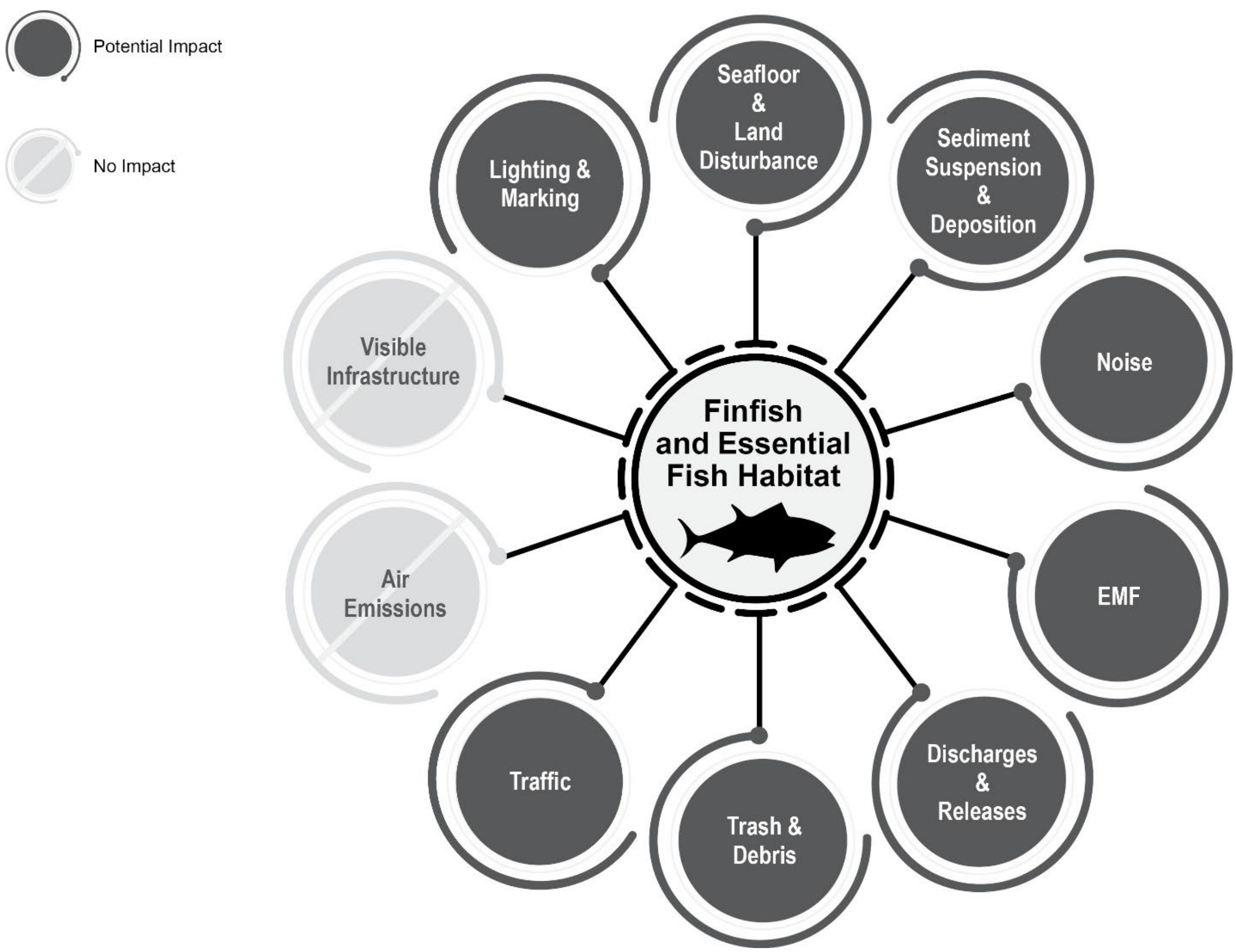

Figure 3.0-1 Impact-Producing Factors on Essential Fish Habitat

3.1 SUNRISE WIND FARM

During construction and O&M activities of the SRWF, impacts on species with designated EFH (EFH species) are expected to vary with each IPF. In general, impacts on pelagic life stages of EFH species are expected to be less than for demersal or benthic life stages. Overall, during construction, O&M, and decommissioning of the SRWF, benthic/demersal life stages of EFH species may be exposed to direct impacts from seafloor disturbance, sediment suspension/deposition, and noise associated with impact pile driving and/or vibratory pile driving of foundations or with MEC/UXO detonation, and indirect impacts from all other IPFs. Impacts on the pelagic life stages of EFH species may be direct for impact and/or vibratory pile driving noise, and other construction/decommissioning noise sources, and indirect for all other IPFs. Potential, long-term impacts may result from the conversion of soft bottom habitat to hard bottom habitat associated with the foundations, scour protection, and secondary protection of the IAC. None of the IPFs are expected to result in alteration of EFH that would result in population-level effects due to the limited scale and intensity of construction and O&M activities, the availability of similar habitat in the surrounding area, and the implementation of avoidance, minimization, and mitigation measures.

3.1.1 Construction

Seafloor and Land Disturbance

Impacts on EFH associated with seafloor preparation, pile driving, vessel anchoring, and cable installation will primarily be associated with species that have benthic/demersal early life stages (eggs and larvae) and later life stages (neonates, juveniles, and adults) that prefer the types of habitats that will be disturbed by seafloor-disturbing activities. Habitat alteration and seafloor disturbance from these activities could cause injury or mortality to benthic/demersal species, affect their habitat, and spawning. Specifically, seafloor-disturbing activities could result in a small loss of spawning habitat for Atlantic cod, as studies completed in other regions suggest that cod often demonstrate spawning site fidelity, returning to the same fine-scale bathymetric locations year after year to spawn (Hernandez et al. 2013; Siceloff and Howell 2013). An active Atlantic cod winter spawning ground has been identified in a broad geographical area that includes Cox Ledge and surrounding locations (Zemeckis et al. 2014; Cadrin et al. 2020; Dean et al. 2020; Langan et al. 2020). There is currently a BOEM funded acoustic telemetry study to better understand the distribution and habitat use of spawning cod on and around Cox Ledge. Given the availability of similar surrounding habitat, Project activities are not expected to result in measurable impacts on spawning Atlantic cod.

Non-lethal impacts on EFH from seafloor preparation activities are expected to be short-term, as any effects will cease shortly after seafloor preparation is completed in a given area and only a small portion of the available habitat in the area will be disturbed. Impacts on EFH species that have pelagic early and/or later life stages within the SRWF are expected to be limited as pelagic habitats will not be directly affected by seafloor preparation, aside from temporary seawater intake associated with controlled flow excavation (CFE) equipment used with sand wave leveling. However, these species may temporarily vacate the area of disturbance and entrainment in construction equipment is not expected to result in population-level impacts.

Impacts on EFH associated with boulder clearance and related seafloor preparation activities are expected to be low. Boulders relocated during seafloor preparation will be in new locations and may be in new physical configurations in relation to other boulders. Concerning these spatial and physical attributes, the boulders are not expected to return to pre-project conditions. However, relatively rapid (< 1 year) recolonization of these boulders is expected (Guarinello et al. 2017) that will return these boulders to their pre-project habitat function. Additionally, if relocation results in aggregations of boulders, these new features could serve as high value refuge habitat for juvenile lobster and fish that prefer structured habitat, as they may provide more complexity and opportunity for refuge than surrounding patchy habitat.

Impacts on EFH associated with seafloor disturbance from impact pile driving and/or vibratory pile driving and installation of the foundations (WTG and OCS–DC) and scour protection are expected to be similar to those produced from seafloor preparation. Impact pile driving and/or vibratory pile driving, and foundation installation could crush benthic/demersal species, particularly eggs and larvae, but also less mobile, older life stages that do not vacate the area. Limited impacts on EFH are expected for pelagic species because they are not expected to be near the seafloor during work activities or subject to crushing or injury through placement of the piles and foundations.

Impacts on EFH associated with the IAC installation are expected to result in similar impacts as those for seafloor preparation, as the cables will be installed in the same area that will have been disturbed during seafloor preparation. Because of the slow speed of the cable installation equipment and limited size of the impact area, it is expected that most mobile benthic/demersal and pelagic finfish will temporarily leave the area of disturbance; however, eggs, larvae, and other sessile or slower moving species may be subject to injury or mortality. Additionally, fish eggs and larvae (ichthyoplankton), as well as zooplankton, are expected to be entrained during jet plow installation of the IAC and CFE for targeted-area cable installation. During these activities, seawater is used to circulate through hydraulic motors and jets during installation. The water withdrawal volumes are expected to be approximately 250 to 650 million gallons (946 to 2,460 million liters) for the jet-plow and approximately 191 to 516 million gallons (724 to 1,953 million liters) for CFE equipment. Although this seawater is released back into the ocean, species may be drawn into the water intake (entrained), and it is assumed that all entrained eggs, larvae, and zooplankton will be killed. These losses are expected to be very low, based on a previous assessment conducted for South Fork Wind (SFW), which found that the total estimated losses of zooplankton and ichthyoplankton from jet plow entrainment were less than 0.001% of the total zooplankton and ichthyoplankton abundance present in the study area, which encompassed a linearly buffered region of 15 km around the export cable and 25 km around the wind farm (INSPIRE Environmental 2018). Only early life stages of fishes may be impacted by the jet plow; later life stages will not be impacted.

If necessary, CFE or suction hopper dredging may be used for sand wave leveling during installation of the IAC. This method utilizes thrust to direct waterflow into sediment, creating liquefaction and subsequent dispersal. The CFE tool draws in seawater from the sides and then jets this water out from a vertical down pipe at a specified pressure and volume. The down pipe is positioned over the cable alignment, enabling the stream of water to fluidize the sands around the cable, which allows the cable to settle into the trench under its own weight. During the process, the fluidized sand gets deposited within the local sand wave field. Local impact caused by entrainment of zooplankton and ichthyoplankton during hydraulic plowing or dredging can lead to mortality. These losses of eggs and larvae from CFE are expected to be similar to those observed from jet plow trenching and are not expected to result in population-level impacts.

Immediately following impact-producing activities, EFH species are expected to move back into the area; however, in areas of sediment disturbance, demersal/benthic habitat recovery and benthic infaunal and epifaunal species abundances may take up to 1 to 3 years to recover to pre-impact levels. (AKRF Inc. et al. 2012; Germano et al. 1994; Hirsch et al. 1978; Kenny and Rees 1994). Recolonization of sediments by epifaunal and infaunal species and the return of mobile fish and invertebrate species will allow this area to continue to serve as foraging habitat. Pelagic species/life stages may be indirectly affected by the temporary reduction of benthic forage species, but these impacts are expected to be small given the availability of similar habitats in the area. Other species may be attracted to the disruption and prey on dislodged benthic species or other species injured or flushed during seafloor preparation, IAC installation, and vessel anchoring activities.

Sediment Suspension and Deposition

Seafloor-disturbing activities will result in temporary increases in sediment suspension and deposition. Sand wave leveling may occur with either a suction hopper dredger or CFE. A suction hopper dredger includes a pump system that sucks up fluidized sand and deposits it within the local sand wave field. CFE uses water to clear loose sediment, creating soil liquefaction and subsequent dispersal. Cable installation methodologies may include mechanical plowing, jet plowing, pre-cut dredging, mechanical cutting, or CFE. Mechanical plowing may pull a plow that simultaneously lays and buries the cable, or a trench may be pre-cut in advance of cable burial activities. Jet plowing uses water jets to fluidize temporarily the soil to open a channel into which the cable is embedded. Pre-cut dredging is similar to pre-cut mechanical plowing where a trench is formed into which the cable is laid. Mechanical cutting cuts a narrow trench in the seafloor into which the cable sinks under its own weight or is pushed via a cable depressor.

Sediment transport modeling for the Project was performed by Woods Hole Group (2021) using the Particle Tracking Model (PTM) in the Surface-Water Modeling System. The PTM is a two-dimensional Lagrangian particle tracking model developed by the Coastal Inlets Research Program and the Dredging Operations and Environmental Research Program at the USACE Research and Development Center. The model, inputs, and results are described in detail in *Hydrodynamic and Sediment Transport Modeling - Sunrise Wind Farm Project* (Woods Hole Group 2021).

Several model simulations were run to evaluate the concentrations of suspended sediments, spatial extent and duration of sediment plumes, and the seafloor deposition resulting from IAC burial activities. The grain size distributions used for modeling were based on grab samples from federal waters collected during field studies performed for the Project, and USGS sediment core data for NYS waters (USGS 2014).

For the SRWF IAC, a representative segment of installation by jet plow was simulated and the modeling results indicate that sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L could extend up to 3,346 ft (1,020 m) from the cable centerline. The model estimated that the elevated TSS concentrations would be of short duration and expected to return to ambient conditions within 0.5 hours following the cessation of cable burial activities. The modeling results indicate that sedimentation from IAC burial is expected to exceed 0.4 inch (10 mm) of deposition out to a maximum of 220 ft (67 m), with a total of 7.4 acres of seafloor experiencing more than 0.4 inch (10 mm) of sediment deposition during construction. Additionally, the TSS plume is expected to be primarily contained within the lower portion of the water column, approximately 12.8 ft (3.9 m) above the seafloor.

Most marine species have some degree of tolerance to higher concentrations of suspended sediment because storms, currents, and other natural processes regularly result in increases in turbidity (MMS 2009). Direct impacts on benthic/demersal EFH could include mortality, injury, or temporary displacement of the organisms living on, in, or near the seafloor. Sediment deposition on eggs or larvae may result in smothering, potentially resulting in mortality (MMS 2007). Demersal/benthic early life stages in or near the area of disturbance would be most affected, but these impacts are not expected to result in population-level effects. Pelagic species could also be affected but are expected to temporarily vacate the area to avoid the disturbance and pelagic habitat quality is expected to quickly return to pre-disturbance levels.

Noise

To evaluate the levels of underwater noise likely to be generated during construction, modeling of impact pile driving was conducted that combines the outputs of source modeling with the spatial and temporal environmental context (e.g., location, oceanographic conditions, and seabed type) to estimate acoustic sound fields (Küsel et al. 2022). Results of the acoustic modeling of impact pile driving activities are presented as single-strike ranges to a series of nominal sound pressure levels (SPL), sound exposure levels (SEL), and zero-to-peak sound pressure levels (PK). Dual acoustic thresholds for physiological injury to fish are considered by the Fisheries Hydroacoustic Working Group (FHWG) to be 206 decibels (dB) PK and either 187 dB SEL (> 2 grams [g] fish weight) or 183 dB SEL (< 2 g fish weight). The behavioral threshold for fish is considered to be 150 dB SPL for all species (FHWG 2008; Stadler and Woodbury 2009). A technical report by an American National Standards Institute (ANSI) registered committee (Popper et al. 2014) reviewed available data and also suggested metrics and methods for estimating acoustic impacts for permanent injury. Dual acoustic thresholds for permanent injury to fish without a swim bladder (particle motion detection) are considered to be 213 dB PK and 219 dB SEL; fish with a swim bladder not involved in hearing (particle motion detection) are 207 dB PK and 210 dB SEL; fish with a swim bladder involved in hearing (primarily pressure detection) are 207 dB PK and 207 dB SEL; and fish eggs and larvae are 207 dB PK and 210 dB SEL. Popper et al. (2014) do not define sound levels that may result in behavioral response, but indicate a high likelihood of response near impact pile driving (tens of meters), moderate response at intermediate ranges (hundreds of meters), and low response far (thousands of meters) from the pile.

Sound exposure guidelines and regulations designed to protect finfish are described in terms of sound pressure levels, but the observable effects of high intensity noise sources on finfish may actually be caused by exposure to particle motion (Popper and Hawkins 2018). However, the particle motion levels associated with a high intensity noise source are difficult to measure and isolate from sound pressure levels. There is currently very limited understanding of the potential effects of particle motion on finfish and invertebrates.

All fishes (including elasmobranchs) detect and use particle motion, even for those fishes that are also sensitive to sound pressure (Popper and Hawkins 2019). Fishes that do not possess a swim bladder (sharks, mackerel, flatfish), as well as fishes with a swim bladder distant from the ear (salmon, tuna, most teleosts) are thought to primarily be sensitive to particle motion (Hawkins et al. 2020). Fishes with the swim bladder close to the ear (Atlantic cod, eels) or where the swim bladder is connected to the ear (herrings) are able to detect sound pressure as well as particle motion (Hawkins et al. 2020). In these finfish, the swim bladder and other gas-filled organs may act as a type of acoustic transformer, converting sound pressure into particle motion (Popper and Hawkins 2018). The movement of these organs may indirectly stimulate the otolith structures such that fishes experience particle motion both from the noise source and from this indirect signal (Popper and Hawkins 2018).

Cephalopods, including cuttlefish, octopus, and squid species, are likely sensitive to particle motion rather than sound pressure (e.g., Packard et al. 1990; Mooney et al. 2010), with the lowest particle motion thresholds reported at 1 to 2 Hz (Packard et al. 1990). Particle motion thresholds were measured for longfin squid between 100 and 300 Hz, with a threshold of 110 dB re 1 μPa reported at 200 Hz (Mooney et al. 2010). No other studies have measured particle motion. Cephalopods appear to be particularly sensitive to low frequency sound. Solé et al. (2017) estimated that trauma onset may begin to occur in cephalopods at sound pressure levels (SPL_{rms}) from 139 to 142 dB re 1 μPa at one-third octave bands centered at 315 Hz and 400 Hz. A recent study found impulsive pile driving noise resulted in a change in squid (*Doryteuthis pealeii*) behavior, with squid exhibiting body pattern changes, inking, jetting, and startle responses (Jones et al. 2020).

Longfin squid (*Doryteuthis pealeii*) are known to spawn inshore in southern New England waters from May to July (Hatfield and Cadrin 2002). Noise from impact pile driving and/or vibratory pile driving may temporarily cause a disturbance to spawning habitat, however the majority of spawning habitat occurs inshore of the SRWF Project Area (MAFMC 2011) and therefore pile driving noise is not expected to result in measurable impacts on spawning squid habitat.

Sessile invertebrates such as bivalves may respond to sound exposure by closing their valves (e.g., Kastelein 2008; Roberts et al. 2015; Solan et al. 2016) much as they do when water quality is temporarily unsuitable. In one study, the duration of valve closure was shown to increase with increasing vibrational strength (Roberts et al. 2015). Clams may respond to anthropogenic noise by reducing activity and moving to a position above the sediment-water interface.

For exposed species, noise from impact pile driving and/or vibratory pile driving may temporarily reduce habitat quality and cause mobile species to temporarily vacate the area (Hawkins et al. 2014; Neo et al. 2015). Some fish species may move away from the area before noise levels exceed the threshold for injury, but given the size of the potential zones of ensonification exceeding the behavioral disturbance threshold, harassment of individual fish is possible (Popper et al. 2014; Neo et al. 2015). The radial distances to SEL injury thresholds for mitigated (10 dB attenuation) impact pile driving of monopiles are a maximum of 4.9 mi (7.8 km) for large fish and 6.3 mi (10.1 km) for small fish. Radial distances for pin piles (assuming 10-dB attenuation and a rate of 4 pin piles per day) are 9.3 mi (15.0 km) for large fish and 13. 4 mi (21.6 km) for small fish. These SEL estimates assume fish remain stationary during pile driving and that this sound level occurs throughout the entire water column. In reality, fish would be moving around, which could, for some species, lessen the impact during pile driving, which will only occur for an approximately 4-hr period each day. Full modeling results are available in Küsel et al. (2022).

As noted in impacts from seafloor disturbance, an active Atlantic cod winter spawning ground has been identified in a broad geographical area that includes Cox Ledge and surrounding locations (Zemeckis et al. 2014b; Dean et al. 2020). In southern New England, cod spawn primarily from December through May (Dean et al. 2020; Langan et al. 2020). Atlantic cod produce “grunts” which may play a significant role in their reproductive behavior (Rowe and Hutchings 2004; Stanley et al. 2017). Noise from pile driving could potentially have an impact on cod reproduction by reducing the efficiency of these vocalizations (Stanley et al. 2017). If pile driving is suspended during the winter months to avoid impacts to North Atlantic right whales, this will also mitigate potential noise impacts on spawning Atlantic cod. In conclusion, impact pile driving and/or vibratory pile driving is expected to result in short-term impacts on EFH for both pelagic and demersal life stages, as once pile driving is completed, the habitat suitability is expected to return to pre-pile driving conditions.

Injury to fish from exposures to blast pressure waves from MEC/UXO detonation is attributed to compressive damage to tissue surrounding the swim bladder and gastrointestinal tract, which may contain small gas bubbles. Effects of detonation pressure exposures to fish have been assessed (Hannay and Zykov 2022) according to the L_{pk} limits for onset of mortality or injury leading to mortality due to explosives, as recommended by the ANSI expert working group (Popper et al. 2014). The injurious effects thresholds for all fish species groups are the same: L_{pk} = 229–234 dB re 1 μPa. Assuming the lower value of 229 dB re 1 μPa and the largest charge weight of the five sizes that were modeled, the maximum distance to L_{pk} onset of injury threshold for all fish hearing groups is 0.5 mi (0.8 km).

The Popper et al. (2014) guidelines are qualitative and vague about non-injurious effects to fish from explosive detonations. For fish species that use swim bladders for hearing, Popper et al. (2014) suggests a high likelihood of temporary threshold shift (TTS) and recoverable injury at near and intermediate distances, where near refers to within a few tens of meters and intermediate refers to a few hundreds of meters. For fish species with swim bladders not used for hearing, the guidelines indicate high likelihood of recoverable impairment at near and intermediate distances but low levels of TTS at intermediate distances. For fish without swim bladders the guidelines indicate low likelihood of recoverable injury and moderate likelihood of TTS at intermediate distances, and low levels of both effects at far distances of a few kilometers. Similar to impact pile driving, detonation of MECs/UXOs is expected to result in short-term impacts on finfish and EFH for both pelagic and demersal life stages, as once the detonation event is completed, the habitat suitability is expected to return to pre-detonation conditions.

Short-term and short-range impacts on EFH could also occur due to geophysical surveys, vessel noise, construction equipment noise, and/or aircraft noise. Limited research has been conducted on underwater noise from mechanical/hydro-jet plows. Generally, the noise from this equipment is expected to be masked by louder sounds from vessels. Also, as most noise generated by these pieces of equipment will be below the sediment surface and associated with the high-pressure jets, noise levels are not expected to result in injury or mortality to EFH species but may cause mobile species to temporarily vacate the area. The duration of noise at a given location will be short, as the installation vessel will only be present for a short period at any given location along the cable route.

Short-term, localized geophysical surveys during the construction period may include the use of multi-beam echosounders, side-scan sonars, shallow penetration sub-bottom profilers, medium penetration sub-bottom profilers and marine magnetometers. The survey equipment to be employed will be equivalent to the equipment utilized during survey campaigns associated with Lease Area OCS-A 0500 conducted in 2016, 2017, 2018, 2019, and 2020 and with Lease Area OCS-A 04876 conducted in 2018, 2019 and 2020 (CSA Ocean Sciences Inc. 2020) and is not expected to result in measurable impacts on EFH.

Helicopters will be used for crew transfers between the SRWF and shore. Underwater noise associated with helicopters is generally brief as compared with the duration of audibility in the air (Richardson et al. 1995). The noise generated by aircraft will be similar to the range of noise from existing aircraft traffic in the region and is not expected to substantially affect the existing underwater noise environment.

Vessel noise may also cause mobile species to temporarily vacate the area. Vessel sound source levels have been shown to cause several different effects, the most common of which are behavioral responses, including avoidance, alteration of swimming speed and direction, and alteration of schooling behavior (Vabø et al. 2002; Handegard and Tjøstheim 2005; Sarà et al. 2007; Becker et al. 2013; Slabbekoorn et al. 2019). These studies also demonstrated that the behavioral changes generally were temporary or that fish habituated to the noises. EFH species in the vicinity of construction vessels may be affected by vessel noise but the duration of the disturbance will occur over a very short period at any given location. Noise from vessel traffic is also expected to be similar to existing background vessel traffic noise in the area.

Discharge and Releases

Project-related marine vessels operating during construction will be required to comply with regulatory requirements for management of onboard fluids and fuels, including prevention and control of discharges. Trained, licensed vessel operators will adhere to navigational rules and regulations, and vessels will be equipped with spill containment and cleanup materials. Additionally, Sunrise Wind will comply with applicable international regulations (i.e., the International Maritime Organization's [IMO] International Convention for the Prevention of Pollution from Ships [MARPOL]), federal (USCG), and state (New York) regulations and standards for reporting treatment and disposal of solid and liquid wastes generated during all phases of the Project. As described in the COP Appendix E1 – *Emergency Response Plan / Oil Spill Response Plan*, some liquid wastes will be permitted as discharge into marine waters (i.e., domestic water, deck drainage, treated sump drainage, uncontaminated ballast water, and uncontaminated bilge water); these are not expected to pose an adverse impact to marine resources as they will quickly disperse, dilute, and biodegrade (BOEM 2013).

All vessels will similarly comply with USCG standards regarding ballast and bilge water management. Liquid wastes from vessels (including sewage, chemicals, solvents, and oils and greases from equipment) will be properly stored, and disposal will occur at a licensed receiving facility. As required by 30 CFR 585.626, chemicals to be utilized during the Project are provided in the COP Appendix E1. Any unanticipated discharges or releases are expected to result in minimal, temporary impacts; activities are heavily regulated and unpermitted discharges are considered accidental events that are unlikely to occur. In the unlikely event that a reportable spill were to occur, the National Response Center would be notified, followed by the EPA, BOEM, and USCG, as outlined in the COP Appendix E1.

Trash and Debris

Any active vessel operating within a marine environment has the potential to create trash and debris. However, the discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by BOEM (30 CFR 250.300) and the USCG (MARPOL, Annex V, Pub. L. 100-220 [101 Stat. 1458]). In accordance with applicable federal, state, and local laws, Sunrise Wind will implement comprehensive measures prior to and during Project construction activities to avoid, minimize, and mitigate impacts related to trash and debris disposal. All trash and debris will be properly stored on vessels for later disposal of on land at an appropriate facility per 30 CFR 585.626(b)(9). Trash and debris will be contained on vessels and offloaded at port or construction staging areas. Food waste that has been ground and can pass through a 1-in (25-mm) mesh screen may be disposed of according to 33 CFR 151.51-77. All other trash and debris returned to shore will be disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any other form of solid waste or debris in the water will be prohibited, and good housekeeping practices will be implemented to minimize trash and debris in vessel work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. With proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Traffic

Impacts associated with vessel traffic during SRWF construction and decommissioning are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

Artificial lighting during construction at the SRWF will be associated with navigational and deck lighting on vessels and partially installed structures from dusk to dawn in accordance with USCG regulations. The response of finfish species to artificial lights is highly variable and depends on several factors such as the species, life stage, and the intensity of the light. Small organisms are often attracted to lights, which in turn attract larger predators to feed on the prey aggregations. Other species may avoid artificially illuminated areas. Artificial lighting may disrupt the diel vertical migration patterns of fish and this may affect species richness and community composition (Nightingale et al. 2006; Phipps 2001). It could also increase the risk of predation and disruption of predator/prey interactions and result in the loss of opportunity for dark-adapted behaviors including foraging and migration (Orr et al. 2013). Artificial lighting associated with construction would be temporary and limited relative to the surrounding areas. Additionally, lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations and no underwater lighting is proposed. Artificial lighting is not expected to result in measurable impacts on EFH.

3.1.2 Operations and Maintenance

Seafloor and Land Disturbance

Seafloor disturbance during O&M of the SRWF may occur during non-routine maintenance of bottom-founded infrastructure (e.g., foundations, scour protection, cable protection) and associated vessel anchoring activities. During O&M, anchoring will be limited to vessels required to be onsite for an extended duration. These maintenance activities are expected to result in similar impacts on EFH as those discussed for the construction phase, although the extent of disturbance would be limited to specific areas.

Once constructed, the SRWF will result in localized changes to seafloor topography and hydrodynamics because of the presence of foundations, scour protection, and cable protection. In previous assessments, offshore structures have not been shown to change the strength or direction of regional oceanic currents that transport eggs and larvae of marine fishes (RI CRMC 2010; DONG Energy et al. 2006). Larval recruitment of EFH species from the water column is not anticipated to be affected by the SRWF structures because the vertical foundations represent a miniscule surface area within the surrounding waters, and recruitment is generally influenced by numerous environmental signals other than the presence of physical structure (including stage of larval development, temperature, prey availability, and chemical odor of conspecifics) (McManus et al. 2018; Pineda et al. 2007). Foundations have been hypothesized as serving as attachment sites for eggs of squid and herrings in the North Sea, but data so far are lacking (Vandendriessche et al. 2016). Planktonic life stages of EFH species would not be directly affected by the introduction of foundations and scour protection. The seafloor overlaying the majority of buried IAC (where cable protection will not exist) is expected to return to pre-construction conditions over time and no long-term changes to sediment mobility and depositional patterns are expected. BOEM is funding an additional study to assess how wind energy facilities may affect local and regional physical oceanographic processes, including circulation and sediment, nutrient, and larval transport (BOEM 2020). Affiliates of Sunrise Wind have provided BOEM with ocean current data from several measurement campaigns within their respective lease areas to help support this study and achieve greater modeling accuracy and study reliability.

The presence of the foundations, associated scour protection, and cable protection may result in both adverse and beneficial long-term impacts on EFH due to conversion of habitat from primarily soft bottom to hard bottom in the immediate vicinity of the structures. Habitat conversion is expected to cause a shift in species assemblages towards those found in rocky reef/rock outcrop habitat; this is known as the “reef effect” (Wilhelmsson et al. 2006; Reubens et al. 2013). This effect is also well known from other anthropogenic structures in the sea, such as oil platforms, artificial reefs, piers, and shipwrecks (Claudet and Pelletier 2004; Wilhelmsson et al. 2006; Seaman 2007; Langhamer and Wilhelmsson 2009; Glarou et al. 2020).

The use of gravel, boulders, and/or concrete mats will create new hard substrate, and this substrate is expected to be initially colonized by barnacles, tube-forming species, hydroids, and other fouling species found on existing hard bottom habitat in the region. Mobile organisms, such as lobsters and crabs, may also be attracted to and occur in and around the foundation in higher numbers than surrounding areas. Monopiles attract a range of attached epifauna and epiflora, including barnacles and filamentous algae (Petersen and Malm 2006). Jacket foundations (which will be used for the OCS–DC) provide a more complex structure than monopile foundations and may increase habitat complexity through more suitable fouling surfaces and increased protection from predators (MMS 2009). As these foundations extend from below the seafloor to above the surface of the water, there is expected to be a zonation of macroalgae from deeper growing red foliose algae and calcareous algae, to kelps and other species, including those that may grow in subtidal, intertidal, and splash zone areas. Foundations and cable protection typically also have crevices that increase structural complexity of the area and attract invertebrate species seeking shelter.

EFH species that have life stages associated with soft bottom habitats may experience impacts, as available habitat will be slightly reduced. EFH species and life stages that inhabit hard bottom habitats may experience a beneficial effect, depending on the quality of the habitat created by the foundations and scour protection, and the quality of the benthic community that colonizes that habitat. Overall, habitat alteration is expected to cause minimal impacts because similar soft and hard bottom habitats are already present in and around the SRWF (INSPIRE 2020a), and the conversion of a relatively small area of habitat is unlikely to result in substantial effects, as any “reef effect” observed will be limited to the immediate vicinity of the individual structures.

Sediment Suspension and Deposition

Increases in sediment suspension and deposition during the O&M phase will result from vessel anchoring and non-routine maintenance activities that require exposing the IAC. Impacts on EFH resulting from sediment suspension and deposition during the O&M phase are expected to be similar to those discussed for the construction phase, but on a more limited spatial scale.

Noise

Impacts on EFH from ship and aircraft noise during O&M of the SRWF are expected to be similar to those discussed for the construction phase, though much lesser in intensity and spatial extent. The underwater noise generated by vessel and aircrafts will be similar to the range of noise from existing vessel and aircraft traffic in the region and are not expected to substantially affect the existing underwater noise environment.

The underwater noise levels produced by operating WTGs are expected to be within the hearing ranges of fish. Low-frequency sounds, generally below 700 Hz, are produced when the blades are spinning, at source levels of 80 to 150 dB re 1 μPa (Kikuchi 2010; Betke et al. 2004). Noise levels from operation of the WTGs are not expected to result in injury or mortality, and it is unlikely that most fish will be exposed to sound levels above background noise levels in the ocean, but if they do, finfish may become habituated to the operational noise

(Thomsen et al. 2006; Bergström et al. 2014). Lindeboom et al. (2011) found no difference in the residency times of juvenile cod around monopiles between periods of WTG operation or when WTGs were out-of-order. This study also found that sand eels did not avoid the wind farm. In a similar study, the abundance of cod, eel, shorthorn sculpin (*Myoxocephalus scorpius*), and goldsinny wrasse (*Ctenolabrus rupestris*) were found to be higher near WTGs, suggesting that potential noise impacts from operation did not override the attraction of these species to the artificial reef habitat (Bergström et al. 2013). Based on the available literature, operational noise from the WTGs is expected to have insignificant impacts on EFH.

Short-term, localized impacts from geophysical surveys during O&M may occur from the use of multi-beam echosounders, side-scan sonars, shallow penetration sub-bottom profilers, medium penetration sub-bottom profilers and marine magnetometers. The survey equipment to be employed will be equivalent to the equipment utilized during survey campaigns associated with Lease Area OCS-A 0500 conducted in 2016, 2017, 2018, 2019, and 2020 and with Lease Area OCS-A 0487 conducted in 2019 and 2020 (CSA Ocean Sciences Inc. 2020), and are not expected to result in measurable impacts on EFH.

Electric and Magnetic Fields

Operation of the WTGs does not generate EMF; however, once energized, the Project cables will produce a magnetic field and an induced electric field that will decrease in strength rapidly with distance. The OCS–DC equipment is too far above sea level to be a source of EMF in the marine environment; however, several cables come into this structure and will be sources of EMF when energized. The following discussion focuses on potential impacts from AC EMF emissions of the IAC. DC EMF from the SRWEC is discussed in later sections.

The IAC will be shielded and, where feasible, buried beneath the seafloor and will otherwise be protected. Shielded electrical transmission cables do not directly emit electrical fields into surrounding areas but are surrounded by magnetic fields that can cause induced electrical fields in moving water (Gill et al. 2012). Exposure to EMF could be short- or long-term, depending on the mobility and behavior of the species/life stage.

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the IAC, and OCS–DC was performed by Exponent Engineering, PC (Exponent Engineering). Results are included in the COP Appendix J1 (Exponent Engineering 2020a), along with a summary of data from field studies conducted to assess impacts of EMF on marine organisms. Though multiple cables come into the OCS–DC, the cables are sufficiently distributed that the level of EMF at this structure is similar to the individual cables themselves (see the COP Appendix J1 for more details). These studies constitute the best source of evidence to assess the potential impacts on finfish and invertebrate behavior or distribution in the presence of energized cables.

The available laboratory-generated research regarding the effects of 50- or 60-Hz AC power sources on fish behavior do not indicate that produced fields will have adverse effects on magnetosensitive and electrosensitive species. Controlled laboratory studies conducted with eel and salmon (Richardson et al. 1976; Armstrong et al. 2015; Orpwood et al. 2015) support the conclusion that EMF produced by 50-75 Hz AC cables do not alter the behavior of magnetosensitive fish species, indicating that high frequency AC EMF in this frequency range is not easily detected by magnetosensitive migratory fish species. Laboratory studies assessing the EMF detection abilities of elasmobranchs indicate that the EMF detection ability decreases as the source frequency increases over 20 Hz and suggest that elasmobranchs are unlikely to easily detect electric fields produced by 50/60 Hz power sources (Andrianov et al. 1984; Kempster et al. 2013). In a laboratory study, demersal catshark were exposed to magnetic fields produced by a 50-Hz source and did not exhibit any significant behavioral changes (Orr 2016). Field studies have also concluded that energized power cables neither attract nor repel elasmobranchs (Love et al. 2016). Based on the available information, EMF produced by 50/60 Hz power sources such as the IAC is unlikely to be detected by elasmobranchs and is unlikely to cause changes in elasmobranch behavior or distribution.

Love et al. (2016) conducted a series of surveys between 2012 and 2014 to track fish populations at both energized and unenergized submarine cables off the California coast. These studies were designed to assess whether EMF produced by the energized cable had any in situ effects on the distribution of marine species. Over three years of observations, no differences in fish communities at energized and unenergized cable sites were noted, indicating that EMF had no effect on fish distributions, although the physical structure of the unburied cables did create a “reef effect” (Love et al. 2016). Additionally, multiple fish surveys have been conducted at existing offshore windfarm sites. Results from these studies strongly indicate that operating windfarms and cables do not adversely affect the distributions of resident fish populations.

Nearly 10 years of pre- and post-operational data from the Horns Rev Offshore Wind Farm site near Denmark indicate “no general significant changes in the abundance or distribution patterns of pelagic and demersal fish” (Leonhard et al. 2011), including species similar to those expected to inhabit the SRWF. Researchers did note an increase in fish species associated with hard ground and vertical features, especially around WTG footings (Leonhard et al. 2011).

Compared to fish and elasmobranchs, relatively little is known about the response of marine invertebrates to EMF (Albert et al. 2020). Field surveys on the behavior of large crab species and lobster at submarine cable sites (Love et al. 2017; Hutchison et al. 2018) indicate that the Project’s calculated magnetic-field levels are not likely to impact the distribution and movement of large epibenthic crustaceans. Ancillary data and observations from these field studies also suggest that cephalopod behavior is similarly unaffected by the presence of 60-Hz AC cables. A synthesis paper on the current understanding of potential impacts of EMF on invertebrates concludes that while some studies have shown changes in individuals during laboratory studies, not enough information is available to determine how those changes may extend to the population or community level or ecological processes (Albert et al. 2020). Based on the modeling results and existing evidence, the EMF associated with the cables will be below the detection capability of most invertebrate species and are unlikely to result in measurable impacts on EFH invertebrate species.

Based on the modeling results and existing evidence, EMF associated with the IAC, and OCS–DC is not expected to adversely affect EFH habitat in the SRWF. These conclusions are consistent with the findings of a previous comprehensive review of the ecological impacts of marine renewable energy projects, where it was determined “the ecological impacts of EMFs … are likely to be limited, and marine animals living in the vicinity of MRE [Marine Renewable Energy] devices and export cables are not likely to be harmed by emitted EMFs” (Copping et al. 2020). Moreover, a 2019 BOEM report that assessed the potential for AC EMF from offshore wind facilities to affect marine populations concluded that, for the southern New England area, no negative effects are expected for populations of key commercial and recreational fish species (Snyder et al. 2019). Based on this information, it is not expected that EFH will be measurably affected by AC EMF from the IAC.

Discharges and Releases

Impacts from accidental discharges and releases during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply. Unpermitted discharges or releases are considered accidental events, and in their unlikely occurrence, these are expected to result in minimal, temporary impacts. Permitted discharges are not expected to pose an adverse impact to marine resources as they will quickly disperse, dilute, and biodegrade (BOEM 2013).

Seawater cooling will be needed for the OCS–DC. During operation, the OCS–DC will require continuous cooling water withdrawals and subsequent discharge of heated effluent back to the receiving waters. The maximum DIF and discharge volume is 8.1 million gallons per day with AIF and discharge volumes that are dependent on ambient source water temperature and facility output. Hydrodynamic modeling was completed to estimate the zone of hydraulic influence associated with cooling water withdrawals and the extent of the thermal plume during discharge activities (TRC 2022). Results indicate that there will be some highly localized increases in water temperature in the immediate vicinity of the discharge location of the OCS–DC. The maximum size of the OCS–DC thermal plume (defined as a 2°F (1°C) water temperature differential from ambient) will be contained to a distance of 87 ft (27 m) from the discharge location, with no migration to the surface waters or benthos in a worst-case scenario (i.e., slack tide during spring months when mean ambient temperature is expected to be the lowest). The final design, configuration, and operation of the CWIS for the OCS–DC will be permitted as part of an individual NPDES permit and additional details have been included in the permit application submitted to the EPA.

The potential effects to marine organisms during water withdrawals include the entrainment of egg and larval life stages as described in the Project-specific Ichthyoplankton Entrainment Assessment (TRC 2022). The hydraulic zone of influence under design intake flow conditions is highly localized and does not extend within 15 ft (5 m) of the pre-installation seafloor grade or 98 ft (30 m) of the surface (TRC 2022). Only eggs and larvae that enter the localized hydraulic zone of influence would be susceptible to entrainment; species whose ichthyoplankton are buoyant or benthic would not be affected. Forage species are expected to be those most susceptible to entrainment impacts associated with operation of the OCS–DC and include Atlantic herring (*Clupea harengus*), red hake (*Urophycis chuss*), Atlantic mackerel (*Scomber scombrus*), and silver hake (Merluccius bilinearis). As entrainment rates are directly proportional to water flow, the most effective means to minimize entrainment are primarily focused on minimizing and managing water use. The water circulation pumps for the OCS–DC are equipped with VFDs that allow the intake flow to correspond with cooling water demand. Using VFD, the cooling water intake structure of the OCS–DC has been designed to minimize the cooling water volumes required to the greatest extent practicable. This technology is recognized by the EPA as a best technology available for minimizing entrainment impacts.

Trash and Debris

Impacts from marine disposal of trash and debris during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply. The unanticipated marine disposal of trash and debris is considered an unpermitted, accidental event, and containment and good housekeeping practices will be implemented to minimize the potential.

Traffic

Impacts associated with vessel traffic during SRWF O&M are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

Artificial lighting during O&M will be associated with vessels, the WTGs, and the OCS–DC for operational safety and security purposes. As discussed for the construction phase, the response of fish species to artificial lights is highly variable and depends on several factors such as the species, life stage, and the intensity of the light. Small organisms are often attracted to lights, which in turn attract larger predators to feed on the prey aggregations. Other species may avoid artificially illuminated areas. However, lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations. Because of the limited area that will have artificial lighting relative to the surrounding areas, and because no underwater lighting is proposed, impacts on EFH are expected to be insignificant

3.1.3 Decommissioning

At the end of the Project's operational life, project structures will be decommissioned in accordance with a detailed Project decommissioning plan that will be developed in compliance with applicable laws, regulations, and BMPs at that time. All facilities will need to be removed to a depth of 15 ft (4.6 m) below the mudline, unless otherwise authorized by BOEM (30 CFR § 585.910(a)). This plan will account for changing circumstances during the operational phase of the Project and will reflect new discoveries particularly in the areas of marine environment, technological change, and any relevant amended legislation. Absent permission from BOEM, Sunrise Wind will complete decommissioning within two years of termination of the Lease.

If the man-made structures are to be removed at the end of the Project's operational life, as currently prescribed, this will reverse the expected beneficial impacts on EFH resources through the introduction of complex habitat. Over time, the disturbed area is expected to revert to pre-construction conditions, which would result in a beneficial impact for species and life stages that inhabit soft bottom habitats. Overall, habitat alteration from decommissioning is expected to cause minimal impacts because similar soft and hard bottom habitats are already present in and around the SRWF and SRWEC (Appendices M1, M2, and M3).

A recent review on the impacts of decommissioning man-made structures provides the case for considering alternatives to a mandated complete removal of all man-made structures. The paper emphasizes the potential importance of man-made submerged structures as complex habitats potentially supporting a rich localized food web (Fortune and Paterson 2021). Benthic habitat and finfish monitoring at the monopiles and the surrounding area will document the direct realized effects of these novel hard surfaces on finfish and EFH resources. Documenting the established epifaunal community that will inhabit the foundations, as well as the infaunal community at the base of these structures, will provide information on the habitat value to finfish as potential EFH. The data gathered from these post construction benthic and finfish surveys will be used to inform decommissioning strategies in the future.

3.2 SUNRISE WIND EXPORT CABLE – OCS

3.2.1 Construction

Seafloor and Land Disturbance

Direct impacts on EFH from seafloor preparation, SRWEC–OCS installation, and vessel anchoring are expected to be similar to those discussed for construction of the SRWF, though less boulders are present along the cable route than in the SRWF. Seafloor preparation, SRWEC–OCS installation, and vessel anchoring are expected to have minimal impacts on EFH species that have pelagic early or later life stages.

As described in the construction discussion for the SRWF, fish eggs and larvae (ichthyoplankton), as well as zooplankton, are expected to be entrained and killed during jet plow embedment of the SRWEC–OCS and CFE associated with sand wave leveling. These losses are expected to be very low based on a previous assessment conducted for the South Fork Wind Farm (SFWF), which found that the total estimated losses of zooplankton and ichthyoplankton from jet plow entrainment were less than 0.001% of the total zooplankton and ichthyoplankton abundance present in the study area, which encompassed a linearly buffered region of 15 km around the export cable and 25 km around the wind farm (INSPIRE 2018).

As discussed for the construction of the SRWF, in areas of sediment disturbance, benthic habitat recovery and benthic infaunal and epifaunal species abundances may take up to 1 to 3 years to recover to pre-impact levels, based on the results of a number of studies on benthic recovery (e.g., AKRF, Inc. et al. 2012; Germano et al. 1994; Hirsch et al. 1978; Kenny and Rees 1994). Recolonization of sediments by epifaunal and infaunal species and the return of mobile fish and invertebrate species will allow this area to continue to serve as foraging habitat for EFH species. Pelagic species/life stages may be indirectly affected by the temporary reduction of benthic forage species, but these impacts are expected to be insignificant given the availability of similar habitats in the area. Other species may be attracted to the disruption and prey on dislodged benthic species or other species injured or flushed during seafloor preparation, SRWEC–OCS installation, and vessel anchoring activities.

Sediment Suspension and Deposition

Seafloor-disturbing activities associated with the SRWEC–OCS installation will result in temporary increases in sediment suspension and deposition, similar to construction of the SRWF discussed above.

Sediment transport modeling for the Project was performed by using the PTM to evaluate the concentrations of suspended sediments, spatial extent and duration of sediment plumes, and the seafloor deposition resulting from construction activities. The model, inputs, and results are described in detail in the COP Appendix H (Woods Hole Group 2021).

During installation of the SRWEC–OCS, modeling results indicate that during jet plowing, sediment plumes with TSS concentrations exceeding the ambient conditions by 100 mg/L could extend up to 2,969 ft (905 m) from the cable centerline in federal waters. The model estimated that the elevated TSS concentrations would be of short duration and expected to return to ambient conditions within 0.4 hours following the cessation of cable burial activities. Sedimentation from SRWEC–OCS burial is predicted to exceed 0.4 inch (10 mm) of deposition up to 791 ft (241 m) from the cable centerline. This thickness of sedimentation is expected to cover approximately 832.3 acres (3.37 km^2) in federal waters, and the TSS plume is expected to be primarily contained within the lower portion of the water column, approximately 9.8 ft (3.0 m) above the seafloor.

For sand wave leveling associated with SRWEC–OCS construction, modeling results indicate that sediment plumes with TSS concentrations exceeding ambient conditions by 100 mg/L could extend up to 5,052 ft (1,540 m) from the cable corridor centerline in federal waters (trailing suction hopper dredge with bulk disposal scenario). The model estimated that the elevated TSS concentrations from sand wave leveling would be of short duration and expected to return to ambient conditions within up to 0.4 hours following the cessation of sand wave leveling activities in federal waters. Sedimentation from sand wave leveling along the SRWEC–OCS is predicted to exceed 0.4 inch (10 mm) of deposition up to 1,427 ft (435 m) from the activity (CFE sand wave leveling scenario). This thickness of sedimentation is expected to cover approximately 174.2 acres (0.70 km^2) in federal waters.

Direct impacts on EFH from sediment suspension and deposition are expected to be similar to those discussed for construction of the SRWF, with greater impacts on sessile and slow-moving benthic species/life stages compared to mobile and pelagic species/life stages. Longfin squid (*Doryteuthis paeleii*) spawning generally occurs from May to July in the near-shore portions of the SRWEC–OCS corridor (Hatfield and Cadrin 2002). Longfin squid lay eggs on a wide variety of substrates (MAFMC 2001) and impacts to squid egg mops could occur from sediment suspension and deposition from sand wave leveling within this time frame.

Noise

The direct impacts on EFH from noise associated with geophysical surveys, vessels, construction equipment, and aircraft during construction of the SRWEC–OCS are expected to be similar to those discussed for the construction phase of the SRWF.

Discharges and Releases

Impacts associated with wastewater discharges or an inadvertent release of hazardous material during construction of the SRWEC–OCS are expected to be insignificant and similar to the impacts of discharges and releases discussed for the construction of the SRWF.

Trash and Debris

The potential for exposure and adverse impacts from routine and non-routine activities resulting in trash and debris will be similar to those identified for the SRWF. Depending on the type of trash or debris, fish could become entangled or ingest foreign materials, causing injury or mortality. However, with proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Traffic

Impacts associated with vessel traffic during SRWEC–OCS construction are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

Impacts on EFH from artificial lighting during SRWEC–OCS construction are expected to be insignificant and similar to the impacts from artificial lighting for construction of the SRWF.

3.2.2 Operations and Maintenance

Seafloor and Land Disturbance

Minimal impacts on EFH are expected from operation of the SRWEC–OCS, as it will be buried beneath the seabed where feasible and will otherwise be protected. Seafloor disturbance during O&M of the SRWEC–OCS will be limited to non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection where present. These maintenance activities and associated vessel anchoring are expected to result in similar direct impacts on EFH as those discussed for construction, although the extent of disturbance would be limited to specific areas along the SRWEC–OCS route.

Cable protection (e.g., concrete mattresses or rock placement) may be placed in select areas along the SRWEC–OCS. The introduction of engineered concrete mattresses or rock to areas of the seafloor can cause local disruptions to circulation, currents, and natural sediment transport patterns, though these impacts are expected to be insignificant given the miniscule surface area associated with the cable protection compared to the surrounding waters. Under normal circumstances, these segments of the SRWEC–OCS are expected to remain covered as by sediment and associated cable protection (where applicable). In non-routine situations, these segments may be uncovered, and reburial might be required (for buried portions of the SRWEC). The seafloor overlaying the majority of buried SRWEC–OCS (where cable protection will not exist) is expected to return to pre-construction conditions over time and no long-term changes to sediment mobility or depositional patterns are expected.

Indirect impacts on EFH associated with O&M activities for the SRWEC–OCS are expected to result in similar impacts as those discussed for the IAC but will be limited in spatial extent. The protection of the cable with concrete mattresses or rock may result in the long-term conversion of soft bottom habitat to hard bottom habitat. Similar to the foundations, this cable protection may have a long-term impact on EFH species associated with soft bottom habitats and a long-term beneficial impact on EFH species associated with hard bottom habitats, depending on the quality of the habitat created by the secondary cable protection, and the quality of the benthic community that colonizes that habitat.

Sediment Suspension and Deposition

Increases in sediment suspension and deposition during the O&M phase may result from vessel anchoring and non-routine maintenance activities that require exposing portions of the SRWEC–OCS. Impacts on EFH resulting from sediment suspension and deposition during the O&M phase are expected to be similar to those discussed for the construction phase, but on a more limited spatial scale.

Noise

Impacts on EFH from geophysical surveys and ship and aircraft noise during O&M of the SRWEC–OCS are expected to be similar to those discussed for the construction, though lesser in extent.

Electric and Magnetic Fields

Once the SRWEC–OCS becomes energized, the cable will produce a magnetic field, both perpendicularly and in a lateral direction around the cable. The cable will be shielded and, where feasible, buried beneath the seafloor and will otherwise be protected. Shielded electrical transmission cables do not directly emit electrical fields into surrounding areas but are surrounded by magnetic fields that can cause induced electrical fields in moving water (Normandeau et al., 2011).). Exposure to EMF could be short- or long-term, depending on the mobility of the species.

A modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SRWEC–OCS was performed by Exponent Engineering, and results are included in the COP Appendix J1 (Exponent Engineering 2020a). COP Appendix J1 also summarizes published data from field and laboratory studies conducted to assess impacts of EMF on marine organisms.

Tagging studies and field surveys have been conducted to determine if the presence of direct current (DC) submarine cables significantly alter fish migration or the distribution of fish populations at submarine cable sites. Acoustic telemetry tagging and passive acoustic monitoring of green sturgeon and Chinook salmon in San Francisco Bay were correlated with magnetic field anomalies due to DC submarine cables and bridges spanning San Francisco Bay (Klimley et al. 2017). Kavet et al. (2016) found that the magnetic anomaly from the DC cables was at least an order of magnitude (ten times) less than that from the bridges. Neither the bridges nor the cables deterred migration movements of green sturgeon or Chinook salmon (Klimley et al. 2017). An acoustic telemetry study monitoring the movements of migratory silver European eel examined the effect of a DC cable on eel movements and concluded that the cable did not act as a barrier or obstruction to migration (Westerberg and Begout-Anras 1999).

A series of biological field surveys along the Monterey Accelerated Research System (MARS) cable off the coast of California tracked the presence of different marine species both before and after the installation and energization of a submarine communication/DC power cable energized to 10 kV. Over 30,000 individuals from 154 taxonomic groups were observed between 2004 and 2015 (Kuhnz et al. 2015). Based on this data, authors concluded that the MARS cable has had little detectable impact on biological assemblages. Similarly, diver studies conducted at sites along the high-voltage direct current (HVDC) Basslink submarine cable indicated no adverse effects on fish communities, but where burial was impractical and the cable was protected with an iron shell, various fish species were observed to be associated with this vertical structure (Sherwood et al. 2016).

Hutchison et al. (2018, 2020) assessed the responses of American lobster to an HVDC cable under field conditions and concluded that EMF resulted in small-scale changes in lobster distribution within the cages, although the cable was not observed to present a barrier to movement.

At peak loading, the magnetic fields produced by the DC cables at the overlying seabed are projected to be well below the levels detectable by finfish (COP Appendix J1 [Exponent Engineering 2020a]). Similarly, electric fields associated with DC cables at peak loading are expected to be detectable by elasmobranchs, but based on available field studies, slightly below levels documented to elicit minor changes in the behaviors of elasmobranchs. Therefore, the SRWEC–OCS will not result in adverse effects on finfish species or EFH.

Discharges and Releases

Impacts from marine discharges and releases during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Trash and Debris

Impacts from disposal of trash and debris during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Traffic

Impacts associated with vessel traffic during SRWEC–OCS O&M are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

Impacts on EFH from artificial lighting during SRWEC–OCS O&M are expected to be similar to the impacts from artificial lighting for O&M of the SRWF, though to a lesser extent, though lesser in extent, as there are no permanent lighted structures associated with the SRWEC–OCS.

3.3 SUNRISE WIND EXPORT CABLE – NYS

3.3.1 Construction

Seafloor and Land Disturbance

Direct impacts on benthic species and life stages from seafloor preparation, SRWEC–NYS installation, and vessel anchoring are expected to be similar to those discussed for construction of the SRWEC–OCS, with the exception of shallower areas being affected as the SRWEC–NYS nears landfall. These shallower areas are expected to have slightly different finfish species assemblages than the deeper offshore areas. Seafloor preparation, SRWEC–NYS installation, and vessel anchoring are expected to have insignificant impacts on EFH species that have pelagic early or later life stages.

Construction of the SRWEC–NYS landfall would be accomplished using HDD methodology. Use of HDD will avoid impacts to mapped tidal wetlands. To support HDD installation, a temporary offshore HDD Work Area would be required. The HDD Work Area would be located within the Export Cable Corridor. Within this work area, an HDD exit pit may be dredged. A barge or jack up vessel may be used at this location to assist the drilling process, handle the pipe for pull in, and for other support activities. To minimize the potential risks associated with an inadvertent drilling fluid return/release, Sunrise Wind will develop an Inadvertent Return Plan for the inadvertent release of drilling fluids prior to construction and will implement appropriate BMPs. Potential impacts from the HDD exit pit would be similar to those discussed for seafloor preparation, but on a smaller scale.

As described in the construction discussion for the SRWF, fish eggs and larvae (ichthyoplankton), as well as zooplankton, are expected to be entrained and killed during jet plow embedment of the SRWEC–NYS. The water withdrawal volumes are expected to be approximately 250 to 650 million gallons (946 to 2,460 million liters) for the jet-plow. These losses are expected to be very low, based on a previous assessment conducted for the SFWF, which found that the total estimated losses of zooplankton and ichthyoplankton from jet plow entrainment were less than 0.001% of the total zooplankton and ichthyoplankton abundance present in the study area, which encompassed a linearly buffered region of 15 km around the South Fork Export Cable and 25 km around the SFWF (INSPIRE 2018).

As discussed for the construction of the SRWEC–OCS, in areas of sediment disturbance, benthic habitat recovery and benthic infaunal and epifaunal species abundances may take up to 1 to 3 years to recover to pre-impact levels, based on the results of a number of studies on benthic recovery (e.g., AKRF, Inc. et al. 2012; Germano et al. 1994; Hirsch et al. 1978; Kenny and Rees 1994). Recolonization of sediments by epifaunal and infaunal species and the return of mobile fish and invertebrate species will allow this area to continue to serve as foraging habitat for EFH species. Pelagic species/life stages may be indirectly affected by the temporary reduction of benthic forage species, but these impacts are expected to be insignificant given the availability of similar habitats in the area. Other species may be attracted to the disruption and prey on dislodged benthic species or other species injured or flushed during seafloor preparation, SRWEC–NYS installation, and vessel anchoring activities.

Sediment Suspension and Deposition

As discussed for the SRWEC–OCS, seafloor-disturbing activities associated with the SRWEC–NYS will also result in temporary increases in sediment suspension and deposition. Within the SRWEC–NYS corridor, an HDD exit pit may be dredged. Sediment transport modeling for the Project was performed by using the PTM to evaluate the concentrations of suspended sediments, spatial extent and duration of sediment plumes, and the seafloor deposition resulting from construction activities. The model, inputs, and results are described in detail in the COP Appendix H (Woods Hole Group 2021).

During installation of the SRWEC–NYS by jet plow, modeling results indicate that sediment plumes with TSS concentrations are not expected to exceed the ambient conditions by 100 mg/L in NYS waters. The model estimated that any elevated TSS concentrations would be of short duration and expected to return to ambient conditions within 0.3 hours following the cessation of cable burial activities. Sedimentation from SRWEC–NYS burial is predicted to exceed 0.4 inch (10 mm) of deposition up to 253 ft (77 m) from the cable centerline. This thickness of sedimentation is expected to cover approximately 53.1 acres (0.21 km^2) in state waters, and the TSS plume is expected to be primarily contained within the lower portion of the water column, approximately 8.5 ft (2.5 m) above the seafloor.

Mechanical dredging of the HDD exit pit may produce TSS concentrations more than 100 mg/L above ambient conditions within 1,204 ft (367 m) of the construction activity, and TSS concentrations are expected to return to ambient within 0.3 hours. Sedimentation from HDD exit pit dredging may exceed 0.4 inch (10 mm) of deposition up to 128 ft (39 m) from the pit and cover approximately 0.25 acres (1,012 m^2). Additionally, the TSS plume is expected to be primarily contained within the lower portion of the water column, approximately 13.1 ft (4.0 m) above the seafloor.

Similar to the impacts discussed for the construction of the SRWEC–OCS, direct impacts on EFH from sediment suspension and deposition associated with construction of the SRWEC–NYS are expected to be similar to those discussed for construction of the SRWF, with greater impacts on sessile and slow-moving benthic species/life stages compared to mobile and pelagic species/life stages. In shallow waters, TSS plumes from construction activities may occupy the majority of the water column, and mobile species/life stages may temporarily vacate the area of disturbance.

Noise

Construction of the SRWEC–NYS landfall would be accomplished using HDD methodology including potential impact installation of a casing pipe or similar containment structure, and vibratory installation of temporary supporting sheet piles (Küsel et al. 2022). Within the SRWEC–NYS corridor, an HDD exit pit may be dredged. A barge or jack up vessel may be used at this location to assist the drilling process, handle the pipe for pull in, and for other support activities. Direct impacts on EFH resulting from vessel, construction equipment, impact pile driving, and aircraft noise are expected to be similar to those discussed for construction of the SRWF and SRWEC–OCS.

G&G surveys may be used to identify and confirm MEC/UXO targets for removal/disposal. Although MEC/UXO avoidance is the preferred approach, detonation methods may be selected based on consultations with a specialist and in coordination with the appropriate agencies. In the event that MEC/UXO detonation is required, it is expected that detonation impacts to finfish would be similar to those described above during construction of the SRWF. Residual risk management actions would be implemented to minimize impacts to finfish, as outlined in the environmental protection measures.

Vibratory installation of the temporary goal post sheet piles may elevate underwater noise levels beyond non-impulsive fish hearing thresholds. The non-impulsive injury threshold for fish with swim bladder involved in hearing is 170 dB rms (Popper et al. 2014), and the behavioral threshold for fish is 150 dB rms (Andersson et al. 2007, Wysocki et al. 2007, Mueller-Blenkle et al. 2010, Purser and Radford 2011). The maximum radial distance to injury thresholds is approximately 0.01 mi (20 m), and the maximum distance to the fish behavioral threshold is 0.06 mi (100 m). These ensonification zones are relatively small, and it is anticipated that fish species would move away from the area at the start of vibratory pile driving. Direct impacts to finfish and EFH from vibratory driving of goal posts are expected to be very short term and minimal.

Discharges and Releases

The potential for exposure and adverse impacts from routine and non-routine discharges and releases will be similar to those identified for the SRWF. Additionally, HDD at landfall will use a drilling fluid that consists of bentonite, drilling additives, and water. A barge or jack-up vessel may also be used to assist the drilling process, handle the pipe for pull in, and help transport the drilling fluids and mud for treatment, disposal and/or reuse. To minimize the potential risks for an inadvertent drilling fluid release, an Inadvertent Return Plan will be developed and implemented during construction.

Trash and Debris

The potential for exposure and adverse impacts from routine and non-routine activities resulting in trash and debris will be similar to those identified for the SRWF. Depending on the type of trash or debris, fish could become entangled or ingest foreign materials, causing injury or mortality. However, with proper waste management procedures, the potential for trash or debris to be inadvertently left overboard or introduced into the marine environment is not anticipated.

Traffic

Impacts associated with vessel traffic during SRWEC–NYS construction are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

During construction and decommissioning activities, navigational and deck lighting will be utilized from dusk to dawn on the vessels that will be installing or decommissioning the SRWEC–NYS. Direct impacts on EFH from artificial lighting are expected to be short-term because the vessels are expected to pass quickly along the SRWEC route during cable installation. As discussed for the SRWEC–OCS, artificial lighting associated with SRWEC–NYS installation would be temporary and limited relative to the surrounding areas and impacts on EFH are expected to be insignificant.

3.3.2 Operations and Maintenance

Seafloor and Land Disturbance

Minimal impacts on EFH are expected from operation of the SRWEC–NYS, as it will be buried beneath the seabed where feasible and will otherwise be protected. As discussed for the SRWEC–OCS, seafloor disturbance during O&M of the SRWEC–NYS will be limited to non-routine maintenance that may require uncovering and reburial of the cables, as well as maintenance of cable protection where present. These maintenance activities and associated vessel anchoring are expected to result in similar impacts on EFH as those discussed for the SRWEC–OCS.

As discussed for the SRWEC–OCS, cable protection (e.g., concrete mattresses or rock placement) may be placed in select areas along the SRWEC–NYS. The seafloor overlaying the majority of buried SRWEC–NYS (where cable protection will not exist) is expected to return to pre-construction conditions over time and no long-term changes to sediment mobility and depositional patterns are expected.

Impacts on EFH associated with O&M activities for the SRWEC–NYS are expected to result in similar impacts as those discussed for the IAC and SRWEC–OCS, but will be more limited in spatial extent. The protection of the cable with concrete mattresses or rock may result in the long-term conversion of soft bottom habitat to hard bottom habitat. Similar to the foundations, this cable protection may have a long-term impact on EFH species associated with soft bottom habitats and a long-term beneficial impact on EFH species associated with hard bottom habitats, depending on the quality of the habitat created by the secondary cable protection, and the quality of the benthic community that colonizes that habitat.

Sediment Suspension and Deposition

Increases in sediment suspension and deposition during the O&M phase may result from vessel anchoring and non-routine maintenance activities that require exposing portions of the SRWEC–NYS. Direct impacts on EFH resulting from sediment suspension and deposition during the O&M phase are expected to be similar to those discussed for the construction phase, but on a more limited spatial scale.

Noise

Impacts on EFH from geophysical surveys and ship and aircraft noise during O&M of the SRWEC–NYS are expected to be insignificant and similar to those discussed for the construction phase, though lesser in extent.

Electric and Magnetic Fields

As discussed for the SRWEC–OCS, a modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the SRWEC–NYS was performed by Exponent Engineering, and results are included in the COP Appendix J1 (Exponent Engineering 2020a). It is not expected that EFH will be measurably affected by EMF from the SRWEC–NYS. Higher magnetic fields and induced electric fields are expected where the cables separate for installation via HDD, which could induce some localized investigation behaviors in those individuals that encounter this portion of the Project; however, changes in populations are not expected, given that this area represents a small part of the available coastal habitat.

Discharges and Releases

Impacts from marine discharges and releases during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Trash and Debris

Impacts from disposal of trash and debris during O&M are expected to be similar to, but of lesser likelihood than during construction, as there will be fewer Project-related marine vessels during this phase, and regulatory requirements and preventative measures will still apply.

Traffic

Impacts associated with vessel traffic during SRWEC–NYS O&M are identified under the Seafloor Disturbance, Noise, Sediment Suspension and Deposition, and Lighting and Marking sections.

Lighting and Marking

Artificial lighting during O&M of the SRWEC–NYS will be associated only with vessels. Lighting will be limited to the minimum necessary to ensure safety and to comply with applicable regulations. Because of the limited area that will have artificial lighting relative to the surrounding areas, and because no underwater lighting is proposed, impacts on EFH are expected to be insignificant.

3.4 ONSHORE FACILITIES

3.4.1 Construction

Seafloor and Land Disturbance

Onshore Facilities are expected to have minimal impacts on EFH, including littoral zone habitats such as SAV and tidal wetlands, due to the majority of the facilities being on land, as well as the use of HDD where the Onshore Transmission Cable crosses the ICW between Bellport Bay and Narrow Bay. The proposed Onshore Transmission Cable route may cross under SAV or macroalgae, which is considered HAPC for summer flounder.

Sunrise Wind conducted a video survey in 2020 within an assessment area in which potential Project impacts related to the ICW HDD could occur (ICW HDD Assessment Area; Figure 3.4-1). Historical SAV and benthic macroalgae are referenced as “potential” and comprised mostly of the vegetated habitats mapped in the ICW HDD Assessment Area (Table 3.4.1-1). Recently confirmed (2020) SAV and benthic macroalgae presence covered a very small area (1.7 acres) of the ICW HDD Assessment Area (32.8 acres) (Table 3.4.1-1; Figure 3.4-1). Installation of the cable via HDD will avoid direct impacts to marine vegetated habitats as this methodology avoids disturbance to the seafloor; HDD exit pits and work areas will not overlap with littoral zone habitats in the ICW HDD Assessment Area (Table 3.4.1-1). Similarly, the extent of wetlands within the ICW HDD Assessment Area were mapped using NYSDEC tidal wetlands data (NYSDEC 1974) (Figure 3.4-1); and no impacts are anticipated to these habitats from the ICW HDD installation as use of this methodology avoids disturbance to the seafloor (Table 3.4.1-1); however, impacts could occur in the unlikely event of an inadvertent release of drilling fluid (see discussion on Sediment Suspension and Deposition and Discharges and Releases).

Some equipment and materials required for the Landfall HDD, ICW HDD, cable pulling and ductbank construction will be transported via barge to Smith Point County Park due to existing weight limit restrictions on the Smith Point Bridge. The temporary landing structure that will be installed at Smith Point County Park to aid in the offloading of equipment/materials may temporarily impact EFH in its direct vicinity. A Temporary Landing Structure Assessment Area (Figure 3.4-1) has been established within which a single temporary landing structure may be deployed to support construction activities at Smith Point County Park. The temporary landing structure would be up to approximately 4,800 sq ft (446 sq m) and may consist of a floating module(s), bridge sections and/or a ramp or transition pad connecting the landing structure to shore. The temporary landing structure will be secured to the seabed with spuds, piles or anchors. Some minimal seafloor disturbance would occur along the northern shoreline of Smith Point County Park, from the spuds, piles or anchors for the temporary landing structure as well as the spuds from the barge, which could cause minimal, temporary impacts to finfish and EFH in the immediate vicinity of the landing structure. Additionally, depending on the tides and water depths at the selected location, the temporary floating pier may result in temporary minor tidal wetland impacts. The tidal range in the ICW is approximately 2 ft. The temporary landing structure may need to remain in place year-round but the use would be limited to fall and spring. The temporary landing structure may be used during two construction periods since the Landfall HDD, ICW HDD, and SRWEC pull-in may be done in different years.

The assessment area was examined for SAV and benthic macroalgae extent, as well as wetland presence (Table 3.4.1-1; Figure 3.4-1). No recent SAV or benthic macroalgae habitats were mapped in these areas (Table 3.4.1-1; Figure 3.4-1). Historical data from 2002 indicate the potential presence of 0.3 acres of SAV in the area; confirmatory surveys have not yet been conducted in this area (Table 3.4.1-1; Figure 3.4-1).

Should subtidal vegetated habitat (SAV and/or benthic macroalgae) be present in the area at the time of construction and these cannot be avoided in siting the pier, up to 4,800 sq ft (446 sq m; 0.11 acres) could be indirectly and temporarily impacted if these habitats completely overlap with the planned pier location. Temporary indirect impacts over the entire area of overlap between the pier and the vegetated habitats would result from shading effects that could reduce the photosynthetically active radiation available to SAV. Depending on the ultimate landing structure location, direct temporary impacts of no more than approximately 960 sq ft (0.02 acres) to vegetated benthic habitat are possible during times that portions of the pier are grounded and from direct contact with the landing structure. A preconstruction SAV survey will be conducted prior to construction to confirm current presence of SAV. The likelihood of impacts to intertidal and subtidal vegetated habitats is considered very low given that the proposed temporary landing structure will be positioned to avoid and minimize impacts to these sensitive habitats to the extent practicable.

The NYSDEC tidal wetlands (1974) category of "coastal shoals, bars, and mudflats" was the only tidal wetlands mapped within the temporary landing assessment area, with a total of 0.05 acres in the area (Table 3.4.1-1; Figure 3.4-1). This category is defined as "The tidal wetland zone that at high tide is covered by saline or fresh tidal waters, at low tide is exposed or is covered by water to a maximum depth of approximately one foot and is not vegetated." Direct temporary impacts of up to approximately 960 sq ft (0.02 acres) to this habitat is possible during times when portions of the temporary landing structure are grounded.

Subtidal (below low tide) portions of the assessment area may be suitable habitat for benthic eggs, such as winter flounder. Only a small area directly under the spuds and the portion of the temporary landing structure that rests on subtidal seafloor would have an impact on these habitats. Direct temporary impacts to egg habitat are expected to be extremely minor given the very small area of impact and the low amounts of sedimentation expected from construction. In addition, and although the current EFH definition for winter flounder eggs includes mud and muddy sand (NEFMC 2017), Wilber et al. (2013) found that in New York harbors winter flounder had very specific habitat preferences and were more likely to utilize sandy sediments than muddy or silty bottoms or bottoms with a high percentage of total organic carbon. Should the subtidal sediments in the area selected for siting the temporary landing structure have higher components of mud than sand, the potential for egg habitat and, thus, the potential for the temporary landing structure to impact winter flounder eggs, may be further reduced.

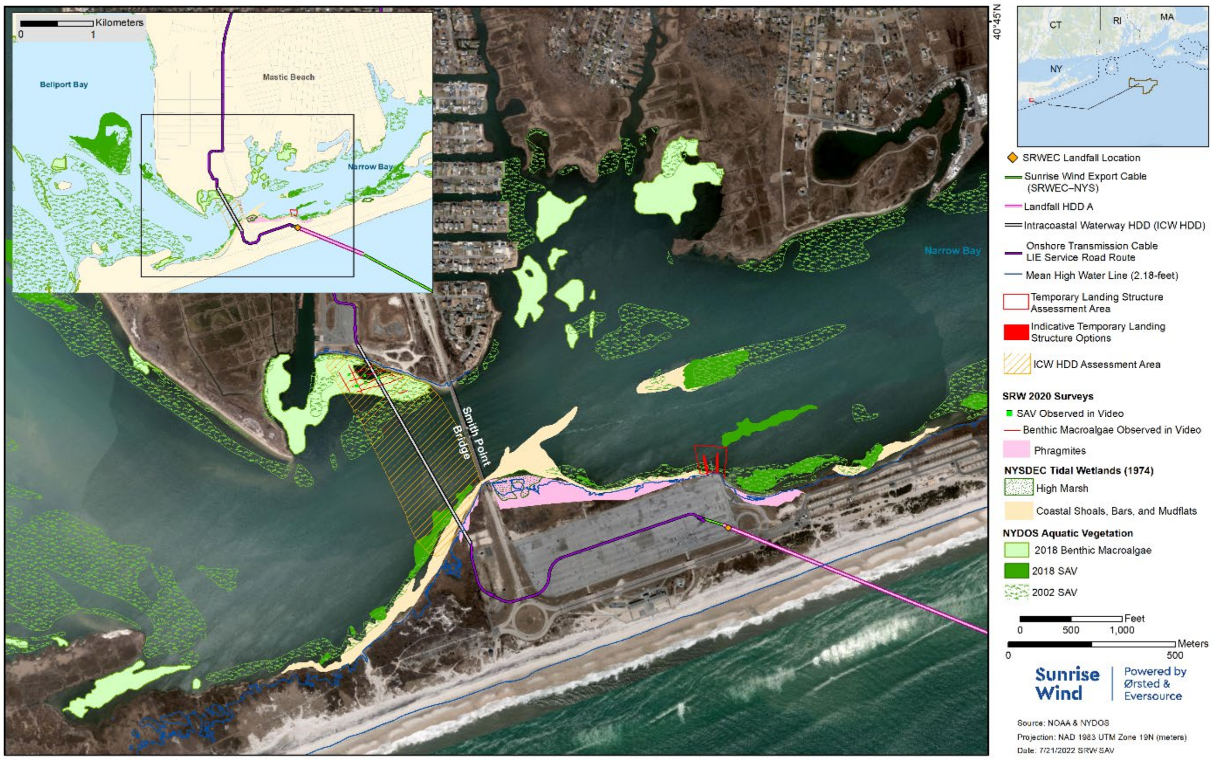

Figure 3.4.-1 Long Island South Shore Littoral Zone Habitats

Table 3.4.1-1 Anticipated Impacts to Waterbodies, Wetlands, or SAV

Table 3.4.1-1			
Project Assessment Area (Figure 3.4-1)	**Littoral Zone Habitat**	**Acres Within Project Assessment Area** (below mean high water line [MHWL])	**Total Acres of Anticipated Impacts to Seafloor Habitat**
Landfall HDD Assessment Area	NYSDEC Tidal Wetlands – Atlantic Ocean	N/A	No impacts, installed via HDD, and no tidal vegetated wetlands documented below MHWL,
ICW HDD Assessment Area	NYSDEC Tidal Wetlands	High Marsh (Phragmites) = 0 Shoals, Bars, Mudflats = 1.6	No impacts, installed via HDD.
	Aquatic Vegetation (2020 Video Survey)	SAV = 1.7 Macroalgae = 2.2 *(1.7 acres of SAV & macroalgae are co-occurring)*	
	Potential / Historical Aquatic Vegetation (2002/2018 NYDOS)	SAV = 6.3 Macroalgae = 3.5 *(1.6 acres of SAV & macroalgae are co-occurring)*	

Table 3.4.1-1			
Project Assessment Area (Figure 3.4-1)	**Littoral Zone Habitat**	**Acres Within Project Assessment Area** (below mean high water line [MHWL])	**Total Acres of Anticipated Impacts to Seafloor Habitat**
Temporary Landing Structure Assessment Area	NYSDEC Tidal Wetlands	High Marsh (Phragmites) = 0 Shoals, Bars, Mudflats = 0.05	High Marsh (Phragmites) = 0 Shoals, Bars, Mudflats = 0.02
	Potential/ Historical Aquatic Vegetation (2002/2018 NYDOS)	SAV = 0.3 Macroalgae = 0	SAV = 0.11 Macroalgae = 0

Sediment Suspension and Deposition

Construction of the Onshore Transmission Cable will be accomplished using HDD methodology where the proposed route crosses the ICW.

The proposed Onshore Transmission Cable route may cross under SAV habitat in the ICW that is considered HAPC for summer flounder. The use of HDD would avoid impacts to tidal wetlands and SAV; however, impacts could occur in the unlikely event of an inadvertent release of drilling fluid. An inadvertent release occurs when drilling fluids (i.e., naturally occurring bentonite clay) migrate unpredictably to the surface of the seafloor through fractures, fissures, or other conduits in the underlying rock/sediments. An inadvertent release of drilling fluid along the HDD segment could cause a temporary turbidity plume, however bentonite clay particles would be expected to settle quickly due to the natural flocculation of clay particles in seawater. Although bentonite by itself is non-toxic, it is a fine particulate material that could become entrained in the water column and transported to other locations if sufficient current velocities were present, causing turbidity and sedimentation.

Mobile species could be temporarily displaced by a turbidity plume and, depending on the thickness of materials settling on the seafloor, demersal eggs/larvae could be at risk of smothering or other injury. Demersal/benthic finfish eggs and larvae in the vicinity of a release may potentially experience short-term, direct impacts from a temporary increase in sedimentation/ deposition. Eggs and larvae can be more sensitive to sediment deposition (Berry et al. 2003). They are unable to relocate from the affected areas and, therefore, would be more susceptible to impacts from an inadvertent release compared to juveniles and adults. Impacts on EFH species, if they were to occur, would be temporary and localized, and would generally be limited to individuals in the immediate vicinity of the release.

Noise

The use of HDD methodology at the ICW crossing will involve underground drilling from an onshore work area. No impacts to the noise environment of the ICW are expected due to these activities.

Discharges and Releases

Although no impacts from discharges and releases are anticipated, spills or accidental releases of fuels, lubricants, or hydraulic fluids could occur during use of trenchless installation and duct bank installation methods, installation of the Onshore Transmission Cable or Onshore Interconnection Cable, or during construction activities at the OnCS–DC. A Spill Prevention, Control, and Countermeasure (SPCC) Plan will be developed, and any discharges or release will be governed by NYS regulations. Any unanticipated discharges or releases within the Onshore Facilities during construction are expected to result in minimal, temporary impacts; activities are heavily regulated, and discharges and releases are considered accidental events that are unlikely to occur. Additionally, where HDD is utilized, an Inadvertent Return Plan will be prepared and implemented to minimize the potential risks associated with release of drilling fluids. The potential for a significant loss of drilling fluid in this inshore environment is considered to be low. Given this information, impacts on summer flounder HAPC, finfish, and EFH as a result of an inadvertent release of drilling fluid are not expected

Trash and Debris

Good housekeeping practices will be implemented to minimize trash and debris in onshore work areas. These practices will include orderly storage of tools, equipment, and materials, as well as proper waste collection, storage, and disposal to keep work areas clean and minimize potential environmental impacts. All trash and debris returned to shore from offshore vessels will be properly disposed of or recycled at licensed waste management and/or recycling facilities. Disposal of any solid waste or debris in the water will be prohibited. With proper waste management procedures, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

Traffic

Traffic due to the construction of Onshore Facilities is not expected to have impacts on EFH due to the minimal portion of Onshore Facilities that cross waterbodies inhabited by EFH species.

Lighting and Marking

Light from the construction of Onshore Facilities is not expected to have impacts on EFH due to the minimal portion of Onshore Facilities that cross waterbodies inhabited by EFH species.

3.4.2 Operations and Maintenance

Seafloor and Land Disturbance

Minimal impacts on EFH are expected from operation of the Onshore Transmission Cable, as it will be buried beneath the seabed of the ICW, between Bellport Bay and Narrow Bay. Any non-routine maintenance would occur through the HDD cable duct and would not impact the environment of the ICW.

Electric and Magnetic Fields

As discussed for the SRWEC–OCS, a modeling analysis of the magnetic fields and induced electric fields anticipated to be produced during operation of the Onshore Transmission Cable was performed by Exponent Engineering, and results are included in the COP Appendix J2 (Exponent Engineering 2020b). It is not expected that EFH will be measurably affected by EMF from the Onshore Transmission Cable.

Discharges and Releases

The OnCS–DC will require various oils, fuels, and lubricants to support its operation, and sulfur hexafluoride (SF6) gas will also be used for electrical insulating purposes. As described above in the construction section, accidental discharges, releases, and disposal could indirectly cause habitat degradation, but risks will be avoided through implementation of the measures described in the SPCC.

Trash and Debris

Solid waste and other debris will be generated predominantly during Project construction activities but may also occur during O&M of the Onshore Facilities. With the implementation of proper waste management procedures, and adherence to regulations, the potential for trash or debris to be inadvertently introduced onto an onshore area is unlikely.

3.5 SUMMARY OF IMPACTS

3.5.1 Summary of Impacts on EFH from SRWF IPFs

During construction and O&M activities of the SRWF, impacts on EFH are expected to vary with each IPF. In general, impacts on pelagic life stages of are expected to be less than for demersal or benthic life stages. Overall, during construction and O&M of the SRWF, benthic/demersal life stages may be exposed to direct impacts from seafloor disturbance, sediment suspension/deposition, noise associated with pile driving and/or geophysical survey activities, and indirect impacts from other IPFs, including trash and debris, traffic, and lighting and marking. Impacts on the pelagic life stages species may be direct for seafloor disturbance and noise from impact and/or vibratory pile driving and other construction/decommissioning activities, and indirect other IPFs, including trash and debris, traffic, and lighting and marking. Impacts from discharges and releases could occur during construction but are very unlikely. Impacts from EMF may occur during O&M once the SRWF becomes operational and electricity is flowing through the cables. Potential, long-term impacts may result from the conversion of soft bottom habitat to hard bottom habitat associated with the foundations, scour protection, and secondary protection of the IAC. None of the IPFs are expected to result in population-level effects on EFH due to the limited scale and intensity of construction and O&M activities, the availability of similar habitat in the surrounding area, and the implementation of avoidance, minimization, and mitigation measures.

3.5.1.1 EFH Species Least Likely to Experience Impacts

Of the species with EFH designated at the SRWF, those that are least likely to experience impacts have both pelagic early and late life stages or only have EFH at the SRWF associated with pelagic environments. They include the species and life stages listed in Table 3.5.1-1 below.

Table 3.5.1-1 EFH Species Least Likely to Experience Impacts – SRWF

Table 3.5.1-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Mid-Atlantic Finfish					
Atlantic butterfish (*Peprilus triacanthus*)	●	●		●	●
Atlantic mackerel (*Scomber scombrus*)	●	●		●	●
Bluefish (*Pomatomus saltatrix*)	●	●			●
Invertebrates					
Longfin inshore squid (*Doryteuthis pealeii*)				●	●
Highly Migratory Species					
Albacore tuna (*Thunnus alalunga*)				●	●
Bluefin tuna (*Thunnus thynnus*)				●	●
Skipjack tuna (*Katsuwonus pelamis*)				●	●
Yellowfin tuna (*Thunnus albacares*)				●	●
Sharks					
Basking shark (*Cetorhinus maximus*)			●	●	●
Blue shark (*Prionace glauca*)			●	●	●
Common thresher shark (*Alopias vulpinus*)			●	●	●
Dusky shark (*Carcharhinus obscurus*)			●	●	●
Porbeagle Shark (*Lamna nasus*)			●	●	●
Shortfin mako shark (*Isurus oxyrinchus*)			●	●	●

Table 3.5.1-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Tiger Shark (*Galeocerdo cuvier*)				●	●
White shark (*Carcharodon carcharias*)			●	●	●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWF or that are not applicable to the species.

3.5.1.2 EFH Species Most Likely to Experience Impacts

Of the species with EFH designated within the SRWF area that also have preferred habitat present, those with benthic/demersal early and/or late life stages are the most likely to experience impacts as a result of construction and/or O&M of the SRWF. The species and associated life stages most likely to experience some level of short-term or long-term, direct or indirect impact are listed in Table 3.5.1-2 below.

Conversion of soft-bottom habitat to hard-bottom habitat associated with the WTGs, scour protection, and protection of the IAC may have a long-term, beneficial effect on species with life stages with a preference for rock, boulder or reef habitat, depending on the quality of the newly-created hard-bottom habitat, and the quality of the benthic community that colonizes that habitat. These species and life stages that may experience a long-term, beneficial effect are listed in Table 3.5.1-3.

Note that some species could experience both negative and beneficial impacts at different phases of the Project. Thus, the same species and life stages may appear in both Table 3.5.1-2 and Table 3.5.1-3.

Table 3.5.1-2 EFH Species Most Likely to Experience Negative Impacts – SRWF

Table 3.5.1-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)				●	●
Atlantic herring (*Clupea harengus*)	●				
Atlantic wolffish (*Anarhichas lupus*)	●	●		●	●
Haddock (*Melanogrammus aeglefinus*)				●	
Monkfish (*Lophius americanus*)				●	●
Ocean pout (*Zoarces americanus*)	●			●	●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
Silver hake (*Merluccius bilinearis*)				●	
White hake (*Urophycis tenuis*)				●	
Windowpane flounder (*Scophthalmus aquosus*)				●	●
Winter flounder (*Pseudopleuronectes americanus*)		●		●	●
Witch flounder (*Glyptocephalus cynoglossus*)					●
Yellowtail flounder (*Limanda ferruginea*)				●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)				●	●
Summer flounder (*Paralichthys dentatus*)					●
Invertebrates					
Atlantic sea scallop (*Placopecten magellanicus*)	●	●		●	●
Ocean quahog (*Arctica islandica*)				●	●
Skates					
Barndoor skate (*Dipturis laevis*)				●	●
Little skate (*Leucoraja erinacea*)				●	●
Winter skate (*Leucoraja ocellata*)				●	●
Sharks					
Sandbar shark (*Carcharhinus plumbeus*)				●	●
Sand tiger shark (*Carcharias taurus*)			●	●	
Smoothhound shark (*Mustelus canis*)			●	●	●
Spiny dogfish (*Squalus acanthias*)					● [2]

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWF or that are not applicable to the species.
[2] Includes spiny dogfish sub-adult females, adult males, and adult females.

Table 3.5.1-3 EFH Species That May Experience Beneficial Effects – SRWF

Table 3.5.1-3 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)				●	●
Atlantic wolffish (*Anarhichas lupus*)	●				●
Monkfish (*Lophius americanus*)				●	●
Ocean pout (*Zoarces americanus*)	●			●	●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)					●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWF or that are not applicable to the species.

3.5.2 Summary of Impacts on EFH from SRWEC–OCS IPFs

Based on the IPFs discussed above, species with a completely pelagic lifestyle are generally expected to be less negatively affected than demersal or benthic species. Overall, construction and O&M of the SRWEC is expected to result in direct impacts on EFH species with benthic/demersal life stages from seafloor disturbance, sediment suspension/deposition, and noise IPFs. Impacts on EFH species with pelagic life stages are expected to be primarily associated with noise. Potential beneficial impacts may result from the conversion of soft-bottom habitat to hard-bottom habitat associated with the protection of the SRWEC. None of the IPFs are expected to result in population-level effects on EFH species, due to the limited scale and intensity of the Project activities, and the availability of similar habitat in the surrounding area.

3.5.2.1 EFH Species Least Likely to Experience Impacts

Of the species with EFH designated within the SRWEC–OCS area, those that are least likely to experience impacts have both pelagic early and late life stages, or only have EFH in the SRWEC–OCS area associated with pelagic environments. They include the species and life stages listed in Table 3.5.2-1 below.

Table 3.5.2-1 EFH Species Least Likely to Experience Impacts – SRWEC–OCS

Table 3.5.2-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic plaice (*Hippoglossoides platessoides*)		●			
Atlantic herring (*Clupea harengus*)		●		●	●
Offshore hake (*Merluccius albidus*)		●			
Mid-Atlantic Finfish					
Atlantic butterfish (*Peprilus triacanthus*)	●	●		●	●
Atlantic mackerel (*Scomber scombrus*)	●	●		●	●
Bluefish (*Pomatomus saltatrix*)	●	●		●	●
Invertebrates					
Northern shortfin squid (*Illex illecebrosus*)					●
Highly Migratory Species					

Table 3.5.2-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Albacore tuna (*Thunnus alalunga*)				●	●
Bluefin tuna (*Thunnus thynnus*)				●	●
Skipjack tuna (*Katsuwonus pelamis*)				●	●
Yellowfin tuna (*Thunnus albacares*)				●	●
Sharks					
Basking shark (*Cetorhinus maximus*)			●	●	●
Blue shark (*Prionace glauca*)			●	●	●
Common thresher shark (*Alopias vulpinus*)			●	●	●
Dusky shark (*Carcharhinus obscurus*)			●	●	●
Porbeagle Shark (*Lamna nasus*)			●	●	●
Shortfin mako shark (*Isurus oxyrinchus*)			●	●	●
Tiger Shark (*Galeocerdo cuvier*)				●	●
White shark (*Carcharodon carcharias*)			●	●	●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–OCS or that are not applicable to the species.

3.5.2.2 EFH Species Most Likely to Experience Impacts

Of the species with EFH designated within the SRWEC–OCS area that also have preferred habitat present, those with benthic/demersal early and/or late life stages are the most likely to experience impacts as a result of construction and O&M of the SRWEC–OCS. The species and associated life stages most likely to experience some level of short-term or long-term, direct or indirect impact are listed in Table 3.5.2-2 below.

Conversion of soft-bottom habitat to hard-bottom habitat associated with the cable protection may have a long-term beneficial effect on species with life stages with a preference for rock, boulder or reef habitat, depending on the quality of the newly-created hard-bottom habitat, and the quality of the benthic community that colonizes that habitat. These species and life stages that may experience a long-term, beneficial effect are listed in Table 3.5.2-3.

Note that some species could experience both negative and beneficial impacts at different phases of the Project. Thus, the same species and life stages may appear in both Table 3.5.2-2 and Table 3.5.2-3.

Table 3.5.2-2 EFH Species Most Likely to Experience Negative Impacts – SRWEC–OCS

Table 3.5.2-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)				●	●
Haddock (*Melanogrammus aeglefinus*)				●	●
Monkfish (*Lophius americanus*)				●	●
Ocean pout (*Zoarces americanus*)	●			●	●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
Silver hake (*Merluccius bilinearis*)				●	●
White hake (*Urophycis tenuis*)				●	●

Table 3.5.2-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Windowpane flounder (*Scophthalmus aquosus*)				●	●
Winter flounder (*Pseudopleuronectes americanus*)		●		●	●
Witch flounder (*Glyptocephalus cynoglossus*)				●	●
Yellowtail flounder (*Limanda ferruginea*)				●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)				●	●
Summer flounder (*Paralichthys dentatus*)				●	●
Invertebrates					
Atlantic sea scallop (*Placopecten magellanicus*)	●	●		●	●
Atlantic surfclam (Spisula solidissima)				●	●
Longfin inshore squid (*Doryteuthis pealeii*)	●				
Ocean quahog (*Arctica islandica*)				●	●
Skates					
Barndoor skate (*Dipturis laevis*)				●	●
Little skate (*Leucoraja erinacea*)				●	●
Winter skate (*Leucoraja ocellata*)				●	●
Sharks					
Sandbar shark (*Carcharhinus plumbeus*)			●	●	●
Sand tiger shark (*Carcharias taurus*)			●	●	
Smoothhound shark (*Mustelus canis*)			●	●	●
Spiny dogfish (*Squalus acanthias*)				●	● [2]

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–OCS or that are not applicable to the species. [2] Includes spiny dogfish sub-adult females, sub-adult males, adult females, and adult males.

Table 3.5.2-3 EFH Species That May Experience Beneficial Effects – SRWEC–OCS

Table 3.5.2-3 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)				●	●
Haddock (*Melanogrammus aeglefinus*)				●	●
Monkfish (*Lophius americanus*)				●	●
Ocean pout (*Zoarces americanus*)	●			●	●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)					●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–OCS or that are not applicable to the species.

3.5.3 Summary of Impacts on EFH from SRWEC–NYS IPFs

Based on the IPFs discussed above, species with a completely pelagic lifestyle are generally expected to be less negatively affected than demersal or benthic species. Overall, during construction and O&M of the SRWEC, impacts on EFH species with benthic/demersal life stages are expected to be associated with seafloor disturbance, sediment suspension/deposition, and noise IPFs. Impacts on EFH species with pelagic life stages are expected to be primarily associated with noise. Potential long-term, beneficial impacts may result from the conversion of soft-bottom habitat to hard-bottom habitat associated with the protection of the SRWEC. None of the IPFs are expected to result in population-level effects on EFH species, due to the limited scale and intensity of the Project activities, and the availability of similar habitat in the surrounding area.

3.5.3.1 EFH Species Least Likely to Experience Impacts

Of the species with EFH designated within the SRWEC–NYS area, those that are least likely to experience impacts have both pelagic early and late life stages, or only have EFH in the SRWEC–NYS area associated with pelagic environments. They include the species and life stages listed in Table 3.5.3-1 below.

Table 3.5.3-1 EFH Species Least Likely to Experience Impacts – SRWEC–NYS

Table 3.5.3-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic herring (*Clupea harengus*)		●		●	●
Haddock (*Melanogrammus aeglefinus*)		●			
Silver hake (*Merluccius bilinearis*)	●	●			
Mid-Atlantic Finfish					
Atlantic butterfish (*Peprilus triacanthus*)				●	●
Atlantic mackerel (*Scomber scombrus*)	●	●		●	●
Bluefish (*Pomatomus saltatrix*)				●	●
Highly Migratory Species					
Albacore tuna (*Thunnus alalunga*)				●	

Table 3.5.3-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Bluefin tuna (*Thunnus thynnus*)				●	
Skipjack tuna (*Katsuwonus pelamis*)				●	●
Sharks					
Common thresher shark (*Alopias vulpinus*)			●	●	●
Dusky shark (*Carcharhinus obscurus*)			●	●	●
White shark (*Carcharodon carcharias*)			●	●	●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–NYS or that are not applicable to the species.

3.5.3.2 EFH Species Most Likely to Experience Impacts

Of the species with EFH designated within the SRWEC–NYS area that also have preferred habitat present, those with benthic/demersal early and/or late life stages are the most likely to experience impacts as a result of construction and O&M of the SRWEC–NYS. The species and associated life stages most likely to experience some level of short-term or long-term, direct or indirect impact are listed in Table 3.5.3-2 below.

Conversion of soft-bottom habitat to hard-bottom habitat associated with the cable protection may have a long-term beneficial effect on species with life stages with a preference for rock, boulder or reef habitat, depending on the quality of the newly-created hard-bottom habitat, and the quality of the benthic community that colonizes that habitat. These species and life stages that may experience a long-term, beneficial effect are listed in Table 3.5.3-3.

Note that some species could experience both negative and beneficial impacts at different phases of the Project. Thus, the same species and life stages may appear in both Table 3.5.3-2 and Table 3.5.3-3.

Table 3.5.3-2 EFH Species Most Likely to Experience Negative Impacts – SRWEC–NYS

Table 3.5.3-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)					●
Monkfish (*Lophius americanus*)					●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
White hake (*Urophycis tenuis*)				●	
Windowpane flounder (*Scophthalmus aquosus*)				●	●
Winter flounder (*Pseudopleuronectes americanus*)	●	●		●	●
Yellowtail flounder (*Limanda ferruginea*)					●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)				●	●
Summer flounder (*Paralichthys dentatus*)				●	●
Invertebrates					
Atlantic sea scallop (*Placopecten magellanicus*)	●	●		●	●

Table 3.5.3-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
Longfin inshore squid (*Doryteuthis pealeii*)	●				
Skates					
Little skate (*Leucoraja erinacea*)				●	●
Winter skate (*Leucoraja ocellata*)				●	●
Sharks					
Sandbar shark (*Carcharhinus plumbeus*)			●	●	●
Sand tiger shark (*Carcharias taurus*)			●	●	
Smoothhound shark (*Mustelus canis*)			●	●	●
Spiny dogfish (*Squalus acanthias*)					● [2]

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–NYS or that are not applicable to the species.
[2] Includes spiny dogfish sub-adult females and adult males.

Table 3.5.3-3 EFH Species That May Experience Beneficial Effects – SRWEC–NYS

Table 3.5.3-3 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic cod (*Gadus morhua*)					●
Monkfish (*Lophius americanus*)					●
Pollock (*Pollachius virens*)				●	
Red hake (*Urophycis chuss*)				●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)					●

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the SRWEC–NYS or that are not applicable to the species.

3.5.4 Summary of Impacts on EFH from Onshore Facilities IPFs

Onshore Facilities are expected to have minimal impacts on EFH due to the majority of the facilities being on land, as well as the use of HDD where the Onshore Transmission Cable crosses the ICW between Bellport Bay and Narrow Bay, just west of the Smith Point Bridge. The proposed Onshore Transmission Cable route may cross under SAV habitat, which is considered HAPC for summer flounder. SAV was documented along the ICW HDD in 2018 (NYSDOS 2020, Figure 2.2-1), although was not identified during the site-specific video survey in the ICW (INSPIRE 2020b). Dense macroalgal beds, which may also serve as important habitat, were observed during the site-specific video survey on the north side of the navigation channel between Narrow Bay and Bellport Bay (INSPIRE 2020b). The use of HDD would avoid any seafloor disturbance or habitat alteration that could impact this sensitive habitat; however, impacts could occur in the unlikely event of an inadvertent release of drilling fluid.

Based on the IPFs discussed above, species with a completely pelagic lifestyle are generally expected to be less negatively affected than demersal or benthic species. Overall, during construction and O&M of Onshore Facilities, impacts on EFH species with benthic/demersal life stages are expected to be associated with seafloor disturbance, sediment suspension/deposition, and noise IPFs. Impacts on EFH species with pelagic life stages are expected to be primarily associated with noise. None of the IPFs are expected to result in population-level effects on EFH species, due to the limited scale and intensity of the Project activities, and the availability of similar habitat in the surrounding area.

3.5.4.1 EFH Species Least Likely to Experience Impacts

Of the species with EFH designated within the Onshore Facilities area, those that are least likely to experience impacts have both pelagic early and late life stages, or only have EFH in the Onshore Facilities area associated with pelagic environments. They include the species and life stages listed in Table 3.5.4-1 below.

Table 3.5.4-1 EFH Species Least Likely to Experience Impacts – Onshore Facilities

Table 3.5.4-1 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Atlantic herring (*Clupea harengus*)				●	●
Mid-Atlantic Finfish					
Atlantic mackerel (*Scomber scombrus*)	●	●		●	●
Bluefish (*Pomatomus saltatrix*)				●	●
Sharks					
White shark (*Carcharodon carcharias*)			●		

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the Onshore Facilities area or that are not applicable to the species.

3.5.4.2 EFH Species Most Likely to Experience Impacts

Of the species with EFH designated within the ICW, those with benthic/demersal early and/or late life stages are the most likely to experience impacts as a result of construction and O&M of the Onshore Transmission Cable. The species and associated life stages most likely to experience some level of short-term or long-term, direct or indirect impact are listed in Table 3.5.4-2 below.

Table 3.5.4-2 EFH Species Most Likely to Experience Negative Impacts – Onshore Facilities

Table 3.5.4-2 [1]					
Species	**Egg**	**Larvae**	**Neonate**	**Juvenile**	**Adult**
New England Finfish					
Pollock (*Pollachius virens*)				●	
Windowpane flounder (*Scophthalmus aquosus*)				●	●
Winter flounder (*Pseudopleuronectes americanus*)	●	●		●	●
Mid-Atlantic Finfish					
Black sea bass (*Centropristis striata*)				●	●
Scup (*Stenotomus chrysops*)				●	●
Summer flounder (*Paralichthys dentatus*)				●	●
Invertebrates					
Longfin inshore squid (*Doryteuthis pealeii*)	●				
Skates					
Little skate (*Leucoraja erinacea*)				●	●
Winter skate (*Leucoraja ocellata*)				●	●
Sharks					
Sandbar shark (*Carcharhinus plumbeus*)				●	●
Sand tiger shark (*Carcharias taurus*)			●	●	
Smoothhound shark (*Mustelus canis*)			●	●	●
Spiny dogfish (*Squalus acanthias*)					● [2]

[1] Gray-shaded cells indicate life stages that do not have designated EFH in the Onshore Facilities Area or that are not applicable to the species.
[2] Includes spiny dogfish sub-adult females and adult males.

4.0 PROPOSED ENVIRONMENTAL PROTECTION MEASURES

Sunrise Wind will implement the following environmental protection measures to reduce potential impacts on EFH:

- Sunrise Wind is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction. Fisheries monitoring studies were developed to assess the impacts associated with the proposed project on economically and ecologically important fisheries resources within the Project Area. These studies will be conducted in collaboration with the local fishing industry and will build upon monitoring efforts being conducted by affiliates of Sunrise Wind at other wind farms in the region.
- To the extent feasible, installation of the IAC and SRWEC will be buried using equipment such as mechanical plow, jet plow, and/or mechanical cutter. These equipment options would result in less habitat modification than dredging options. The feasibility of cable burial equipment will be determined based on an assessment of seabed conditions and the Cable Burial Risk Assessment.
- To the extent feasible, the SRWEC and IAC will typically target a burial depth of 3 to 7 ft (1 to 2 m). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The SRWEC Landfall will be installed via HDD to avoid impacts to the dunes, beach, nearshore zones and finfish resources. The Onshore Transmission Cable will also be installed via HDD under the ICW to avoid impacts to coastal resources; HDD and trenchless methods will also be used elsewhere onshore, where appropriate, to minimize impacts to resource areas.
- A preconstruction SAV survey will be conducted prior to construction in the ICW, and the proposed temporary landing structure will be positioned to avoid and minimize impacts to this sensitive habitat to the extent practicable.
- DP vessels will be used for installation of the IAC and SRWEC to the extent practicable. DP vessels minimize seafloor impacts, as compared to use of a vessel relying on multiple anchors. A plan for vessels will be developed prior to construction to identify no-anchor areas to protect sensitive areas to avoid documented sensitive resources.
- Time-of-year in-water restrictions will be employed to the extent feasible to avoid or minimize direct impacts to species of concern, such as Atlantic sturgeon or winter flounder, during construction. If work is anticipated to occur outside of these time-of-year restriction periods, Sunrise Wind will work with state and federal agencies to develop appropriate construction monitoring and impact minimization plans.
- Accidental spill or release of oils or other hazardous materials will be managed offshore through an ERP/OSRP and onshore through an SPCC Plan.
- Sunrise Wind will require all construction and O&M vessels to comply with applicable international (IMO MARPOL), federal (USCG and EPA), and state (NYS) regulations and standards for the management, treatment, discharge, and disposal of onboard solid and liquid wastes and the prevention and control of spills and discharges.

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