VINEYARD MID-ATLANTIC

CONSTRUCTION AND OPERATIONS PLAN

VOLUME II APPENDIX

JANUARY 2025

PREPARED BY:

Epsilon ASSOCIATES INC.

SUBMITTED BY:

VINEYARD MID-ATLANTIC LLC

VINEYARD MID-ATLANTIC

VINEYARD OFFSHORE

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Vineyard Mid-Atlantic COP

Appendix II-F Economic Exposure of Commercial Fisheries

Prepared by:
King and Associates

Prepared for:
Vineyard Mid-Atlantic LLC

January 2025

Revision	Date	Description
0	January 2024	Initial submission
1	September 2024	Updated to address Bureau of Ocean Energy Management Round 1 Comments and to incorporate revisions to the Project Design Envelope (PDE) and new data.
2	November 2024	Updated to incorporate revisions to the PDE and make minor corrections.
2	January 2025	Resubmitted without revisions.

Economic Exposure of Commercial Fisheries to the Vineyard Mid-Atlantic Wind Energy Development in Lease Area OCS-A 0544

Prepared for:

Vineyard Mid-Atlantic LLC

Prepared by:

Dennis M. King, Ph.D.
KING AND ASSOCIATES, LLC
24 Trillium Rise
Plymouth, MA 02360

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List of Acronyms

AIS	automatic identification system
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
CZMA	Coastal Zone Management Act
EE	economic exposure
ESP	electrical service platform
FAD	fish aggregation device
FMP	fishery management plan
FRD	fishing revenue density
ft	feet
km	kilometers
km^2	square kilometers
kts	knots
m	meters
NM	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NSRA	Navigation Safety Risk Assessment
NTM	Notices to Mariners
O&M	operations and maintenance
OCS	Outer Continental Shelf
OECC	offshore export cable corridor
US	United States
USCG	United States Coast Guard
VMS	vessel monitoring system
VTR	vessel trip report
WEA	Wind Energy Area
WTG	wind turbine generator

Executive Summary

Context

Vineyard Mid-Atlantic LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." Vineyard Mid-Atlantic includes 118 total wind turbine generator (WTG) and electrical service platform (ESP) positions within the Lease Area. One or two of those positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. Offshore export cables installed within an Offshore Export Cable Corridor (OECC) will transmit power from the renewable wind energy facilities to onshore transmission systems on Long Island, New York.

This report addresses the "economic exposure" of commercial fisheries to Vineyard Mid-Atlantic based on average annual fishing revenues in the Lease Area during the 15-year period from 2008 to 2022 and the OECC during the 16-year period from 2008 to 2023. BOEM states that economic exposure refers to potential economic impacts, not predicted or expected economic impacts (Kirkpatrick et al. 2017) and is "a starting point to understanding potential economic impacts of future offshore wind project development if a harvester opts to no longer fish in the area and cannot recapture that income in a different location" (BOEM 2021). This report focuses on "economic exposure" and does not address expected "economic impacts." Expected economic impacts are likely to be significantly lower than full "economic exposure" because fishing effort temporarily precluded in the Lease Area and OECC is likely to be diverted to other fishing areas where it will continue generating at least some of the fishing revenues lost in the Lease Area and OECC.

Fishing vessels will not be restricted from operating in or transiting through the Lease Area or OECC other than where the United States Coast Guard (USCG) establishes temporary safety zones, per 33 CFR Part 147, that extend 500 meters (m) (1,640 feet [ft]) around each WTG and ESP during construction, and around certain maintenance activities. However, depending on the construction or operations and maintenance (O&M) activity, the Proponent may request that mariners give a wide berth to active work sites and construction or maintenance vessel(s) through the issuance of Offshore Wind Mariner Updates.

The use of a consistent layout will allow fishing vessels to continue to operate along three consistent headings (and their reciprocal courses) through the Lease Area if they choose to transit through or operate within the Lease Area. Additionally, the uniform grid pattern for the 0.68 x 0.68 nautical miles (NM) WTG/ESP layout provides two common lines of orientation with the layout proposed for neighboring Lease Area OCS-A 0512. Within the OECC, the offshore

export cables will have a target burial depth beneath the stable seafloor[1] of 1.2 m (4 ft) in federal waters and 1.8 m (6 ft) in state waters. The target burial depth is at least twice the burial depth required to prevent cables from interfering with fishing activities. While every effort will be made to achieve sufficient burial, a limited portion of the offshore export cables (up to approximately 4%)[2] may require remedial cable protection if a sufficient burial depth cannot be achieved. Potential cable protection methods include rocks, rock bags, concrete mattresses, half-shell pipes, or something similar. Cable protection will be designed and installed to mimic the ocean floor and minimize interfering with bottom fishing gear to the maximum extent practicable, and after installation the Proponent will share the location of the cables as well as any cable protection with fishermen. However, a possibility will still exist for mobile bottom fishing gear to snag on cable protection, resulting in gear damage and/or lost fishing time and associated costs and fishing revenue losses. Vineyard Mid-Atlantic has developed a fishing gear loss and compensation protocol that provides a standard approach to fishing gear loss and compensation.

Focus

This report focuses primarily on direct sources of economic exposure involving commercial fishing disruptions in the Lease Area and OECC during the construction, O&M, and decommissioning phases of Vineyard Mid-Atlantic. However, it also addresses two potential indirect sources of economic exposure based on: (1) potential "fishing congestion impacts" outside the Lease Area and OECC caused by fishing effort shifting from those two areas to other fishing areas; and (2) increases in fishing vessel transit times and costs associated with vessel operators choosing to steam around rather than through the Lease Area.

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1 Based on a preliminary Cable Burial Risk Assessment (CBRA) (see Appendix II-T), in a limited portion of the OECC within the Nantucket to Ambrose Traffic Lane, the offshore export cables will have a greater target burial depth of 2.9 m (9.5 ft) beneath the stable seafloor. The target burial depths are subject to change if the final CBRA indicates that a greater burial depth is necessary and taking into consideration technical feasibility factors, including thermal conductivity.

2 This percentage excludes cable protection for cable crossings and is based on the total length of the offshore export cables, including the portion of the cables within the Lease Area. The percentage of the offshore export cable requiring cable protection for insufficient burial varies depending on the landfall site approach and whether the primary OECC or Western Landfall Sites OECC Variant is used.

Findings

Estimates of Economic Exposure

Economic Exposure in the Lease Area

Based on National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) data, annual commercial fishing revenues generated in the Lease Area during 2008–2022 averaged $1,950,400 (2022 dollars; NOAA Fisheries 2024a). This estimate of average annual fishing revenues from the Lease Area provides a baseline measure of full annual economic exposure in the Lease Area; that is, expected losses in commercial fishing revenues under average fishing conditions if all commercial fishing ceased in the entire Lease Area for a full year with none of the resulting losses in fishing revenues recouped as a result of fishing effort being diverted from the Lease Area to other fishing areas.

Economic Exposure in the OECC

Based on NOAA Fisheries data, annual fishing revenues in the OECC during 2008–2023 averaged $5,290 per square kilometers (km^2) (2023 dollars; NOAA Fisheries 2024b). This provides a baseline value for estimating economic exposure in parts of the OECC where commercial fishing will be temporarily precluded during cable installation. Commercial fishing will be precluded in the OECC only in specific areas where pre-installation and cable installation activities are underway. Besides the laying of cable, cable installation involves several "pre-installation" activities, such as surveys of cable alignments, pre-lay grapnel runs of cable alignments, and possible boulder relocation, and some "post-lay activities" such as cable splicing and the placement of cable protection (these activities are collectively referred to throughout as "pre-installation and cable installation activities"). Based on the expected durations of these activities, Vineyard Mid-Atlantic's export cable engineers have estimated that cable installation in the OECC will take place during approximately 40 months (3.33 years). Commercial fishing will be precluded in the OECC only in the immediate vicinity of these cable installation activities while those activities are underway. Commercial fishing will not be precluded or impaired in those areas during other times or in parts of the OECC where cable installation is either planned or has been completed.

During pre-installation and cable installation activities the Proponent expects to request that mariners give a wide berth to active work sites and construction vessel(s) through the issuance of Offshore Wind Mariner Updates. The Proponent also coordinates with the USCG to issue Notices to Mariners (NTMs) advising other vessel operators of planned offshore activities. For the purposes of the economic analysis described in this report it was assumed that fishermen would give a wide berth of 1 kilometer (km) (0.54 NM) around cable pre-installation and installation activities. This results in estimated fishing revenue losses being based on commercial fishing being precluded in the OECC in an area of approximately 3.14 km^2 (776 acres) around where cable installation activities are underway (see Figure 2-1).

Assuming cable laying activities take place at only one location at a time, commercial fishing would be precluded from a 3.14 km^2 (776 acres) area with annual fishing revenues of $5,290 per km^2 for 3.33 years. This results in estimated economic exposure of $55,314 (2023 dollars) in the OECC during cable pre-installation and installation. If cable laying activities take place in more than one location at a time the resulting reduction in the duration of cable laying activity results in little change in this estimate of economic exposure.

Indirect Sources of Potential Economic Exposure

This report addresses two potential indirect sources of economic exposure including: potential "fishing congestion impacts" outside the Lease Area and OECC caused by fishing effort shifting from those two areas to other fishing areas; and potential increases in fishing vessel transit times and costs associated with vessel operators steaming around rather than through the Lease Area or OECC.

In the Lease Area

As described in Section 3.1, there is a low level of fishing effort in the Lease Area. Automatic Identification System (AIS) data presented in Section 3.1 indicates that during 2017-2022 the number of unique commercial fishing vessels that fish in the Lease Area (an average of 34 vessels annually) and the number of annual fishing trips to the Lease Area by those vessels (an average of 89 fishing trips annually) are too small to pose significant "fishing congestion" risks even if all fishing effort in the Lease Area were to shift to other fishing areas.

The use of a consistent WTG/ESP layout with 0.68 NM x 0.68 NM between WTG/ESP positions will allow fishing vessels to continue to operate along three consistent headings (and their reciprocal courses) through the Lease Area if they choose to fish or transit through the Lease Area. As described in Section 3.2 and illustrated in Figure 3-2 and Table 3-2, if unusually severe weather or other factors cause some fishing vessel operators to decide to reroute around the Lease Area, they would experience very small increases in transit times and costs.

In the OECC

The analysis described in Section 2.2 indicates that the small areas and limited durations of commercial fishing impacts during cable installation in the OECC and the low probability of any significant impacts of OECC operations on commercial fishing after cable installation make it highly unlikely that the OECC will result in the types of potential sources of indirect economic exposure listed above.

Potential Impacts on the Abundance and Distribution of Fish

As described in Section 4.6 of COP Volume II, studies related to other proposed offshore wind farms in United States (US) waters and studies of established offshore wind farms in Europe indicate that the impacts of offshore wind farms on fish population dynamics are primarily local and short-term. That research indicates that the potential impact of Vineyard Mid-Atlantic on fish population dynamics is not a likely source of economic exposure in commercial fisheries.

Concern has also been expressed that WTG and ESP foundations may function as fish aggregation devices (FADs) that will attract fish to locations in the Lease Area where they will become less accessible to some types of commercial fishing. While WTGs and ESPs functioning as FADs may provide advantages and disadvantages to different types of fishing methods, the available studies indicate that they could have overall positive economic impacts on commercial fisheries (Wilhelmsson, et al. 2006; Riefolo et al. 2016; Raoux et al. 2017; Wilber et al., 2022).

Conclusions

As shown in Table 2-1, annual economic exposure in the Lease Area is estimated to be $1,950,400 (2022 dollars) and, as shown in Table 2-2, economic exposure during cable installation in the OECC is estimated to be $55,314 (2023 dollars). These are estimates of full economic exposure based on the assumption that commercial fishing revenues will be lost as a result of commercial fishing being precluded from the Lease Area for one full year, and being precluded from impacted segments of the OECC during approximately 40 months (3.33 years) of cable installation, with none of the resulting losses in fishing revenues recouped as a result of fishing effort being diverted from those areas to other fishing areas.

Economic impact estimates based on estimates of economic exposure presented in this report will be determined at a later date based on updated BOEM guidance and consultations with affected state(s) through the Coastal Zone Management Act (CZMA) review processes.

1 Introduction

1.1 Vineyard Mid-Atlantic Overview

Vineyard Mid-Atlantic LLC (the "Proponent") proposes to develop, construct, and operate offshore renewable wind energy facilities in Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0544 (the "Lease Area") along with associated offshore and onshore transmission systems. This proposed development is referred to as "Vineyard Mid-Atlantic." Vineyard Mid-Atlantic includes 118 total wind turbine generator (WTG) and electrical service platform (ESP) positions within the Lease Area. One or two of those positions will be occupied by ESPs and the remaining positions will be occupied by WTGs. Offshore export cables installed within an Offshore Export Cable Corridor (OECC) will transmit power from the renewable wind energy facilities to onshore transmission systems on Long Island, New York. Figure 1-1 provides an overview of Vineyard Mid-Atlantic.

1.2 Focus

This report develops estimates of the "economic exposure" of commercial fisheries to the construction, operation, and decommissioning of Vineyard Mid-Atlantic in the Lease Area and OECC. BOEM states that economic exposure refers to potential economic impacts, not predicted or expected economic impacts (Kirkpatrick et al. 2017) and refers to it as "a starting point to understanding potential economic impacts of future offshore wind project development if a harvester opts to no longer fish in the area and cannot recapture that income in a different location" (BOEM 2021). BOEM emphasizes that if alternative fishing grounds are available nearby and may be fished at no additional cost, the economic impact will be lower than estimated economic exposure (Kirkpatrick et al. 2017; BOEM 2021). Figure 1-2 through Figure 1-6 show that the Lease Area and OECC are surrounded by alternative fishing grounds that are available nearby and can be fished at no additional cost.

Economic exposure is estimated in this report based on the assumption that Vineyard Mid-Atlantic will result in the cessation of all fishing activity in the Lease Area for a full year and in areas of active construction along the OECC during the estimated 40 month-duration (3.3 year) of cable pre-installation and installation activities. Estimates of economic exposure are developed in this report based on the assumption that none of the estimated fishing revenue losses in the Lease Area and OECC will be recouped as a result of fishing effort being diverted from those two areas to other fishing areas. In the case of Vineyard Mid-Atlantic, most of the Lease Area and most of the OECC will remain open to fishing during and after construction so fishing vessel operators will have the opportunity to continue generating at least some fishing revenues in those areas as well as the opportunity to recoup at least some fishing revenues lost in those areas by diverting fishing effort to other fishing areas. This report does not attempt to predict how commercial fishing operations will adapt or respond to Vineyard Mid-Atlantic in ways that result in economic impacts being less than estimated economic exposure.

This report focuses on the two most significant sources of potential commercial fishery economic exposure from Vineyard Mid-Atlantic which are:

- Potential lost fishing revenues in the entire Lease Area during construction of a total of 118 WTG and ESP positions.

- Potential lost fishing revenues in the OECC during construction as a result of commercial fishing being precluded in areas around where cable pre-installation and installation activities are underway.

The report also addresses two potential indirect sources of fishery-related economic exposure:

- Potential increases in fishing congestion outside the Lease Area and OECC if enough fishing effort is diverted from those areas to other fishing areas to result in "fishing power penalties" that lower fishing revenues, increase fishing costs, or both.

- Potential costs and lost fishing time associated with increased fishing vessel transit times if Vineyard Mid-Atlantic results in fishing vessels that typically transit through the Lease Area using less direct routes around the Lease Area as they transit between fishing ports and fishing areas.

Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

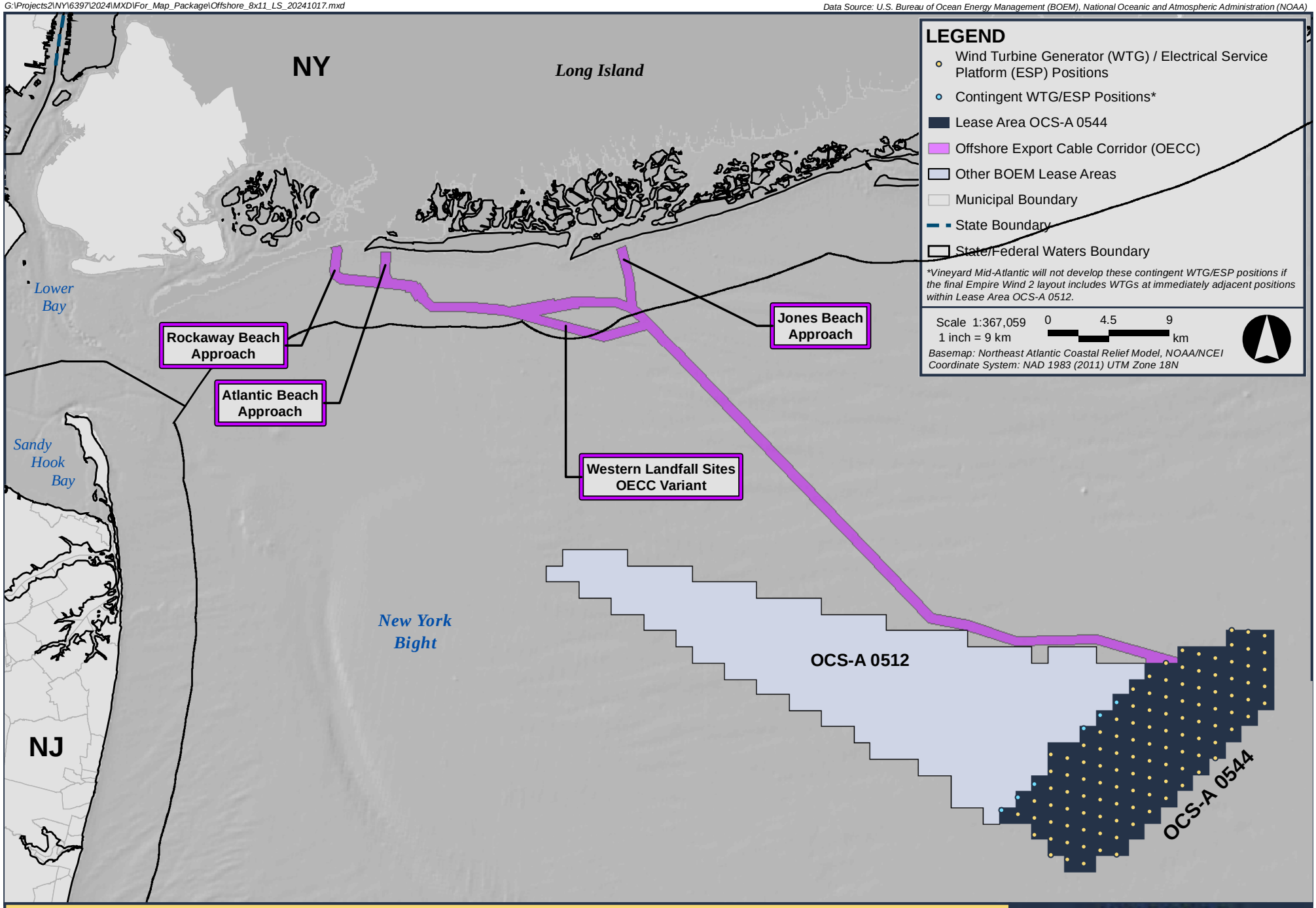

Figure 1-1
Vineyard Mid-Atlantic Overview

VINEYARD MID-ATLANTIC
VINEYARD OFFSHORE

NY

Long Island

Lower Bay

Rockaway Beach Approach

Atlantic Beach Approach

Jones Beach Approach

Western Landfall Sites OECC Variant

NJ

New York Bight

OCS A 0512

OCS-A 0544

OCS A 0537

LEGEND

- Lease Area OCS-A 0544
- Offshore Export Cable Corridor (OECC)
- Other BOEM Lease Areas
- Municipal Boundary
- State Boundary
- State/Federal Waters Boundary

2018 Fishing Revenue (2019 dollars per 0.25 km^2; BOEM 2020)

High : $5,078

Low : $0

Scale 1:369,059
1 inch = 9 km

0 4.5 9 km

Basemap: Northeast Atlantic Coastal Relief Model, NOAA/NCEI
Coordinate System: NAD 1983 (2011) UTM Zone 18N

Figure 1-2
Fishing Revenue Density, All Fishery Management Plans, 2018

VINEYARD MID-ATLANTIC

VINEYARD OFFSHORE

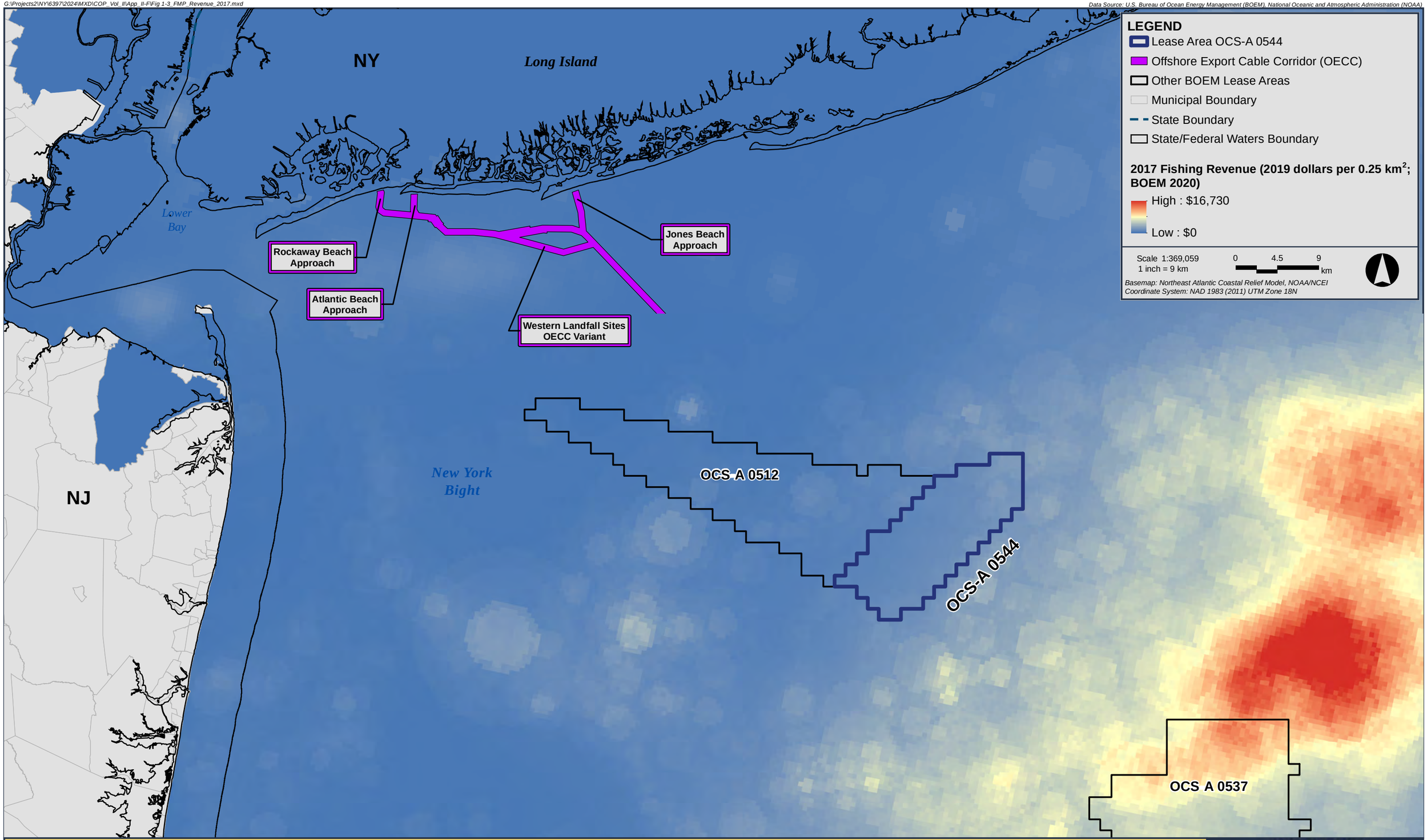

Figure 1-3
Fishing Revenue Density, All Fishery Management Plans, 2017

VINEYARD MID-ATLANTIC
VINEYARD OFFSHORE

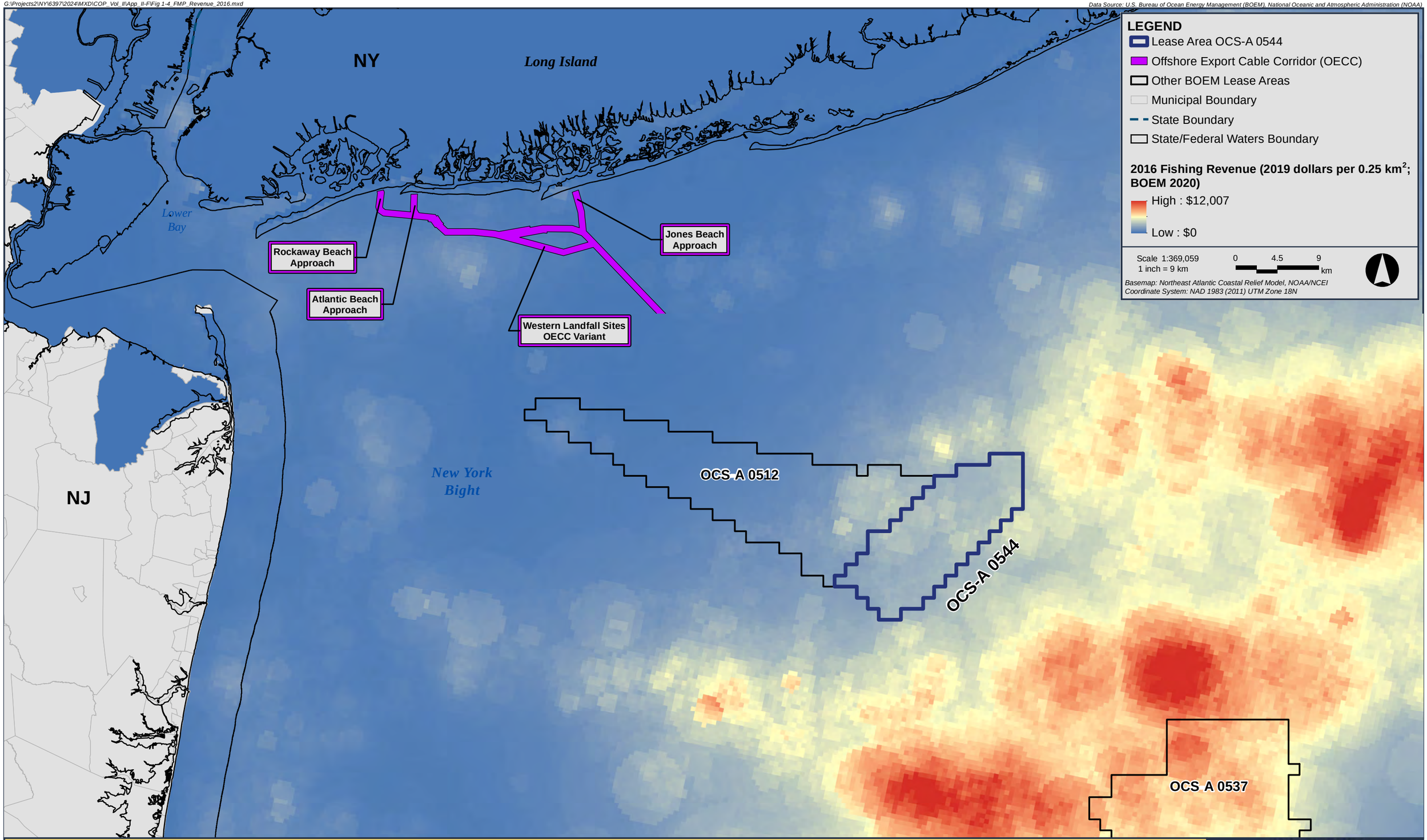

Figure 1-4
Fishing Revenue Density, All Fishery Management Plans, 2016

VINEYARD MID-ATLANTIC
VINEYARD OFFSHORE

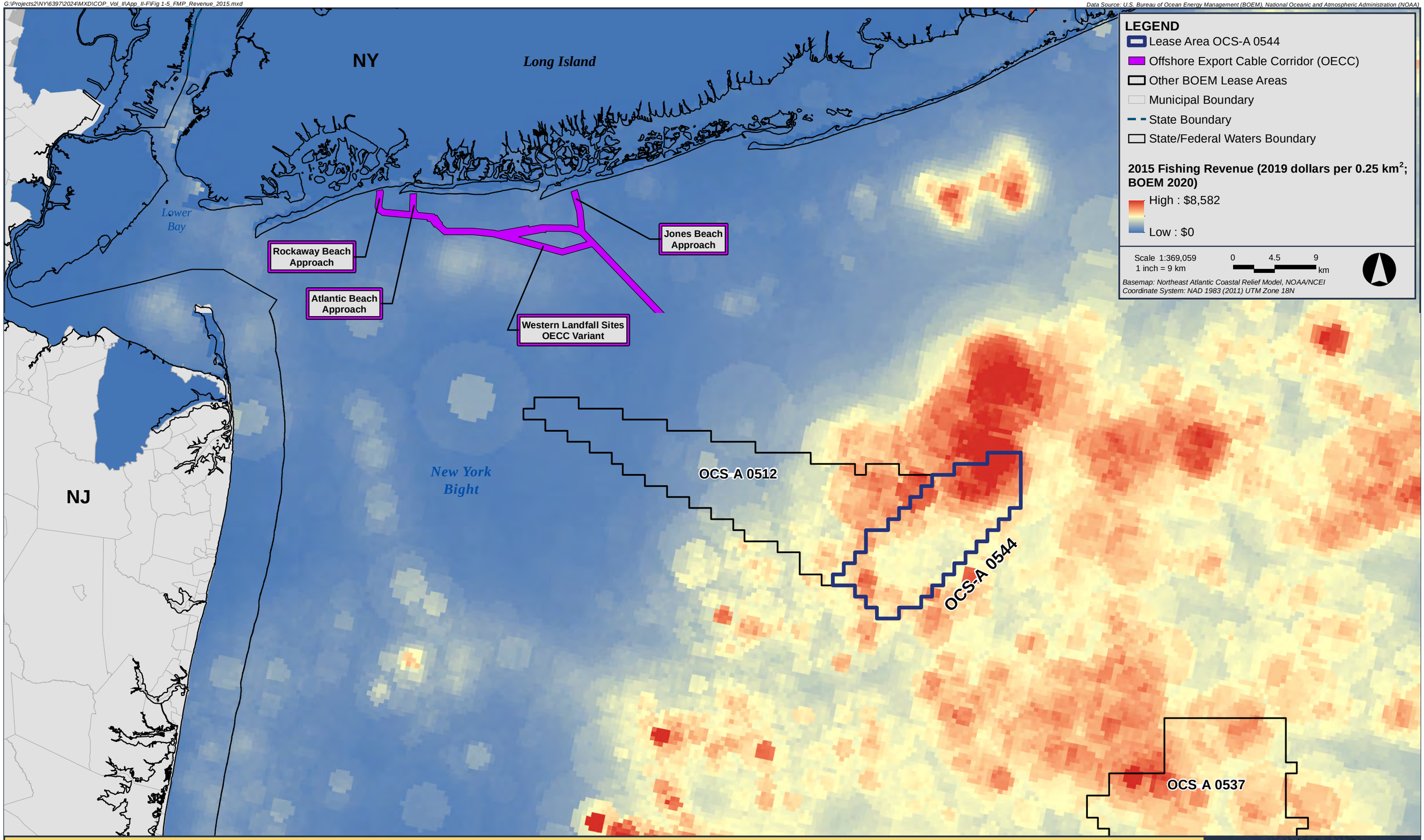

Figure 1-5
Fishing Revenue Density, All Fishery Management Plans, 2015

VINEYARD MID-ATLANTIC
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Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

NY

Long Island

Lower Bay

Rockaway Beach Approach

Atlantic Beach Approach

Jones Beach Approach

Western Landfall Sites OECC Variant

New York Bight

OCS A 0512

OCS-A 0544

OCS A 0537

NJ

LEGEND

- Lease Area OCS-A 0544
- Offshore Export Cable Corridor (OECC)
- Other BOEM Lease Areas
- Municipal Boundary
- State Boundary
- State/Federal Waters Boundary

2014 Fishing Revenue (2019 dollars per 0.25 km^2; BOEM 2020)

High : $14,200

Low : $0

Scale 1:369,059
1 inch = 9 km

0 4.5 9 km

Basemap: Northeast Atlantic Coastal Relief Model, NOAA/NCEI
Coordinate System: NAD 1983 (2011) UTM Zone 18N

Figure 1-6
Fishing Revenue Density, All Fishery Management Plans, 2014

VINEYARD MID-ATLANTIC

VINEYARD OFFSHORE

1.3 Data Sources

Reliable sources of fishing revenue data for the Lease Area and OECC are described in Table 1-1.

Table 1-1 Data Sources

Data Source	Description
Kirkpatrick et al. (2017)	BOEM funded a study prepared by the National Oceanic and Atmospheric Administration (NOAA) Northeast Fisheries Science Center that characterizes commercial fishing from Maine to North Carolina and provides insight into revenue generated by federally permitted fishermen. The report details the average value of fish harvested over the six-year period between 2007 and 2012 and identifies the ports and fishery sectors (e.g., gear, species) supporting that activity. NOAA Fisheries also developed a model to estimate the socioeconomic impact of wind energy development on commercial fishermen. Making use of vessel trip report (VTR) data, spatial data from the Northeast Fisheries Observer Program database, and vessel monitoring system (VMS) data, the study provides information on commercial harvest by location, species caught, gear type, and port group. This study is available at: Volume 1: https://espis.boem.gov/final%20reports/5580.pdf Volume 2: https://espis.boem.gov/final%20reports/5581.pdf
BOEM (2020)	BOEM makes available single-year revenue intensity rasters summarized by fishery management plan (FMP). These revenue intensity rasters were developed for Kirkpatrick et al. (2017), described above, and updated by BOEM to account for additional years of data. Revenue intensity rasters can be accessed at: https://www.boem.gov/renewable-energy/mapping-and-data/renewable-energy-gis-data. This data source was used to develop Figure 1-2 through Figure 1-6, which show the fishing revenue density for 2014–2018.
NOAA Fisheries (2024a)	*Socioeconomic Impacts of Atlantic Offshore Wind Development* Website NOAA Fisheries developed sets of tables summarizing annual fishing activity within each offshore wind lease or project area and related annual fishing revenues during years 2008–2022. These data are based on modeled results using federal VTR and clam logbook data queried for spatial overlap and linked to dealer-based landings data. These tables highlight annual landings and revenue by species, gear type, and FMP within each wind energy area (WEA), as well as revenue by port and vessel dependence upon operations in each WEA. Landing and revenue data can be accessed at: https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/WIND/WIND_AREA_REPORTS/com/OCS_A_0544_com.html. These data were used to develop estimates of annual economic exposure for the Lease Area.
NOAA Fisheries (2024b)	Upon request from the Proponent, NOAA Fisheries provided landing and revenue data (2008–2023) for the OECC. The OECC data from NOAA Fisheries are the same data used for revenue estimates for the Lease Area in the *Socioeconomic Impacts of Atlantic Offshore Wind Development* website (see above). The average annual revenue per square kilometer (km^2) is the value used to develop the estimated economic exposure during construction and is based on a uniform distribution fishing revenues generated throughout the OECC (see Table 2-2).

1.3.1 Thresholds of Data Requirements

In order to use fishing revenue data to estimate the economic exposure of commercial fishing to offshore wind energy projects it is necessary to make assumptions about thresholds or minimum standards for defining what BOEM refers to as fishing values that "may be impacted" (Kirkpatrick et al. 2017). For the purposes of this report, it is assumed that all fishing revenues in the Lease Area and in areas of cable installation activity in the OECC "may be impacted." It is also assumed that fishing values outside the Lease Area and OECC "may be impacted" if Vineyard Mid-Atlantic results in fishing vessels avoiding the Lease Area or OECC which could result in increased fishing vessel transit times or fishing congestion impacts outside the Lease Area and OECC.

1.4 Baseline Commercial Fisheries Landings and Values

Data summarizing commercial fishing activity, landings, and fishing revenues within the Lease Area during 2008-2022, reported by species, gear type, and fishery management plan as well as by port and state, are available from National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) (NOAA Fisheries 2024a). Landings and fishing revenue data for the Lease Area based on this source are summarized in Tables 1-2 through 1-7. All dollar values reported in these tables have been deflated to 2022 dollars[3] to aid in comparisons across the 15 years of data. These data are based on NOAA Fisheries' analysis of data from Vessel Trip Reports (VTRs) submitted by commercial vessels with federal fishing permits as confirmed by dealer reports of ex-vessel fish purchases. They provide the most reliable and recent estimates of fishing revenues within the Lease Area and the extent to which specific commercial fisheries, ports, and states face economic exposure as a result of Vineyard Mid-Atlantic.

Table 1-2 provides the annual landed weight and dollar value of all species harvested within the Lease Area between 2008 and 2022.

Table 1-2 Commercial Landings from the Lease Area by Year, 2008–2022

Year	Landings (lbs)	Value (2022 dollars)
2008	793,000	$1,429,000
2009	990,000	$1,119,000
2010	718,000	$1,928,000
2011	491,000	$4,350,000
2012	990,000	$4,905,000

[3] The NOAA Fisheries landed values have been deflated to 2022 dollars using the Gross Domestic Product Implicit Price Deflator, as noted on the *Socioeconomic Impacts of Atlantic Offshore Wind Development* website.

Table 1-2 Commercial Landings from the Lease Area by Year, 2008–2022 (Continued)

Year	Landings (lbs)	Value (2022 dollars)
2013	544,000	$2,326,000
2014	449,000	$4,174,000
2015	255,000	$1,989,000
2016	712,000	$1,955,000
2017	362,000	$1,004,000
2018	429,000	$897,000
2019	287,000	$746,000
2020	392,000	$1,460,000
2021	235,000	$371,000
2022	166,000	$603,000
Average annual	520,867	$1,950,400

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.

Table 1-3 shows the 15-year average annual weight and dollar value of the 10 most valuable species landed in the Lease Area. These 10 species account for approximately 99% of the average annual ex-vessel value of fish harvested in the Lease Area during 2008 through 2022.

Table 1-3 Average Annual Volume and Value of Commercial Landings from the Lease Area by Species, 2008–2022

Species	Average Annual Landings (lbs)	Average Annual Value (2022 dollars)	Percentage of Average Annual Lease Area Value
Sea Scallop	138,467	$1,721,600	88.3%
All Others	73,000	$69,933	3.6%
Monkfish	16,933	$35,800	1.8%
Atlantic Mackerel	92,933	$20,800	1.1%
Atlantic Herring	135,933	$19,867	1.0%
Summer Flounder	5,933	$18,333	0.9%
Longfin Squid	11,667	$16,933	0.9%
Black Sea Bass	3,867	$13,733	0.7%
Scup	10,933	$10,533	0.5%
Surfclam	11,133	$8,867	0.5%
Total of Top Species	500,800	$1,936,400	-

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.
3. "All Others" refers collectively to all species with landings data related to fewer than three permits or dealers to protect data confidentiality.

Table 1-4 shows the 15-year average annual weight and dollar value of the 10 most valuable species managed under fishery management plans (FMPs) in the Lease Area. These FMPs account for approximately 99.8% of the average annual value of commercial landings from the Lease Area.

Table 1-4 Average Annual Volume and Value of Commercial Landings from the Lease Area by Fishery Management Plan, 2008–2022

Fishery Management Plan	Average Annual Landings (lbs)	Average Annual Value (2022 dollars)	Percentage of Average Annual Lease Area Value
Sea Scallop	138,467	$1,721,600	88.2%
Surfclam, Ocean Quahog	49,067	$54,333	2.8%
Summer Flounder, Scup, Black Sea Bass	20,733	$42,600	2.2%
Mackerel, Squid, and Butterfish	112,867	$38,067	1.9%
Monkfish	16,933	$35,800	1.8%
All Others	29,000	$26,467	1.4%
Atlantic Herring	135,933	$19,867	1.0%
ASMFC FMP	6,267	$5,200	0.3%
No Federal FMP	3,200	$2,400	0.1%
Skates	5,933	$2,267	0.1%
Other FMPs	2,533	$1,900	0.1%
Total	520,933	$1,950,500	-

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.
3. "All Others" refers collectively to all FMPs with landings reported for fewer than three permits or dealers to protect data confidentiality.
4. The Atlantic States Marine Fisheries Commission (ASMFC) FMP includes the following species: American lobster, cobia, Atlantic croaker, black drum, red drum, menhaden, NK sea bass, NK seatrout, spot, striped bass, tautog, Jonah crab, and pandalid shrimp.
5. "No Federal FMP" contains a variety of species that are not federally regulated, such as: lobster, Jonah crab, smooth and chain dogfish, whelk, and menhaden (approximately 69 species without federal FMPs are harvested in the Lease Area).

Table 1-5 shows the 15-year average annual weight and dollar value of the select gear types in the Lease Area. The first five gear types listed account for approximately 99.6% of average annual value of fish landed from the Lease Area.

Table 1-5 Average Annual Volume and Value of Commercial Landings from the Lease Area by Gear Type, 2008–2022

Gear Type	Average Annual Landings (lbs)	Average Annual Value (2022 dollars)	Percentage of Average Annual Lease Area Value
Scallop Dredge	136,133	$1,671,600	85.7%
Bottom Trawl	67,600	$126,533	6.5%
Clam Dredge	78,200	$82,533	4.2%
Midwater Trawl	215,400	$32,067	1.6%
Gillnet (sink)	17,867	$29,800	1.5%
Lobster Pot	1,200	$4,267	0.2%
Other Pot	2,667	$2,133	0.1%
All Others	1,800	$1,133	0.1%
Other Dredge	33	$400	0.02%
Handline	33	$33	0.002%
Total	520,933	$1,950,500	-

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.
3. "All Others" refers collectively to gear types with landings reported for fewer than three permits or dealers to protect data confidentiality.

Table 1-6 shows the 15-year average annual weight and dollar value of commercial landings from the Lease Area by state. The first five states listed account for approximately 97.6% of the average annual value of fish landed from the Lease Area.

Table 1-6 Average Annual Volume and Value of Commercial Landings from the Lease Area by State, 2008–2022

State	Average Annual Landings (lbs)	Average Annual Value (2022 dollars)	Percentage of Average Annual Lease Area Value
New Jersey	227,067	$932,000	47.8%
Massachusetts	213,667	$700,400	35.9%
Virginia	16,733	$174,200	8.9%
New York	24,800	$50,800	2.6%
Connecticut	5,133	$45,467	2.3%
Rhode Island	29,333	$41,533	2.1%
North Carolina	1,467	$4,000	0.2%
Maryland	467	$1,200	0.1%
All Others	2,267	$800	0.04%
Total	520,933	$1,950,400	-

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.
3. "All Others" refers collectively to states with landings reported for fewer than three permits or dealers to protect data confidentiality.

Table 1-7 shows the 15-year average annual weight and dollar value of landings from the Lease Area at the 10 ports that face the most economic exposure. The first five ports listed account for approximately 92.4% of the average annual value of fish landed from the Lease Area.

Table 1-7 Average Annual Volume and Value of Commercial Landings from the Lease Area by Port, 2008–2022

Port	Average Annual Landings (lbs)	Average Annual Value (2022 dollars)	Percentage of Average Annual Lease Area Value
New Bedford, MA	152,533	$685,000	35.1%
Point Pleasant, NJ	72,800	$340,667	17.5%
Cape May, NJ	90,067	$299,733	15.4%
Barnegat, NJ	29,067	$220,800	11.3%
Newport News, VA	11,000	$119,800	6.1%
City Of Seaford, VA	2,733	$34,800	1.8%
Point Judith, RI	9,467	$28,867	1.5%
Atlantic City, NJ	25,733	$27,867	1.4%
Stonington, CT	2,533	$24,133	1.2%
Point Lookout, NY	3,067	$21,533	1.1%
Total of Top 10 Ports	399,000	$1,803,200	-

Notes:
1. NOAA Fisheries 2024a
2. Values have been deflated to 2022 dollars.

2 Estimates of Economic Exposure

2.1 Economic Exposure in the Lease Area

During 2017–2022 commercial fishing vessels entered the Lease Area an average of approximately 296 times annually. However, they engaged in fishing in the Lease Area during only 89 (30%) of those trips. NOAA Fisheries performed a boxplot analysis of the percent of annual fishing revenues per permitted vessel that fished in the Lease Area that was generated in the Lease Area during 2008-2022 (NOAA Fisheries 2024a).[4] That analysis indicates that 25% of vessels fishing in the Lease Area generated 0.02% or less of their annual revenue in the Lease Area, 50% of those vessels generate 0.09% or less of their annual revenues in the Lease Area, and 75% of those vessels generate 0.30% or less of their revenues in the Lease Area. That analysis also shows that during the 15-year period of analysis (2008-2022), vessels that fished in the Lease Area generated more than 20% of their annual revenues in the Lease Area only five times. This analysis indicates that although significant fishing revenues are generated in the Lease Area, the vessels that generate those fishing revenues spend most of their fishing time and generate most of their fishing revenues outside the Lease Area. The Automatic Identification System (AIS) data and fishing vessel revenue boxplot analysis indicates that the Lease Area is a relatively small part of a much larger fishing area that includes adjacent and nearby locations where fishing vessels spend most of their fishing time,[5] while also occasionally operating in, and more frequently transiting through, the Lease Area.

Based on NOAA Fisheries data during years 2008 through 2022, annual commercial fishing revenues in the Lease Area (in 2022 dollars) ranged from a low of $371,000 (in 2021) to a high of $4,905,000 (in 2012) (Table 1-2). This relatively wide range in annual fishing revenues reported in the Lease Area (from 19% to 252% of the annual average) is reflected in Figure 1-2 through Figure 1-6, which show Fishing Revenue Density (FRD) estimates (value per 0.25 square kilometer [km^2] [62 acres]) for all FMPs for the northeast Atlantic region that includes the Lease Area for years 2014-2018 (BOEM 2020). These figures show FRDs were at or near zero throughout the Lease Area in some years but were moderate to high in some parts of the Lease Area in other years.

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[4] A box and whisker plot—also called a boxplot–is a graphic tool that displays a five-number summary of a set of data that includes: the minimum, first quartile, median, third quartile, and maximum. Values presented here are the results of NOAA Fisheries' boxplot analysis of the percent of a commercial fishing vessel's gross revenues generated in the Lease Area as presented in NOAA Fisheries 2024a.

[5] Estimates of the annual number of commercial fishing vessels fishing in and transiting through the Lease Area are based on an analysis of AIS data presented in the Navigation Safety Risk Assessment (NSRA) (Appendix II-G; Baird 2024), which assumes that vessels moving at or below 4 kts are fishing and those moving at above 4 kts are transiting.

Table 2-1 presents the 15-year total and average annual fishing revenues generated in the Lease Area during the years 2008–2022, valued in 2022 dollars, as estimated by NOAA Fisheries based on VTR data and confirmed by dealer reports (NOAA Fisheries 2024a). The average annual fishing revenues generated in the Lease Area during 2008–2022 is estimated to be $1,950,400. This represents the best available estimate of the annual economic exposure of commercial fisheries assuming all commercial fishing ceases in the Lease Area for a full year and none of the associated loss of fishing revenues are recouped as a result of fishing effort shifting from the Lease Area to other fishing areas.

Table 2-1 Estimates of Annual Commercial Fishing Economic Exposure in the Lease Area

Total Fishing Revenues (2008-2022)	Average Annual Revenues	Average Annual Fishing Revenues per km^2
$29,256,000	$1,950,400	$11,209

Table 1-5 shows that sea scallop dredges and bottom trawlers account for 92% of fishing revenues generated in the Lease Area and other mobile fishing gear account for another 6% while pots, traps, and other fixed bottom gear account for approximately 2%. This represents the share of economic exposure facing fishing vessels that employ these gear types and indicates that most economic exposure in the Lease Area is associated with mobile fishing gear, such as trawlers and draggers, not fixed gear, such as traps, pots, and (sink) gillnets.

Table 1-6 presents estimates of annual economic exposure by state based on each state's share of the landed dollar value of fish harvested in the Lease Area as shown in NOAA Fisheries (2024a). New Jersey and Massachusetts account for approximately 48% and 36%, respectively, of the landed value of fish from the Lease Area and the ex-vessel value of fish landed in all other states account for the other 16%.

2.2 Economic Exposure in the OECC

2.2.1 Overview

As the OECC approaches shore, it splits into three potential variations that connect to three potential landfall sites (see Figure 1-1). Vineyard Mid-Atlantic will use up to two of these approaches to reach up to two landfall sites. In order to be conservative in the OECC economic exposure analysis, the Jones Beach Approach was used to estimate the economic exposure because it has the highest FRD, which is $5,290 per km^2 (NOAA Fisheries 2024b). This FRD provides a baseline value for estimating economic exposure in parts of the OECC where commercial fishing will be temporarily precluded during cable installation.

Besides cable laying activity, cable installation in the OECC requires several pre-installation activities, such as surveys of cable alignments, pre-lay grapnel runs of cable alignments, and possibly boulder relocation, and some "post-lay activities" such as cable splicing and the placement of cable protection. Each of these cable installation activities will result in commercial fishing being temporarily precluded in part of the OECC. It is important to note that commercial fishing in the OECC will be precluded only in areas where cable installation activities are underway, but not in the rest of the OECC where cable installation is either planned or has been completed. Based on the expected durations of cable pre-installation and installation activities, Vineyard Mid-Atlantic's export cable engineers have estimated that overall cable pre-installation and installation activities in the OECC will take place during approximately 40 months (3.33 years).

During pre-installation and cable installation activities, the Proponent expects to request that mariners give a wide berth to active work sites or construction vessel(s) through the issuance of Offshore Wind Mariner Updates. The Proponent also coordinates with the United States Coast Guard (USCG) to issue Notices to Mariners (NTMs) advising other vessel operators of planned offshore activities. For the purposes of this economic analysis, it is assumed that fishermen will give a wide berth of 1 kilometer (km) (0.54 nautical miles [NM]) around cable installation activities which will result in a fishing preclusion area of 3.14 km^2 (776 acres) around where cable installation activities are underway. As Figure 2-1 illustrates the fishing preclusion area will move along the OECC as cable installation activities take place and at any particular time will occupy approximately 2 km (1.1 NM) along the OECC; that is, 1 km (0.54 NM) forward of and 1 km (0.54 NM) aft of where cable installation vessels are operating. This means that cable installation activity taking place at any given time is expected to preclude commercial fishing along approximately 3-4% (depending on which landfall site is selected) of the overall length of the OECC. During periods of cable installation, it is not expected that commercial fishing will be precluded or impaired in the remaining 96-97% (depending on which landfall site is selected) of the OECC where cable installation is either completed or planned.

Possibilities exist that disruptions in the rate of cable installation may increase the duration of cable installation impacts on commercial fishing, but that should not affect the area of fishing impacts at any particular time. At present it is assumed that cable installation activity will take place at only one location and restrict commercial fishing in a single 3.14 km^2 (776 acre) area at a time. If more than one cable installation activity occurs at a particular time, there could be a proportional increase in the area of fishing impacts during those times. However, overlapping cable installation activities that increase the area of impacts will result in a proportional decrease in the expected duration of overall cable installation activities. Under most circumstances, therefore, the possibility of multiple cable installation activities being underway at the same time is expected to result in no net change in overall commercial fishing impacts.

Data Source: U.S. Bureau of Ocean Energy Management (BOEM), National Oceanic and Atmospheric Administration (NOAA)

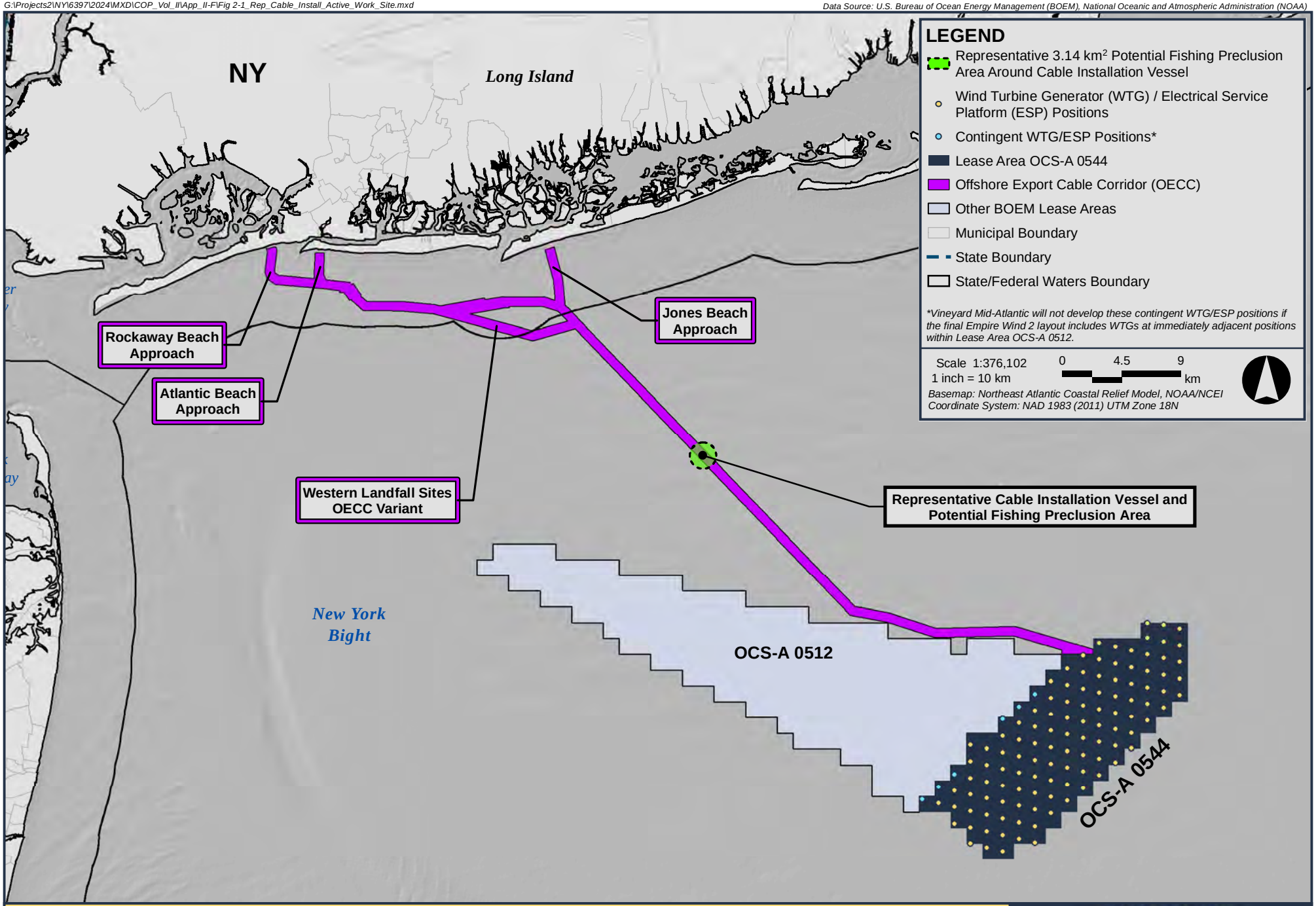

Figure 2-1
Representative Cable Installation Active Work Site in the OECC

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2.2.2 Estimating Economic Exposure in the OECC

The method of estimating economic exposure in the OECC that was described in the previous section can be summarized as estimating values for three factors, A, B, and C, and multiplying them together.

That is:

Economic Exposure in the OECC = EE_{OECC} = A x B x C

Where:

A = expected FRD (annual fishing revenues per km^2) in the OECC

B = area precluded from fishing during ongoing cable installation activities (3.14 km^2)

C = the total duration of cable installation activities expressed in years (3.33)

Table 2-2 presents estimates of A, B, and C for the OECC and an estimate of economic exposure in the OECC during cable installation based on the analysis described above. As shown in Table 2-2, based on the estimated annual FRD in the OECC of $5,290 per km^2, the expected duration, and area of fishing preclusion in the OECC, economic exposure during cable installation in the OECC is estimated to be $55,314 (2023 dollars). New Jersey and Massachusetts experience the highest percentage of economic exposure in the OECC (see Table 2-3). The five most valuable species harvested in the OECC are sea scallop, longfin squid, surf clam, summer flounder, and monkfish (NOAA Fisheries 2024b).

Table 2-2 Estimates of Commercial Fishing Economic Exposure in the OECC During Construction

	A	B	C	EE
OECC	**Average Annual Fishing Revenues per km^2**	**Fishing Preclusion Area (km^2)**	**Construction Period (years)**	**Economic Exposure During Construction**
OECC	$5,290	3.14	3.33	$55,314

Table 2-3 Estimate of Commercial Fishing Economic Exposure in the OECC by State

State	Percentage of Average Annual OECC Fishing Revenues (2008–2023)
New Jersey	38%
Massachusetts	30%
Virginia	10%
New York	9%
All Others	6%
Rhode Island	4%
Connecticut	3%
North Carolina	0.1%
Maryland	0.01%

Note:
1. Data source is NOAA Fisheries 2024b.

Offshore export cables will be installed at a target burial depth beneath the stable seabed of 1.2 meters (m) (4 feet [ft]) in federal waters and 1.8 m (6 ft) in state waters. The target burial depth is at least twice the burial depth required to prevent cables from interfering with commercial fishing operations. However, while the Proponent will make every effort to achieve sufficient burial, a limited portion of the offshore export cables (up to approximately 4%) may require remedial cable protection because a sufficient burial depth cannot be achieved. Potential cable protection methods include rocks, rock bags, concrete mattresses, half-shell pipes, or something similar.

Any required cable protection will be designed and installed to minimize interfering with mobile bottom fishing gear to the maximum extent practicable, and after installation the Proponent will share the location of the cables as well as any cable protection with fishermen. For these reasons, potential fishery-related economic losses associated with bottom fishing gear snagging on cable protection are expected to be extremely low. The Proponent has developed a fishing gear loss and compensation protocol that provides a standard approach to fishing gear loss and compensation. For these reasons, the economic exposure of commercial fishing in the OECC after cable installation is expected to be at or near zero.

2.3 Summary of Economic Exposure

Annual economic exposure in the Lease Area is estimated based on the assumption that all fishing will be precluded for a full year with none of the associated losses in fishing revenues recouped as a result of fishing effort being diverted from the Lease Area to other fishing areas. Average annual fishing revenues in the Lease Area are estimated in Section 2.1 and shown in Table 2-1 to be $1,950,400 (2022 dollars). This is the best available estimate of full annual

economic exposure in the Lease Area. As shown in Table 2-2 economic exposure related to full duration of cable installation (including pre-installation activities) in the OECC is estimated to be $55,314 (2023 dollars).

Economic impact estimates based on estimates of economic exposure presented in this report may be updated at a later date based on new BOEM guidance and consultations with affected state(s) through the Coastal Zone Management Act (CZMA) review processes.

3 Indirect Sources of Potential Economic Exposure

3.1 Fishing Congestion Impacts Outside the Lease Area and the OECC

In fishery economics, the term "congestion externalities" refers to increases in vessel-specific or fleetwide fishing costs and/or reductions in fishing revenues that result when so many vessels are operating in a fishing area that they interfere with one another. This is typically the result of some combination of fish being highly concentrated in an area, the fishery being overcapitalized, or regulations that limit fishing times or fishing areas in ways that concentrate when or where fishing is allowed.

In general, the likelihood that the introduction of new fishing effort to an area will result in fishing congestion impacts depends on the size of the fishing area, the concentration of fish and fishing effort in the area, the amount of new fishing effort entering the area, and whether fish harvests in the area are limited by fish stock abundance or fishing regulations, or both. It is uncommon for fishing congestion impacts associated with small shifts in where fishing effort is deployed at sea to be significant in open ocean fisheries.

Increases in concentrations of fishing effort and related fishing congestion impacts could result from some offshore wind energy projects. However, the evidence described below indicates that it is extremely unlikely that the level of potential fishing effort that could be diverted from the Lease Area or the OECC to other fishing areas could constitute a significant source of potential fishing congestion impacts. The NOAA Fisheries fishing vessel revenue boxplot analysis described in Section 2.1 shows that commercial vessels that spend time fishing in the Lease Area already generate most of their fishing revenues outside the Lease Area and so do not constitute a significant new source of fishing effort outside the Lease Area.

3.1.1 Potential Fishing Congestion Impacts from the Lease Area

As shown in Table 1-3, the Lease Area does not include highly productive commercial fishing grounds for species other than sea scallops, and as AIS data presented in Figure 3-1 and Table 3-1 illustrate, most fishing vessels that enter the Lease Area are transiting through not fishing in the Lease Area. Table 3-1, for example, shows that in the average year during 2017–2022, a total of 88 fishing vessels entered the Lease Area on a total of 296 trips, but only 34 of those vessels (37%) engaged in fishing in the Lease area and only during 89 of those trips (30%).[6] Table 3-1 also shows that the number of commercial fishing vessels operating in the Lease Area averaged over five vessels during only two months (September and October). This low level of fishing effort in the Lease Area is not a significant enough source of potential new fishing effort entering nearby fishing areas to pose fishing congestion threats outside the Lease Area. Also, as AIS data and NOAA Fisheries fishing revenue boxplots show, fishing vessels that

[6] The number of times fishing vessels entered the Lease Area to fish or transit during 2017–2022 are based on analysis of AIS records for those years as presented in Baird (2024). This analysis is inclusive of AIS-equipped fishing vessels. Not all fishing vessels have AIS; only fishing vessels greater than 65 ft (20 m) length overall are required to carry AIS per USCG requirements.

operate in the Lease Area already generate most of their fishing revenues outside the Lease Area and are already part of the established fishing fleet operating in adjacent and nearby fishing grounds. In summary, based on the best available data, the development of the Lease Area is not expected to result in fishing congestion impacts in nearby fishing areas.

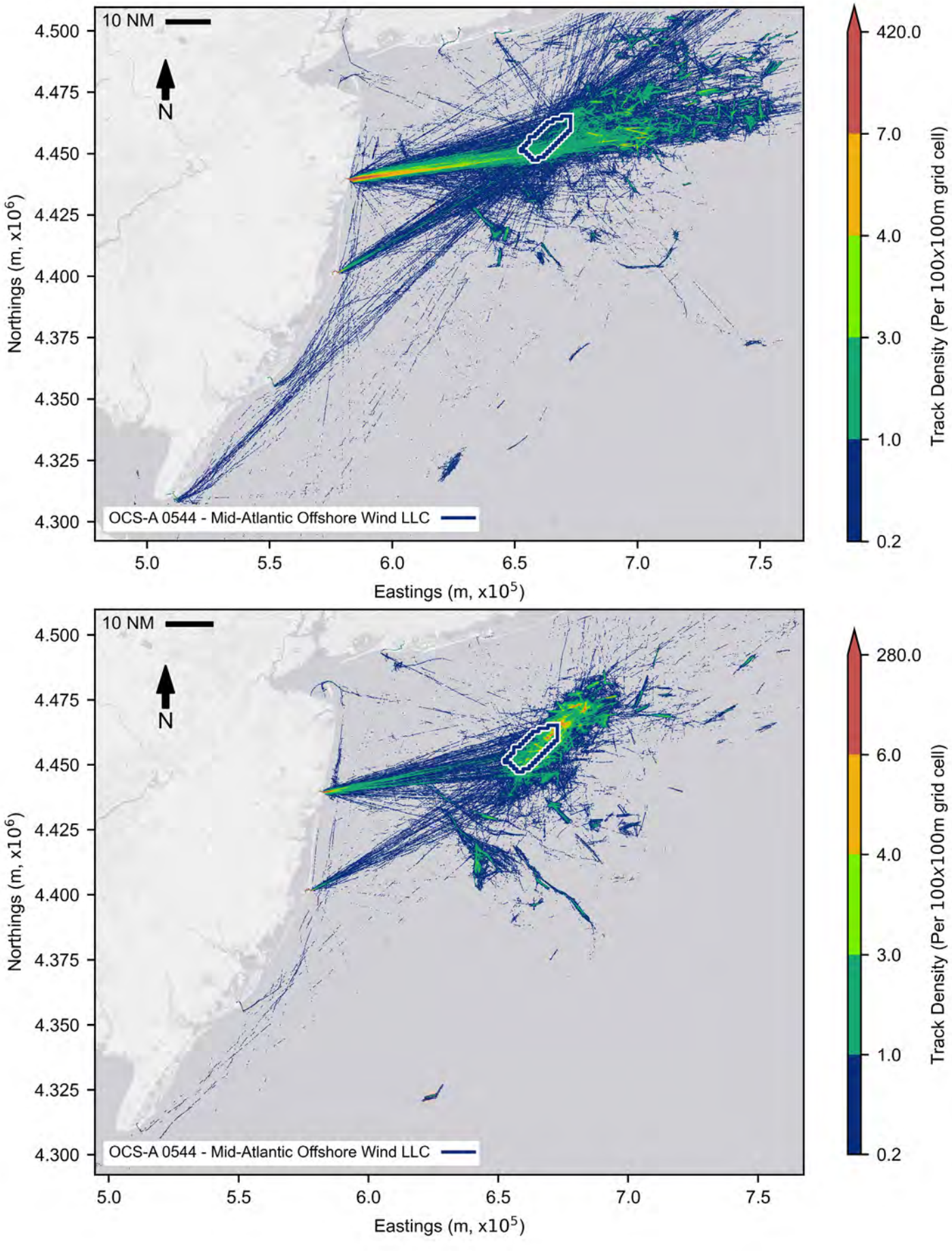

Figure 3-1
Transiting (top) and Actively Fishing (bottom) AIS Vessel Average Annual Traffic Densities (Baird 2024)

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VINEYARD OFFSHORE

Table 3-1 Average Monthly and Annual AIS Fishing Vessel Traffic through the Lease Area (2017–2022)

Average (2017–2022)	Month												Average Annual Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
Number of Unique Fishing Vessels (fishing)	1.8	2.4	3.2	1.6	2.2	3.4	3.6	4.2	6.8	9.8	3.8	2.0	34.0
Number of Unique Fishing Vessel Tracks (fishing)	2.8	4.0	5.0	2.0	4.8	6.0	6.8	14.8	10.4	19.6	9.8	3.4	89.4
Number of Unique Fishing Vessels (transiting)	7.6	7.4	11.0	8.4	7.6	12.2	14.0	12.8	13.8	15.4	9.8	5.6	81.0
Number of Unique Fishing Vessel Tracks (transiting)	15.4	14.2	18.0	13.0	17.4	19.8	28.0	31.2	21.4	31.8	18.8	11.4	240.4
Number of Unique Fishing Vessels (all)	8.4	8.4	13.4	9.8	8.6	13.4	16.0	14.0	16.0	17.4	11.6	7.0	88.4
Number of Unique Fishing Vessel Tracks (all)	16.6	16.6	23.6	15.6	20.4	25.8	34.4	36.2	27.4	37.8	28.4	13.2	296.0

Notes:
1. Data source is Baird 2024.
2. Analysis was performed to separate transiting fishing vessels (vessels moving at > 4 knots [kts]) from fishing vessels that are likely to be engaged in fishing (vessels moving at ≤4 kts).
3. Vessel tracks that include some transiting and actively fishing tracks can be double counted as both transiting and fishing.

3.1.2 Potential Fishing Congestion Impacts from the OECC

As Figure 1-2 through Figure 1-6 indicate, the OECC represents a small portion of the available fishing grounds in the relevant Offshore Development Area and accounts for a very small share of the fishing effort and fishing revenues generated in that area. As described above in Section 2.2, it is assumed in this analysis that fishermen would give a wide berth of up to 1 km (0.54 NM) around cable pre-installation and installation activities in the OECC, resulting in an estimated fishing preclusion area of 3.14 km^2 (776 acres) around where cable installation activities are underway. The remainder of the OECC, where cable installation is either completed or planned, will likely remain open to fishing vessels. It is not expected that the small areas of temporary fishing limitations within the OECC during cable installation will cause enough shifts in fishing effort to other fishing areas to result in any meaningful fishing congestion impacts.

As described in Section 1.2.2, during operations and maintenance (O&M) of Vineyard Mid-Atlantic, the OECC will have no impact on commercial fishing except, potentially, along short segments of the cable route where cable protection may need to be installed on the seafloor and may pose risks of bottom fishing gear snagging. While avoiding these risks may involve modifications in the precise tracks of mobile bottom fishing gear in the OECC, it is unlikely to result in enough fishing effort shifting away from the OECC to cause fishing congestion impacts in other areas.

3.2 Lease Area Impacts on Fishing Vessel Transit Costs

Figure 3-2 shows the proximity of the Lease Area to major nearby fishing ports and fishing areas and the most direct (shortest distance) tracks that fishing vessels would normally use to travel between them that involve passing through the Lease Area. Table 3-1 displays the average number of unique AIS-equipped fishing vessels that transited the Lease Area and the average number of fishing vessel transits through the Lease Area by month from 2017 to 2022. It shows that during these years, the average monthly number of fishing vessel transits through the Lease Area ranged from 11 to 32 and that average annual vessel transits through the Lease Area averaged 240 (Baird 2024).

The use of a consistent layout of WTG/ESP locations will allow fishing vessels to continue to operate along three consistent headings (and their reciprocal courses) through the Lease Area if they choose to transit through or operate within the Lease Area. Additionally, the uniform grid pattern for the 0.68 x 0.68 NM WTG/ESP layout provides two common lines of orientation with the layout proposed for neighboring Lease Area OCS-A 0512. As further detailed in the NSRA (see Appendix II-G), the north-south and northwest-southeast corridors created by the layout would accommodate all of the existing AIS-equipped fishing fleet. During O&M of Vineyard Mid-Atlantic, there will be no restrictions on fishing vessels operating in or transiting through the Lease Area other than any temporary safety zones established by the USCG during certain maintenance activities.

During construction and installation activities in the Lease Area, fishing vessels will be allowed to transit through the Lease Area but will need to avoid any safety zones that are temporarily established by USCG around the WTGs and ESP(s). This may require at least some of the vessels transiting through the Lease Area to implement minor adjustments from the most direct transit route through the Lease Area in order to use the transit/fishing corridors created by the WTG/ESP layout in the Lease Area. This can be expected to have an insignificant impact on vessel transit distances, times, or costs.

However, despite the existence of safe corridors in the Lease Area, some fishermen may opt to reroute transits around the Lease Area, especially during extreme weather. Figure 3-2 depicts how transiting around, rather than through, the Lease Area will affect transit distances by depicting "original" port to offshore fishing area routes through the Lease Area (solid lines) and "adjusted" routes between ports and offshore fishing areas that avoid the Lease Area (dashed lines). Table 3-2 presents associated differences in transit distances (NM) and added transit times (minutes) based on the average fishing vessel transit speed through the Lease Area, which has been estimated to be 8 kts (Baird 2024).

It is not possible to predict how many annual straight-line transits through the Lease Area may be rerouted around the Lease Area during and after construction. For purposes of illustrating potential economic exposure during fishing vessel transits, therefore, it is assumed here that 100% of the 240 average annual fishing vessel transits through the Lease Area will reroute around the Lease Area.

As shown in Table 3-2, at a typical steaming speed of 8 kts, the expected increase in transit times around the Lease Area between major fishing ports and important fishing areas range from approximately 2 minutes to 8 minutes. If each of the 240 annual transits through the Lease Area were rerouted around the Lease Area, and those transits experienced the maximum estimated increase in transit time of 8 minutes, the increase in annual fleetwide transit time would be 25.6 hours. Assuming the average fishing vessel steaming at 8 kts consumes fuel (diesel) at a rate of 25 gallons per hour and purchases diesel fuel at a dockside price of $5.00 per gallon, this additional transit time would add approximately $16.67 to fuel costs per transit and add approximately $4,000 to annual fleet-wide fuel-based transit costs for AIS-equipped vessels.

This estimate of a potential $4,000 increase in annual fleetwide transit cost if all current annual transits through the Lease Area were to detour around the Lease Area, is sensitive to assumptions about distances and destinations, steaming speeds, fuel consumption rates, and fuel prices and does not reflect operating costs other than fuel costs or the opportunity cost of any lost fishing time resulting from longer transit times. However, it is reasonable to assume that factoring in potential transit cost impacts beyond the $4,000 increase in fuel costs would be more than offset by a reduction in estimated cost increases if the extreme assumption that all fishing vessels that currently transit through the Lease Area will be transiting around the Lease Area is relaxed. In fact, most vessels that currently transit through the Lease Area can be expected to continue transiting through rather than around the Lease Area and therefore can be expected to experience no increase in transit times or costs.

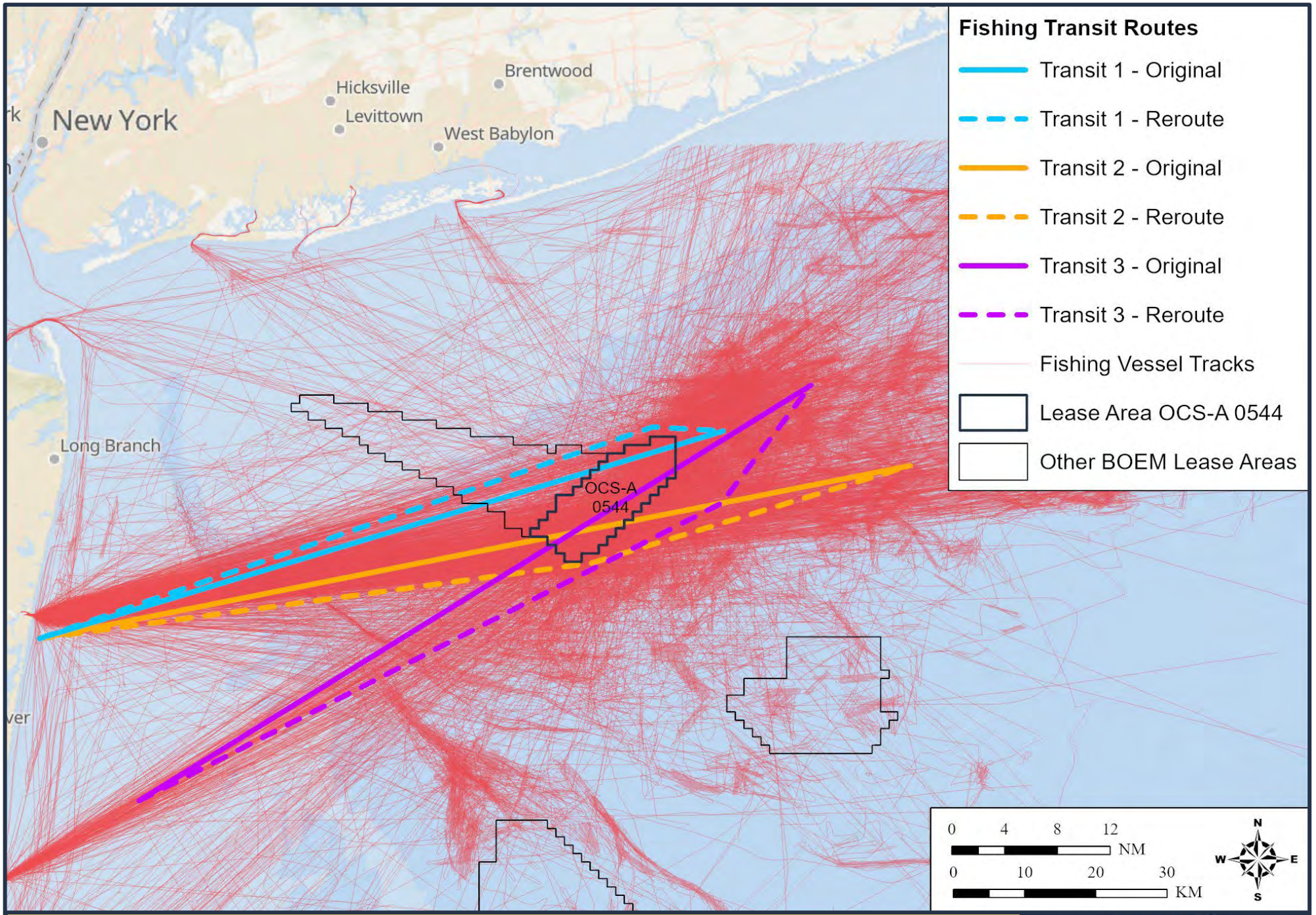

Figure 3-2
Analysis of Transit Routes for AIS Commercial Fishing Vessels: Existing and Post-Construction (Bypassing Lease Area) (Baird 2024)

VINEYARD MID-ATLANTIC
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Table 3-2 Transit Route Analysis for AIS Commercial Fishing Vessels Currently Transiting the Lease Area: Existing and Lease Area Bypass Route

Transit Route Name	Distance (NM)	Change in Distance (meters)	Change in Transit Times (minutes)
Transit 1 - Original	54.28	703.8	3.4
Transit 1 - Reroute	54.66		
Transit 2 - Original	67.34	407.4	1.9
Transit 2 - Reroute	67.56		
Transit 3 - Original	60.29	1,722.4	8.2
Transit 3 - Reroute	61.22		

Note:
1. Data source is Baird 2024.

4 Conclusions

BOEM refers to economic exposure as "a starting point to understanding potential economic impacts … if a harvester opts to no longer fish in the area and cannot recapture that income in a different location" (BOEM 2021). Section 2 of this report developed $1,950,400 as an estimate of full annual economic exposure in the Lease Area and $55,314 as an estimate of economic exposure during cable installation in the OECC. However, lost fishing revenues would be as high as these estimates of economic exposure only if fishing vessels generate no fishing revenues when they are assumed to be precluded from fishing in the Lease Area and parts of the OECC. This requires the additional assumption that commercial fishermen will either stay in port or remain idle at sea or continue to fish outside the Lease Area and OECC while generating no fishing revenues. All of these responses to the relatively small areas and limited durations of Vineyard Mid-Atlantic impacts on commercial fishing are highly unlikely because they would require all fishing vessel owner/operators who typically operate in the Lease Area or OECC to act in an economically irrational manner.[7]

The economic impact of Vineyard Mid-Atlantic on commercial fishing revenues will be estimated at a later date based on estimates of economic exposure presented in this report, updated BOEM guidance, and consultations with affected state(s) through the CZMA review process.

[7] A basic tenet of economics is that businesses will continue to operate in the short-term as long as revenues (e.g., the ex-vessel value of landings) exceed operating costs (e.g., trip expenses), which allows net operating profits to offset at least some fixed costs. It is highly unlikely that the limited areas and durations of fishing preclusions associated with Vineyard Mid-Atlantic would cause fishermen to cease fishing (stay in port or remain idle at sea), as opposed to diverting fishing effort away from impact areas. In many meetings related to Vineyard Wind 1, commercial fishermen themselves acknowledged that fishing will likely continue in or around offshore wind farms during and after construction.

5 References

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