THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114 ◦ (617) 626-1200

October 21, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza, Suite 205
Boston, MA 02108

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Conditional Concurrence

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) has reviewed the proposed offshore wind renewable energy project of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC) and issues this conditional concurrence. SouthCoast Wind Energy LLC (SCW LLC), a wholly owned subsidiary of OW North America LLC (a 50-50 joint venture of EDP Renewables and ENGIE, and SouthCoast Wind Energy Holdings LLC, is the proponent of the project and will be responsible for the construction, operation, and decommissioning of the project. SCW LLC has proposed to construct and operate an offshore wind energy facility within the Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0521 in two phases (SCW Project 1 and SCW Project 2), with up to 149 positions comprised of a combination of up to 147 wind turbine generators (WTG) and up to 5 offshore substation platforms (OSPs) sited in a 1 nautical mile (nm) x 1 nm grid layout across the 127,388-acre site. Some or all of the OSPs may contain converter stations to convert alternating current (AC) power to direct current (DC) power depending upon the landfall location. The proposed project also includes inter-array cables connecting the WTGs, and up to six cables in the Brayton Point offshore export cable corridor. As discussed, SCW LLC intends to utilize Brayton Point as the point of interconnection for both SCW Project 1 and SCW Project 2. The Falmouth Connector Project has been downgraded to a "variant" option in the SCW LLC Construction and Operations Plan (COP). As such, the Falmouth portion of the Project (Falmouth export cable corridor, landfall, and onshore project facilities) is not covered under this conditional concurrence. Should SCW LLC need to use the Falmouth variant in the future, an updated Federal Consistency Determination which includes the Falmouth Project components would be required. The project includes two landing sites for the offshore transmission cables sites in Somerset, Massachusetts (the western and eastern sides of Brayton Point), and an intermediate landfall in Portsmouth, Rhode Island at Aquidneck Island.

Under Section 307 of the Coastal Zone Management Act (CZMA), 15 CFR § 930.57, and 15 CFR 930.54(f), SCW LLC voluntarily filed a federal consistency certification with CZM on November 30, 2021, for the proposed project and the federal consistency review commenced on that date. However, stays of the CZMA review period have been agreed to by CZM and SCW LLC changing the current date that the decision is due to July 31, 2024. CZM issued a three-month update and request

for additional information on February 18, 2022. SCW LLC was notified that the final issued state licenses and certifications were required for those parts of the project that would occur in state waters and state lands during the discussions of needed stay agreements on December 16, 2021, May 5, 2023, November 8, 2023, March 26, 2024, May 15, 2024, July 24, 2024, August 28, 2024, and September 27, 2024, October 15, 2024, and October 17, 2024.

To inform the federal consistency review, CZM reviewed the COP, Draft Environmental Impact Statement, and the Preliminary Final Environmental Impact Statement developed under the National Environmental Policy Act; the CZMA federal consistency certification; the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404/Section 10 permit application; and lease/easement/right-of-way application to BOEM under the Outer Continental Shelf Lands Act. Throughout the state and federal review process, CZM received data and information necessary to complete its consistency review. As a designated cooperating agency, CZM will continue to review and comment on future BOEM submissions for SCW LLC, including the Final Environmental Impact Statement scheduled for release in the Fall of 2024.

In addition to the documents reviewed above, the SCW LLC fisheries impact analysis identified the need for mitigation to impacted fishermen to meet the CZM's enforceable policy under Ports and Harbors Policy #4. Because CZM cannot require monetary compensation for mitigation as part of CZMA federal consistency reviews, CZM could not object for failure to pay a compensation amount or include a condition that an applicant must pay a compensation amount. However, CZM and SCW LLC can mutually agree upon a monetary compensation package and CZM can then determine that the applicable enforceable policies are satisfied. As a result of extensive mitigation negotiations conducted between SCW LLC, CZM, the Massachusetts Division of Marine Fisheries (DMF), the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Fisheries Working Group on Offshore Wind, and key stakeholders, SCW LLC has entered into an agreement with the EEA to provide funds totaling $5,717,000 for impacts over the life of the project. The agreement includes the Massachusetts Fisheries Compensatory Mitigation Fund and the Massachusetts Fisheries Innovation Fund. The Massachusetts Fisheries Compensatory Mitigation Fund ($4,217,000) will be used to offset economic impacts to Massachusetts commercial and charter/for-hire fishing and is intended for claims of direct economic loss to compensate Massachusetts fishermen for loss of access or reduction of harvest. The Massachusetts Fisheries Innovation Fund ($1,500,000) will provide funding to programs and projects through grants to conduct studies on the impacts of offshore wind development on fishery resources and the recreational and commercial fishing industries as well as provide grants for technology and innovation upgrades for fishery participants (and vessels) actively fishing within a wind energy area. The Agreement Regarding the Massachusetts Fisheries Compensatory Mitigation Funds and the Contribution to the Massachusetts Fisheries Innovation Fund is attached.

CZM conveyed to SCW LLC during the agreements for required federal consistency review stays on December 16, 2021, May 5, 2023, November 8, 2023, March 26, 2024, May 15, 2024, July 24, 2024, August 28, 2024, and September 27, 2024, October 15, 2024, and October 21, 2024 that CZM needed the required final and issued Massachusetts Department of Environmental Protection's (MassDEP) §401 Water Quality Certifications and the Chapter 91 Waterways authorizations (and associated Wetlands Protection Act Order of Conditions or Superseding Order of Conditions) to determine consistency for the parts of the project within state jurisdiction. On May 7, 2024, MassDEP issued to SCW LLC the §401 Water Quality Certification for SouthCoast Wind Project 1 based upon the proposed offshore export cable corridor in the Lee River and Mount Hope Bay. On October 21,

2024 MassDEP issued to SCW LLC the Chapter 91 Waterways license for Project 1. To date, the Chapter 91 Waterways authorization for Project 2 has not been issued. Therefore, CZM issues this full concurrence for the SCW BOEM COP and a conditional concurrence with the following conditions regarding the USACE Section 10 permit.

1. SCW Project 2 – SCW LLC shall obtain and provide to CZM the required signed final MassDEP Chapter 91 license (and associated Wetlands Protection Act Order of Conditions or Superseding Order of Conditions) for the offshore export cable in state waters with a landfall site in Somerset, Massachusetts. SCW Project 2 proposes to use the same offshore export cable corridor assessed by MassDEP for the SCW Project 1 Chapter 91 License.

If SCW LLC agrees with these conditions, then the CZMA process is complete. If SCW LLC does not agree with these conditions, then pursuant to 15 CFR 930.4, the conditional concurrence automatically becomes an objection. SCW LLC then has the right to appeal the state's conditional concurrence/objection to the U.S. Secretary of Commerce (with a copy to the National Oceanic and Atmospheric Administration's Office of General Council, Oceans and Coast Section) within 30 days of receipt of this letter. As per 15 CFR 930.125(d), the appellant shall send the notice of appeal to the Secretary, Herbert C. Hoover Building, 14th Street and Constitution Avenue, NW., Washington, DC 20230; a copy of the notice of appeal to the objecting State agency; and to the Assistant General Counsel for Ocean Services (GCOS), 1305 East West Highway, Room 6111 SSMC 4, Silver Spring, Maryland 20910.

Thank you for your cooperation with CZM.

Sincerely,

Alison Brizius
Director

AB/sd
CZM # 4922

cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jeff Willis, RI CRMC
Kevin Sloan, RI CRMC
Tyler Soleau, CZM
Alison Brizius, CZM
Sam Haines, CZM

Todd Callaghan, CZM
Hollie Emery, CZM
Sean Duffey, CZM
Kerry Kehoe, NOAA OCM
David Kaiser, NOAA OCM

AGREEMENT REGARDING THE MASSACHUSETTS FISHERIES COMPENSATORY MITIGATION FUND AND THE CONTRIBUTION TO THE MASSACHUSETTS FISHERIES INNOVATION FUND

This Agreement Regarding the Massachusetts Fisheries Compensatory Mitigation Fund and the Massachusetts Fisheries Innovation Fund (the "Agreement"), effective as of the date in which this Agreement is signed by both Parties, as defined herein, is made between SouthCoast Wind Energy LLC ("SouthCoast Wind") and the Massachusetts Executive Office of Energy and Environmental Affairs ("EEA") (collectively, the "Parties").

WHEREAS, SouthCoast Wind holds a federal Commercial Lease of Submerged Lands for Renewable Energy Development with the U.S. Bureau of Ocean Energy Management ("BOEM"), OCS-A-0521 (the "Lease"), pursuant to the Outer Continental Shelf Lands Act ("OCSLA"), located in federal waters approximately 20 miles south of Nantucket, Massachusetts;

WHEREAS, the Lease grants SouthCoast Wind the exclusive right to submit to BOEM a Construction and Operations Plan ("COP") for wind energy development and to conduct the activities described in the COP if approved by BOEM;

WHEREAS, SouthCoast Wind has submitted to BOEM a COP indicating its intent to develop the Lease in two phases, referred to as SouthCoast Wind Project 1 and SouthCoast Wind Project 2, or Phase 1 and Phase 2, respectively (together, the "Development");

WHEREAS, under OCSLA, BOEM, as part of its COP review, requires the submission of information on social and economic conditions, including recreational and commercial fishing that could be affected by the proposed activities and proposed measures for mitigating those impacts (30 CFR 585.627(a)(7); .626(b)(15)), including compensatory mitigation;

WHEREAS, the COP estimates the potential economic exposure of the Development on commercial and recreational fishers, including Massachusetts fishers;

WHEREAS, Section 307(c)(3) of the Coastal Zone Management Act, 16 U.S.C. 1451 et seq., ("CZMA"), as amended, requires that an applicant for a federal license or permit activity in or outside the coastal zone or an outer continental shelf plan affecting any land or water use or natural resource of a state coastal zone certify that the proposed activities comply with the enforceable policies of the state's approved coastal program and that such activities will be conducted in a manner consistent with the program;

WHEREAS, the enforceable policies of the Massachusetts Coastal Zone Management Program ("Coastal Program") require, to the maximum extent practicable, the avoidance, minimization, and mitigation of impacts to areas of high concentrations of existing water-dependent uses specified in the Ocean Plan, which include commercial and recreational fishing, including charter/for-hire fishing;

WHEREAS, portions of the Development are fished by Massachusetts commercial and charter/for hire fishers;

WHEREAS, SouthCoast Wind has committed in the COP to implement measures to avoid, minimize, and mitigate potential impacts to Massachusetts fishers, including but not limited to adopting a uniform one nautical mile by one nautical mile spacing between wind turbines;

WHEREAS, on April 10, 2024, SouthCoast Wind submitted a proposed Compensatory Mitigation Plan (the "Compensatory Mitigation Plan") to EEA's Office of Coastal Zone Management ("CZM") to address potential impacts to Massachusetts commercial and charter/for hire fisheries from the Development, which was based on reports included in the COP and dated October 2023 (baseline economic assessment) and February 2024 (economic exposure and impact assessment) prepared by a team of expert fisheries economists at the Woods Hole Oceanographic Institution;

WHEREAS, SouthCoast Wind and CZM subsequently discussed proposed terms to be included in the Compensatory Mitigation Plan, reflecting feedback received from the Massachusetts Fisheries Working Group on Offshore Wind Energy;

WHEREAS, the Office for Coastal Management of the National Oceanic and Atmospheric Administration has stated that Parties may agree to compensatory mitigation as a means of achieving federal consistency concurrence;

WHEREAS, SouthCoast Wind has agreed to establish a two-part compensatory mitigation program with total funding of $5,717,000 to (1) compensate Massachusetts fishers for reasonably foreseeable adverse impacts not eliminated by the avoidance and minimization measures within the Development area (the "Compensatory Mitigation Fund") and (2) to support Massachusetts fishers' continued fishing in its lease area (the "Massachusetts Fisheries Innovation Fund");

WHEREAS, the Compensatory Mitigation Fund will compensate Massachusetts fishers and associated businesses for economic losses directly related to the construction, operations, and decommissioning of Phase 1 and Phase 2 of the Development;

WHEREAS, the Compensatory Mitigation Fund will satisfy, in part, SouthCoast Wind's obligations under its COP to mitigate impacts to recreational and commercial fishermen, making the Funds federally enforceable;

WHEREAS, the Massachusetts Fisheries Innovation Fund will provide funds to support Massachusetts fishers' continued fishing in and around the Development;

WHEREAS, SouthCoast Wind has established gear loss program that is separate and apart from the Compensatory Mitigation Funds and Massachusetts Fisheries Innovation Fund that provides compensation for loss or damage to fishing gear due to Development activities;

WHEREAS, Massachusetts CZM will reference the Compensatory Mitigation Fund and the Massachusetts Fisheries Innovation Fund as a condition of its federal consistency concurrence

as a means by which the Development satisfies the enforceable policies of the Massachusetts Coastal Zone Management Program;

WHEREAS, Massachusetts has an already-established Fisheries Innovation Expendable Trust for the same purposes as the Massachusetts Fisheries Innovation Fund, as described herein;

NOW THEREFORE, the Parties agree as follows:

1. The Compensatory Mitigation Fund

(a) The purpose of the Compensatory Mitigation Funds is to compensate claims by Massachusetts fishing businesses for impacts resulting in economic losses during each phase of development (construction, operations, decommission) of the Development.

(b) SouthCoast Wind will provide a total of $4,217,000 in funding to the Compensatory Mitigation Fund as part of its overall Development modifications and mitigations to meet, in part, its mitigation obligations under the COP and achieve consistency with the enforceable policies of the Coastal Policies. The Compensatory Mitigation Fund will compensate Massachusetts commercial and for-hire charter fishers and shoreside businesses impacted by the Development in lease area OCS-A 0521 and its export cable areas in federal and state waters for direct economic losses arising from the construction, operation, decommissioning of each Phase of the Development, and unforeseen, extraordinary events that lead to later business interruption. The funds are based on the best available data, adjusted for lobster and Jonah crab, cover potential economic exposure to both lease area OCS-A 0521 and its preferred export cable corridor, and include multipliers for upstream, downstream, and for-hire recreational fisheries.

(c) The funds will be deposited into either: (1) an escrow account managed by a third-party administrator ("TPA"); or (2) if established and mutually agreed to by the Parties, a regional fund to compensate commercial fishing interests for impacts associated with offshore wind development on the East Coast, provided that the funds will be reserved to pay claims by Massachusetts fishers and businesses.

(d) SouthCoast Wind will deposit 50% of the Compensatory Mitigation Funds ($2,108,500) within 60 days of Phase 1 achieving financial close[1] and 50% of the Compensatory Mitigation Funds ($2,108,500) within 60 days of Phase 2 achieving financial close. Each such deposit shall be made to either the escrow account or the regional fund, whichever is agreed to by the Parties pursuant to paragraph (c) above.

(e) If the funds are deposited to an escrow account, SouthCoast Wind will establish the account with a national bank, federal savings bank or federal savings and loan

[1] For the purposes of this Agreement, "financial close" means the date upon which all financing documentation for the relevant Development Phase has been executed and becomes effective.

association (the "Trust Company"). The Trust Company shall serve as custodial administrator of the Compensatory Mitigation Fund. SouthCoast Wind, in consultation with CZM, will select a TPA to establish and administer a claims process and to independently evaluate and process claims against the Compensatory Mitigation Fund. The terms and conditions governing administration of the Compensatory Mitigation Fund shall be mutually agreed by the Parties to include establishment of one or more defined periods of eligibility for receipt of claims (the "Eligibility Period(s)"). The TPA shall be a person, institution, or business entity with fiduciary, accounting, and/or legal experience and where feasible knowledge of the fishing industry, including the commercial and charter/for-hire fishing industry, in New England. Absent fishing industry experience, the TPA would be supported by fishing advisors knowledgeable of Massachusetts commercial and for-hire charter fishers and shoreside businesses operating in the Development area.

(f) Administrative costs associated with the Trust Company serving as the custodial administrator of the Compensatory Mitigation Fund and the reasonable costs associated with the TPA establishing a claims procedure, reviewing claims, and, dispersing financial compensation will be paid by SouthCoast Wind directly and not deducted from the escrow funds.

(g) The claims process will be aligned, to the extent practicable, with already established claims processes established by other offshore wind developers to decrease confusion and simplify the process for claimants. This may include retaining a TPA and/or fishing advisors that are also working on behalf of other developers, aligning the eligibility requirements for making claims, developing similar claims forms, and using similar criteria for claims payments. The selection of the TPA and the final claims process shall be subject to the approval of EEA, which approval shall not be unreasonably withheld, conditioned, or delayed.

(h) Paid claims will be accompanied by a release of liability for only those claims that are resolved thereby, and not for other claims that may arise.

(i) The Compensatory Mitigation Fund is not intended to address or provide compensation for any claims of lost or damaged gear. Those claims will be processed separately by SouthCoast Wind's already established gear loss program. Under the program, gear loss claim forms are available on SouthCoast Wind's website and claims are processed as quickly as possible to allow fishers to continue fishing.

(j) The Parties shall work together to determine the duration of the claims period. If at the conclusion of, or periodically during, the claims period, as agreed and defined by the Parties, any unclaimed and/or unspent funds remain in the Compensatory Mitigation Fund, those remaining funds will be transferred or otherwise allocated to the Massachusetts Fisheries Innovation Fund. Such transfer(s) and/or reallocation(s) of funds from the Compensatory Mitigation Fund will constitute a final disposition of such funds for purposes of this Agreement and SouthCoast Wind shall have no further liability with respect to any future claims or expenditures related to the

Compensatory Mitigation Fund and under no circumstances be required to replenish funds into the Compensatory Mitigation Fund.

2. Purpose of the Massachusetts Fisheries Innovation Fund

(a) The purpose of the Massachusetts Fisheries Innovation Fund is to support programs and projects that ensure safe and profitable fishing continues as the Development and other offshore wind projects are constructed, operated, and decommissioned in Northern Atlantic waters. The Fund will provide support to programs and projects through grants to conduct studies on the impacts of offshore wind development on fishery resources and the recreational and commercial fishing industries as well as provide grants for technology and innovation upgrades for fishery participants (and vessels) actively fishing within a wind energy area. These programs and projects may include, but are not limited to, studies on the impacts of offshore wind development on fishery resources and the recreational and commercial fishing industries, improvements in fishing vessels and gear, development of new technology to improve navigation in and around the wind farm area, the development of alternative gear and fishing methods, optimization of vessel systems, technology and innovation upgrades for fishery participants (and vessels) actively fishing within a wind energy area, and general fishing vessel safety improvements.

(b) SouthCoast Wind will provide a total of $1,500,000 to support the Massachusetts Fisheries Innovation Fund. SouthCoast Wind shall deposit 50% of the funds ($750,000) into the Massachusetts Fisheries Innovation Fund within 60 days after SouthCoast Wind Project 1 achieving financial close; and shall deposit 50% of the funds ($750,000) into the Massachusetts Fisheries Innovation Fund within 60 days after SouthCoast Wind Project 2 achieving financial close.

3. Conditions Precedent to Performance

(a) CZM issues a concurrence with SouthCoast Wind's federal consistency certifications for both Phase 1 and Phase 2 of the Development.

(b) With respect to each of Phase 1 and Phase 2, all other final federal, state, and local permits, authorizations, concurrences, and approvals necessary to construct and operate each Phase of the Development are received.

(c) With respect to each of Phase 1 and Phase 2, financial close is achieved.

4. Dispute Resolution. If either Party alleges that there exists a dispute or disagreement regarding the matters covered by this Agreement, it shall notify in writing the other Party of such alleged dispute or disagreement (a "Dispute Notice"). The Parties shall attempt to resolve the alleged dispute or disagreement through good faith negotiations. If the Parties fail to resolve the alleged dispute or disagreement within sixty (60) days of the receipt date of the Dispute Notice, the Party alleging the dispute or disagreement may enforce this only by specific performance, injunctive relief or a declaratory judgment action pursuant to the laws of the Commonwealth of Massachusetts. The remedies of specific performance,

injunctive relief and declaratory judgment shall be cumulative of all other rights and remedies at law or equity of the parties under this Agreement.

5. **Governing Law.** This Agreement shall be construed in accordance with laws of the Commonwealth of Massachusetts and all disputes hereunder shall be controlled by the laws of the Commonwealth of Massachusetts without regard to its conflict of laws principles. Massachusetts shall be the forum state for all forms of dispute resolution, including but not limited to judicial actions to enforce the Agreement.

6. **Implementation.** CZM shall implement this Agreement on behalf of the EEA.

7. **Entire Agreement.** This Agreement and the SouthCoast payments described herein, and the attached exhibits, if any, constitute the entire agreement of the parties as to the subject matter of compensatory mitigation for potential impacts to Massachusetts fisheries and businesses operating within the Development area and supersedes any and all prior oral or written agreements of the parties relating to this subject matter. This Agreement cannot be changed or modified except in a written instrument mutually agreed-upon and signed by both Parties.

8. **Assignment; Successors and Assigns.** This Agreement may be assigned by SouthCoast Wind, in whole or in part, to any SouthCoast Wind affiliate or finance party having the capacity to perform SouthCoast Wind's obligations hereunder. This Agreement shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns.

9. **Severability.** If any part of this Agreement is found to be unenforceable, the rest will remain in full force and effect and shall be interpreted so as to give full effect to the intent of the parties.

10. **Execution in Counterparts.** This Agreement may be executed in counterparts and by the different parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all counterparts shall together constitute one and the same instrument. This Agreement may be delivered by the exchange of signed signature pages by facsimile transmission, electronic signatures, or by attaching a pdf copy to an e-mail, and any printed or copied version of any signature page so delivered shall have the same force and effect as an originally signed version of such signature page.

11. **Term; Termination.** The term of this Agreement shall start as of the date of this Agreement and shall expire after all funds have been expended. SouthCoast Wind shall be relieved of any obligations hereunder (excluding SouthCoast Wind's commitment to pay administrative costs as set forth in Section 1(f)) and shall be relieved of any further liability related hereto, once SouthCoast Wind has made all required payments to the Compensatory Mitigation Fund and the Massachusetts Fisheries Innovation Fund as provided in Sections 1(d) and 2(b). SouthCoast Wind may terminate this Agreement with respect to Phase 1 and/or Phase 2 on 30 days' prior written notice to EEA if SouthCoast Wind determines, in its sole discretion, that the conditions precedent in Section 3 will not be met for Phase 1 and/or Phase 2, as applicable.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed as of the last date below.

SOUTHCOAST WIND ENERGY LLC

DocuSigned by:
Michael Brown
B2F31605ED134D3...

29-May-2024

Michael Brown, CEO Date

MASSACHUSETTS EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS

DocuSigned by:
Rebecca Tepper
F52CDF56944F449...

31-May-2024

Rebecca L. Tepper, Secretary Date

MAYFLOWER WIND

Prepared for:
Mayflower Wind Energy LLC

Final Massachusetts Coastal Zone Management Act Consistency Certification

Prepared by:

AECOM
9 Jonathan Bourne Drive
Pocasset, MA 02559

January 2022

AECOM Imagine it. Delivered.

Quality Information

Prepared by	Approved by
Conor Makepeace	Nancy Palmstrom
Wetland Scientist	Mayflower Wind Project Manager

Revised by
Sherri Albrecht

Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	2/12/21	Submittal	Yes	Nancy Palmstrom	Project Manager
1	8/30/21	Revised to include updated Falmouth Project Design Envelope and in response to BOEM comments	Yes	Nancy Palmstrom	Project Manager
2	1/13/22	Consolidated to include Project components in Falmouth, Brayton Point, and federal waters	Yes	Nancy Palmstrom	Project Manager

Prepared for:

Jennifer Flood
Mayflower Wind Energy LLC
101 Federal Street
Boston, MA 02110

Prepared by:

AECOM
9 Jonathan Bourne Drive
Pocasset, MA 02559
aecom.com

Table of Contents

Tables

Figures (in Attachment 1)

Acronyms and Abbreviations

Abbreviation or Acronym	Definition
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
COP	Construction and Operations Plan
CRMC	Coastal Resources Management Council
CZMA	Coastal Zone Management Act
CZM	Massachusetts Office of Coastal Zone Management
DEP	Department of Environmental Protection
ECC	Export Cable Corridor
EEA	Massachusetts Executive Office of Energy and Environmental Affairs
EIS	Environmental Impact Statement
ENF/EIR	Environmental Notification Form/Environmental Impact Report
ft	foot/feet
FEIR	Final Environmental Impact Report
GLD	geographic location descriptions
G&G	geophysical and geotechnical
HDD	Horizontal Directional Drilling
HVAC	high voltage alternating current
HVDC	high voltage direct current
ha	hectare
km	kilometer
kV	kilovolt
Lease Area	Lease Area OCS-A 0521
m	meter
Mayflower Wind	Mayflower Wind Energy LLC
MEPA	Massachusetts Environmental Policy Act
M.G.L.	Massachusetts General Laws
MHC	Massachusetts Historical Commission
mi	mile
nm	nautical mile
NRHP	National Register of Historic Places
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
OCS	Outer Continental Shelf
OMP	Ocean Management Plan

OSP	Offshore Substation Platform
PDE	project design envelope
POI	Point of Interconnection
Q	quarter
ROW	Right of Way
SAV	Submerged Aquatic Vegetation
SPI/PV	sediment profile imaging/plan view
SSU	special, sensitive or unique
TJB	transition joint bay
USC	United States Code
USCG	United States Coast Guard
UXO	Unexploded ordnance
WPA	Wetlands Protection Act
WTG	Wind Turbine Generator

1.0 Introduction

Mayflower Wind Energy LLC (Mayflower Wind) proposes an offshore wind renewable energy generation project (the Project) located in federal waters off the southern coast of Massachusetts in the Outer Continental Shelf (OCS) Lease Area OCS-A 0521 (Lease Area). The Project will deliver electricity to the regionally administered transmission system via export cables with sea-to-shore transitions in Falmouth, Massachusetts, Portsmouth, Rhode Island (for overland crossing of Aquidneck Island), and Brayton Point in Somerset, Massachusetts as well as onshore transmission systems extending to the respective points of interconnection (POIs) in Massachusetts (Figure 1). This Coastal Zone Management Act (CZMA) Consistency Statement is specific to those portions of the Project located within Waters of the Commonwealth of Massachusetts and portions of the Project within federal waters that may affect regulated Massachusetts coastal resources (Figure 2). A separate CZMA certification statement has been prepared for a portion of the Project within Rhode Island State Waters and the two National Oceanic and Atmospheric Administration (NOAA)-approved geographic location descriptions (GLDs) subject to jurisdiction by the Rhode Island Coastal Resources Management Council (CRMC) (Construction and Operations Plan [COP] Appendix D2).

1.1 Project Objectives

The Project's objective is to provide Massachusetts, and the regional electricity grid, with clean, renewable wind energy in accordance with the Commonwealth of Massachusetts' Section 83C II and Section 83C III of the Green Communities Act and Mayflower Wind's winning bids selected by the Electric Distribution Companies that serve Massachusetts customers. The first bid was provided by Mayflower Wind in response to the 2019 Offshore Wind Energy Generation request for proposals ("Section 83C II RFP") and has now been memorialized in executed Power Purchase Agreements with the Electric Distribution Companies that were approved by to the Massachusetts Department of Public Utilities in November 2020. The second bid was provided by Mayflower Wind in response to the 2021 Offshore Wind Energy Generation request for proposals ("Section 83C III RFP"). Mayflower Wind's winning bid was selected by the Electric Distribution Companies on December 17, 2021.

There are several significant economic, environmental, and social benefits to offshore wind power, including the generation of electricity that does not emit air pollutants and that can replace other more environmentally costly forms of electricity generation. The Project is expected to help achieve mandatory Commonwealth environmental and clean/renewable energy goals, including by potentially eliminating at least 1.6 million metric tons of CO_2 emissions annually once in operation[1] — the equivalent of taking at least 347,968 cars off the road per year. These benefits also extend to coastal communities and to threatened and endangered species. The generation of clean renewable energy will reduce the need for greenhouse gas emitting electricity generation which will contribute to a reduction in the harmful effects of climate change such as sea level rise and ocean acidification both of which pose significant harm to the human and natural environment of the New England coastline. Additionally, the Project is expected to bring significant employment and other economic benefits to the south coast of Massachusetts and the region. It should be instrumental in creating a thriving, utility scale, domestic offshore wind industry.

In Energy Policy #2, a non-enforceable policy, the Massachusetts Office of Coastal Zone Management (CZM) recognizes "energy conservation and renewable energy use are significant coastal management issues" and in turn "CZM strongly endorses efforts to conserve energy and to develop alternative sources of power."[2] The Project will produce a viable form of alternative energy for the Commonwealth and be a key addition to promoting the use of alternative energies in the region.

Specific environmental and socioeconomic benefits that the Project will provide include:

[1] Daymark Energy Advisors. (2021). *Massachusetts 83C-III Benefits Report: Mayflower Wind Proposal A.* Prepared for Mayflower Wind Energy, LLC. (2021, September 16).

[2] Coastal Zone Management, Policy Guide, 35-36.

1. The Project is expected to be the Commonwealth's single greatest contributor to achieving the emissions reduction goals outlined in the 2008 Global Warming Solutions Act, the 2010 Clean Energy and Climate Plan for 2020 (updated in 2015), and the Massachusetts 2050 Decarbonization Plan[3] (released in December 2020), helping to achieve Massachusetts' Green House Gas targets for 2030, 2040, and 2050.
2. The Project is expected to bring significant employment and other economic benefits to Massachusetts, including creation of more than 14,310 full time equivalent jobs throughout the Project lifecycle from both direct, indirect, and induced employment opportunities. From employment creation, it is estimated that $1.1 billion of gross earnings will be made in Massachusetts.[4]
3. The Project will collaborate with the Massachusetts Clean Energy Center to make investments that make Massachusetts a hub for offshore wind through ports and infrastructure improvements, innovative technologies and applied research, and workforce training and development. Under the Massachusetts Clean Energy Center's administration, these investments will build on the efforts of existing institutions, including the Massachusetts Research Partnership in Offshore Wind, as well as workforce development programs, such as those with Bristol Community College and the Massachusetts Maritime Academy, to train and equip the Massachusetts offshore wind workforce.

1.2 Regulatory Applicability

In compliance with the Federal Coastal Zone Management Act (CZMA, 16 United States Code [USC] 1451 et seq.), Mayflower Wind has prepared this consistency certification for the Bureau of Ocean Energy Management (BOEM) and the Massachusetts Office of Coastal Zone Management (CZM) to demonstrate compliance with the provisions identified as enforceable by the coastal zone management policies of the Commonwealth of Massachusetts.[5] Federal Consistency Regulations (15 Code of Federal Regulations [CFR] 930.00) require all Federal Actions within or outside the coastal zone that involve reasonably foreseeable coastal effects on any land or water use or natural resource of a state's coastal zone to be consistent with all enforceable policies of the state's CZM Program. Federal Actions include the permitting of actions by private entities. This Project involves the installation of energy facilities on the OCS and therefore meets the definition of a Coastal Energy Activity under the CZMA (16 USC 1453 (5)(i)). The Project will require approval of the COP[6] by BOEM and, subsequently, a Record of Decision issued by BOEM under the National Environmental Policy Act in response to a Final Environmental Impact Statement (EIS), and a permit from the United States Army Corps of Engineers pursuant to Section 404 of the federal Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Actions requiring a federal permit or license or receiving federal funding must be compliant with the enforceable policies of the state CZM Program.

Within Massachusetts, the CZMA is administered within the coastal zone by the Massachusetts Office of CZM within the Executive Office of Energy and Environmental Affairs (EEA). The Ocean Act of 2008 required EEA to develop a comprehensive Ocean Management Plan (OMP). The first OMP was finalized in 2009 which was subsequently revised in 2015. OMP outlines a comprehensive approach to manage ocean and coastal resources that can be implemented through existing state programs and regulations. The plan also informs siting priorities, locations, and standards for allowed uses, facilities and activities. The management is based on an approach that directs new development away from special, sensitive, or unique (SSU) resources, and areas important for water dependent uses that are identified and mapped in the planning process.[7] The 12 important SSUs that are the foundation of OMP include: North Atlantic Right Whale core habitat, Humpback Whale core habitat, Fin Whale core habitat, Roseate Tern core habitat, special concern

[3] Massachusetts 2050 Decarbonization Roadmap, published in December 2020 (Link: https://www.mass.gov/info-details/ma-decarbonization-roadmap)

[4] BVG Associates. (BVGA). (2021). *Economic Benefits. A Technical Report to Support Mayflower Wind's Bid for Long-Term Contracts for Offshore Wind Energy Projects.* (2021, August).

[5] Massachusetts Office of Coastal Zone Management. 2011. Policy Guide, October 2011. Executive Office of Energy and Environmental Affairs. Boston, MA. Available URL: https://www.mass.gov/files/documents/2016/08/qc/czm-policy-guide-october2011.pdf [Accessed July 28, 2020].

[6] Mayflower Wind Construction and Operations Plan. Available URL: https://www.boem.gov/renewable-energy/state-activities/mayflower-wind#tabs-2046

[7] Massachusetts Ocean Management Plan (2015). Volume 1: Management and Administration. https://www.mass.gov/files/documents/2016/08/ua/2015-ocean-plan-v1-complete-low-res.pdf

(Arctic, Least, and Common) Tern core habitat, Sea Duck core habitat, Leach's Storm Petrel important nesting habitat, Colonial Waterbirds important nesting habitat, hard/complex seafloor, eelgrass, intertidal flats, and important fish resources.

In Massachusetts, the Coastal Zone includes the lands and waters within an area defined by the seaward limit of the state's territorial sea, extending from the Massachusetts-New Hampshire border south to the Massachusetts-Rhode Island border, and landward to 100 feet (ft) (30 meters [m]) inland of specified major roads, rail lines, other visible rights-of-way, or in the absence of these, at the coordinates specified by CZM. The Massachusetts Coastal Zone includes all of Cape Cod, Nantucket, Martha's Vineyard, and the Elizabeth Islands. Project facilities to be located within the coastal zone, and thus within the jurisdiction of the CZM, include the offshore export cables within State waters, associated landfall locations, onshore underground export cables, onshore substation, high voltage direct current (HVDC) converter station, and underground transmission cables (Figure 2).

1.3 Necessary Data and Information

In addition to the enforceable policies of the Commonwealth of Massachusetts identified and addressed in Section 3.0 of this report, the Commonwealth considers certain background information on a proposed project in their decision-making process.[8] This background and general Project information is summarized in this document and is described in detail within the COP developed by Mayflower Wind and submitted to BOEM. Table 1-1 below provides details on the required information outlined within the CZM Policy Guide, dated October 2011, and where that information can be found within this document as well as the COP.

This document is intended to provide background information on portions of the Project relevant to the CZM to ensure consistency with all applicable regulations. Applicable review procedures are set forth at 301 Code of Massachusetts Regulations (CMR) 21.07 (see 301 CMR 21.04(2)).

It should be noted that Mayflower Wind will undertake separate EFSB petitions, MEPA filings, and State permits for the Falmouth and Brayton Point points of interconnections because there are:

- Two separate sets of transmission facilities to be interconnected to the regionally administered transmission system at two separate points
- Geographically distinct and separate components:
  - Export cable corridors in MA waters,
  - Landfall sites,
  - Onshore routes,
  - Substation/converter station locations,
  - Points of interconnection, and
  - Stakeholders (i.e., communities, abutters)
- Separate interconnection processes with different timelines in the ISO New England interconnection queue

1.4 Document Organization

The balance of this document is organized as follows: Section 2.0 provides supporting Project information including timeline (Section 2.1), Project overview (Section 2.2), specific design and siting details (Section 2.3), alternatives considered (Section 2.4), affected environment (Section 2.5), potential impacts (Section 2.6) and avoidance, minimization and mitigation measures (Section 2.7). Consistency of the Project with the enforceable Massachusetts Coastal Zone Program Policies is addressed in Section 3.0, and the Project Consistency Certification is provided in Section 4.0. Figures referenced throughout the text are contained in Attachment 1.

[8] Massachusetts Office of Coastal Zone Management Policy Guide – October 2011, pages 11-12.

Table 1-1. Necessary Data and Information

Project Information	Reference Section or Description
The name and location of the project	Mayflower Wind Energy LLC; OCS Lease Area OCS-A 0521
A narrative summary of the project in clear, nontechnical language	CZMA Consistency Certification Section 2.0 – Project Information COP Section 1.1 – Project Overview
The EEA Massachusetts Environmental Policy Act (MEPA) number, if applicable	Environmental Notification Form (ENF) (Falmouth POI)), EEA# 16507 – filed November 17, 2021 Environmental Impact Report (EIR) (Falmouth POI)), EEA# 16507 - to be filed Q2 2022 ENF (Brayton Point POI) to be filed Q2 2022; separate EEA number to be assigned Draft EIR (Brayton Point POI) to be filed Q3 2022 Final EIR (Brayton Point POI) to be filed Q1 2023
A detailed description and analysis of the nature, location, type, size, proposed use, and anticipated lifespan of the project illustrated with map(s) and site plan(s)	CZMA Consistency Certification Section 2.0 – Project Description (summary) COP Section 3.0 – Description of Proposed Activities
A detailed description and analysis of the project objectives and anticipated benefits	CZMA Consistency Certification Section 1.1 – Project Objectives COP Section 1.3 – Purpose and Need
A detailed description of the physical, biological, chemical, economic, and social conditions of the project site, surroundings, and affected environment, including resource area delineations, illustrated with map(s) and site plan(s) depicting both existing and proposed conditions	COP Section 4.0 – Site Geology and Environmental Conditions COP Section 5.0 – Physical Resources COP Section 6.0 – Biological Resources COP Section 7.0 – Cultural Resources COP Section 10.0 – Socioeconomic Resources
A timetable, approximate cost, and the methods and timing of construction and operation of the project (including types of equipment, temporary impacts associated with construction, monitoring and maintenance plans, proposed reporting schedule)	COP Section 3.2 – Proposed Project Schedule COP Section 3.3 – Project Components and Project Stages COP Section 3.4 – Summary of Impact-Producing Factors

Project Information	Reference Section or Description
A detailed description and assessment of the negative and positive potential coastal effects of the project including direct and indirect resource and use impacts from all aspects of the project, short-term and long-term impacts for all phases of the project (e.g., acquisition, development, construction, and operation), and cumulative impacts of the project	CZMA Consistency Certification Section 3.0– Massachusetts Coastal Program Policies COP Section 5.1 Air Quality COP Section 5.2 Water Quality COP Section 6.1 Coastal and Marine Birds COP Section 6.2 Bats COP Section 6.3 Terrestrial Vegetation and Wildlife COP Section 6.4 Wetlands and Waterbodies COP Section 6.5 Coastal Habitats COP Section 6.6 Benthic and Shellfish COP Section 6.7 Finfish and Invertebrates COP Section 6.8 Marine Mammals COP Section 6.9 Sea Turtles COP Section 7.1 Marine Archaeology COP Section 7.2 Terrestrial Archaeology COP Section 7.3 Above-Ground Historic Properties
A detailed description of alternatives considered, analysis of the impacts on the resource areas, and explanation and justification as to why the preferred alternative was selected	CZMA Consistency Certification Section 2.4- Alternatives Considered COP Section 2.0 – Project Siting and Design Development
A description detailing any changes made to the project during MEPA review, if applicable	ENF (Falmouth POI), EEA# 16507 – filed November 17, 2021 Draft EIR (Falmouth POI), EEA# 16507, to be filed Q2 2022 Final EIR (Falmouth POI), EEA# 16507, to be filed Q4 2022 ENF (Brayton Point POI) to be filed Q2 2022; separate EEA number to be assigned Draft EIR (Brayton Point POI) to be filed Q3 2022 Final EIR (Brayton Point POI) to be filed Q1 2023

Project Information	Reference Section or Description
A description of measures taken to avoid, minimize, and mitigate adverse coastal effects and a description of how the project meets performance standards under the applicable regulations.	CZMA Consistency Certification Section 3.0– Massachusetts Coastal Program Policies Avoidance, Minimization and Mitigation Measures in the following COP Sections: COP Section 5.1 Air Quality COP Section 5.2 Water Quality COP Section 6.1 Coastal and Marine Birds COP Section 6.2 Bats COP Section 6.3 Terrestrial Vegetation and Wildlife COP Section 6.4 Wetlands and Waterbodies COP Section 6.5 Coastal Habitats COP Section 6.6 Benthic and Shellfish COP Section 6.7 Finfish and Invertebrates COP Section 6.8 Marine Mammals COP Section 6.9 Sea Turtles COP Section 7.1 Marine Archaeology COP Section 7.2 Terrestrial Archaeology COP Section 7.3 Above-Ground Historic Properties For a summary: COP Section 16.0 – Summary of Avoidance, Minimization, and Mitigation Measures
Permit applications	**Federal** COP filed February 15, 2021, and amended on August 30, 2021 and October 28, 2021; BOEM Notice of Intent to Prepare an EIS published on November 1, 2021 **State** MA Energy Facilities Siting Board (EFSB) and Department of Public Utilities (DPU) Section 69J, Section 72, and zoning petitions (Falmouth POI) filed November 17, 2021 MA EFSB and DPU Section 69J, Section 72, and zoning petitions (Brayton Point POI) to be filed Q2 2022
Final Environmental Impact Report (FEIR)	Anticipated Q4 2022 for FEIR (Falmouth POI) Anticipated Q1 2023 for FEIR (Brayton Point POI)

2.0 Project Information

This section summarizes relevant Project information needed to evaluate consistency with the Massachusetts OMP. Information presented herein includes a high level Project timeline, an overview Project description, table of specific Project siting and design details, and a summary of alternatives considered. Detailed information about the Project and affected environment is included in the Mayflower Wind COP (Volumes I and II as well as Appendices to the COP). Also addressed in this section are the Potential Project Impacts (Section 2.6) and Avoidance, Minimization and Mitigation Measures (Section 2.7).

Portions of the Project addressed in this Certification as described in Section 2.2, include:

- Project activities within the Massachusetts Coastal Zone (including portions of the Falmouth and Brayton Point export cable corridors (ECCs), the export cable sea-to-shore horizontal directional drilling (HDD) transitions, onshore Project elements in Falmouth and Somerset, Massachusetts); and
- Portions of the Project within Federal Waters (including portions of the Falmouth and Brayton Point ECCs and the Lease Area) which may have reasonably foreseeable coastal effects on any land or water use or natural resource of the Massachusetts regulated coastal resources.

2.1 Project Timeline

The Project is currently in the planning and engineering design stages. For more details on the Project timeline please see the COP Section 3.2 – Proposed Project Schedule. The Project will be operational for approximately 30 years, after which time the Project will be decommissioned as per requirements in 30 CFR 585.906-910. Over the 30-year lifespan of the Project, there will be ongoing remote monitoring and maintenance of the offshore and onshore Project facilities.

2.2 Project Overview

The Mayflower Wind Project includes a Lease Area located south of Martha's Vineyard and Nantucket (Figure 1). Wind turbine generators (WTGs) constructed within the Lease Area will deliver power via inter-array cables to the offshore substation platform(s) (OSPs). The WTG/OSP positions have been established based on a 1 x 1 nautical mile (nm) (1.9 x 1.9 kilometer [km]) grid oriented along the cardinal directions to maintain a uniform spacing of WTGs across all the lease areas within the Massachusetts/Rhode Island Wind Energy Area. Submarine offshore export cable(s) will be installed within offshore ECCs to carry the electricity from the OSPs within the Lease Area in federal waters to the onshore transmission systems via two different ECCs. One ECC will make landfall in Falmouth, Massachusetts and the other will make landfall at Brayton Point, in Somerset, Massachusetts. The proposed Falmouth ECC will extend from the Lease Area and enter Massachusetts state waters south of Nantucket Island and Martha's Vineyard, and pass through Muskeget Channel into Nantucket Sound, remaining in Massachusetts state waters. The offshore export cables will make landfall via HDD. Potential landing location(s) for the Falmouth ECC include Worcester Avenue (preferred), Shore Street, or Central Park in Falmouth, Massachusetts. The proposed Brayton Point ECC will run north and west from the Lease Area through Rhode Island Sound up the Sakonnet River and across land at Aquidneck Island to Mount Hope Bay, and then north into Massachusetts state waters to Brayton Point. Landfall will be made via HDD at one of two potential landing locations in Somerset on the western side of Brayton Point from the Lee River (preferred) or the eastern side from the Taunton River (alternate).

In Falmouth, the underground onshore export cables will extend from the selected landfall location(s) to an onshore substation and will be installed within existing paved roadways and/or shoulder and within other municipally-owned land (Figure 5). The new onshore substation will transform the voltage to 345 kilovolts (kV) to enable connection to either an overhead transmission line (preferred) or an underground transmission route (alternate). The selected landfall location will determine the route of the underground onshore export cables between the landfall and the new onshore substation. The planned Falmouth POI to the regional transmission system will be near the existing interconnecting transmission owner substation (Falmouth Tap),

as determined based on ISO-NE's Cape Cod cluster interconnection process.[9] The preliminary Cluster Study 1 results indicate that the interconnecting transmission owner will be responsible for installing a 345 kV transmission loop from Bourne to Falmouth to West Barnstable and a new 345 kV substation. Mayflower Wind also anticipates that a transmission line between a new Mayflower Wind substation and the Falmouth POI will be sited, designed, and permitted by the interconnecting transmission owner within the existing utility right-of-way (ROW). The alternate underground transmission route would be constructed within local roadway and/or shoulder extending from the onshore substation to the POI at or near Falmouth Tap (Figure 5).

At Brayton Point (Figure 6), the onshore underground export cables will traverse the site from the landing to the location of a new HVDC converter station (converter station). Underground transmission cables will be constructed from the converter station to the Brayton Point POI, the adjacent existing National Grid substation.

The Falmouth Onshore Project Area includes the landing(s), underground onshore export cables, onshore substation, alternate underground transmission route, and POI at the Falmouth Tap switching station. The Brayton Point Onshore Project Area includes the onshore export cable route options over Aquidneck Island, landings at Aquidneck Island and Brayton Point, the underground onshore export cables, HVDC converter station, underground transmission route, and the POI at the National Grid substation. See Figure 5 and Figure 6 for the Falmouth Onshore Project Area and the Brayton Point Onshore Project Area respectively. The Offshore Project Area includes the Lease Area, Falmouth and Brayton Point ECCs, and the HDD sea-to-shore transitions to the landfall locations (Figure 2, Figure 3, and Figure 4).

2.3 Specific Project Details

Each primary Project component is briefly described below in Table 2-1. Additional details may be found in the COP Section 3.0 – Description of Proposed Activities.

[9] On October 21, 2020, ISO-NE initiated the First Cape Cod Resource Integration Study (Cluster Study 1). A final report, First Cape Cod Resource Integration Study, was issued by ISO-NE on July 30, 2021. Redacted Non-CEII Version Available at URL: https://www.iso-ne.com/static-assets/documents/2021/07/cape-cod-resource-integration-study-report-non-ceii-final.pdf

Table 2-1. Key Project Details

Project Attribute	Description
Lease Area Size	127,388 acres (51,552 hectares [ha])
Layout and Project Size	Up to 149 WTG/OSP positions Up to 147 WTGs Up to 5 OSPs Combined number of OSPs and WTGs not to exceed 149
WTGs	Rotor diameter: 721.7 – 918.6 ft (220.0 – 280.0 m) Blade length of 351.0 – 452.8 ft (107.0 – 138.0 m) Hub height above Mean Lower Low Water: 418.7 – 605.1 ft (127.6 – 184.4 m)
OSP(s)	Top of topside height above Mean Lower Low Water: 160.8 – 344.5 ft (49.0 – 105.0 m)
WTG/OSP Substructures	Monopile, piled jacket, suction-bucket jacket, and/or gravity-based structure Seabed penetration: 0 – 295.3 ft (0 – 90.0 m) Scour protection for up to all positions
Inter-Array Cables	Nominal inter-array cable voltage: 60 kV to 72.5 kV Length of inter-array cables beneath seafloor: 124.3 – 497.1 miles (mi) (200 – 800 km) Target burial depth (below level seabed): 3.2 – 8.2 ft (1 – 2.5 m)
Landfall Locations	Falmouth, MA Three locations under consideration: Worcester Avenue (preferred), Central Park, and Shore Street Brayton Point, Somerset, MA Two locations under consideration: the western (preferred) and eastern (alternate) shorelines of Brayton Point
Offshore Export Cables	Falmouth ECC Anticipated Cable Type: high voltage alternating current (HVAC) Number of export cables: up to 5 Nominal export cable voltage: up to 345 kV Corridor width: up to 3,208.8 ft (1,000 m) (may be locally narrower or wider in sensitive or constrained areas, including landfalls) Length per export cable beneath seabed: 51.6 – 87.0 mi (83 – 140 km) Cable crossings: up to 9 Target burial depth (below level seabed): 3.2 – 13.1 ft (1 – 4 m) Brayton Point ECC Cable Type: HVDC Number of export cables: up to 6 Up to 4 export power cables and up to 2 communication cables (to be installed in 1-2 cable bundles, where practicable) Nominal export cable voltage: ±320 kV Corridor width: up to 2,300 ft (700 m) (may be locally narrower or wider in sensitive or constrained areas, including landfalls) Length per export cable beneath seabed: 97 – 124 mi (156 – 200 km) Cable/pipeline crossings: up to 16 (total) Target burial depth (below level seabed): 3.2 – 13.1 ft (1 – 4 m)

Project Attribute	Description
Onshore Export Cables	Falmouth, MA HVAC (anticipated); Nominal underground onshore export cable voltage: up to 345 kV Up to 12 onshore export power cables and up to five communications cables Length: Up to 6.4 mi (10.3 km) Brayton Point, Somerset, MA HVDC; Nominal underground onshore export cable voltage: ±320 kV Up to 4 export power cables and up to 2 communications cables Length: Up to 3,940 ft (1,200 m) on Brayton Point
Onshore Substation/HVDC Converter Station	Falmouth, MA Type: Transform to 345 kV; Air-insulated substation or gas-insulated substation onshore substation Location: Two locations under consideration: Lawrence Lynch (preferred), and Cape Cod Aggregates (alternate) Area: Up to 26 acres (10.5 ha) Brayton Point, Somerset, MA Type: HVDC Converter Station Location: On the Brayton Point property area under consideration Area: Up to 7.5 acres (3.0 ha)
Transmission from Onshore Substation/HVDC Converter Station to the POI	Falmouth, MA New, 345 kV transmission line along existing utility ROW (preferred) (to be designed, permitted, and built by utility operator) Up to 5.1 mi (8.2 km) in length New, 345 kV underground transmission route within roadway layout (alternate) Up to 2.1 mi (3.4 km) in length Brayton Point, Somerset, MA New 345 kV underground transmission route to Brayton Point POI HVAC; nominal underground transmission cable voltage: up to 345 kV Up to 0.5 mi (0.8 km) on Brayton Point property
POI	Falmouth, MA Falmouth Tap (new or upgraded switching station to be designed, permitted, and built by interconnecting transmission owner) Brayton Point, Somerset, MA Existing National Grid substation

2.4 Alternatives Considered

Mayflower Wind has considered numerous alternatives for various Project elements associated with the offshore and onshore Project development. COP Section 2.0 – Project Siting and Design Development provides a discussion of alternatives considered. Alternatives relevant to the CZMA consistency determination are summarized below.

2.4.1 Lease Area Facilities

The Lease Area will include WTGs, OSPs, WTG/OSP substructures, and inter-array cables. As discussed below, considerations related to the Lease Area's depth, sea floor conditions, protected areas, and applicable

regulations, provide clarity to site-specific technologies and processes Mayflower Wind can reasonably utilize within the Project Area. Mayflower Wind also considered commercial and technical availability in evaluating Project components.

2.4.1.1 Wind Turbine Generators

Mayflower Wind is selecting WTGs based on available technology and feasibility for the proposed Project. The WTGs initially considered varied based on the size of the rotor diameter. There are tradeoffs for selecting WTG models; most notably, WTGs with larger rotor diameters will yield more power, but involve larger foundations to accommodate their size. Advancing WTG technology will lead to more efficient WTGs (with larger rotor diameters) to be available on the market prior to construction. As WTG technology advances, Mayflower Wind will select larger WTGs, such as those with rotor diameters up to 919 ft (280 m).

2.4.1.2 Site Layout

Site layout for an offshore wind project depends on a variety of factors, including sea floor conditions and navigation safety. Obstructions, sea floor slope, shipwrecks, shoal features, and seabed conditions will impact the placement of WTGs, OSPs, inter-array cables, and offshore export cables for the Project layout. Layouts must also include multiple options because some pre-planned WTG or OSP locations may be deemed unusable as additional site characterization information is collected.

Mayflower Wind worked with the United States Coast Guard (USCG), BOEM, the other MA/RI WEA leaseholders, and other regulators and stakeholders to develop an aligned 1 nm x 1 nm (1.9 km x 1.9 km) grid for WTG/OSPs layouts across all MA/RI WEA leases. This collaborative layout provides both uniform spacing and 1 nm wide corridors in both the north-south and east-west orientations (Equinor Wind US, Eversource Energy, Mayflower Wind, Orsted North America, and Vineyard Wind LLC, 2019) across all of the MA/RI WEA lease areas. Figure 1 illustrates the grid spacing for the Mayflower Wind Lease Area consistent with the above described spacing.

Additional transit lanes beyond the ample sea space provided in the predictable and measured 1 nm x 1 nm (1.9 km x 1.9 km) grid would unquestionably hinder, and in cases like Mayflower Wind, decimate the delivery of contracted electricity supply to the market and put New England's energy security at risk.

Less clean energy would be produced in the region if numerous, wide, transit lanes were established through the lease areas. Notably, the capacity within the MA/RI WEA would be reduced by approximately 3,300 MW, which is 500 MW less than current state demand for offshore wind from the MA/RI WEA. Through the Vineyard Wind NEPA process, BOEM acknowledged that the Responsible Offshore Development Alliance (RODA) transit lane alternative (Alternative F), "could further erode project economics and viability," (Mayflower Wind, 2020)[10]. If the RODA transit lanes were imposed, Mayflower Wind would specifically lose 38 WTG/OSP positions under the 2 nm wide transit lane layout and 68 WTG/OSP positions under the 4-nm-wide transit lane layout.

Mayflower Wind also considered optimized site layout plans. One layout would place OSP(s) in aligned rows or columns, but not on the 1 nm x 1 nm (1.9 km x 1.9 km) grid. Another considered optimized site layout was a grid with less than a 1 nm x 1 nm (1.9 km x 1.9 km) spacing between structures. These layouts were not selected for two primary reasons: (1) the USCG concluded that a standard and uniform grid layout maximizes safe navigation, and (2) collaboration among MA/RI WEA leaseholders concerning uniform layout and consistent lighting and marking of structures is paramount to assuring safe navigation.

2.4.1.3 Substructures

Selecting the appropriate substructures for a project requires careful consideration of conditions present at the site and the construction feasibility of considered designs.

[10] Mayflower Wind. (2020). RE: Vineyard Wind 1 COP Supplement to the Draft EIS Docket No. BOEM-2020-0005. https://www.regulations.gov/document?D=BOEM-2020-0005-13019

Floating foundation systems inherently have significantly different considerations when compared to the fixed bottom structures. Since the majority of the Lease Area resides in waters shallower than 196.8 ft (60.0 m), fixed bottom has been identified as the preferred solution. Mayflower Wind has selected four viable substructure options to potentially be used in the proposed Project. These include:

- Monopiles
- Piled jackets
- Suction-bucket jackets, and
- Gravity-based substructures

The final selection will be based on water depths and geotechnical conditions.

2.4.1.4 Offshore Substation Platforms

The OSP is where Project-generated power is transformed from the inter-array cable voltage to the offshore export cable voltage. OSPs require a robust design and can include multiple decks for equipment. Mayflower Wind originally considered a large range of platform sizes, number of OSPs, pile depths, and scour protection options. Initial designs were filtered down based on conservative assumptions for environmental impacts and front-end engineering to rule out infeasible, unsafe, or overly impactful options.

The proposed Project will include the following designs:

- Modular OSP,
- Integrated OSP, and
- DC Converter OSP

2.4.1.5 Inter-Array Cables

Submarine inter-array cables will connect the WTGs to the OSPs. Mayflower Wind will consider multiple inter-array cable layouts within the Lease Area and attempt to optimize the proposed Project by minimizing cable lengths and maximizing efficiency and reliability. Thus, only indicative layouts have been selected at this time.

Considerations for inter-array cables may include offshore physical hazards and economic or recreational use areas. Physical hazards may include shipwrecks, unexploded ordnance (UXO), other existing cables, and sea floor and subsurface obstructions. Economic or recreational uses may include commercial or recreational fishing, recreational boating and tourism, and anchoring.

2.4.2 Offshore Export Cable Routing

The proposed Project considered five export cable corridors from the Lease Area to Falmouth, Massachusetts, and three export cable corridors from the Lease Area to Brayton Point.

Numerous technical and environmental considerations and constraints have factored into determining the location of the ECCs, including:

- Water depths greater than 20 ft (6.1 m) are most suitable for accommodating the cable laying vessels that are likely to be utilized for the Project, and are preferable along the majority of the offshore corridors;
- Minimizing cable length is critical for reducing transmission losses and avoiding higher costs;
- The corridors should consider the presence of other existing offshore cables and/or pipelines, or intended location of planned future cables and/or pipelines, in order to mitigate (if possible) or carefully manage the risks associated with installing and maintaining cables in proximity to other infrastructure;

- The routes should be perpendicular, or nearly perpendicular, to any large seabed slopes, and likewise across any existing offshore cables and/or pipelines (or planned future offshore cables and/or pipelines);
- The corridors should avoid or minimize impacts to SSU natural resource areas, including North Atlantic Right Whale Habitat, hard/complex bottom, and eelgrass;
- The corridors should avoid mobile seabeds which may pose a threat of altering the cable burial depth which could risk exposing the cables to potential harm from an insufficient cable burial depth, without specific mitigation (i.e., burial to a depth to account for the mobility of the overlying sediments to avoid uncovering); and
- Anchorage areas and areas with mapped shipwrecks and boulders are to be avoided or minimized.

2.4.2.1 Falmouth Export Cable Routing

Geologic and sea floor conditions existing within the Offshore Project Area influenced the siting and selection of the Falmouth ECC. Hard or complex seabed conditions, steep slopes, ledges, extensive shallow water areas, as well as mobile seabeds will be avoided to the extent practicable in the selection of the preferred corridor and installation locations within the corridor. The results from the 2020 geophysical and geotechnical (G&G) survey as well as results of a benthic survey program were used to evaluate the offshore route segments associated with the Falmouth POI. In 2021, additional G&G and benthic surveys were conducted along the selected, western, ECC. In addition, available state mapping data were considered in the evaluation of the ECCs including: Massachusetts OMP Areas of Concern, Areas to Avoid, and Preliminary Transmission Cable Routes (Figure 7 and Figure 8); Sensitive Uses and Hard and Complex Seabed (Figure 10); Shellfish Suitability (Figure 12); and Shellfish Suitability and Eelgrass near the sea-to-shore transition (Figure 14) and regulated wetland resources for alternate landing locations (Figure 15, Figure 16, and Figure 17).

Mayflower Wind intends to maintain an ECC width between approximately 2,625 ft (800.0 m) and 3,281 ft (1,000.0 m) for the Falmouth ECC to allow for maneuverability during installation and maintenance. The ECC may be locally narrower or wider to accommodate sensitive locations, to provide sufficient area for anchoring, and/or at anticipated cable crossing locations.

Numerous ECCs were considered in Project development, including five for the Falmouth POI. Two of the five ECC options were eliminated; the first, which closely paralleled the western option, was de-selected because of its similarity to selected corridors, and the second, which routed much farther to the east, was de-selected because of a high level of technical risk because of challenging seabed conditions (i.e., high sediment mobility, very shallow bathymetry, and high seabed slopes), especially near Muskeget Island and Nantucket. Three ECC options were retained for further assessment, including eastern, western, and central export cable corridor options through Muskeget Channel are described below and illustrated in Figure 3. All three of the retained ECC options are co-located for a large portion of the total ECC length, differing only in route through Muskeget Channel.

Based on the analysis of the Falmouth ECC options, the western option was the selected route corridor for reaching the potential landfall location(s) because it will minimize technical risks and minimizes cumulative impacts to sensitive/protected habitats of the Mayflower Wind and Vineyard Wind projects. Specific advantages of the western ECC include:

- Fewer areas of high risk related to extremely shallow water depths than the other options.
- Greater length of ECC proximate to or co-located with the Vineyard Wind cables, which may reduce the cumulative impact area of both projects.
- Shortest of the three options assessed.

Western Offshore Export Cable Corridor

The western option diverges from the original common ECC from the Lease Area approximately 8 km south of the entrance to Muskeget Channel within federal waters. This ECC is located the farthest westward within Muskeget Channel, closest to Martha's Vineyard. The western ECC rejoins the common ECC north of the exit from Muskeget Channel. A portion of the western option is partially co-located in parallel with a planned

export cable corridor for Vineyard Wind OCS-A-0501 and New England Wind OCS-A 0534 Lease Area developments, which would provide the benefit of reducing the cumulative impact area of both projects. The western ECC is expected to cross the Vineyard Wind project export cable corridor south of Muskeget Channel. Up to six separate cables may be crossed depending on installation timing and as-installed locations of each respective project.

The western option through Muskeget Channel has been selected as the preferred offshore ECC route.

Central Offshore Export Cable Corridor

The central and eastern ECC options share a common ECC entering Muskeget Channel, and rejoin prior to exiting the Channel. The central option is located in between the eastern and western options within Muskeget channel, east of the western ECC and Martha's Vineyard. The central ECC enters Muskeget Channel close to Nantucket, and then turns westward before turning north passing through the central portion of Muskeget Channel. The central option reenters federal waters, after passing through Muskeget Channel within Nantucket Sound.

A small portion of the central ECC option is partially co-located in parallel with a planned export cable corridor for Vineyard Wind OCS-A-0501 and New England Wind OCS-A 0534 Lease Area developments. The common central-eastern ECC is expected to cross the Vineyard Wind project export cable corridor north of Muskeget Channel. Up to six separate cables may be crossed depending on installation timing and as-installed locations of each respective project.

The central corridor was de-selected in order to avoid confliction with other proposed offshore wind projects and because of challenging seabed conditions within Muskeget Channel that were identified during reconnaissance and site characterization surveys completed in 2020. The resulting level of technical risk was too high to carry these corridors through for the PDE.

Eastern Offshore Export Cable Corridor

The eastern ECC option includes a short segment located to the east of the central option within Muskeget Channel, farther eastward from Martha's Vineyard and closer to Nantucket. The eastern option continues north from the common ECC it shares with central option through Muskeget Channel, at a point where the central route diverges to the west before a turn northward through the Muskeget Channel. This deviation from the central route results in a slightly shorter total ECC length compared to the central option.

The eastern option generally avoids overlap with a planned ECC for Vineyard Wind OCS-A-0501 and New England Wind OCS-A 0534 Lease Area developments, except at the necessary cable crossing locations. The common central-eastern ECC is expected to cross the Vineyard Wind project export cable corridor north of Muskeget Channel. Up to six separate cables may be crossed, depending on installation timing and as-installed locations of each respective project.

The eastern corridor was de-selected in order to avoid confliction with other proposed offshore wind projects and because of challenging seabed conditions within Muskeget Channel that were identified during reconnaissance and site characterization surveys completed in 2020. The resulting level of technical risk was too high to carry these corridors through for the PDE.

2.4.2.2 Brayton Point Export Cable Routing

Geologic and seafloor conditions existing within the Offshore Project Area greatly influenced the export cable corridors from the OSPs within the Lease Area to the landfall location(s). Mayflower Wind will avoid hard bottom and complex steep slopes, ledges, extensive shallow water areas, as well as mobile seabeds to the extent practicable. The G&G, benthic, and marine archaeological surveys completed in 2021 will further inform cable routing within the Brayton Point ECC. In addition, available state mapping data were considered in the evaluation of the ECC.

Figure 8 illustrates the Massachusetts OMP Areas of Concern and Areas to Avoid in the vicinity of the Brayton Point ECC within Massachusetts waters and a small, mapped area within federal waters. The Brayton Point ECC, including both preferred and alternate landing approaches, is located within mapped Areas to Avoid within the Massachusetts Coastal Zone (Figure 9). The mapped Areas to Avoid represent areas with rock

substrate and/or shallow water depth (i.e., less than 16 ft [4.9 m]) which are prevalent within Mount Hope Bay and near the mouths of the Lee and Taunton Rivers. For interconnection at the Brayton Point POI, complete avoidance of these mapped areas is not possible.

The OMP mapping does not provide mapped hard or complex seabed conditions within this area of the Massachusetts Coastal Zone, which fall outside of the OMP boundary. However, mapping of surface sediments does show the presence of rock and gravel substrates that could contain hard or complex seabed conditions (Figure 11). Both Brayton Point ECC landing approaches traverse mapped Shellfish Suitability areas (Figure 13); however, HDD installation may avoid or minimize impact to these areas. As noted above, no seagrass beds have been mapped within the Brayton Point ECC. Figure 18 illustrates Massachusetts regulated wetland resources in the vicinity of the Brayton Point alternate landings. Impacts to regulated wetlands will be avoided with HDD installation for the sea-to-shore transition.

Three alternate ECCs were considered for the Brayton Point POI as described in COP Section 2.1.6 and illustrated in COP Figure 2-2. However, all of the alternate routes use the same corridor within the Massachusetts Coastal Zone. Therefore, these alternates are not addressed further for this CZM Certification.

2.4.3 Alternate Landfall Location(s)

Numerous landfall locations have been considered for the Mayflower Wind project.

2.4.3.1 Falmouth Landfall Location(s)

There are three landfall points being considered in the town of Falmouth (Figure 5). These landfall locations include:

1. Shore Street at its intersection with Surf Drive (Figure 15);
2. Central Park north of Grand Street (Figure 16); and
3. Worcester Avenue near its intersection with Grand Avenue (in Worcester Park) (Figure 17).

The estimated locations of sensitive coastal habitats in the nearshore areas of the three Falmouth landfall locations under consideration are shown in Figure 15 through Figure 17. The Worcester Avenue landfall location in Falmouth, MA, near the intersection of Worcester Avenue with Grand Avenue (in Worcester Park), is the preferred landfall as the area is protected by a short seawall, a broad beach, and Grand Avenue. The main appeal of this location is the municipally-owned Worcester Park that runs between the two lanes of Worcester Avenue and is surrounded by businesses and residences on either side. This area has only a slight elevation making it a prime candidate for an HDD landfall as well as being unlikely to be impacted by a typical storm event. Stakeholder engagement will be critical at this location as the area is home to a popular road race as well as hotels and inns. There are no known existing submarine cables that make landfall at Worcester Avenue and this landfall would avoid the need to cross any of the existing submarine cables between Martha's Vineyard and Falmouth. The landscaped area in Worcester Park would require re-landscaping after installation of the HDDs, transition joint bays (TJBs), and first set of splice vaults located at the northern end of the route in the park. The remaining cable installation within the park will have a smaller limit of disturbance and will not require intensive repair and re-landscaping following the installation of the onshore export cables (Figure 17).

Selection of the preferred landfall location, as well as the HDD landfall installation method, were important considerations in preventing impacts to coastal areas. All locations were evaluated for their potential effects on coastal and nearshore environments including coastal, beaches, and coastal dunes (Figure 15, Figure 16, and Figure 17). Using an HDD landfall method will prevent or avoid excessive impacts to nearshore resources such as submerged aquatic vegetation (SAV) and eelgrass beds that would be otherwise impacted with an open trench installation (Figure 14). This method will also reduce impacts to public access to coastal areas as the installation will take place beneath the coastal beach and intertidal area at Falmouth Heights Beach.

Another factor considered in the selection of the preferred landfall location is its effect on the onshore route. The landfall point will be the beginning of the onshore transmission route in Falmouth and the preferred

landfall location at the intersection of Worcester Avenue and Grand Avenue will ensure that the cable route will be able to be located within and beneath existing roadways to the substation facility. This will limit disturbances to natural areas along the Project onshore route.

2.4.3.2 Brayton Point Landfall Location(s)

Alternate landfall locations for evaluation are first identified based on the intended POI and seek to minimize the distance from the offshore OSPs to the POI. For the Brayton Point POI, Mayflower Wind has identified two alternate landfall points in the town of Somerset at Brayton Point (Figure 6). These landfall locations include:

1. Western shoreline of Brayton Point via the Lee River (preferred)
2. Eastern shoreline of Brayton Point via the Taunton River (alternate)

Selection of the preferred landfall location, as well as the HDD landfall installation method, were important considerations in preventing impacts to coastal areas. All locations were evaluated for their potential effects on coastal and nearshore environments including coastal, beaches, coastal dunes, eelgrass, and other submerged aquatic vegetation (SAV) (Figure 18). Both landfall locations avoid impacts to coastal resources. Coastal beach and bluffs are located adjacent to the preferred western landfall, and a coastal marsh and barrier beach system is located north and east of the alternate landing (Figure 18). No SAV or eelgrass beds have been mapped by MassDEP in the landfall areas at Brayton Point (see COP Appendix K, Seagrass and Macroalgae Characterization Report). Mayflower Wind has elected to use HDD for the sea-to-shore transition at Brayton Point to prevent impacts to nearshore resources that would be otherwise impacted with an open trench installation. As is best practice prior to any HDD operation, Mayflower Wind plans to obtain detailed site-specific geotechnical data at the landfall location(s) and near the HDD trajectory as part of the detailed design and engineering process.

2.4.4 Potential Onshore Substation/HVDC Converter Station Locations

Several potential onshore substation/converter station locations have been evaluated.

2.4.4.1 Falmouth Potential Onshore Substation Locations

The two locations being examined are in close proximity to the POI (Falmouth Tap) determined preliminarily by ISO-NE. The final location of the onshore substation will determine the ultimate lengths of the underground onshore export cables and alternate underground transmission route. The current preferred site for the onshore substation is the Lawrence Lynch site. This site consists predominantly of disturbed land (Figure 5). Cape Cod Aggregates is also largely disturbed bare land with low vegetations along the margins (Figure 5). For more information on potential substation locations, please see COP Section 3.3 – Project Components and Project Stages and COP Section 12.0 Zoning and Land Use (see Figures 12-13 and 12-14).

2.4.4.2 Brayton Point Onshore HVDC Converter Station Location

The converter station will be located within the Brayton Point property. As shown in Figure 6, Mayflower Wind expects to locate the converter station within the northern portion of the Brayton Point site, in an area extending from the location of the former cooling towers to the northern property boundary. For more information, please see COP Section 3.3 – Project Components and Project Stages.

2.4.5 Onshore Export Cable Routing

Mayflower Wind evaluated a number of onshore export cable routes between the landing location options and the preferred and alternate substation locations. The ultimate landfall selection will determine the route of the underground onshore export cables between the landfall and the new onshore substation.

2.4.5.1 Falmouth Onshore Export Cable Routing

The preferred and several alternate routes under consideration are shown in Figure 5. Underground onshore export cables will primarily be installed within roadways and/or the roadway layout. The exception to this is a 0.4 mi (0.6 km) segment of the underground route that would be constructed within a grassy media strip known as Worcester Park, prior to joining Worcester Court. Mayflower Wind expects that tree clearing can be largely avoided, however, there may be a few tree removals required to accommodate this installation. The disturbed park areas would be restored after construction.

2.4.6 Transmission Alternatives

Potential transmission alternatives have been assessed for the Mayflower Wind Project.

2.4.6.1 Falmouth Transmission Alternatives

The preferred interconnection transmission, an overhead transmission circuit line would be designed, permitted and constructed within the existing utility ROW by the transmission system owner, Eversource, and will extend approximately 5 mi (8 km) from the preferred substation location (Lawrence Lynch) to the Falmouth Tap POI.

The alternate underground transmission route would be built by Mayflower Wind within the paved roadway or shoulder of several local Falmouth roads (Thomas B Landers Road, Geggatt Road and Turner Road) (Figure 5). The cables would be installed within duct banks in a covered trench starting at the substation and terminating at the POI (Falmouth Tap).

2.4.6.2 Brayton Point Transmission Alternatives

A new 345-kV underground transmission line will connect the converter station to the Brayton Point POI, both located within the Brayton Point property. Because both are located within the same property, other transmission alternatives were not considered.

2.5 Affected Environment

2.5.1 Surveys and Desktop Assessments

Mayflower Wind has conducted and is conducting terrestrial and marine surveys as well as desktop studies to determine the potentially affected resources within the Offshore and Onshore Project Areas.

Marine surveys have included benthic sea floor habitat field studies along the offshore export cable corridors and Lease Area and an eelgrass survey at the landfall locations. In addition to field surveys, a number of desktop studies (shellfish, Essential Fish Habitat) have also been completed to further characterize sensitive resources in the Offshore Project Area. These surveys and studies were used to evaluate and select a preferred Falmouth export cable corridor which is feasible and minimizes impacts to sensitive resources.

Terrestrial surveys will include wetland delineations for both federal- and state-regulated wetlands, waterways, and waterbodies. Resource area delineations will also include coastal wetland resource areas including State Wetlands Protection Act-regulated Land Under the Ocean, Coastal Beach, Coastal Dune, Coastal Bank, and Land Subject to Coastal Storm Flowage. Inland resource area delineations will include areas of Bank, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways, Land Subject to Flooding, Riverfront Areas, and Vernal Pools. Mayflower Wind completed a desktop analysis of the onshore Project activities on Terrestrial Vegetation and Wildlife, including wetlands (see COP Appendix J, Terrestrial Vegetation and Wildlife Assessment).

Terrestrial areas affected by the Project primarily consist of previously disturbed and/or developed areas within the coastal zone. An effort was made by Mayflower Wind to concentrate on the installation of the underground onshore export cables or alternate underground transmission route within pre-disturbed areas, including existing roadways.

2.5.2 Characterization of Affected Environment

The Mayflower Wind COP provides a detailed characterization of the affected onshore and offshore environment. The following provides a cross reference to relevant COP sections where such information can be found.

- COP Section 5.1.1 – Air Quality
- COP Section 5.2.1 – Water Quality
- COP Section 6.1.1 – Coastal and Marine Birds
- COP Section 6.2.1 – Bats
- COP Section 6.3.1 – Terrestrial Vegetation and Wildlife
- COP Section 6.4.1 – Wetlands and Waterbodies
- COP Section 6.5.1– Coastal Habitats
- COP Section 6.6.1 – Benthic and Shellfish
- COP Section 6.7.1 – Finfish and Invertebrates
- COP Section 6.8.1 – Marine Mammals
- COP Section 6.9.1 – Sea Turtles
- COP Section 7.1.1 – Marine Archaeology
- COP Section 7.2.1 – Terrestrial Archaeology
- COP Section 7.3.1 – Above-Ground Historic Properties
- COP Section 8.1 – Visual Resources
- COP Section 9.1.3 – In-Air Acoustics
- COP Section 9.2.1 – Underwater Acoustic Environment
- COP Section 10.1.1 – Demographics, Employment, and Economics
- COP Section 10.2.1 – Environmental Justice and Minority and Lower Income Groups
- COP Section 10.3.1 – Recreation and Tourism
- COP Section 11.1 – Commercial and Recreational Fisheries and Fishing Activity
- COP Section 12.1 – Zoning and Land Use
- COP Section 13.1 – Navigation and Vessel Traffic
- COP Section 14.1 – Other Marine Uses
- COP Section 15.1 – Public Health and Safety

2.6 Potential Project Impacts

Potential Project-related impacts to coastal areas of Massachusetts may be caused by the installation of WTGs, the installation of OSPs, the installation of the offshore export cables as well as landfall of the export cables, installation of the underground onshore export cables, or underground transmission route, and the onshore substation/converter station facilities. A discussion of Project-related impacts can be found in the COP within the sections identified below:

- COP Section 5.1.6 – Air Quality
- COP Section 5.2.3 – Water Quality

- COP Section 6.1.2 – Coastal and Marine Birds
- COP Section 6.2.2 – Bats
- COP Section 6.3.2 – Terrestrial Vegetation and Wildlife
- COP Section 6.4.2 – Wetlands and Waterbodies
- COP Section 6.5.2 – Coastal Habitats
- COP Section 6.6.2 – Benthic and Shellfish
- COP Section 6.7.4 – Finfish and Invertebrates
- COP Section 6.8.2 – Marine Mammals
- COP Section 6.9.2 – Sea Turtles
- COP Section 7.1.2 – Marine Archaeology
- COP Section 7.2.2 – Terrestrial Archaeology
- COP Section 7.3.2 – Above-Ground Historic Properties
- COP Section 8.2 – Visual Resources
- COP Section 9.1.4 – In-Air Acoustics
- COP Section 9.2.5 – Underwater Acoustic Environment
- COP Section 10.1.2 – Demographics, Employment, and Economics
- COP Section 10.2.2 – Environmental Justice and Minority and Lower Income Groups
- COP Section 10.3.2 – Recreation and Tourism
- COP Section 11.2 – Commercial and Recreational Fisheries and Fishing Activity
- COP Section 12.2 – Zoning and Land Use
- COP Section 13.2 – Navigation and Vessel Traffic
- COP Section 14.2 – Other Marine Uses
- COP Section 15.2 – Public Health and Safety

Portions of the Project that will have the most potential for coastal impacts to the Commonwealth of Massachusetts will be the routing and burial of the offshore export cables as well as landfall of the offshore export cables.

2.7 Avoidance, Minimization, and Mitigation Measures

Through design and planning, construction-related impacts to the coastal environment will be minimized to the greatest extent practicable. Many of the remaining Project-related impacts will be isolated or temporary in nature. Temporary impacts to the coastal and nearshore area will include the installation of the export cables as well as facilities at the landfall locations. The COP provides additional details on avoidance, minimization, and mitigation measures for specific resources. They are summarized in COP Section 16.0 – Summary of Avoidance, Minimization, and Mitigation Measures of Potential Impacts (COP Table 16-1).

3.0 Massachusetts Coastal Program Policies

Table 3-1 details the specific enforceable policies of the Commonwealth of Massachusetts that relate to the Project, as well as provides a detailed analysis and description of how the Project, as proposed, is fully consistent with each of these policies and their underlying authorities. The enforceable policies and guidelines are found in the CZM Policy Guide published October 2011. Enforceable policies will be discussed, and therefore, growth management policies, which contain no enforceable policies, are omitted. The Legal Authority for these enforceable policies is detailed in Appendix 3 – Coastal Program Legal Authorities to the policy guide.

Table 3-1. Enforceable Policies of the CZM

Policy #	Policy Requirement	Mayflower Wind Response	COP Section Reference
Coastal Hazards			
Coastal Hazard Policy #1 (Enforceable)	Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes, and land under the ocean. (CZM, 2011 pp 19-25)	This policy protects natural areas of the Massachusetts coastline that serve valuable functions as flood and storm control features. Mayflower Wind will comply with this policy by utilizing construction techniques and placing the export cable landfall in an area where these natural ecosystem functions and landforms will not be altered. Offshore: Installation of the export cables in nearshore and offshore areas will affect Land Under the Ocean as defined in the Massachusetts Wetlands Protection Act (WPA; Massachusetts General Laws [M.G.L.] Chapter 131 Section 40) and implementing regulations (310 CMR 10.00). The minor changes to the seabed associated with the burial of the cables are not anticipated to significantly affect the storm damage prevention and flood control functions of Land Under the Ocean, nor is the more significant dredging that may be required in areas of highly mobile sediments as these areas are already subject to frequent and significant natural seabed disturbances from storms. Landfall: To avoid impacts to nearshore areas and other coastal landforms, Mayflower Wind will utilize an HDD method for all cable landfalls, which is a trenchless installation method that will allow the Project to avoid directly impacting sensitive coastline areas (see Massachusetts Department of Environmental Protection (DEP) wetlands in Figure 15 through Figure 18). The Falmouth and Brayton Point landing locations avoid mapped coastal resources. An HDD landfall method would allow for the export cables to make landfall through a horizontal tunnel bored several meters underneath these nearshore areas and coastline features. The horizontal tunnel boring will be completed by a drill rig set up on shore within previously disturbed land. For the Falmouth ECC, the drill will exit on the seafloor in Nantucket Sound several thousand feet from shore, where the direct burial of the export cables through State waters would end and the cables would be pulled to shore through the HDD borehole. For the Brayton Point ECC, the drill will exit on the seafloor in either the Lee River (preferred) or Taunton River (alternate) approximately 1,640 ft (500 m) from shore, where the direct burial of the export cables through State waters would end and the cables would be pulled to shore through the HDD borehole. Onshore: The preferred landing location for the Falmouth ECC will make landfall within a developed area near the intersection of Worcester Avenue and Grand Avenue within Worcester Park. This location was chosen for the export cable landfall because it contains a seawall, a major secondary roadway and an open grassy area between lanes of Worcester Avenue (see Figure 17). Choosing this location will control or eliminate the damage to coastal areas that assist in flood control and storm damage prevention. If the preferred landfall location is used, there will be no impacts to Coastal Dune, Coastal Beach, or Coastal Bank, as defined in the Massachusetts WPA. The preferred landing location for the Brayton Point ECC will make landfall from the Lee River within a developed area on the western shoreline of Brayton Point. This location was chosen for the export cable landfall because it contains a highly developed land area and close proximity to the converter station site and POI at the existing National Grid substation (Figure 6). Choosing this location will control or eliminate the damage to coastal areas that assist in flood control and storm damage prevention. The Project will avoid impacts to coastal landforms, including Coastal Beach, and Coastal Bank, as defined in the Massachusetts WPA (Figure 18). Following completion of onshore construction, restoration of the HDD landfall location and installation of the underground onshore export cables, the Project will have no effect on flood velocities or floodplain storage capacity, and therefore no permanent impacts to Land Subject to Flooding or Land	COP Section 6.3 - Terrestrial Vegetation and Wildlife 6.3.1 – Affected Environment 6.3.1.1 – Terrestrial Habitats 6.3.1.1.1 - Falmouth Landfall Location 6.3.1.1.2 – Falmouth Onshore Export Cable Route/Transmission Line 6.3.1.1.5 – Brayton Point Landfall Location 6.3.1.1.6 – Brayton Point Export Cable Route 6.3.1.1.7 – Brayton Point Converter Station 6.3.1.2 – Terrestrial Wildlife and Plants 6.3.2 – Potential Effects 6.3.2.1 – Ground Disturbance 6.3.2.5 – Operation of Equipment and Heavy Machinery COP Section 6.4 – Wetlands and Waterbodies 6.4.1 - Affected Environment 6.4.1.1 – Wetlands 6.4.1.2 - Streams and Ponds 6.4.2 - Potential Effects 6.4.2.1 – Ground Disturbance COP Section 6.5 – Coastal Habitats 6.5.1 – Affected Environment 6.5.1.1.1 – Seagrass 6.5.1.1.2 – Macroalgae 6.5.1.1.3 – Submerged Aquatic Vegetation Beds 6.5.2 – Potential Effects 6.5.2.1 – Seabed (or Ground) Disturbance COP Appendix J, Terrestrial Vegetation and Wildlife Assessment

Policy #	Policy Requirement	Mayflower Wind Response	COP Section Reference
		Subject to Coastal Storm Flowage would result as all Project facilities will be below the ground surface and all pre-construction grades and contours will be restored.	
Coastal Hazard Policy #2 (Enforceable)	Ensure that construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Flood or erosion control projects must demonstrate no significant adverse effects on the project site or adjacent or downcoast areas. (CZM, 2011 pp 25-26)	The Project, as proposed, will not interfere with water circulation or pose a threat to the integrity of downcoast areas. Offshore: During installation of the export cables in State waters, some dredging of highly mobile sediments along the export cable route will likely be required to allow for adequate burial of the cables to ensure safe operation. The installation of scour protection as well as cable protections along the seafloor are anticipated to temporarily increase turbidity in the localized area. In regard to the Falmouth ECC and Lease Area, assessments have been completed to evaluate scour influence on built infrastructure (e.g., export cables, WTG/OSP substructures) as well as plume dispersion impacts during construction (COP Appendix F1, Sediment Plume Impacts from Construction Activities and COP Appendix F2, Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure). A hydrodynamic model was developed and the Project is not expected to interfere with ongoing sediment transport functions and patterns occurring along the export cable route, and sediment will continue to naturally accumulate or erode based on pre-existing patterns of sediment transport occurring in Nantucket Sound and elsewhere. In regard to the Brayton Point ECC, an assessment is planned to evaluate sediment dispersion during installation of the cables within the Brayton Point ECC (COP Appendix F3, Sediment Plume Impacts from Construction Activities). Scour will be evaluated based on data collected during the G&G surveys, available hydrodynamic modelling results, as well as literature data. Onshore: Mayflower Wind will be constructing onshore portions of the Project within previously disturbed or developed areas of Falmouth and Brayton Point (Figure 5 and Figure 6). For the Falmouth ECC, once landfall is made, the onshore export cables will be installed within an underground duct bank buried beneath existing roadway and/or shoulder layouts. For the Brayton Point ECC, once landfall is made, the underground export cables will traverse the site from the landing to the location of a new HVDC converter station. Underground transmission cables will be constructed from the converter station to the POI, an existing National Grid substation. The onshore substation in Falmouth and HVDC converter station at Brayton Point are expected to conform to the Massachusetts Stormwater Policy and will not alter existing sediment transport or circulation patterns, or result in adverse changes in stormwater runoff and flooding.	COP Section 4.1 – Site Geology 4.1.4 – Affected Environment 4.1.4.2 – Falmouth Offshore Export Cable Corridor 4.1.4.3 – Brayton Point Export Cable Corridor 4.1.5 – Potential Effects 4.1.5.1 – Seabed Disturbance COP Section 6.4 – Wetlands and Waterbodies 6.4.1 - Affected Environment 6.4.1.1 – Wetlands 6.4.1.2 - Streams and Ponds 6.4.1.3 – Wetlands and Waterbodies in the Onshore Project Area 6.4.2 - Potential Effects 6.4.2.1 – Ground Disturbance COP Section 6.5 – Coastal Habitats 6.5.1 – Affected Environment 6.5.1.1.1 – Seagrass 6.5.1.1.2 – Macroalgae 6.5.1.1.3 – Submerged Aquatic Vegetation Beds 6.5.2 – Potential Effects 6.5.2.1 – Seabed (or Ground) Disturbance COP Appendix F1, Sediment Plume Impacts from Construction Activities COP Appendix F2, Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure COP Appendix F3, Sediment Plume Impacts from Construction Activities - Brayton Point ECC (pending)
Coastal Hazard Policy #3 (Enforceable)	Ensure that state and federally funded public works projects proposed for location within the coastal zone will: • Not exacerbate existing hazards or damage natural buffers or other natural resources. • Be reasonably safe from flood and erosion-related damage. • Not promote growth and development in hazard-prone or buffer areas, especially in velocity zones and Areas of Critical Environmental Concern. • Not be used on Coastal Barrier Resource Units for new or substantial reconstruction of structures in a manner inconsistent with the Coastal Barrier Resource/Improvement Acts. (CZM, 2011 pp 26-28)	There are no state or federally funded public works projects as a result of the proposed action.	Not applicable

Policy #	Policy Requirement	Mayflower Wind Response	COP Section Reference
Energy			
Energy Policy #1 (Enforceable)	For coastally dependent energy facilities, assess siting in alternative coastal locations. For non-coastally dependent energy facilities, assess siting in areas outside of the coastal zone. Weigh the environmental and safety impacts of locating proposed energy facilities at alternative sites. (CZM, 2011 pp 30-35)	The Project involves the installation of a commercial-scale array of offshore WTGs within an established federal lease area for wind energy generation, which will produce clean, renewable energy for the New England region, and fulfill the obligations of the 20-year Power Purchase Agreement between Mayflower Wind and six utilities within the New England area. Offshore: The Project is inherently coastal-dependent. The federal lease areas were previously subject to an analysis of alternatives completed by BOEM during establishment of the Massachusetts/Rhode Island Wind Energy Area, in which the Project is located. This analysis was conducted as a portion of the Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts: Environmental Assessment which received a Finding of No Significant Impact in May 2013. This Environmental Assessment included a prepared Consistency Determination pursuant to 15 CFR 930.36(a) sent to the Commonwealth of Massachusetts on August 20, 2012 for review. The Environmental Assessment provided all data and information required under 30 CFR 939.39 to support the Consistency Determination. BOEM determined that the activities described in the revised Environmental Assessment were consistent with the enforceable policies of the Massachusetts Coastal Zone Management Program. The Commonwealth of Massachusetts concurred with BOEM's determination on January 30, 2013.[11] To transmit electricity generated from the offshore WTG array to the onshore administered electrical grid, the shortest practicable paths to shore will be utilized while considering engineering feasibility, environmental constraints, and regulatory concerns. This path to transmit the generated electricity will naturally cross through the coastal areas of Massachusetts, and Mayflower Wind has assessed multiple alternative routes for the export cables, as well as potential landfall locations. The evaluation of these alternatives is detailed within the COP Section 2.0 – Project Siting and Design Development. Landfall and Onshore: The evaluation of multiple different landfall locations necessitated the evaluation of multiple onshore export cable routes with the coastal zone as well. Mayflower Wind also evaluated multiple different potential sites for the onshore substation and converter station facilities. Mayflower Wind completed these efforts to site the Project in a way that would ensure minimal displacement of water dependent industries and minimize environmental impact to the extent practicable. Additionally, BOEM has commissioned a third-party EIS that will further document and evaluate Project alternatives. Therefore, the Project is consistent with this CZM policy requiring the assessment of siting project facilities within alternative coastal locations.	COP Section 2.0 – Project Siting and Design Development 2.1 – Offshore Facilities 2.1.6 – Offshore Export Cables 2.1.6.1 – Offshore Export Cable Corridors Selected for PDE 2.2 – Onshore Facilities 2.2.1 – Landfall Location 2.2.1.1 – Landfall Locations Selected for PDE 2.2.2 – Sea-to-Shore Transition 2.2.2.1 – Sea-to-Shore Transition Selected for PDE 2.2.3 – Onshore Export Cable Route 2.2.3.1 – Onshore Cable Routes Selected for PDE 2.2.4 – Onshore Substation 2.2.4.1 – Onshore Substation Sites Selected for PDE COP Section 3.0 – Description of Proposed Activities 3.1 – Proposed Project Location 3.4 – Summary of Impact-Producing Factors 3.4.1 – Seabed (or Ground) Disturbance 3.4.1.1 – Offshore Export Cable and Inter-Array Cable Installation 3.4.1.1.1 – Seabed Disturbance – Seabed Preparation and Cable Burial 3.4.1.1.1.1 – Seabed Disturbance – Horizontal Directional Drilling
Habitat			
Habitat Policy #1 (Enforceable)	Protect coastal, estuarine, and marine habitats—including salt marshes, shellfish beds, SAV, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats—and coastal freshwater streams, ponds, and wetlands to preserve critical wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes. (CZM, 2011 pp 41-48)	Mayflower Wind has designed the Project to avoid impacts to ecologically sensitive areas to the maximum extent practicable, including nearshore coastal areas, natural shoreline areas, as well as saltwater and freshwater wetlands that are particularly sensitive to impacts. Offshore: Figure 10, Figure 12, and Figure 14 show the Falmouth ECC in relation to areas of concern or sensitive ocean habitat for consideration in siting transmission cables as mapped within the Massachusetts OMP. Figure 15 through Figure 17 show locations of coastal and marine habitats in the vicinity of the Falmouth ECC landfall locations. Selection of the preferred landfall location and use of HDD in Falmouth will avoid impacts to mapped coastal salt marshes, tidal flats, barrier beaches, salt ponds, bays and sounds, coastal beach, dunes, and rocky shores. Figure 9, Figure 11, and Figure 13 show the Brayton Point ECC in relation to areas of concern or sensitive ocean habitat for consideration in siting transmission cables as mapped within the Massachusetts OMP. Figure 18 shows locations of coastal and marine habitats in the vicinity of the Brayton Point export cable landfall locations. Selection	COP Section 6.4 – Wetlands and Waterbodies 6.4.1 - Affected Environment 6.4.1.1 – Wetlands 6.4.1.2 – Stream and Ponds 6.4.1.3 – Wetlands and Waterbodies in the Onshore Project Area 6.4.2 - Potential Effects 6.4.2.1 – Ground Disturbance 6.4.2.2 – Planned Discharges 6.4.2.3 – Accidental Events COP Section 6.5 – Coastal Habitats 6.5.1 – Affected Environment 6.5.1.1.1 – Seagrass

[11] U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM). May 2013. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts, Revised Environmental Assessment. OCS EIS/EA BOEM 2013-1131

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		of the preferred landfall location and use of HDD at Brayton Point will avoid impacts to mapped coastal salt marshes, tidal flats, barrier beaches, salt ponds, bays and sounds, coastal beach, dunes, or rocky shores. The Falmouth ECC is located entirely within areas designated as Land Under the Ocean by the Massachusetts WPA (M.G.L. Chapter 131 Section 40). These areas may also contain shellfish and SAV (Figure 14). The Falmouth ECC has been evaluated for technical feasibility and environmental considerations, such as the presence of hard bottom habitat, mapped shellfish suitability areas, and the amount of dredging required. The Falmouth ECC crosses some areas of mapped hard bottom and shellfish suitability areas (Figure 10, Figure 12). The Falmouth ECC is up to 3,280.8 ft (1,000 m) in width and is intended to allow maximum flexibility to refine siting to avoid sensitive habitats and resources. The Falmouth ECC width may be narrower or wider in certain locations to avoid known obstructions and/or to allow maximum flexibility to avoid critical features (e.g., complex hardbottom habitat) with micro-siting during installation. Not all sensitive habitat and resource areas can be avoided. Mayflower Wind has selected a preferred ECC to avoid impacts to these areas to the greatest extent practicable. Within the Massachusetts Coastal Zone Boundary, the Brayton Point ECC is located within areas designated as Land Under the Ocean by the Massachusetts WPA (M.G.L. Chapter 131 Section 40). These areas may contain shellfish (Figure 13); no SAV has been mapped in the vicinity of the Brayton Point ECC. Mayflower Wind will use the findings of ongoing surveys of the ECC to evaluate technical feasibility and environmental considerations, such as the presence of hard bottom habitat, mapped shellfish suitability areas, and the extent to which dredging may be required. The OMP mapping of hard bottom/complex habitat (an OMP SSU) does not include the area of the Brayton Point ECC. However, as illustrated in Figure 11, mapped surface sediments identify the presence of gravel and rock substrates in certain areas that may represent hard bottom or complex habitat. Not all sensitive habitat and resource areas can be avoided. Mayflower Wind has selected a preferred export cable route to avoid impacts to these areas to the greatest extent practicable. The ECC under consideration is up to 2,300 ft (700 m) in width to allow maximum flexibility to refine siting to avoid sensitive habitats and resources and may be locally narrower or wider in sensitive or constrained areas. Benthic sampling was conducted along the Brayton Point ECC in Summer 2021 to identify sensitive habitat; this information will support final cable alignment to avoid and/or minimize impacts. In addition to sediment profile imaging/plan view (SPI/PV) images and grab cam videos, video transects have been collected along the Brayton Point ECC to the preferred and alternate landings. Sampling results do not identify seagrass in the ECC within Massachusetts waters. The benthic data in combination with the geophysical survey data will also be used to identify the potential hard bottom and/or complex habitat. Export cable and WTG/OSP substructure installation will temporarily alter the seabed habitat, resulting in some effects associated with mortality and/or displacement during construction and some effects associated with recovery time from the areas affected by their placement. Where the bottom substrate is characterized by more heterogeneous, complex habitats, disturbance of the benthic communities is expected to require a longer period (estimated one to three years) to recover[12] (COP Appendix M, Benthic and Shellfish Resources Characterization Report). Construction related impacts are expected to be temporary. Nearshore/Landfall: The Project will utilize an HDD method for the Falmouth export cable landfall which will limit impacts to both nearshore areas as well as coastal landforms, including Coastal Beach, Coastal Bank, and Coastal Dune (Figure 15 through Figure 17). Mayflower Wind has conducted surveys to identify and delineate areas of SAV, including eelgrass, at the Falmouth landfall locations	6.5.1.1.2 – Macroalgae 6.5.1.1.3 – Submerged Aquatic Vegetation Beds 6.5.2 – Potential Effects 6.5.2.1 – Seabed (or Ground) Disturbance 6.5.2.2 – Changes in Ambient Lighting 6.5.2.3 – Changes in Ambient EMF 6.5.2.4 – Actions that may Displace Biological Resources (Eelgrass and Macroalgae) 6.5.2.5 – Actions that may Cause Direct Injury or Death 6.5.2.6 – Planned Discharges 6.5.2.7 – Accidental Events COP Section 6.6 – Benthic and Shellfish 6.6.1 – Affected Environment 6.6.1.3 – Falmouth Export Cable Corridor 6.6.1.4 – Brayton Point Export Cable Corridor 6.6.1.6 – Benthic Seafloor Substrate Classifications 6.6.1.6.2 – Falmouth Export Cable Corridor – Southern Portion 6.6.1.6.3 – Falmouth Export Cable Corridor – Northern Portion 6.6.1.6.4 – Brayton Point Export Cable Corridor 6.6.1.8 – Substrate and Biota – Integrated Habitat Classification 6.6.1.8.2 – Southern Falmouth Export Cable Corridor Stations 045, 046 and 047 6.6.1.8.3 – Northern Falmouth Export Cable Corridor Transect 005 6.6.2 – Potential Effects 6.6.2.1 – Introduced Sound into the Environment (in-Air or Underwater) 6.6.2.2 – Disturbance of Softbottom Habitat and Species 6.6.2.3 – Introduction of Novel Hardbottom Habitat 6.6.2.4 – Change in Ambient EMF 6.6.2.5 – Planned Discharges 6.6.2.6 – Accidental Events COP Appendix K, Seagrass and Macroalgae Report COP Appendix M, Benthic and Shellfish Resources Characterization Report

[12] Guarinello, M., D. Carey, and L.B. Read. 2017. Year 1 Report for 2016 Summer Post-Construction Surveys to Characterize Potential Impacts and Response of Hard Bottom Habitats to Anchor Placement at the Block Island Wind Farm (BIWF). INSPIRE Environmental prepared for Deepwater Wind Block Island LLC. May.

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		(see COP Appendix K, Seagrass and Macroalgae Report). Based on the results of the 2020 survey, mapped eelgrass beds extend approximately 3,100 ft (945 m) from shore in some locations. Mayflower Wind anticipates that the use of HDD will avoid impacts to mapped eelgrass beds. This information was used in selection of the preferred landfall location and will be used in the design of the HDD. The location that has been chosen for the landfall is a highly developed area near the intersection of Worcester Avenue and Grand Avenue. The HDD construction method will avoid or significantly limit impacts to eelgrass beds, shellfish beds, SAV, dunes, beaches, tidal flats, and rocky shores. As noted above, benthic habitat surveys confirmed the absence of eelgrass at Brayton Point landfall sites. Onshore: For the Falmouth POI, the onshore export cables will largely be installed in a duct bank within existing roadway and/or roadway layout from the landfall location to the onshore substation location. This will eliminate or greatly limit impacts to onshore coastal habitat areas to the maximum extent practicable. For the Brayton Point landfall location, the onshore export cables will be installed underground from the landfall location to the converter station. From the converter station, underground transmission cables will be installed to connect to the POI, the existing National Grid substation location. The Brayton Point site has been previously developed and disturbed, and as such natural habitat and regulated resources are not present on the site within the proposed Project footprint. This will eliminate or limit impacts to onshore coastal habitat areas to the maximum extent practicable.	
Habitat Policy #2 (Enforceable)	Advance the restoration of degraded or former habitats in coastal and marine areas. (CZM, 2011 pp 48-50)	The Project has been designed to avoid impacts to coastal and marine habitats to the maximum extent practicable, and those impacts that cannot be avoided will be mitigated for in accordance with applicable federal, state, and local regulations. Mayflower Wind will comply with performance standards identified in the Massachusetts WPA. In doing so, the Project will serve the protected statutory interests. See also response provided above for Habitat Policy #1.	See references provided for Habitat Policy #1
Ocean Resources			
Ocean Resources Policy #1 (Enforceable)	Support the development of sustainable aquaculture, both for commercial and enhancement (public shellfish stocking) purposes. Ensure that the review process regulating aquaculture facility sites (and access routes to those areas) protects significant ecological resources (salt marshes, dunes, beaches, barrier beaches, and salt ponds) and minimizes adverse effects on the coastal and marine environment and other water-dependent uses. (CZM, 2011 pp 50-53)	The Project is not an aquaculture development, nor will it adversely affect any current aquaculture facilities or local shellfishing areas. As detailed in the COP Section 11.0 – Commercial and Recreational Fisheries and Fishing Activity, commercial and recreational fishing areas will not be permanently impacted by the Project nor will access to these areas be affected. More specifically, as described in COP Section 11.1.2.6 Aquaculture and as illustrated in COP Figures 11-20 and 11-21, there are no aquaculture lease sites in the vicinity of the Falmouth or Brayton Point ECCs within the MA Coastal Zone Boundary or in federal waters.	COP Section 11.0 – Commercial and Recreational Fisheries and Fishing Activity 11.1 – Affected Environment 11.1.1 – Data Sources 11.1.2 – Summary of Commercial Fishing in the Offshore Project Area 11.1.2.6 - Aquaculture 11.1.3 – Recreational Fishing 11.2.2 – Actions that may Displace Biological Resources
Ocean Resources Policy #2 (Enforceable)	Except where such activity is prohibited by the Ocean Sanctuaries Act, the Massachusetts OMP, or other applicable provision of law, the extraction of oil, natural gas, or marine minerals (other than sand and gravel) in or affecting the coastal zone must protect marine resources, marine water quality, fisheries, and navigational, recreational and other uses. (CZM, 2011 pp 53-55)	The Project does not include the extraction of oil, natural gas, or marine minerals.	Not applicable
Ocean Resources Policy #3 (Enforceable)	Accommodate offshore sand and gravel extraction needs in areas and in ways that will not adversely affect marine resources, navigation, or shoreline areas due to alteration of wave direction and dynamics. Extraction of sand and gravel, when and where permitted, will be primarily for the purpose	The Project does not include the extraction of sand and gravel from marine areas and it is not anticipated to affect any ongoing or planned sand and gravel extraction activities.	Not applicable

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	of beach nourishment or shoreline stabilization. (CZM, 2011 pp 55-57)		
Ports and Harbors			
Ports and Harbors Policy #1 (Enforceable)	Ensure that dredging and disposal of dredged material minimize adverse effects on water quality, physical processes, marine productivity, and public health and take full advantage of opportunities for beneficial re-use. (CZM, 2011 pp 57-61)	At this time, it is not anticipated that construction of the Mayflower Wind Project would require dredging at any port or harbor facilities. As such, there will be no dredge material produced from port and harbor areas, nor will there be any need to dispose of dredge material originating from such facilities.	Not Applicable
Ports and Harbors Policy #2 (Enforceable)	Obtain the widest possible public benefit from channel dredging and ensure that Designated Port Areas and developed harbors are given highest priority in the allocation of resources. (CZM, 2011 pp 61-63)	The Project does not anticipate any dredging activities within channels to any port or harbor facilities. At this time, Mayflower Wind does not propose to implement any port or harbor improvements to support the Project and anticipates using existing ports and facilities that are suitable to support the types and sizes of vessels required for use during construction. Similarly, during operations and maintenance (O&M) of the Project, Mayflower Wind would utilize existing port and harbor facilities that are capable of accommodating the necessary vessels and support activities required during that phase of the Project lifecycle.	Not Applicable
Ports and Harbors Policy #3 (Enforceable)	Preserve and enhance the capacity of Designated Port Areas to accommodate water-dependent industrial uses and prevent the exclusion of such uses from tidelands and any other Designated Port Areas lands over which an EEA agency exerts control by virtue of ownership or other legal authority. (CZM, 2011 pp 63-67)	Mayflower Wind is planning to use existing port and harbor facilities that are suitable to support the types and sizes of vessels required for use both during construction, as well as O&M of the Project.	Not Applicable
Ports and Harbors Policy #4 (Enforceable)	For development on tidelands and other coastal waterways, preserve and enhance the immediate waterfront for vessel-related activities that require sufficient space and suitable facilities along the water's edge for operational purposes. (CZM, 2011 pp 68--70)	The export cables located within State waters, including the Falmouth ECC landfall, will not preclude the use of the immediate waterfront for vessel-related activities or other water-dependent activities. The Project will use an HDD landfall method to minimize impacts to nearshore and coastal waters. During construction, this installation method will require a temporary, short-term prohibition on access to the waterfront within the immediate construction work areas and HDD paths for safety reasons. However, there will be no long-term impacts to immediate waterfront areas, public access, or vessel related activities along the waterfront area.	COP Section 3.0 – Description of Proposed Activities 3.4 – Summary of Impact-Producing Factors 3.4.1 – Seabed (or Ground) Disturbance 3.4.1.1 – Offshore Export Cable and Inter-Array Cable Installation 3.4.1.1.1 – Seabed Disturbance – Seabed Preparation and Cable Burial 3.4.1.1.1.1 – Seabed Disturbance – Horizontal Directional Drilling COP Section 6.4 – Wetlands and Waterbodies 6.4.1 - Affected Environment 6.4.1.1 – Wetlands 6.4.1.2 – Stream and Ponds 6.4.1.3 – Wetlands and Waterbodies in the Onshore Project Area 6.4.2 - Potential Effects 6.4.2.1 – Ground Disturbance COP Section 6.5 – Coastal Habitats 6.5.1 – Affected Environment 6.5.1.1.1 – Seagrass 6.5.1.1.2 – Macroalgae 6.5.1.1.3 – Submerged Aquatic Vegetation Beds 6.5.2 – Potential Effects 6.5.2.1 – Seabed (or Ground) Disturbance COP Section 12.0 – Zoning and Land Use 12.1 - Affected Environment

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			12.1.2 – Landfall Locations and HDD Sites 12.1.2.1 – Falmouth Landfall Location Option 1: Falmouth Heights Beach – Worcester Avenue 12.1.2.6 – Brayton Point Export Cable Corridor Intermediate Landfall 12.2 – Potential Effects 12.2.1 – Land Use COP Section 13.0 – Navigation and Vessel Traffic 13.1 – Affected Environment 13.1.1 – Vessel Traffic 13.1.2 - Navigation 13.2 – Potential Effects 13.2.2 – Actions that may Displace or Impact Fishing and Recreation and Tourism COP Section 14.0 – Other Marine Uses 14.1 – Affected Environment 14.1.3 – Federal Offshore Energy 14.1.4 – Cables and Pipelines 14.2 – Potential Effects 14.2.2 – Installation and Maintenance of Infrastructure
Protected Areas			
Protected Areas Policy #1 (Enforceable)	Preserve, restore, and enhance coastal Areas of Critical Environmental Concern, which are complexes of natural and cultural resources of regional or statewide significance. (CZM, 2011 pp 72-75)	There are no Areas of Critical Environmental Concern in proximity to the Project; therefore, the Project will have no effect on Areas of Critical Environmental Concern.	Not applicable
Protected Areas Policy #2 (Enforceable)	Protect state designated scenic rivers in the coastal zone. (CZM, 2011 pp 75-76)	There are no designated scenic rivers within the area of the Project, and therefore, there will be no impact on these resources.	Not applicable
Protected Areas Policy #3 (Enforceable)	Ensure that proposed developments in or near designated or registered historic places respect the preservation intent of the designation and that potential adverse effects are minimized. (CZM, 2011 pp 76-77)	Mayflower Wind is conducting assessments of historical and archaeological resources within the area of potential effect for the Project. This includes both the terrestrial (onshore) and marine (nearshore and offshore) facilities for the Project. Mayflower Wind has obtained a permit from the Massachusetts Board of Underwater Archaeological Resources to conduct a marine archaeological survey of the Falmouth ECC and initiated surveys in July 2020 along the ECC and within the Lease Area. Additional marine archaeological surveys initiated in 2021 covered additional areas of the Falmouth ECC, the Lease Area and the Brayton Point ECC. Mayflower Wind has submitted a Project Notification Form to the Massachusetts Historical Commission (MHC) for the onshore Project facilities, secured a permit from MHC to conduct reconnaissance terrestrial surveys (Phase 1A) and has prepared a Phase 1A report for the Project (see COP Appendix R, Terrestrial Archaeological Resources Assessment). For Brayton Point, Mayflower Wind submitted a Project Notification Mayflower Wind and completed a reconnaissance terrestrial survey (Phase 1A); the archaeologist concluded that construction of the Brayton Point HVDC converter station, underground cable system and HDD site will not impact significant historic properties eligible to the National/State Registers and recommended no further archaeological investigation.	COP Section 7.1 – Marine Archaeology 7.1.1 – Affected Environment 7.1.1.1 – Shipwrecks and Obstructions 7.1.1.2 – Paleolandscape 7.1.2 – Potential Effects 7.1.2.1 – Seabed (or Ground) Disturbance 7.1.2.2 – Sediment Suspension and Deposition COP Section 7.2 – Terrestrial Archaeology 7.2.1 – Affected Environment 7.2.1.1 – Landfall Locations and HDD Sites 7.2.1.1.1 – Falmouth Landfall Location Option A: Falmouth Heights Beach – Worcester Avenue 7.2.1.1.4 – Brayton Point Location Option 1: Brayton Point – Western

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		Mayflower Wind also anticipates conducting intensive surveys, as necessary, within areas identified as potentially sensitive for presence of previously unknown historic or archaeological resources. Potential effects, if any, to historic resources will be addressed with BOEM, the Tribes, Board of Underwater Archaeological Resources, and MHC through established review procedures, and all appropriate measures consistent with Section 106 of the National Historic Preservation Act and state register review process will be taken. Offshore: Mayflower Wind has evaluated potential visual impacts to historic resources as a result of the Project facilities (see COP Appendix S, Analysis of Visual Effects to Historic Properties). There are no anticipated visual impacts to mainland (Upper Cape Cod) historic resources from the WTGs/OSPs due to the distance of the Lease Area. Mayflower Wind has conducted visual simulations from various key observation points on Martha's Vineyard and Nantucket, including designated or registered historic places. In many instances, these properties were not designated or listed due to the significance of the viewshed from the historic property, and therefore, the significance of the designation or listing would not be diminished. Also, based on the distance of the Lease Area from these resources coupled with common weather conditions, it is anticipated that the WTGs/OSPs may not be visible from these resources for a significant portion of the year. Onshore: Similarly, for the onshore Project facilities, Mayflower Wind has assessed the potential visual impact of these facilities on historic resources (see COP Appendix S, Analysis of Visual Effects to Historic Properties and COP Appendix T, Visual Impact Assessment). The underground onshore export cables will have no visual impact on historic resources as the cables will be buried beneath existing paved roadways, and following completion of construction, the only visual indicators of the presence of the cables will be manhole covers within the paved roadway surface. For the Falmouth ECC, the potential onshore substation sites are not located within any designated or registered historic districts, though the preferred substation location (Lawrence Lynch) located at 396 Gifford Street in Falmouth is located next to the Oak Grove Cemetery, which is a listed property on the National Register of Historic Places (NRHP). If this site was selected for construction of the onshore substation facility, Mayflower Wind does not believe the Project would have an unacceptable adverse effect this NRHP-listed historic property as the substation facility would be built within an existing industrial sand and gravel pit facility and would not require tree clearing or land disturbance any closer to the cemetery than currently exists. Visual impacts may be minimized or avoided by vegetative screening. Because the Brayton Point site was previously occupied by the Brayton Point Power Station, the largest coal-fired generating station in New England, historic resources within the viewshed would have previously had views of the power plant cooling towers, stacks and other structures. As such, the visual effect of the Project on historic resources is expected to be less impactful than the previous long-term views of the power plant. The HVDC converter station site is not located within any designated or registered historic districts. Beyond the visual effects mentioned above, the onshore construction at Brayton Point is not expected to directly or indirectly affect historic properties.	7.2.1.1.5 – Brayton Point Location Option 2: Brayton Point – Eastern 7.2.1.3 – Onshore Export Cable Routes 7.2.1.4 – Onshore Substation and Converter Station Sites 7.2.2 – Potential Effects 7.2.2.1 – Ground Disturbance 7.2.2.2 – Accidental Events COP Section 7.3 – Above-Ground Historic Properties 7.3.1 – Affected Environment 7.3.1.1 – Offshore APE 7.3.1.2 – Onshore APE 7.3.2 – Potential Effects 7.3.2.1 – Altered Visual Conditions COP Section 8.0 – Visual Resources 8.1 – Affected Environment 8.1.1 – Offshore Project Area 8.1.2 – Onshore Project Area 8.2 – Potential Effects 8.2.1 – Altered Visual Conditions COP Appendix Q, Marine Archaeological Resources Assessment COP Appendix R, Terrestrial Archaeological Resources Assessment COP Appendix S, Analysis of Visual Effects to Historic Properties COP Appendix T, Visual Impact Assessment
Public Access			
Public Access Policy #1 (Enforceable)	Ensure that development (both water-dependent or non-water-dependent) of coastal sites subject to state waterways regulation will promote general public use and enjoyment of the water's edge, to an extent commensurate with the Commonwealth's interests in flowed and filled tidelands under the Public Trust Doctrine. (CZM, 2011 pp 78-87)	The Project, as proposed, will have no appreciable effects on the Commonwealth's interests in flowed and filled tidelands under the Public Trust Doctrine or on the general public's use and enjoyment at the water's edge. For the Falmouth ECC, the export cables will make landfall in a highly developed section of the Massachusetts coastline utilizing an HDD method that will avoid impacting the public's use and recreation in coastal areas. For the Brayton Point ECC, the area of landfall is in private property that was formerly used as an industrial site (coal fired power plant), and therefore not commonly used for recreation. During the installation of the export cables there will be a temporary, short-term prohibition on access to the waterfront within the immediate construction work areas and HDD path for safety	COP Section 10.3 – Recreation and Tourism 10.3.1 – Affected Environment 10.3.1.1 – Land-based and Near-shore-based Recreation and Tourism Resources 10.3.1.1.1 – Falmouth Onshore Project Area 10.3.1.1.2 – Brayton Point Onshore Project Area

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		reasons. However, it is anticipated that the installation of the export cables and landfall construction will take place outside of peak tourism season so as to not interfere with public access to waterfront areas. Additionally, there will be no long-term impacts to waterfront areas or to public access to the water's edge resulting from the Project.	10.3.1.2 – Water-based Recreation and Tourism Resources 10.3.2 – Potential Effects 10.3.2.1 – Construction Areas and Traffic 10.3.2.2 – Saturation of Tourism-related Services (Boat Rentals, Outfitters, etc.) COP Section 11.0 – Commercial and Recreational Fisheries and Fishing Activity 11.1 – Affected Environment 11.1.1 – Data Sources 11.1.2 – Summary of Commercial Fishing in the Offshore Project Area 11.1.3 – Recreational Fishing 11.1.4 – Fisheries Outreach 11.2 - Potential Effects 11.2.1 – Vessel Activity and Presence of Infrastructure 11.2.3 – Gear Interactions COP Section 12.0 – Zoning and Land Use 12.1 - Affected Environment 12.1.2 – Landfall Locations and HDD Sites 12.1.2.1 – Falmouth Landfall Location Option 1: Falmouth Heights Beach – Worcester Avenue 12.1.2.6 – Brayton Point Export Cable Corridor Intermediate Landfall 12.2 – Potential Effects 12.2.1 – Land Use 12.2.2 – Construction Areas / Traffic 12.2.3 – Noise and Vibration COP Section 15.0 – Public Health and Safety 15.1 – Affected Environment 15.1.1 – Health and Safety Regulations Related to the Proposed Project 15.1.2 – Communities Health and Safety 15.2 – Potential Effects 15.2.1 – Unplanned Events
Water Quality			
Water Quality Policy #1 (Enforceable)	Ensure that point-source discharges and withdrawals in or affecting the coastal zone do not compromise water quality standards and protect designated uses and other interests. (CZM, 2011 pp 92-95)	Offshore: Construction and installation activities associated with the Project have the potential to impact coastal and marine water quality through structure installations and removal, as well as vessel discharges such as domestic wastewater, uncontaminated bilge water, treated deck drainage and sumps, uncontaminated ballast water, and uncontaminated fresh or seawater from vessel air conditioning. Bilge water discharges may only occur in nearshore and offshore waters provided that the effluent is processed by an approved oil and water separator and the oil content of the bilge water is less than 15 parts per million. Bilge water that cannot be discharged in compliance with regulations will be retained onboard the vessel for disposal at an approved receiving facility back in port. Generally, ballast water is pumped into and out of separate compartments and is not usually contaminated with oil. However, the same discharge criteria for oil content also applies to ballast water. All vessels will be required to comply with federal and state discharge requirements, as well as requirements for the control and prevention of accidental spills, which are detailed in the Oil Spill Response Plan developed for the Project (see COP Appendix AA, Oil Spill Response Plan). By	COP Section 3.3 – Project Components and Project Stages 3.3.16 – Waste Generation and Disposal COP Section 5.2 – Water Quality 5.2.1 – Affected Environment 5.2.1.2 – Massachusetts Department of Environmental Protection 5.2.3 – Potential Effects 5.2.3.1 – Seabed or Ground Disturbance 5.2.3.2 – Planned Discharges 5.2.3.3 – Accidental Events COP Section 15.0 – Public Health and Safety

Policy #	Policy Requirement	Mayflower Wind Response	COP Section Reference
		complying with these state and federal regulations, no adverse impacts to water quality are anticipated. Within the Lease Area, Falmouth ECC and Brayton Point ECC, installation of the WTGs/OSPs, as well as burial of the export cables, will cause a temporary increase in turbidity. However, mapped ocean currents should allow this sediment to settle rapidly into the local environment. Cable burial will also occur for all inter-array cables between the WTGs and the OSPs using a similar method to the laying of the export cables. This is not anticipated to be a significant impact, as sediment that will be resuspended is anticipated to settle rapidly within the local environment (ECCs or Lease Area) (see Section 5.2 – Water Quality of the COP document, and the COP Appendix H, Water Quality Report). As part of the federal and state permitting processes under the federal Clean Water Act Section 404 and Section 401 Water Quality Certification frameworks, Mayflower Wind will engage with the permitting agencies and comply with the conditions of the permit issued. The installation of cable scour protection (armoring) as well as cable protections along the seafloor are anticipated to temporarily increase turbidity in the localized area. The surface sediments, however, are predominately sandy and anticipated to settle quickly and present temporary conditions similar to the installation of the WTG/OSP foundations and the inter-array cables (see COP Appendix F1, Sediment Plume Impacts from Construction Activities and COP Appendix F2, Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure). Landfall: Use of the HDD construction technique for installation of the export cable landfalls is proposed to avoid large-scale disturbance of surface and underwater sediments that would have a more significant effect on water quality. However, the HDD activity still has the ability to affect water quality as a result of an inadvertent release of the drilling fluid used to lubricate the drill head and help maintain the bore hole during drilling activities. The drill fluid is composed of non-hazardous compounds and typically consists of mixture of bentonite mud and water. Regardless, any inadvertent release of this drilling fluid to coastal waters has the ability to negatively impact water quality. Mayflower Wind will develop and implement an HDD drill fluid management and contingency plan to avoid inadvertent returns before they occur, and to clean up any drill fluid that is released through an inadvertent return to the ground surface. Provisions of this plan will be a requirement that the Project constantly monitor fluid pressures within the borehole and re-assess conditions and potentially re-align the bore path any time there is a drop in fluid pressure that could indicate the loss of drill fluid to an inadvertent return. Mayflower Wind will require all vessels to comply with applicable regulations for the prevention and control of accidental spills of fuels, oils, and other hazardous materials. Mayflower Wind has also included an Oil Spill Response Plan (COP Appendix AA, Oil Spill Response Plan) that includes provisions for responding to oil and fuel spills. Other wastes generated during offshore construction and O&M activities, including septage, solid wastes or other hazardous materials (chemicals, solvents, oils, greases, etc.) from equipment operation or maintenance will be temporarily stored and properly disposed of on land or otherwise disposed of in accordance with all applicable regulations (see COP Section 3.3 – Project Components and Project Stages). Onshore: Construction of the onshore substation facility and HVDC converter station will be subject to the Massachusetts Stormwater Standards and will be designed with a stormwater management system to adequately manage stormwater runoff originating from these developments. By designing the stormwater management systems in compliance with state regulations pertaining to stormwater, the point source discharges associated with these discrete site developments is anticipated to have no adverse effect on water quality within the coastal zone.	15.1 – Affected Environment 15.1.1 – Health and Safety Regulations Related to the Proposed Project 15.1.2 – Communities Health and Safety 15.2 – Potential Effects 15.2.1 – Unplanned Events COP Appendix A, Agency Correspondence COP Appendix H, Water Quality Report COP Appendix X, Navigation Safety Risk Assessment COP Appendix AA, Oil Spill Response Plan

Policy #	Policy Requirement	Mayflower Wind Response	COP Section Reference
Water Quality Policy #2 (Enforceable)	Ensure the implementation of nonpoint source pollution controls to promote the attainment of water quality standards and protect designated uses and other interests. (CZM, 2011 pp 95-98)	Nonpoint source pollution controls will be utilized during the construction and installation of all onshore portions of the Project to ensure that nonpoint source pollution will not adversely affect water quality within the coastal zone. These include construction phase best management practices, such as limiting of vegetation disturbance and soil grading, installation of erosion and sedimentation controls at the limit of work to manage stormwater runoff, implementation of vehicle refueling restrictions within 100 ft (30 m) of wetlands and waterbodies, strict storage and management of oils and hazardous materials incidental to construction activities, and provisions for immediate containment, cleanup, and reporting (as necessary) of any inadvertent releases of oils and hazardous materials. As part of the National Pollution Discharge Elimination System Construction General Permit for construction projects disturbing one or more acres (0.4 ha or more), Mayflower Wind will develop and implement a construction phase Erosion and Sediment Control Plan for the onshore Project facilities that includes all of the provisions detailed above and more and establishes requirements to inspect the construction areas on a weekly basis at minimum to determine compliance with the Construction General Permit conditions and the Project-specific Erosion and Sediment Control Plan.	COP Section 3.3 – Project Components and Project Stages 3.3.15 – Health, Safety and Environmental Protections COP Appendix A, Agency Correspondence COP Appendix F2, Scour Potential Impacts from Operational Phase and Post-Construction Infrastructure COP Appendix H, Water Quality Report
Water Quality Policy #3 (Enforceable)	Ensure that subsurface waste discharges conform to applicable standards, including the siting, construction, and maintenance requirements for on-site wastewater disposal systems, water quality standards, established Total Maximum Daily Load limits, and prohibitions on facilities in high-hazard areas. (CZM, 2011 pp 98-100)	The Project does not propose any facilities that include a subsurface wastewater disposal system as the onshore facilities will not be manned by any O&M personnel. Temporary sanitation facilities will be provided during construction of the onshore Project components through the use of portable latrines that will be periodically emptied and cleaned by a portable latrine service provider. Likewise, the offshore facilities will not be manned by any O&M personnel. However, during construction and O&M activities, sanitation would be provided on the service vessels utilized by O&M personnel for transport to the offshore facilities. The transport vessels would hold sewage within holding tanks and dispose of all raw or treated sewage in accordance with all applicable discharge rules and regulations.	COP Section 5.2 – Water Quality 5.2.1 – Affected Environment 5.2.1.2 – Massachusetts Department of Environmental Protection 5.2.3 – Potential Effects 5.2.3.1 – Seabed or Ground Disturbance 5.2.3.2 – Planned Discharges 5.2.3.3 – Accidental Events COP Appendix A, Agency Correspondence COP Appendix H, Water Quality Report

4.0 Consistency Certification

Mayflower Wind has evaluated all applicable enforceable policies of the Massachusetts CZM for the Project to determine if the activities are consistent with those policies. Mayflower Wind believes the Project and related activities comply with the enforceable policies of Massachusetts' approved coastal zone management program and will be conducted in a manner fully consistent with that program.

Attachment 1 – Figures

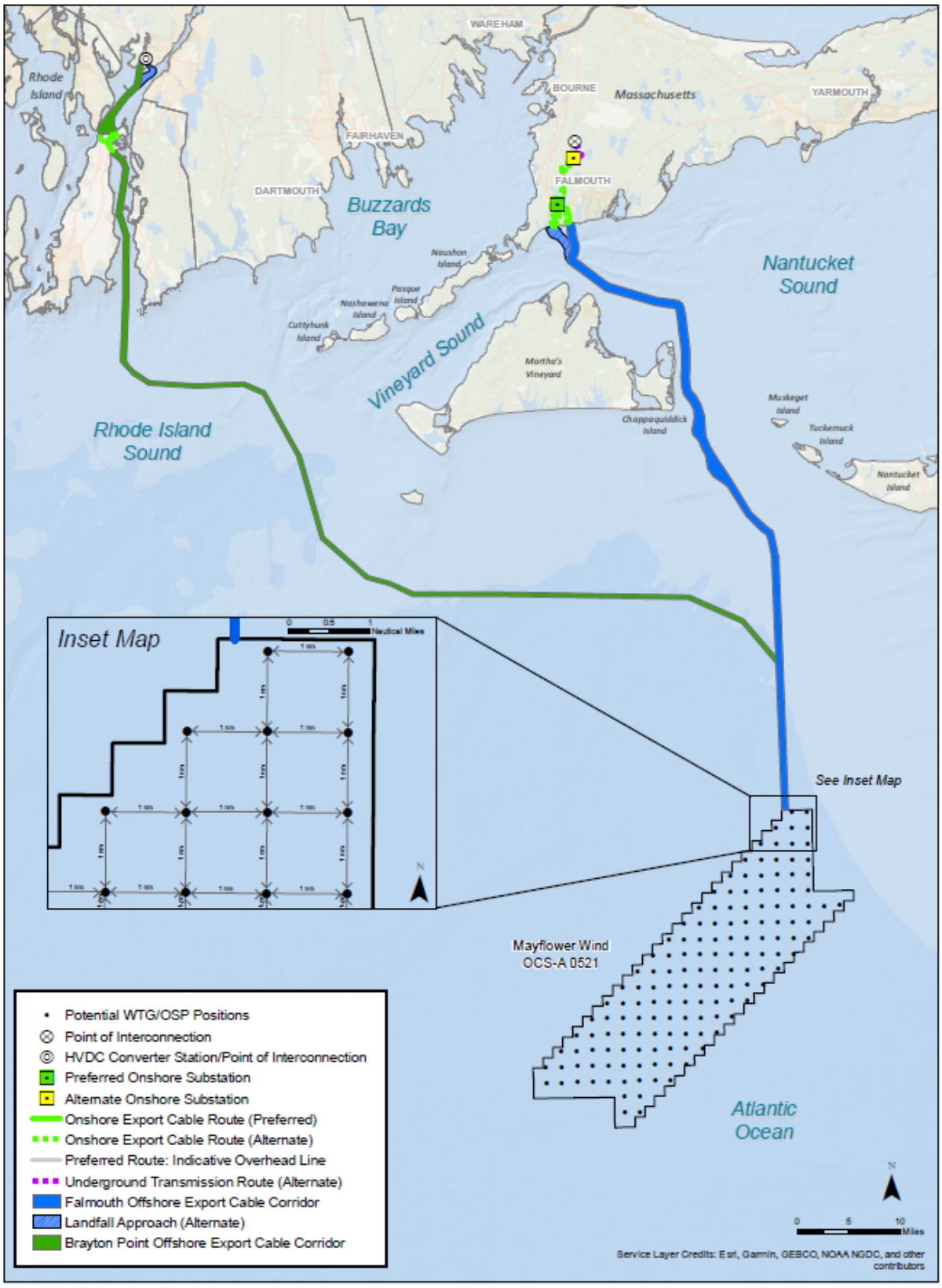


Figure 1. Overview of Mayflower Wind Offshore Renewable Energy Generation Project

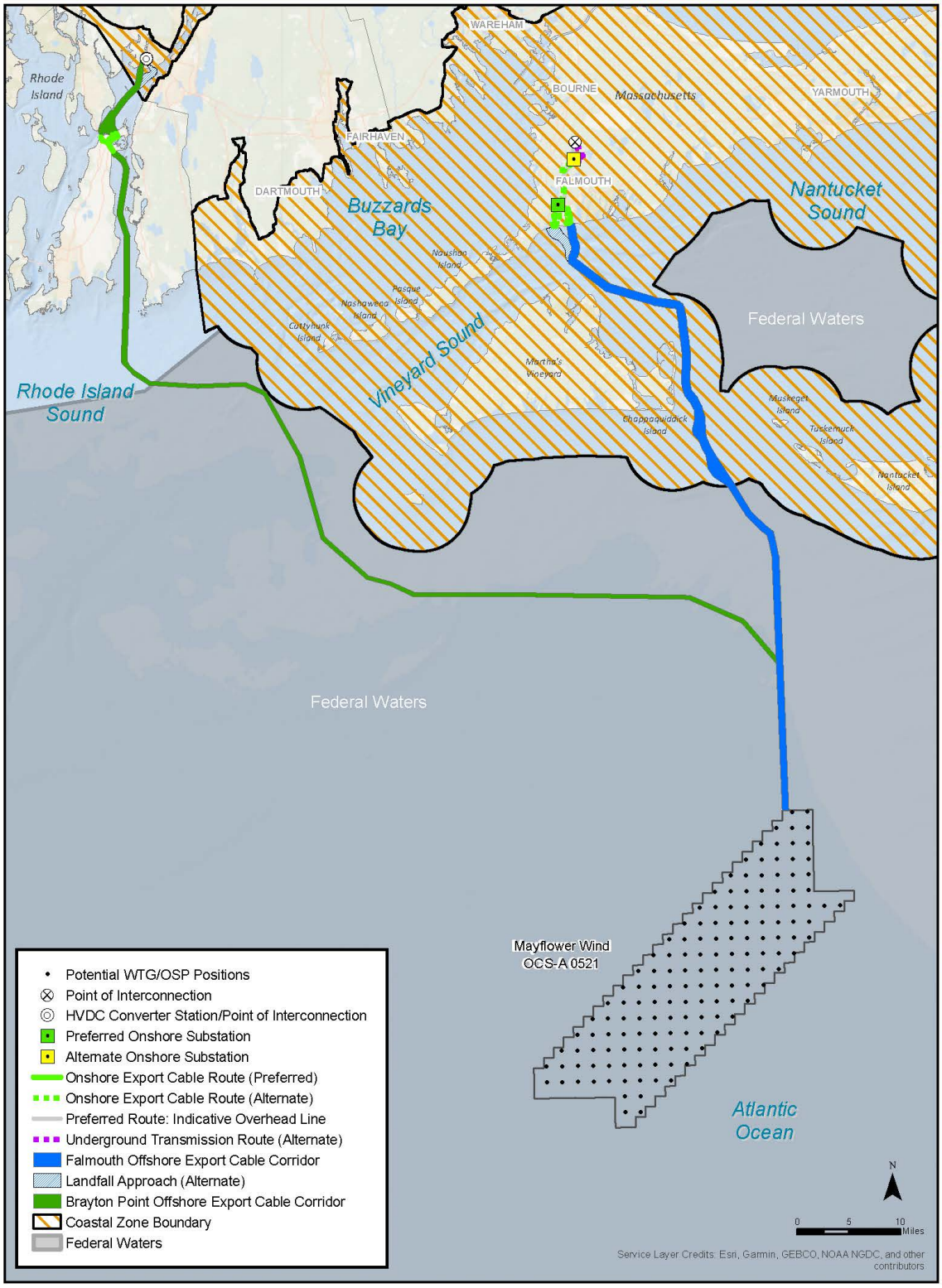


Figure 2. Offshore and Onshore Project Areas with Massachusetts CZM Boundary and Federal Waters

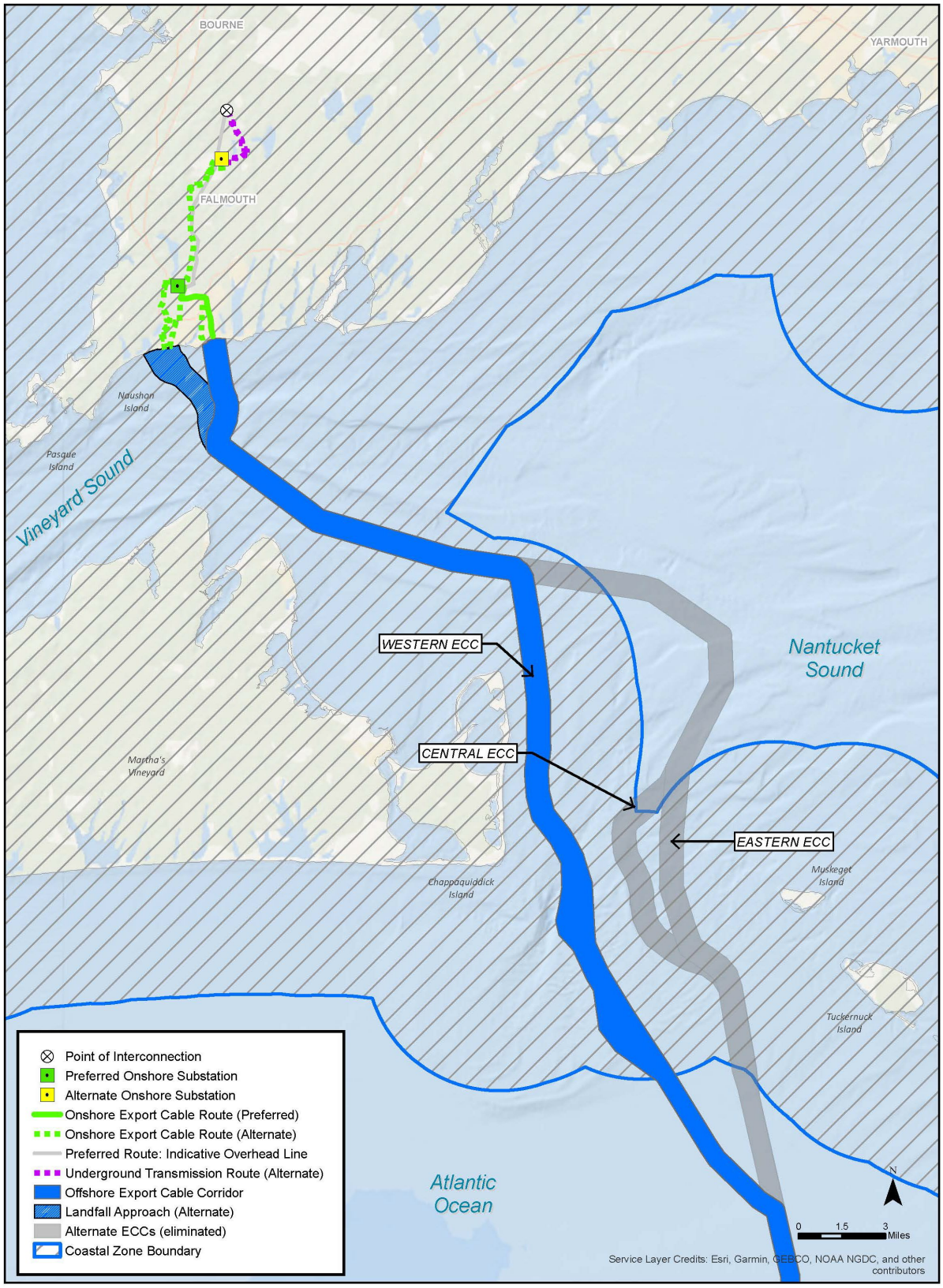


Figure 3. Falmouth ECC Alternatives and Onshore Project Area and Massachusetts CZM Boundary

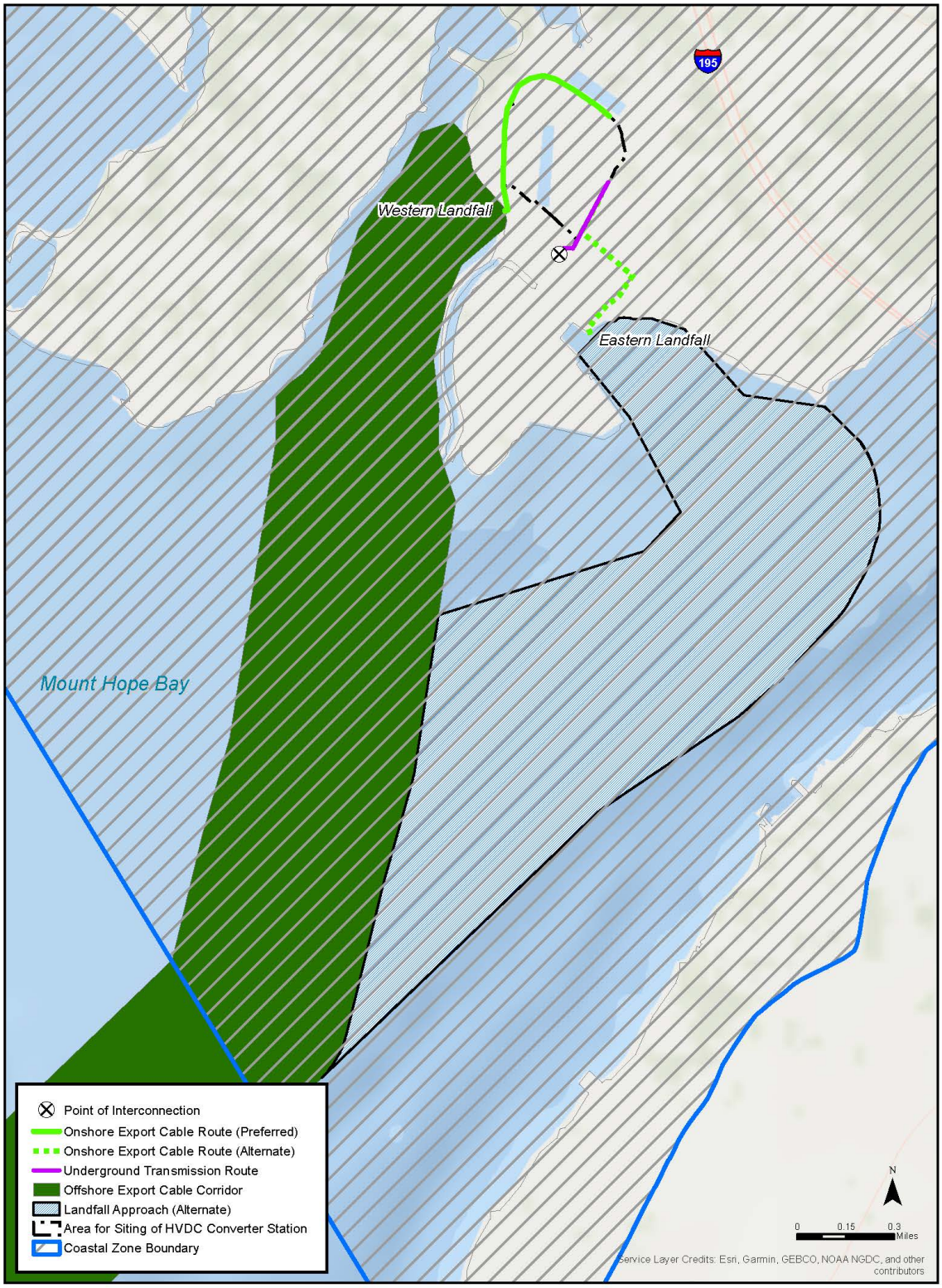


Figure 4. Brayton Point ECC and Onshore Project Area and Massachusetts CZM Boundary

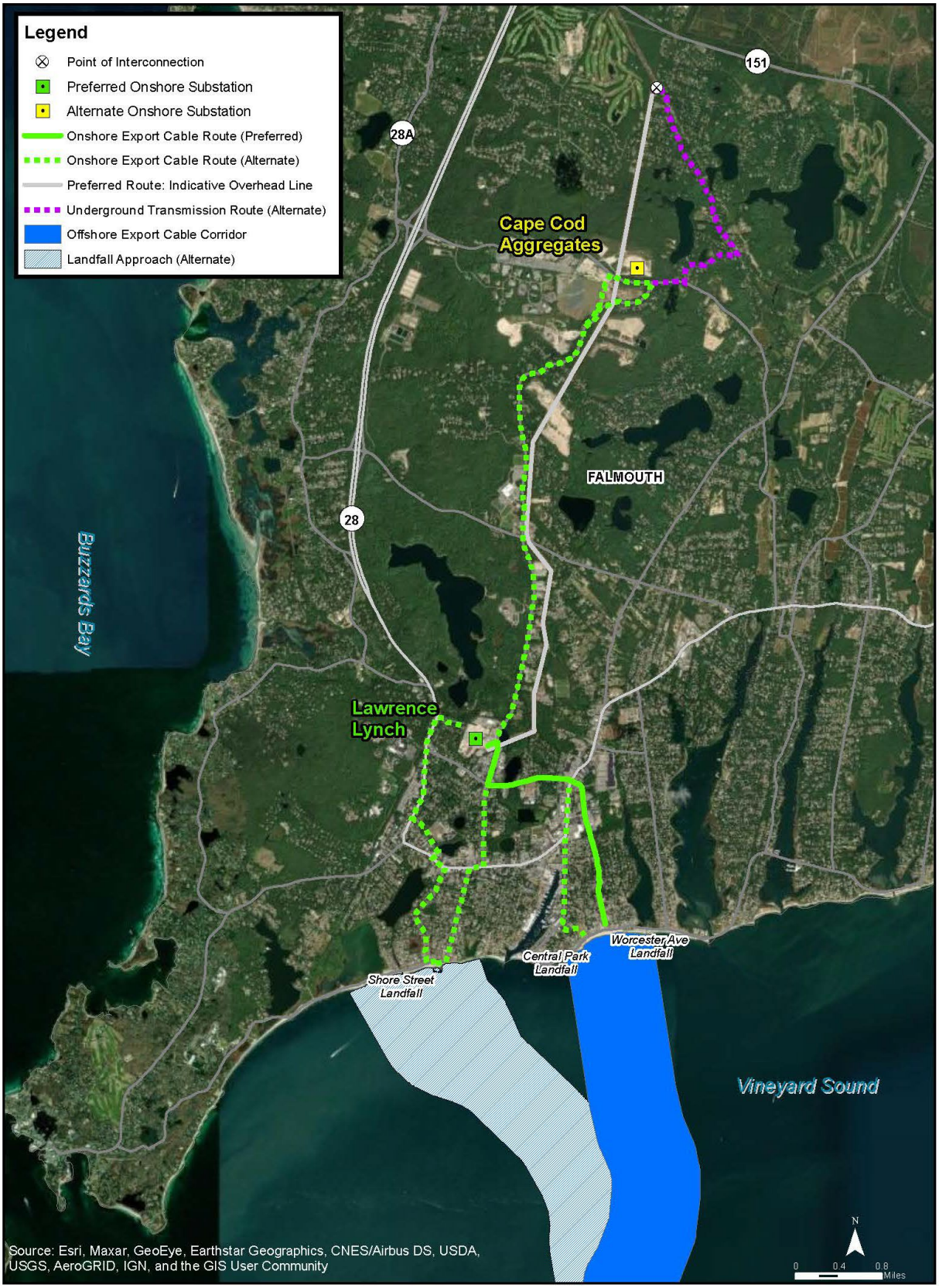
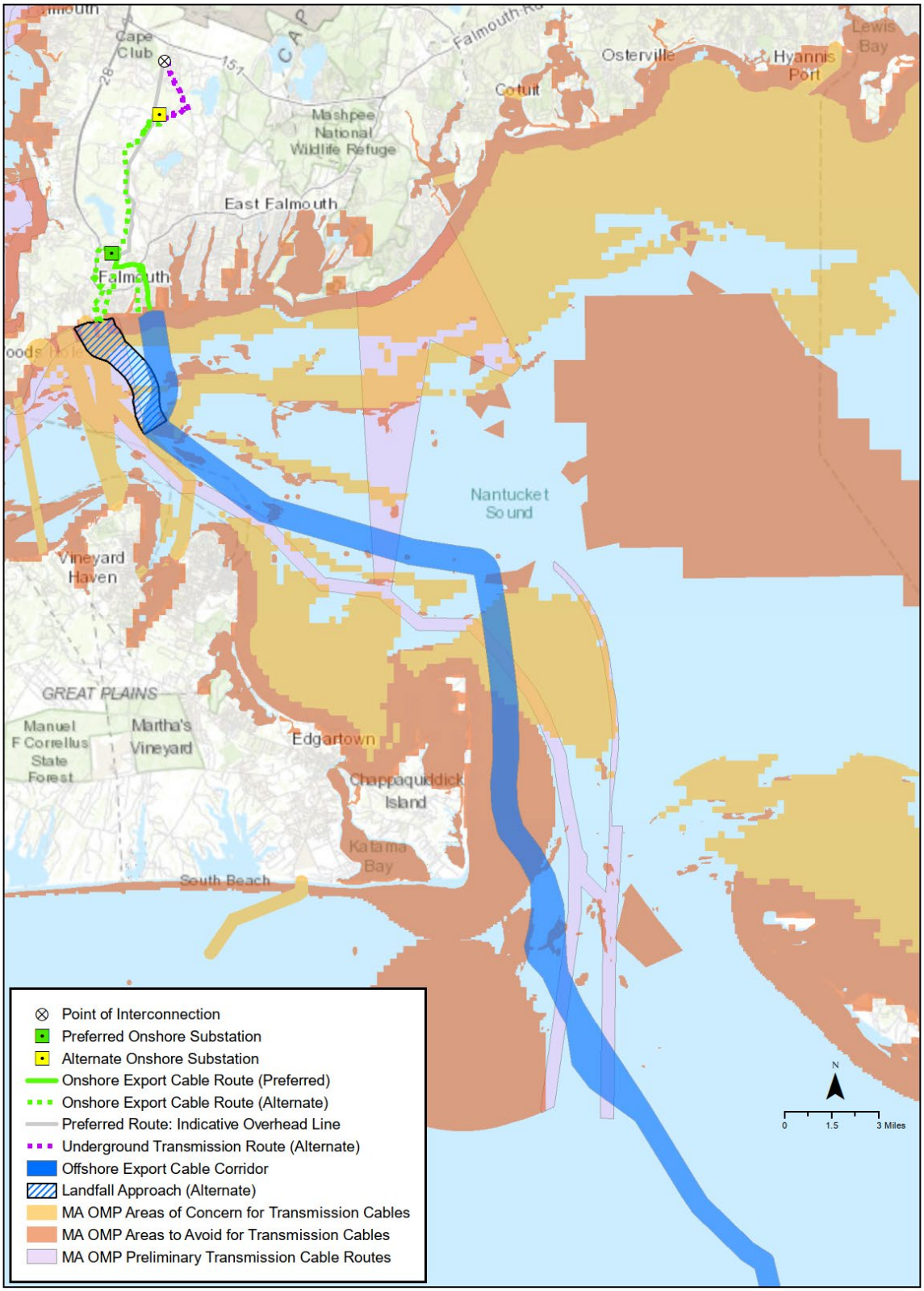


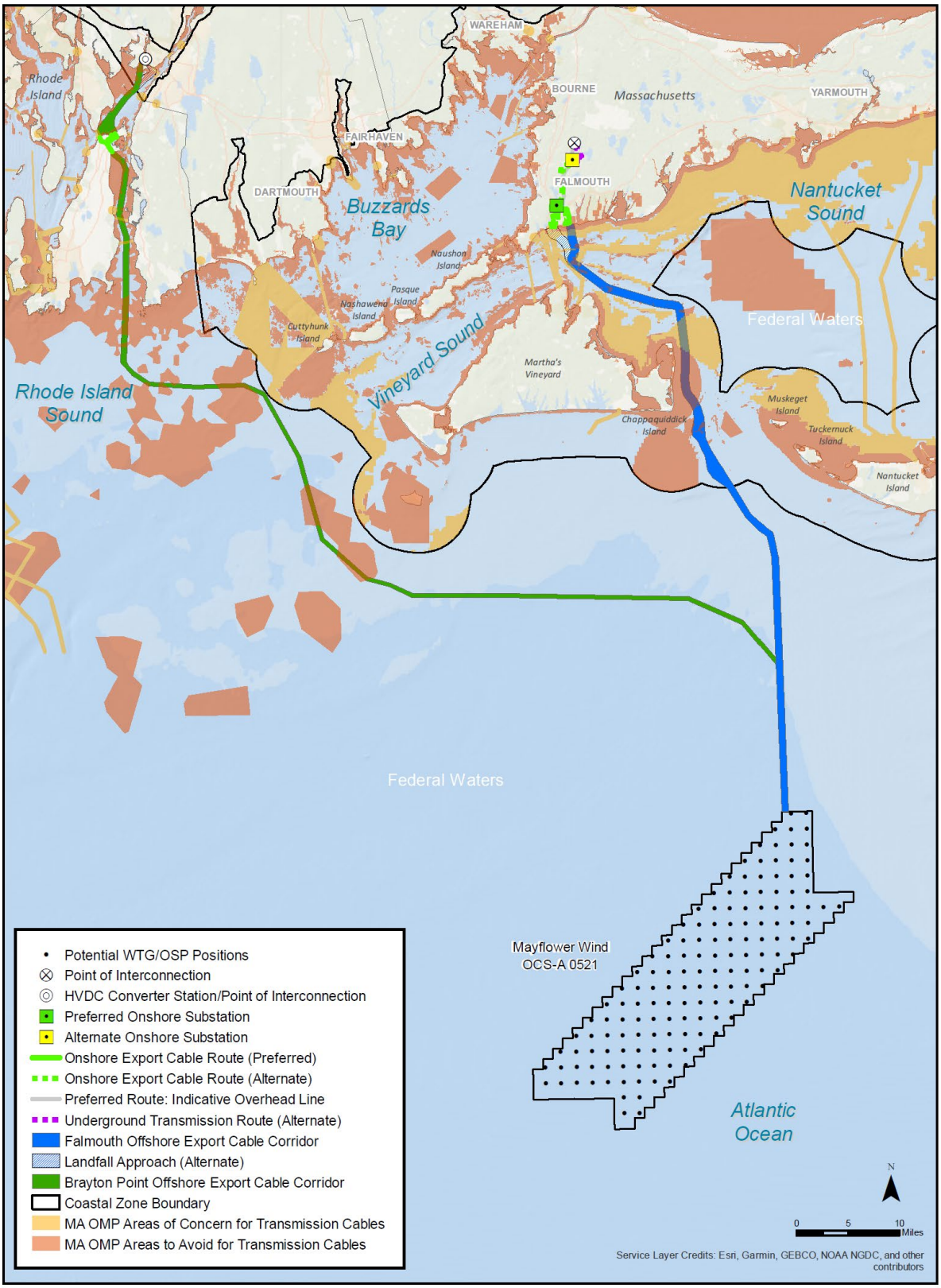
Figure 5. Location of the Falmouth Onshore Project Area

Figure 6. Location of the Brayton Point Onshore Project Area



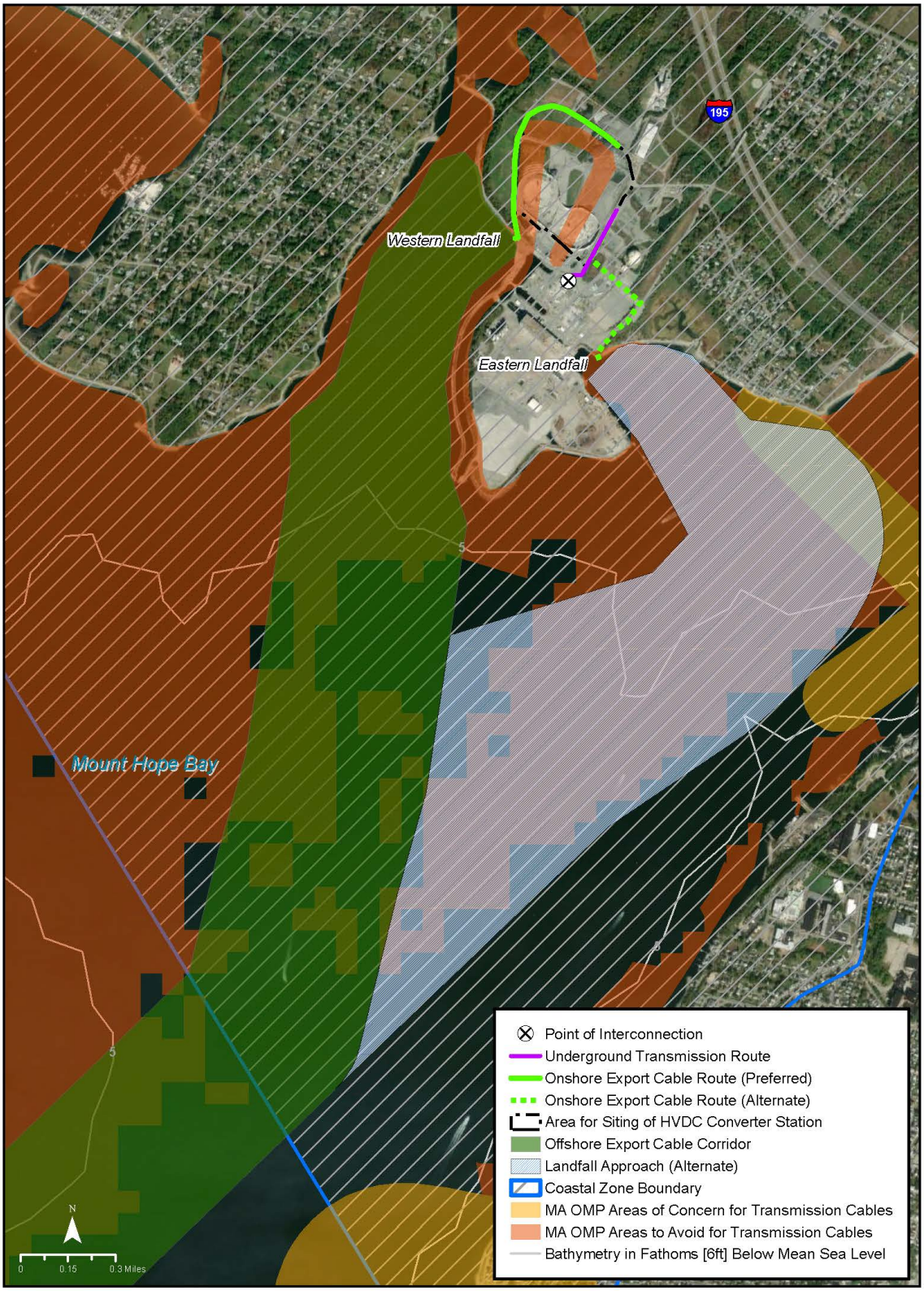
Sources: (1) and (2): See full citation of sources on page Att 1-19

Figure 7. MA OMP Areas of Concern, Areas to Avoid, and Preliminary Transmission Cable Routes within the Massachusetts Coastal Zone Boundary – Falmouth ECC



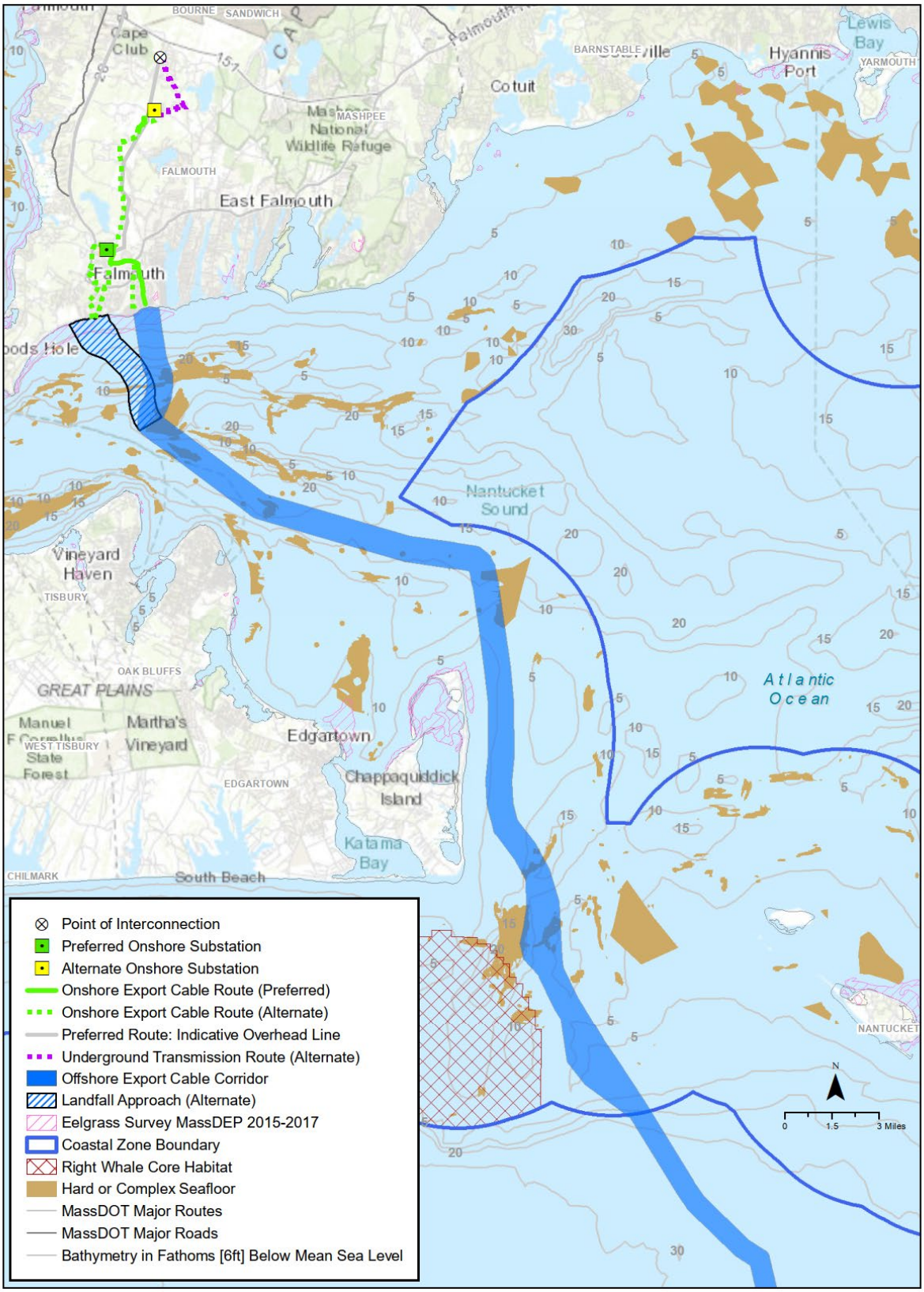
Source: (2): See full citation of source on page Att 1-19

Figure 8. MA OMP Areas of Concern and Areas to Avoid Mapped in the MA Coastal Zone Boundary and Federal Waters



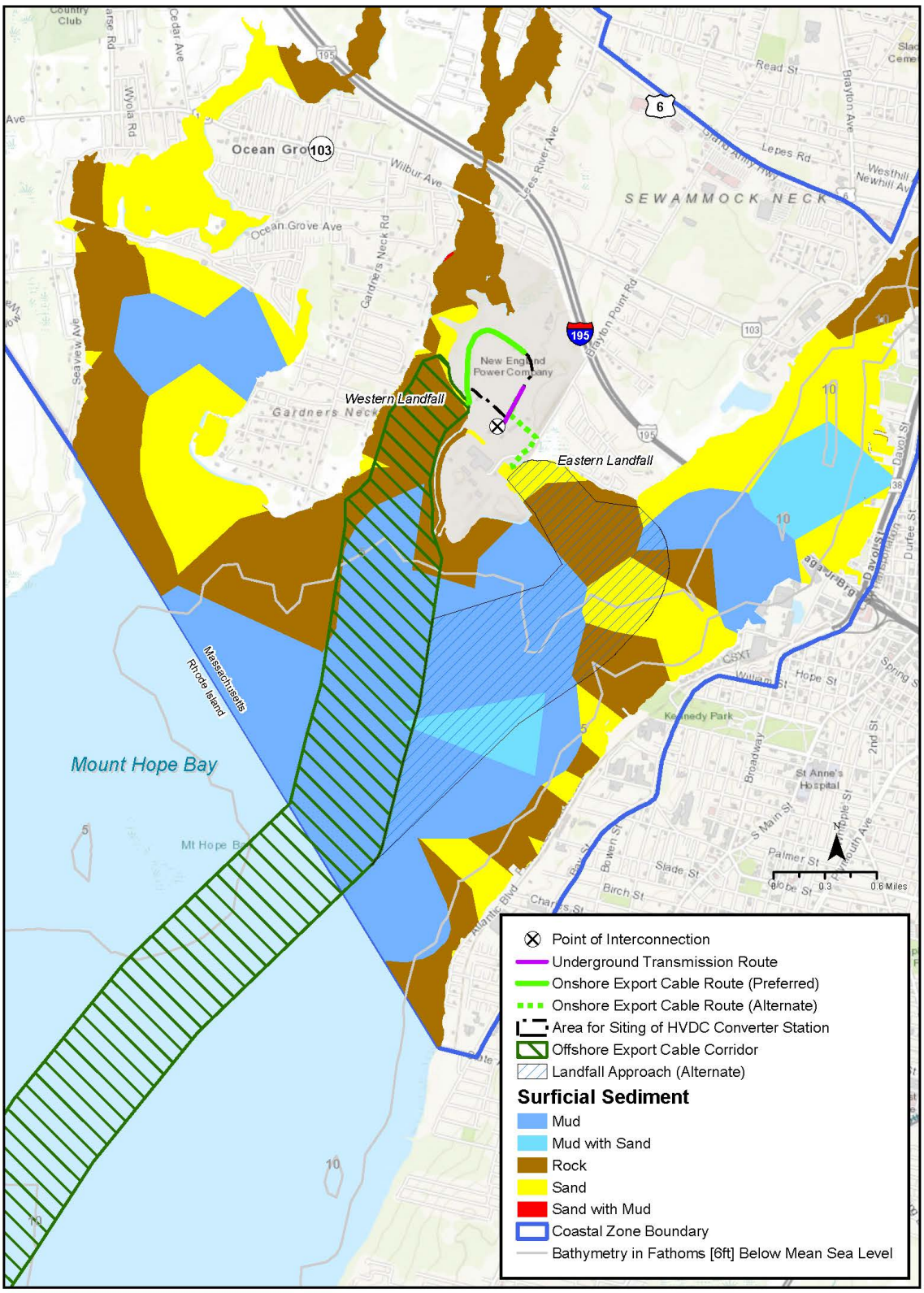
Source: (2): See full citation of source on page Att 1-19

Figure 9. MA OMP Areas of Concern, Areas to Avoid, and Preliminary Transmission Cable Routes within the Massachusetts Coastal Zone Boundary – Brayton Point ECC



Sources: (3), (4): See full citation of sources on page Att 1-19 Notes: Substrate hard/complex seafloor data is from MA CZM. Mayflower Wind field collected-data of substrate type pending. Mayflower Wind collected eelgrass data. See COP Appendix K.

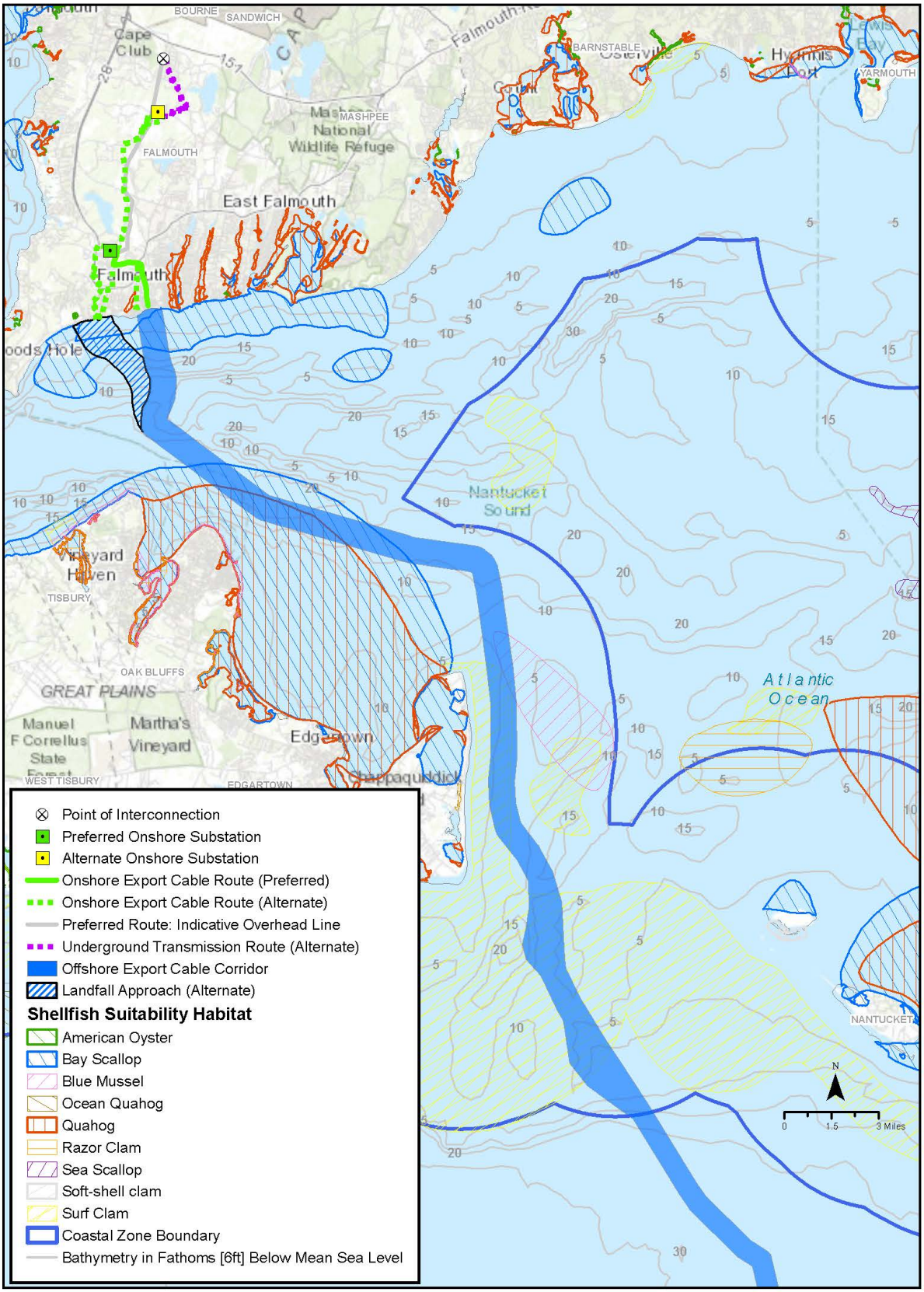
Figure 10. Sensitive Resources and Hard or Complex Seafloor within the Massachusetts Coastal Zone Boundary – Falmouth ECC



Sources: (3), (4): See full citation of sources on page Att 1-19

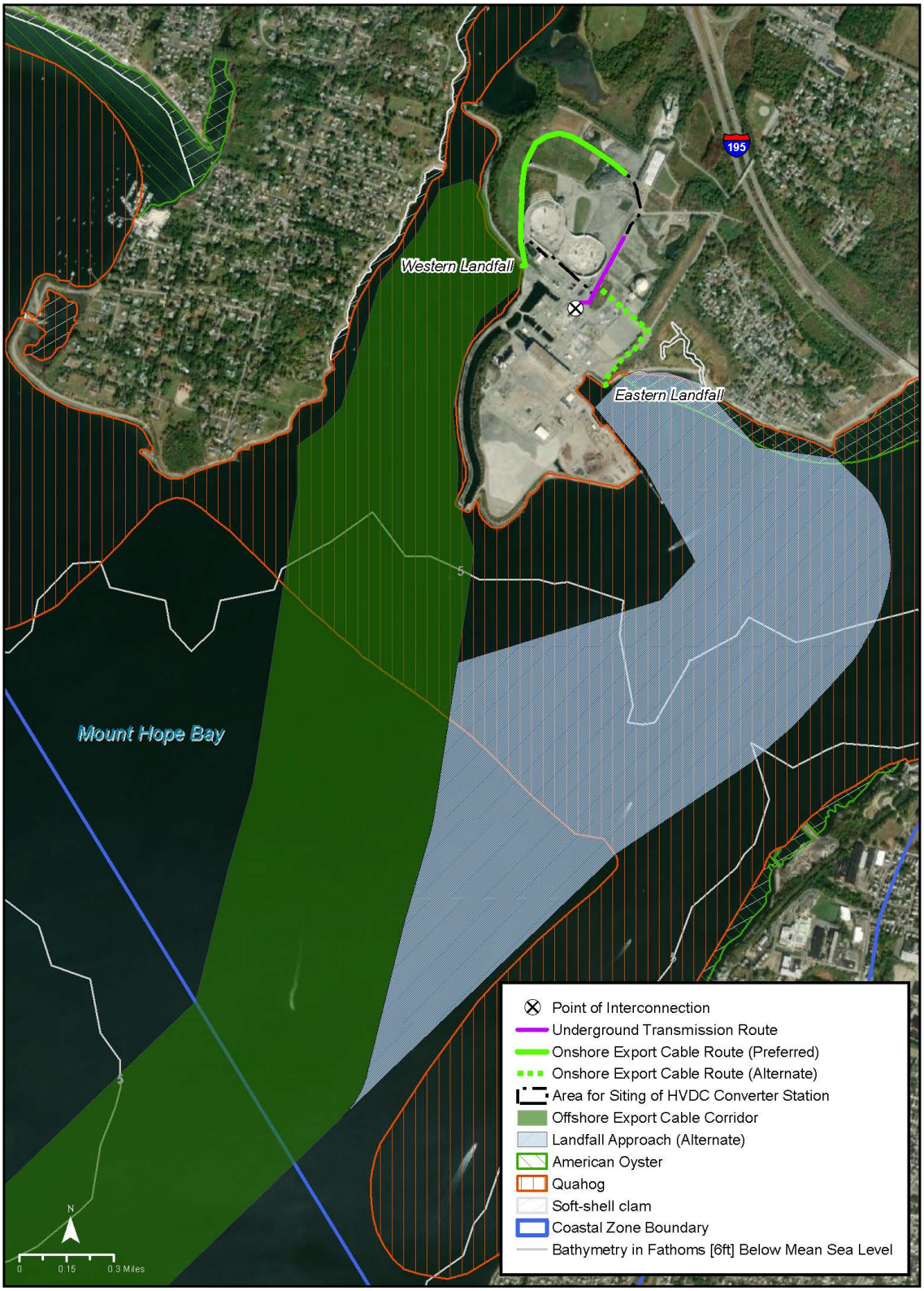
Note: Substrate hard/complex seafloor data is from MA CZM. Mayflower Wind field collected-data of substrate type pending.

Figure 11. Hard or Complex Seafloor within the Massachusetts Coastal Zone Boundary – Brayton Point ECC



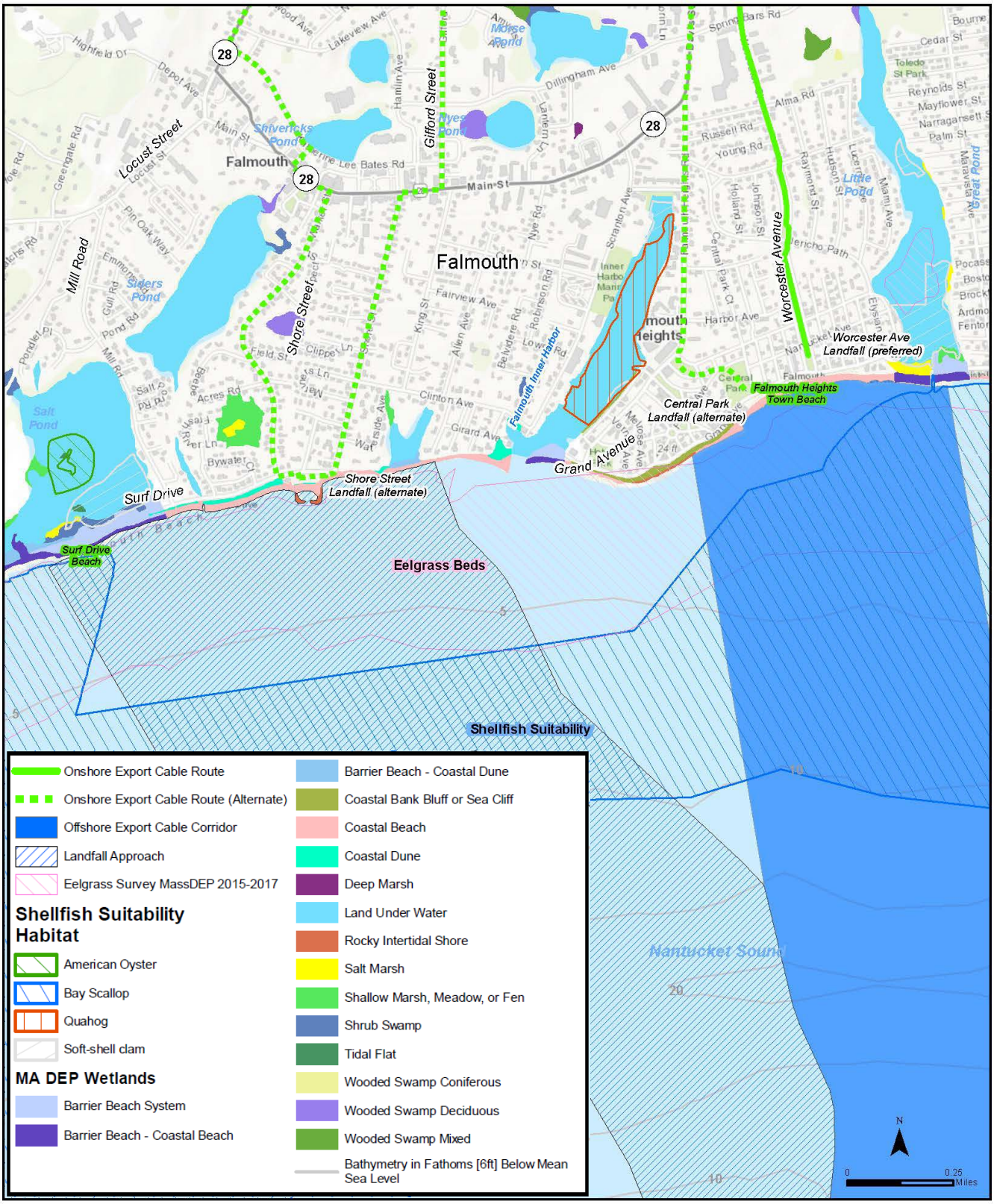
Source: (5): See full citation of source on page Att 1-19

Figure 12. Shellfish Suitability Areas within the Massachusetts Coastal Zone Boundary – Falmouth ECC



Source: (5): See full citation of source on page Att 1-19

Figure 13. Shellfish Suitability Areas within the Massachusetts Coastal Zone Boundary – Brayton Point ECC



Sources: (5), (6), (7): See full citation of sources on page Att 1-19

Note: Mayflower Wind conducted an eelgrass survey in August 2020. See COP Appendix K.

Figure 14. Estimated Location of Sensitive Coastal Habitats, SAV, and Shellfish Suitability Areas at Falmouth Landfall Locations

Source: (7): See full citation of source on page Att 1-19

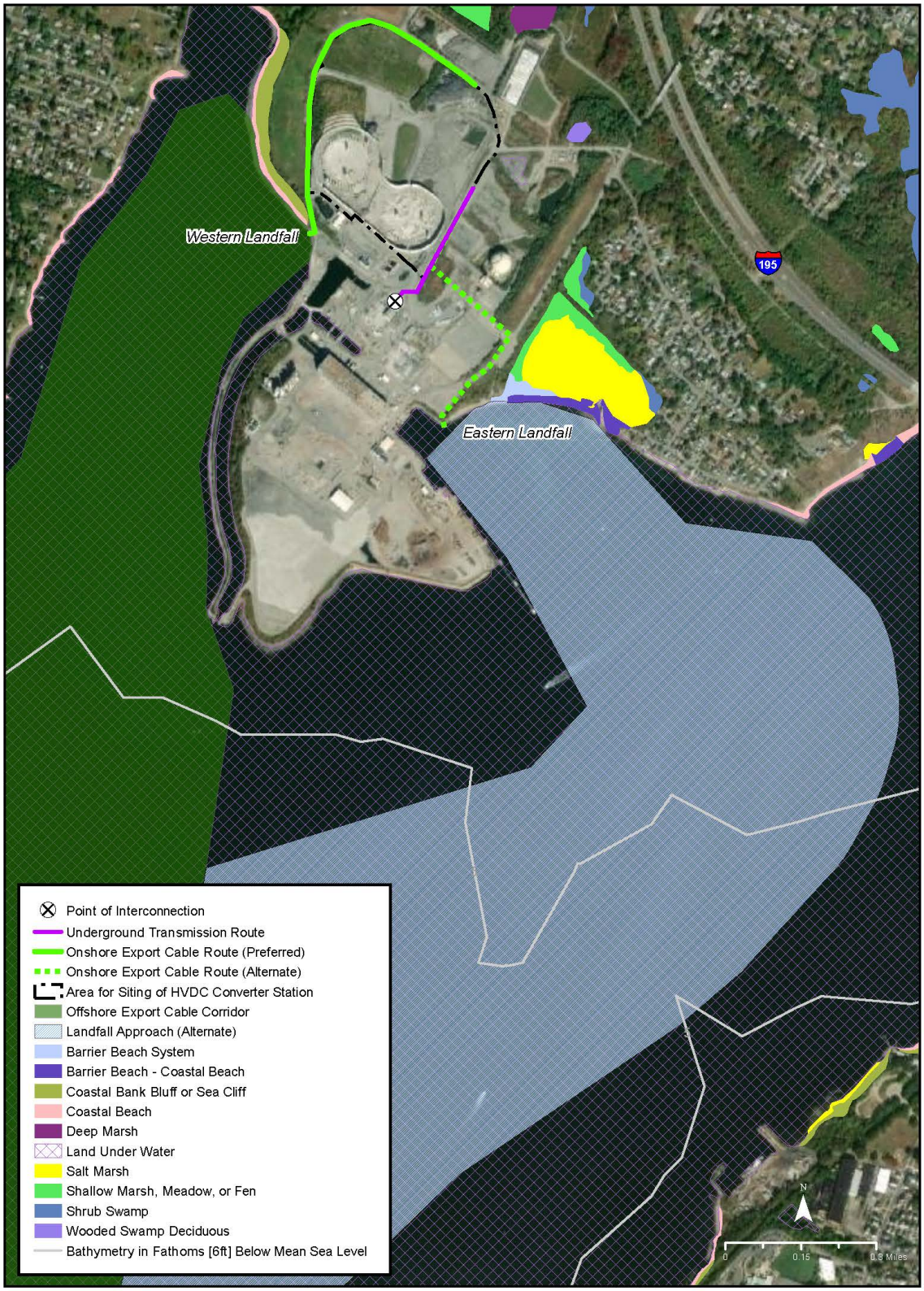
Figure 15. Massachusetts DEP Wetlands and Coastal Resource Areas in the Vicinity of the Shore Street Landfall

Source: (7): See full citation of source on page Att 1-19

Figure 16. Massachusetts DEP Wetlands and Coastal Resource Areas in the Vicinity of the Central Park Landfall

Source: (7): See full citation of source on page Att 1-19

Figure 17. Massachusetts DEP Wetlands and Coastal Resource Areas in the Vicinity of the Worcester Avenue Landfall



Source: (7): See full citation of source on page Att 1-19

Figure 18. Massachusetts DEP Wetlands and Coastal Resource Areas in the Vicinity of Brayton Point Landfall Locations

Data Sources used in Attachment 1 - Figures

1) MA OMP Preliminary Transmission Cable Routes - Massachusetts Office of Coastal Zone Management; Preliminary Areas for Offshore Wind Transmission Cable Corridors, 2015 Massachusetts Ocean Management Plan; Published 1/6/2015; *https://maps.massgis.state.ma.us/czm/moris/metadata/moris_om_prelim_transmsn_cable_poly.htm*

2) MA OMP Areas to Avoid/Areas of Concern – Massachusetts Office of Coastal Zone Management; Areas to Avoid and Areas of Concern for Siting of Potential Offshore Wind Transmission Cables Corridors, 2015 Massachusetts Ocean Management Plan; Published 1/6/2015; *https://maps.massgis.state.ma.us/czm/moris/metadata/moris_om_areas_to_avoid_cables_poly.htm*

3) *MA Dept of CZM; 2015. https://maps.massgis.state.ma.us/czm/moris/metadata/moris_om_hard_complex_seafl_poly.htm, https://maps.massgis.state.ma.us/czm/moris/metadata/moris_om_n_atl_right_w_core_poly.htm, https://maps.massgis.state.ma.us/czm/moris/metadata/moris_om_surficial_sediments_poly.htm*

4) *MassDEP Eelgrass Surveys 2015-2017 – MassDEP; MassDEP Eelgrass 2015-2017; Published 6/2018; https://www.mass.gov/info-details/massgis-data-massdep-eelgrass-2015-2017*

5) *MassGIS, MA Dept of CZM, NOAA; Shellfish Suitability Areas; 05/2011. Shellfish Suitability Areas; 05/2011; https://www.mass.gov/info-details/massgis-data-shellfish-suitability-areas*

6) *MassDEP Eelgrass Surveys 2015-2017 – MassDEP; MassDEP Eelgrass 2015-2017; Published 6/2018; https://www.mass.gov/info-details/massgis-data-massdep-eelgrass-2015-2017*

7) *MassDEP Wetlands – MassDEP; MassDEP Wetlands (2005); Published 2017; https://www.mass.gov/info-details/massgis-data-massdep-wetlands-2005*

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

December 1, 2021

Michael Brown
Mayflower Wind
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of Mayflower Wind Energy LLC Project and Clean Energy Resource - Bureau of Ocean Energy Management (BOEM) Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) received your consistency certification and required necessary data and information for the proposed project on November 30, 2021. CZM also obtained a copy of the Construction and Operations Plan (COP), upon which this review will be conducted. The Mayflower Wind Project is proposed to develop an offshore wind energy facility within lease OCSA-0521 with up to 149 positions for a combination of wind turbine generators (WTG) (up to 147) and offshore substation platforms (up to five) sited in a 1 nautical mile (nm) x 1 nm grid layout across the 127,388-acre site. The proposed project also includes inter-array cables connecting the WTGs, a station to convert alternating current (AC) power to direct current (DC) power depending upon the landfall location, and as many as six cables in up to two offshore export cable corridors (OECC). The COP considers multiple landing sites for the offshore transmission cables; three sites in Falmouth, Massachusetts (Worcester Avenue, Shore Street, and Central Park Court), two sites in Somerset, Massachusetts (the western and eastern sides of Brayton Point), and an intermediate landfall in Portsmouth, Rhode Island at Aquidneck Island. The OECC to Falmouth would include up to five cables, including up to four power cables and one communications cable while the OECC to Somerset would include up to six cables, including up to four power cables and two communications cables. Using the largest WTGs available (currently 15 megawatts (MW)), at buildout the site could generate up to 2,235 MW. The purpose of this letter is to provide you with public notice, scheduling, and other procedural requirements pursuant to National Oceanic and Atmospheric Administration's (NOAA) Coastal Zone Management Act (CZMA) regulations (15 CFR 923 *et seq.*), NOAA's Federal Consistency Regulations (15 CFR 930 *et seq.*), and Massachusetts CZM's Coastal Zone Management Program regulations (301 CMR 20 *et seq.*).

CZM will publish notice that this proposed project is undergoing federal consistency review in the next edition of the *Environmental Monitor,* December 22, 2021. The publication date of that issue of the *Monitor* will commence a 21-day public comment period. Enclosed please find a copy of the review schedule. CZM must issue a consistency decision within six months of commencement of review. If, after three months, CZM has been unable to complete the review, CZM will notify you of outstanding issues or information needed to complete the review. As a networked program, the authorities and expertise of other state agencies are integrated and coordinated in CZM's review of projects to ensure compliance with the policies of the approved coastal program. Because consistency with CZM's enforceable policies cannot be achieved without compliance with their underlying state authorities, CZM will generally not issue a consistency decision until the networked agencies have completed their reviews of license and permits applications identified as necessary data and information.

To keep the review timely, it is recommended that you forward copies of licenses, permits, or other authorizations to CZM as you receive them. If necessary, CZM will contact you in five months to determine whether the review will be completed within the six-month review period, or whether a stay of the review period is recommended.

Note: It is the responsibility of the project proponent to publish a public notice of the federal consistency review by non-electronic means (e.g. local newspaper) concurrently with the public notice published in the *Environmental Monitor*.

Pursuant to the CZMA and NOAA's regulations, a federal agency cannot authorize that any work commence under the federal permit unless the federal permitting agency receives a consistency concurrence letter from CZM for the proposed project, or, if CZM objects and the project proponent appeals CZM's objection to the U.S. Secretary of Commerce and the Secretary overrides CZM's objection.

Communications regarding CZM's federal consistency review of the Mayflower Wind project should be directed to Bob Boeri, at Robert.Boeri@mass.gov.

Sincerely,

Robert L. Boeri
Project Review Coordinator

RLB/pb
Enclosure
CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jim Boyd, RI CRMC
Todd Callaghan, MACZM

CZM Federal Consistency Review Schedule
for an Activity Requiring Federal License or Permit*

Review Steps

1.	*Document Receipt*	
(a)	Received consistency certification and necessary data and information on	November 30, 2021
(b)	Received copy of federal permit application on	November 30, 2021
(c)	CZM federal consistency review will begin on	November 30, 2021
2.	*Public Notice*	
(a)	Notice of the initiation of this federal consistency review will appear in the next edition of the MEPA *Monitor* which will appear on or about	December 22, 2021
(b)	Publication in the *Monitor* begins a 21 day public comment period which will close on or about	January 13, 2022
3.	Applicant and federal permitting agency will be notified of review status and the basis for any further delay within 3 months of the commencement of review. Last date for review status notification is	March 2, 2022
4.	CZM will contact applicant after 5 months to determine whether all networked state agency reviews will be concluded within the review period or whether the review period should be stayed; this will occur no later than	April 30, 2022
5.	CZM must issue its consistency decision within 6 months of commencement of our review. The review period closes and a consistency decision will be issued no later than	May 31, 2022

* 301 CMR 20.04, 15 CFR 930.50 - 930.66

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

February 18, 2022

Michael Brown
Mayflower Wind Energy LLC
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of Mayflower Wind Energy LLC Project and Clean Energy Resource - Bureau of Ocean Energy Management (BOEM) Action; Massachusetts.

Dear Mr. Brown:

Pursuant to 15 CFR § 930.57, the Massachusetts Office of Coastal Zone Management (CZM) is currently reviewing the proposed Mayflower Wind Energy LLC (Mayflower Wind) project to construct and operate an offshore wind energy facility within lease OCSA-0521 with up to 149 positions for a combination of wind turbine generators (WTG) (up to 147) and offshore substation platforms (up to five) sited in a 1 nautical mile (nm) x 1 nm grid layout across the 127,388-acre site. The proposed project also includes inter-array cables connecting the WTGs, a station to convert alternating current (AC) power to direct current (DC) power depending upon the landfall location, and up to six cables in the Brayton Point offshore export cable corridor (ECC) and up to five cables in the Falmouth ECC. The project considers multiple landing sites for the offshore transmission cables; two sites in Falmouth, Massachusetts (Worcester Avenue and Central Park Court), two sites in Somerset, Massachusetts (the western and eastern sides of Brayton Point), and an intermediate landfall in Portsmouth, Rhode Island at Aquidneck Island. CZM received your completed federal consistency certification package on November 30, 2021, with a consistency decision originally due on May 31, 2022. Subsequent to that filing, CZM and Mayflower Wind entered into a stay agreement, with the stay beginning on December 30, 2021, with CZM's review re-starting on December 30, 2022, and completed by May 31, 2023.

CZM's federal consistency review is ongoing. As a networked program, the authorities and expertise of other state agencies are integrated and coordinated in CZM's review of projects to ensure compliance with the policies of our approved coastal program. Because consistency with CZM's enforceable policies cannot be achieved without compliance with their underlying state authorities, CZM will generally not issue a consistency decision until our networked agencies have completed their reviews of license, permit, and certificate applications identified as necessary data and information. Our records indicate the review by the Massachusetts Environmental Policy Act (MEPA) office has not been completed. Our records also indicate that the applications for the Massachusetts Department of Environmental Protection's (MassDEP) 401 Water Quality Certificate and Chapter 91 License for the proposed project have not yet been filed, and that MassDEP's review has not commenced. In addition, our records also indicate that petitions to construct, operate, and maintain transmission facilities have been filed with the Energy Facilities Siting Board (EFSB) and that EFSB review has not been completed. CZM looks forward to reviewing subsequent filings under NEPA for consistency with state enforceable policies. As transmitted to Mayflower Wind on February 18, 2022, CZM will also need the requested additional information on our Ports and Harbors enforceable policies necessary to

complete this review. If we do not receive the additional information, MEPA filings, state licenses and permits, NEPA documentation before December 30, 2022, CZM will contact you regarding a stay in the federal consistency review period, pursuant to NOAA's CZMA federal consistency regulations at 15 CFR 930.60(b).

Pursuant to applicable provisions of NOAA's Federal Consistency Regulations at 15 CFR 930.63, CZM may object to the consistency certification if any application for a specified state permit is denied, or if the applicant has failed to provide copies of final decisions on all applications identified as necessary data and information. As part of a consistency concurrence, CZM may stipulate conditions as may be necessary to achieve consistency with enforceable policies pursuant to provisions of NOAA's Federal Consistency Regulations (15 CFR 930.4, and 930.62). In the event an applicable plan, project proposal, or application is not modified accordingly, such conditional concurrence shall be treated as an objection to a federal consistency certification.

Communications regarding CZM's federal consistency review of the proposed project should be directed to Bob Boeri, at Robert.Boeri@state.ma.us.

Sincerely,

Robert Boeri
Project Review Coordinator

RLB/pb
CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
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Re: CZM Federal Consistency Review of Mayflower Wind Energy LLC Project and Clean Energy Resource - Bureau of Ocean Energy Management (BOEM) Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) is currently reviewing the proposed Mayflower Wind Energy LLC (Mayflower Wind) project to construct and operate an offshore wind energy facility within lease OCSA-0521 with up to 149 positions for a combination of wind turbine generators (WTG) (up to 147) and offshore substation platforms (up to five) sited in a 1 nautical mile (nm) x 1 nm grid layout across the 127,388-acre site. The proposed project also includes inter-array cables connecting the WTGs, a station to convert alternating current (AC) power to direct current (DC) power depending upon the landfall location, and up to six cables in the Brayton Point offshore export cable corridor (ECC) and up to five cables in the Falmouth ECC. The project considers multiple landing sites for the offshore transmission cables; two sites in Falmouth, Massachusetts (Worcester Avenue and Central Park Court), two sites in Somerset, Massachusetts (the western and eastern sides of Brayton Point), and an intermediate landfall in Portsmouth, Rhode Island at Aquidneck Island. CZM received your completed federal consistency certification package on November 30, 2021, with a consistency decision originally due on May 31, 2022. Subsequent to that filing, CZM and Mayflower Wind entered into a stay agreement, with the stay beginning on December 30, 2021, with CZM's review re-starting on December 30, 2022, and completed by May 31, 2023.

In our review of the necessary data and information submitted for the federal consistency review of the proposed wind energy project, we have concluded that additional information is necessary to complete the determination of the proposed project's consistency with enforceable program policies of the Massachusetts coastal management program. Listed below is the applicable enforceable policy, with an excerpt of the relevant policy elements from the *Massachusetts Office of Coastal Zone Management Policy Guide* (Policy Guide) and the supplemental information requested.

Ports and Harbor Policy #4

Ports and harbors hold important state, regional, and national significance because they possess critical characteristics necessary for the successful operation of the Massachusetts maritime industry including access to deep navigation channels, flat lands appropriate for industrial uses, connections to utilities and road/rail networks, and developed shorelines characterize which facilitate the transfer of goods from ship to shore. The enforceable Ports and Harbors Policies (#1 - 4) specifically relate to the dredging and disposal of dredged material, public benefit priorities for channel dredging, Designated Port Area management, and *the protection of water-dependent uses.*

Ports and Harbors Policy #4 states the need to preserve and enhance waterways for water dependent uses and vessel-related activities. However, the policy recognizes that protection of waterways and the water dependent uses operating within them is challenging given limited resources and the constant demand for redevelopment that may not be compatible with existing water dependent uses. The policy addresses this challenge by providing opportunities for protection by appropriately siting new uses so they do not interfere with existing operating water dependent uses. Additionally, the policy states that where existing water dependent uses are disrupted as a result of new water dependent uses at an off-site location within the proximate vicinity of the project site, adequate mitigation shall be provided.

The proposed Mayflower Wind project will be constructed in areas of state and federal waters where Massachusetts commercial and for-hire/charter fishing is known to occur as evidenced by information and data provided through the state and federal review processes and corroborated by fisheries agencies and the Massachusetts commercial fishing industry. Massachusetts commercial and for-hire charter fishing activity currently operating in the project area will be disrupted by the proposed project because fishing activity will be precluded in parts of the project area during construction, the abundance or availability of fish may be temporarily displaced during construction, fishing activities may be restricted after construction, and landings may be affected throughout operation of the project.

Information requested

For CZM to determine the consistency of the project with the enforceable program policies of the Massachusetts coastal management program, Mayflower Wind should provide an assessment of the potential economic impact of the project on the water dependent uses of Massachusetts, specifically addressing the potential economic exposure of the Massachusetts commercial and for-hire/charter fishing industries. The assessment should consider potential changes in fishing across ports, gear type, and fish species as a result of the project. In addition to the assessment of potential economic impacts, Mayflower Wind should develop and provide a mitigation package to the Massachusetts commercial fishing industry to offset disruption, changes, or loss in fishing resulting from the project. The assessment of economic exposure and the mitigation package should incorporate data and input provided by BOEM, the National Oceanic and Atmospheric Administration (NOAA), the Massachusetts Division of Marine Fisheries (MADMF), CZM, the Massachusetts fishing industry, and other data sources, as applicable.

If you have questions about the federal consistency review process, please contact me at the above address or robert.boeri@mass.gov.

Sincerely,

Robert Boeri
Project Review Coordinator

CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS

Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jim Boyd, RI CRMC
Todd Callaghan, CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

December 16, 2021

Michael Brown
Mayflower Wind
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of Mayflower Wind Energy LLC Project and Clean Energy Resource - Bureau of Ocean Energy Management (BOEM) Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) is currently reviewing the Mayflower Wind Project to develop an offshore wind energy facility within lease OCSA-0521 with up to 149 positions for a combination of wind turbine generators (WTG) (up to 147) and offshore substation platforms (up to five) sited in a 1 nautical mile (nm) x 1 nm grid layout across the 127,388-acre site. The proposed project also includes inter-array cables connecting the WTGs, a station to convert alternating current (AC) power to direct current (DC) power depending upon the landfall location, and up to six cables in the Brayton Point offshore export cable corridor (ECC) and up to five cables in the Falmouth ECC. The project considers multiple landing sites for the offshore transmission cables; two sites in Falmouth, Massachusetts (Worcester Avenue and Central Park Court), two sites in Somerset, Massachusetts (the western and eastern sides of Brayton Point), and an intermediate landfall in Portsmouth, Rhode Island at Aquidneck Island. CZM received the completed federal consistency certification package on November 30, 2021, and a consistency determination is presently due on May 31, 2022.

CZM's federal consistency review is ongoing. As a networked program, the authorities and expertise of other state agencies are integrated and coordinated in CZM's review of projects to ensure compliance with the policies of our approved coastal program. Because consistency with CZM's enforceable policies cannot be achieved without compliance with their underlying state authorities, CZM will generally not issue a consistency decision until our networked agencies have completed their reviews of necessary data and information. This includes the final signed Chapter 91 licenses and Section 401 Water Quality Certificates to be issued by the Massachusetts Department of Environmental Protection for those portions of the project in state waters.

As discussed, the Coastal Zone Management Act Federal Consistency Regulations at 15 CFR 930.60(b) allow for a stay of the six-month review period, if mutually agreed upon by both the applicant and the state agency. The rules hold that the stay shall only be for a defined period and the agreement must state the specific date on which the stay will end.

In order for CZM to review the state licenses and certificates as well as the information to be provided in the Draft Environmental Impact Statement to ensure that the proposed activity is consistent with CZM's enforceable policies, we propose a stay of the review, beginning on December 30, 2021, with CZM's review re-starting on December 30, 2022, and completed by May 31, 2023. Unless Mayflower and CZM mutually agree in writing to another later date, CZM will issue its consistency determination on or before May 31, 2023. Please indicate agreement to this schedule by signing below and returning this letter to CZM.

Pursuant to applicable provisions of NOAA's Federal Consistency Regulations at 15 CFR 930.63, CZM may object to the consistency certification if the project fails to meet the standards of CZM's enforceable policies, if any application for a specified state permit is denied, or if the applicant has failed to provide copies of final decisions on all applications identified as necessary data and information. CZM may also stipulate conditions as may be necessary to achieve consistency with enforceable policies pursuant to provisions of NOAA's Federal Consistency Regulations (15 CFR 930.4, and 930.62). In the event an applicable plan, project proposal, or application is not modified accordingly, such conditional concurrence shall be treated as an objection to a federal consistency certification.

If you have questions about the federal consistency review process, please contact me at the above address or at robert.boeri@mass.gov.

Sincerely,

Robert L. Boeri

Robert Boeri
Project Review Coordinator

RLB/pb
CZM #9221

Agreed to by Applicant _____

Michael Brown
Mayflower Wind

Cc: Genevieve Brune, BOEM
Brian Krevor, BOEM
Dan McKiernan, MA DMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, US ACE
Timothy Timmermann, US EPA
Jim Boyd, RI CRMC
Todd Callaghan, MA CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

May 5, 2023

Francis Slingsby, CEO
SouthCoast Wind Energy LLC
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Slingsby:

The Massachusetts Office of Coastal Zone Management (MACZM) and SouthCoast Wind Energy LLC (SouthCoast Wind) hereby agree as follows.

Pursuant to Section 307 of the Coastal Zone Management Act (CZMA) and 15 CFR § 930.57, SouthCoast Wind filed a federal consistency certification with the MACZM on November 30, 2021, for the proposed SouthCoast Wind Farm project. The proposed project is a listed activity subject to MACZM federal consistency review pursuant to the CZMA, and the CZMA's implementing regulations at 15 C.F.R. Part 930, Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit.

In accordance with 15 CFR § 930.60 (b), and in consideration of the parties' mutual interest that the State has additional time to fully assess the proposed SouthCoast Wind project's consistency with the State's enforceable policies (requested additional information regarding consistency with the Ports and Harbors enforceable policies, as well as the State's request to review information to be provided in the Draft Environmental Impact Statement), the MACZM and SouthCoast Wind mutually agree to the following dates and to stay the MACZM CZMA six-month review period as specified herein.

- Date the MACZM 6-month review period commenced: November 30, 2021
- Date the 6-month review period was to end: May 31, 2022
- Date the first stay began: December 30, 2021
- Date the first stay ended: December 30, 2022
- Date the decision was due: May 31, 2023
- Date the second stay begins: May 5, 2023
- Date that the second stay ends: November 5, 2023

  (26 days remaining in the 6-month review period)
- Date the state's consistency decision is due: December 1, 2023

The MACZM will issue its federal consistency decision on or before December 1, 2023**.** The MACZM and SouthCoast Wind mutually agree that the MACZM may issue its consistency decision during the stay period and before the end of the stay if the MACZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by MACZM and SouthCoast Wind.

This agreement was made and entered by:

Robert L. Boeri
Project Review Coordinator, MACZM

May 5, 2023
Date

SouthCoast Wind LLC

DocuSigned by:
Francis Slingsby
4758423DE94E469...

Francis Slingsby,
Authorized Person

09-May-2023
Date

CZM #9221

Cc: Genevieve Brune, BOEM
Brian Krevor, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jeff Willis, RI CRMC
Kevin Sloan, RI CRMC
Todd Callaghan, CZM
Hollie Emery, CZM
Lisa Berry Engler, CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

November 8, 2023

Francis Slingsby, CEO
SouthCoast Wind Energy LLC
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Slingsby:

The Massachusetts Office of Coastal Zone Management (CZM) and SouthCoast Wind Energy LLC (SouthCoast Wind) hereby agree as follows.

Pursuant to Section 307 of the Coastal Zone Management Act (CZMA) and 15 CFR § 930.57, SouthCoast Wind filed a federal consistency certification with CZM on November 30, 2021, for the proposed SouthCoast Wind Farm project. The proposed project is a listed activity subject to CZM federal consistency review pursuant to the CZMA, and the CZMA's implementing regulations at 15 C.F.R. Part 930, Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit.

In accordance with 15 CFR § 930.60 (b), and in consideration of the parties' mutual interest that the State has additional time to fully assess the proposed SouthCoast Wind project's consistency with the State's enforceable policies (requested additional information regarding consistency with the Ports and Harbors enforceable policies, as well as the State's request to review information to be provided in the Draft Environmental Impact Statement, and the final issued state licenses and certifications required for those parts of the project that would occur in state waters and state lands), the CZM and SouthCoast Wind mutually agree to the following dates and to stay the CZM CZMA six-month review period as specified herein.

- Date the MACZM 6-month review period commenced: November 30, 2021
- Date the 6-month review period was to end: May 31, 2022
- Date the first stay began: December 30, 2021
- Date the first stay ended: December 30, 2022
- Date the decision was due: May 31, 2023
- Date the second stay began: May 5, 2023
- Date that the second stay ended November 5, 2023
- Date the state's consistency decision was due: December 1, 2023

- Date the third stay begins: November 8, 2023
- Date that the third stay ends: March 18, 2024

  (23 days remaining in the 6-month review period)
- Date the state's consistency decision is due: April 10, 2024

CZM will issue its federal consistency decision on or before April 10, 2024**.** CZM and SouthCoast Wind mutually agree that CZM may issue its consistency decision during the stay period and before the end of the stay if CZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by CZM and SouthCoast Wind.

This agreement was made and entered by:

Robert L. Boeri
Project Review Coordinator, CZM

November 8, 2023
Date

SouthCoast Wind LLC

DocuSigned by:
Francis Slingsby
4758423DE94E469...

Francis Slingsby,
Authorized Person

14-Nov-2023
Date

CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jeff Willis, RI CRMC
Kevin Sloan, RI CRMC
Todd Callaghan, CZM
Hollie Emery, CZM
Lisa Berry Engler, CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

March 26, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) and SouthCoast Wind Energy LLC (SouthCoast Wind) hereby agree as follows.

Pursuant to Section 307 of the Coastal Zone Management Act (CZMA) and 15 CFR § 930.57, SouthCoast Wind filed a federal consistency certification with CZM on November 30, 2021, for the proposed SouthCoast Wind Farm project. The proposed project is a listed activity subject to CZM federal consistency review pursuant to the CZMA, and the CZMA's implementing regulations at 15 C.F.R. Part 930, Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit.

In accordance with 15 CFR § 930.60 (b), and in consideration of the parties' mutual interest that the State has additional time to fully assess the proposed SouthCoast Wind project's consistency with the State's enforceable policies (requested additional information regarding consistency with the Ports and Harbors enforceable policies, as well as the State's request to review information to be provided in the Draft Environmental Impact Statement, and the final issued state licenses and certifications required for those parts of the project that would occur in state waters and state lands), the CZM and SouthCoast Wind mutually agree to the following dates and to stay the CZM CZMA six-month review period as specified herein.

- Date the MACZM 6-month review period commenced: November 30, 2021
- Date the 6-month review period was to end: May 31, 2022
- Date the first stay began: December 30, 2021
- Date the first stay ended: December 30, 2022
- Date the decision was due: May 31, 2023
- Date the second stay began: May 5, 2023
- Date that the second stay ended November 5, 2023
- Date the state's consistency decision was due: December 1, 2023

- Date the third stay began: November 8, 2023
- Date that the third stay ends March 18, 2024
- Date the state's consistency decision was due: April 10, 2024
- Date the fourth stay begins: March 26, 2024
- Date that the fourth stay ends: May 16, 2024

  (15 days remaining in the 6-month review period)
- Date the state's consistency decision is due: May 31, 2024

CZM will issue its federal consistency decision on or before May 31, 2024**.** CZM and SouthCoast Wind mutually agree that CZM may issue its consistency decision during the stay period and before the end of the stay if CZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by CZM and SouthCoast Wind.

This agreement was made and entered by:

Robert L. Boeri
Project Review Coordinator, CZM

March 26, 2024
Date

SouthCoast Wind LLC

DocuSigned by:
Michael Brown
B2F31605ED134D3...

Michael Brown,
Authorized Person

27-Mar-2024
Date

CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jeff Willis, RI CRMC
Kevin Sloan, RI CRMC
Todd Callaghan, CZM
Hollie Emery, CZM
Tyler Soleau, CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

May 15, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
101 Federal Street
Boston, MA 02110

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) and SouthCoast Wind Energy LLC (SouthCoast Wind) hereby agree as follows.

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In accordance with 15 CFR § 930.60 (b), and in consideration of the parties' mutual interest that the State has additional time to fully assess the proposed SouthCoast Wind project's consistency with the State's enforceable policies (requested additional information regarding consistency with the Ports and Harbors enforceable policies, as well as the State's request to review information to be provided in the Draft Environmental Impact Statement, and the final issued state licenses and certifications required for those parts of the project that would occur in state waters and state lands), the CZM and SouthCoast Wind mutually agree to the following dates and to stay the CZM CZMA six-month review period as specified herein.

- Date the MACZM 6-month review period commenced: November 30, 2021
- Date the 6-month review period was to end: May 31, 2022
- Date the first stay began: December 30, 2021
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- Date that the second stay ended November 5, 2023
- Date the state's consistency decision was due: December 1, 2023

- Date the third stay began: November 8, 2023
- Date that the third stay ends March 18, 2024
- Date the state's consistency decision was due: April 10, 2024
- Date the fourth stay began: March 26, 2024
- Date that the fourth stay ends May 16, 2024, 2024
- Date the state's consistency decision was due: May 31, 2024
- Date the fifth stay begins: May 15, 2024
- Date that the fifth stay ends: July 16, 2024

  (15 days remaining in the 6-month review period)
- Date the state's consistency decision is due: July 31, 2024

CZM will issue its federal consistency decision on or before July 31, 2024**.** CZM and SouthCoast Wind mutually agree that CZM may issue its consistency decision during the stay period and before the end of the stay if CZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by CZM and SouthCoast Wind.

This agreement was made and entered by:

Robert L. Boeri — May 15, 2024
Robert L. Boeri
Project Review Coordinator, CZM — Date

SouthCoast Wind LLC

DocuSigned by: Michael Brown B2F31605ED134D3... — 29-May-2024
Michael Brown,
Authorized Person — Date

CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS
Alison Verkade, NMFS
Julie Crocker, NMFS
Christine Jacek, USACE
Timothy Timmermann, USEPA
Jeff Willis, RI CRMC

Kevin Sloan, RI CRMC
Todd Callaghan, CZM
Hollie Emery, CZM
Tyler Soleau, CZM
Alison Bezius, CZM

SOUTHCOAST WIND

SouthCoast Wind Energy LLC
101 Federal Street
Boston, MA 02110

99 South Main Street
Fall River, MA 02721

May 15, 2024

Mr. Robert L. Boeri
Project Review Coordinator
The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Office of Coastal Zone Management (CZM)
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (SouthCoast Wind) Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts; CZM #9221

Dear Mr. Boeri,

SouthCoast Wind Energy LLC (SouthCoast Wind) is providing this letter in response to your request to provide a status update on the Falmouth Connector Project, which has been downgraded to a "variant" option in the SouthCoast Wind Construction and Operations Plan (COP). As discussed, it is SouthCoast Wind's intention to utilize Brayton Point as the point of interconnection (POI) for both Project 1 and Project 2. In addition, this letter is to acknowledge that the Massachusetts Office of Coastal Zone Management's (MA CZM) Federal Consistency Determination, currently in progress, will not provide authorization, in the form of the Federal Consistency Concurrence, for the Falmouth portion of the Project (Falmouth export cable corridor, landfall, and onshore project facilities). We further understand that, should SouthCoast Wind need to use the Falmouth variant in the future, we will work with MA CZM to receive an updated Federal Consistency Determination which includes the Falmouth Project components.

As discussed with MA CZM, SouthCoast Wind proposes to develop the entire Lease Area as an offshore wind renewable energy project, referred to as "the Project." Following BOEM's Project Design Envelope (PDE) guidelines, SouthCoast Wind has selected a range of Project components and activities to be included in its COP. The Project components and locations described within the SouthCoast Wind PDE have been selected based on environmental and engineering site characterization studies completed to date and are informed by discussions with stakeholders, regulators, and the supply chain. These will be refined in the Facility Design Report and Fabrication and Installation Report, which will be reviewed by BOEM pursuant to 30 CFR §§ 285.700-702 before the commencement of installation.

In September 2023, SouthCoast Wind refined its COP PDE to downgrade the Falmouth ECC, landfall, and onshore project area to a "variant" option. The Falmouth variant option remains in the COP and other federal permits to be used for Project 2 only in the scenario that technical, logistical, grid

interconnection, or other unforeseen challenges arise during the design and engineering phase that prevent Project 2 from making interconnection at Brayton Point.

Due to uncertainty around ISO-New England (ISO-NE) grid capacity and the extent and timing of necessary grid upgrades on Cape Cod, SouthCoast Wind's preferred POI for Project 2 is Brayton Point. As mentioned above, should SouthCoast Wind need to use the Falmouth variant in the future for Project 2, we will work with MA CZM to ensure an updated Federal Consistency Determination properly includes the Falmouth Project components.

We appreciate MA CZM's timely attention to SouthCoast Wind's Federal Consistency Review, and we hope that the status update provided herein addresses your request for information and questions about the downgrade of the Falmouth Connector Project to a variant in the COP.

Sincerely,

Jennifer Flood
Permitting Director
SouthCoast Wind Energy LLC

Cc:
Alison Brizius, Director, CZM
Tyler Soleau, CZM
Sean Duffey, CZM

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

July 24, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza
Suite 205
Boston, MA 02108

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Brown:

The Massachusetts Office of Coastal Zone Management (CZM) and SouthCoast Wind Energy LLC (SouthCoast Wind) hereby agree as follows.

Pursuant to Section 307 of the Coastal Zone Management Act (CZMA) and 15 CFR § 930.57, SouthCoast Wind filed a federal consistency certification with CZM on November 30, 2021, for the proposed SouthCoast Wind Farm project. The proposed project is a listed activity subject to CZM federal consistency review pursuant to the CZMA, and the CZMA's implementing regulations at 15 C.F.R. Part 930, Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit.

In accordance with 15 CFR § 930.60 (b), and in consideration of the parties' mutual interest that the State has additional time to fully assess the proposed SouthCoast Wind project's consistency with the State's enforceable policies (requested additional information regarding consistency with the Ports and Harbors enforceable policies, as well as the State's request to review information to be provided in the Draft Environmental Impact Statement, and the final issued state licenses and certifications required for those parts of the project that would occur in state waters and state lands), the CZM and SouthCoast Wind mutually agree to the following dates and to stay the CZM CZMA six-month review period as specified herein.

- Date the MACZM 6-month review period commenced: November 30, 2021
- Date the 6-month review period was to end: May 31, 2022
- Date the first stay began: December 30, 2021
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- Date that the second stay ended November 5, 2023
- Date the state's consistency decision was due: December 1, 2023

- Date the third stay began: November 8, 2023
- Date that the third stay ends March 18, 2024
- Date the state's consistency decision was due: April 10, 2024
- Date the fourth stay began: March 26, 2024
- Date that the fourth stay ends May 16, 2024, 2024
- Date the state's consistency decision was due: May 31, 2024
- Date the fifth stay begins: May 15, 2024
- Date that the fifth stay ended: July 16, 2024
- Date the sixth stay begins: July 24, 2024
- Date that the sixth stay ends: August 23, 2024

  (7 days remaining in the 6-month review period)
- Date the state's consistency decision is due: August 30, 2024

CZM will issue its federal consistency decision on or before August 30, 2024**.** CZM and SouthCoast Wind mutually agree that CZM may issue its consistency decision during the stay period and before the end of the stay if CZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by CZM and SouthCoast Wind.

This agreement was made and entered by:

Sean Duffey
Project Review Coordinator, CZM

July 24, 2024
Date

SouthCoast Wind LLC

DocuSigned by:
Michael Brown
B2F31605ED134D3...

Michael Brown,
Authorized Person

25-Jul-2024
Date

CZM #9221

Cc: Genevieve Brune, BOEM
Dan McKiernan, MADMF
Peter Burns, NMFS
Susan Tuxbury, NMFS

Alison Verkade, NMFS
Julie Crocker, NMFS
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THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

August 28, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza
Suite 205
Boston, MA 02108

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

Dear Mr. Brown:

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- Date the second stay began: May 5, 2023
- Date that the second stay ended: November 5, 2023
- Date the state's consistency decision was due: December 1, 2023

- Date the third stay began: November 8, 2023
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- Date the state's consistency decision was due: April 10, 2024
- Date the fourth stay began: March 26, 2024
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- Date that the seventh stay ends: September 28, 2024

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SouthCoast Wind LLC

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28-Aug-2024
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CZM #9221

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100 Cambridge Street, Suite 900, Boston, MA 02114

September 27, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza
Suite 205
Boston, MA 02108

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

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- Date the eighth stay begins: September 27, 2024
- Date that the eighth stay ends: October 11, 2024

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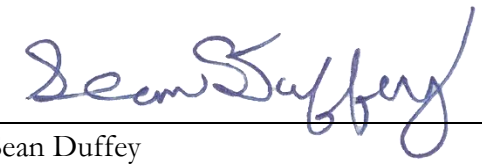

Sean Duffey
Project Review Coordinator, CZM

September 27, 2024
Date

SouthCoast Wind LLC

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27-Sep-2024

Michael Brown,
Authorized Person

Date

CZM #9221

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THE COMMONWEALTH OF MASSACHUSETTS
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OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

October 15, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza
Suite 205
Boston, MA 02108

Re: CZM Federal Consistency Review of SouthCoast Wind Energy LLC (formerly known as Mayflower Wind Energy LLC Project and Clean Energy Resource) Proposed Wind Farm Project - Subpart E – Consistency for Outer Continental Shelf (OCS) Exploration, Development and Production Activities and Subpart D – Consistency for Activities Requiring a Federal License or Permit Action; Massachusetts.

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- Date the ninth stay begins: October 15, 2024
- Date that the ninth stay ends: October 18, 2024

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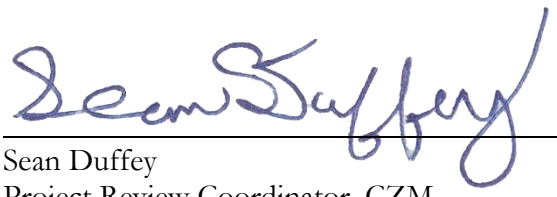

Sean Duffey
Project Review Coordinator, CZM

October 15, 2024
Date

SouthCoast Wind LLC

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16-Oct-2024

Michael Brown,
Authorized Person

Date

DS
DH

CZM #9221

Cc: Genevieve Brune, BOEM
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October 17, 2024

Michael Brown, CEO
SouthCoast Wind Energy LLC
3 Center Plaza
Suite 205
Boston, MA 02108

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- Date that the ninth stay ended: October 18, 2024
- Date the state's consistency decision was due: October 18, 2024
- Date the tenth stay begins: October 18, 2024
- Date that the tenth stay ends: October 25, 2024

  (0 days remaining in the 6-month review period)
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CZM will issue its federal consistency decision on or before October 25, 2024**.** CZM and SouthCoast Wind mutually agree that CZM may issue its consistency decision during the stay period and before the end of the stay if CZM determines it has received sufficient information and completed its review. Any revocation or modification (including extension) of this agreement shall require mutual consent by CZM and SouthCoast Wind.

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October 17, 2024
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SOUTHCOAST WIND

SouthCoast Wind Project Update – MA FWG

Sam Asci

Fisheries Manager

May 10, 2024

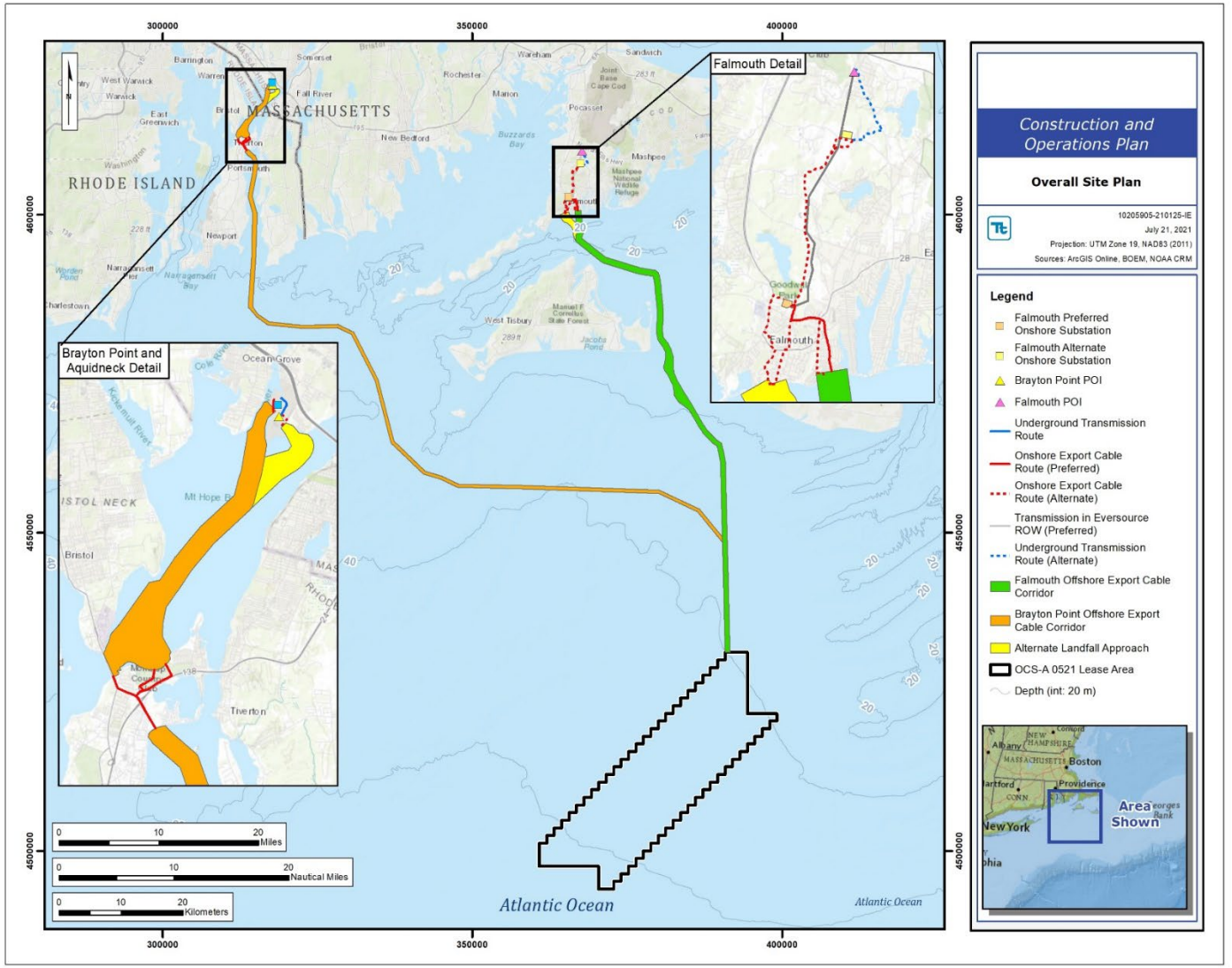
SouthCoast Wind Project Update

General Updates

- SouthCoast Wind fully owned by Ocean Winds (formerly JV of OW & Shell New Energies)
- Recent submission to Tri-State (MA, RI, CT) Energy Offtake Solicitation

Permitting Updates

- Rhode Island Federal Consistency Concurrence – *December 2023*
- MA CZM Federal Consistency Review – *in progress*
- BOEM Record of Decision – *anticipated December 2024*



SouthCoast Wind MA Fisheries Compensation

- **$4,217,000 in direct compensation** for MA commercial and for-hire fishermen
  - Based on WHOI assessment of exposure and impact to MA fishermen
  - Supported by Third Party Administrator (TBD)
  - Eligibility to be developed with TPA, MA DMF/CZM
  - Mechanism to roll funds into MA Fisheries Innovation Fund if necessary
- **$1,500,000 to Massachusetts Fisheries Innovation Fund**
  - Existing, grant-style program for community level support
    - e.g., support for fisheries science focusing on impacts of OSW, safety/training opportunities, vessel upgrades, gear innovation, etc.
- **$5,717,000 in total compensation**

Thank You

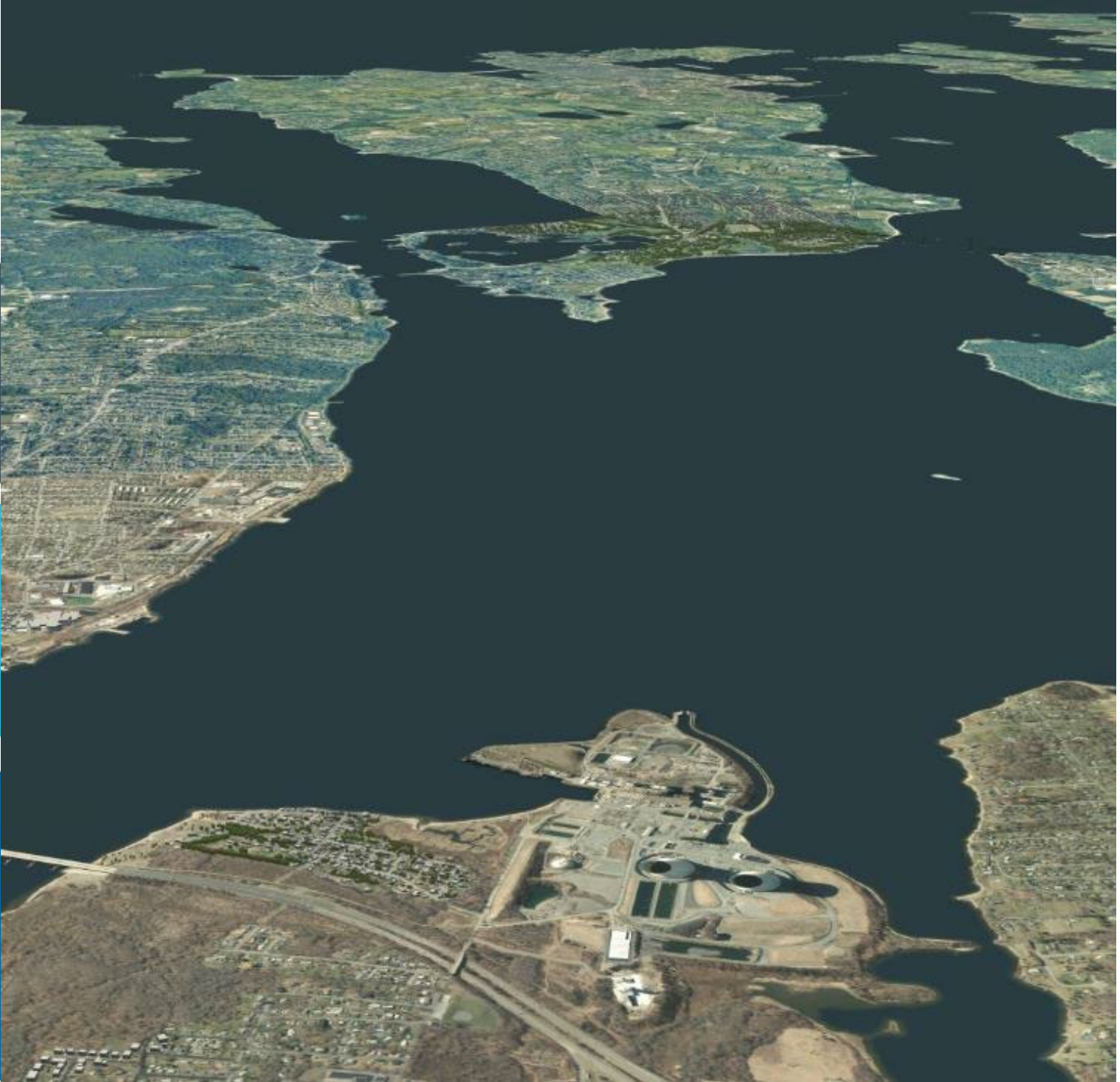
Questions and Comments?

samuel.asci@southcoastwind.com

@SouthCoastWind

www.linkedin.com/company/southcoast-wind/

www.youtube.com/c/SouthCoastWind



SOUTHCOAST WIND

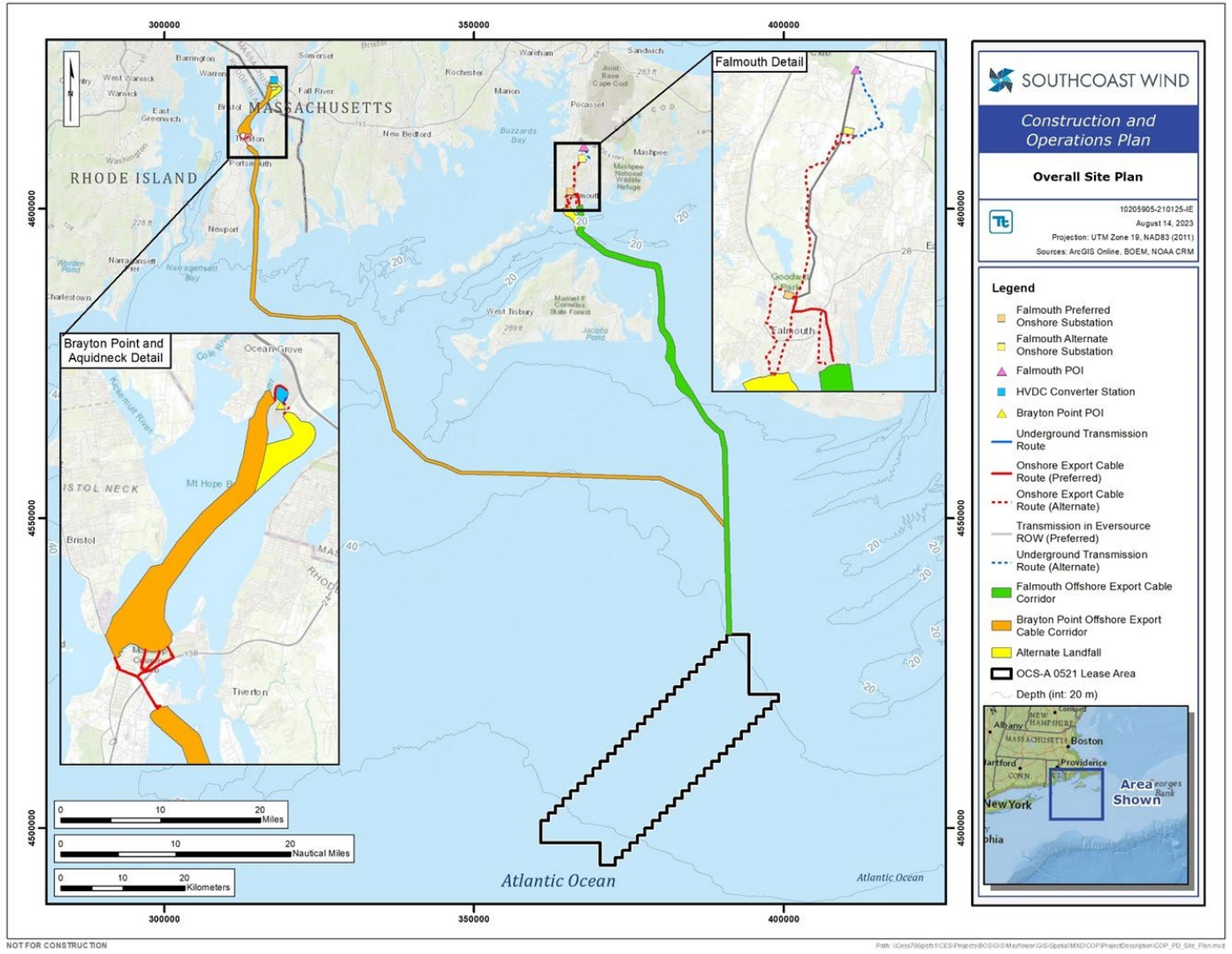
Fisheries Economic Exposure Review

MA Fisheries Working Group

February 9, 2024

SouthCoast Wind Exposure Analysis

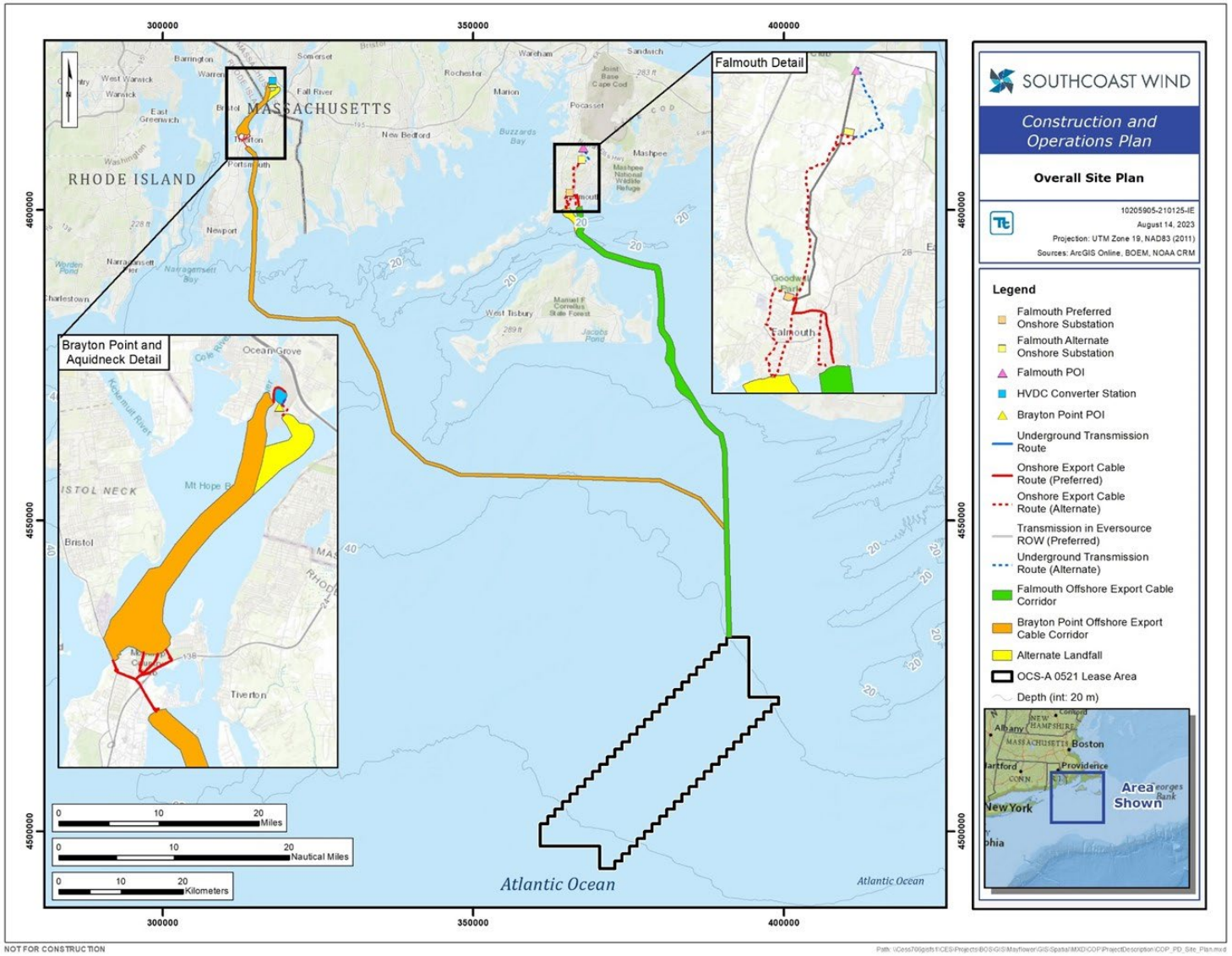
- **Lease Area**
  - Two projects for total of ~2,400 MW generating capacity
- **Export Cable Corridors**
  - Brayton Point and Falmouth ECCs both included in COP Project Design Envelope
  - **Preferred approach is both Projects utilize Brayton Point ECC**
- **Fisheries Economic Exposure Analysis (WHOI)**
  - To estimate economic impacts to MA fishermen, will be basis for compensatory mitigation measures
  - Analysis conservatively reflects both Projects using Brayton Point ECC



SouthCoast Wind Fisheries Exposure Massachusetts

Hauke L. Kite-Powell, Di Jin, and Michael Weir
Marine Policy Center, Woods Hole Oceanographic Institution
9 February 2024

SouthCoast Wind project and fisheries data areas



What is the Massachusetts commercial fishing landed value and charter fishing revenue exposed to development of the SouthCoast Wind Project?

What are indirect and induced effects associated with these landings/ revenue?

Baseline Commercial Landings from SouthCoast Project Areas (2023$)

Table 12. Estimated annual economic impact in Massachusetts (all values in 2023$)

Area	State	Average value of landings/year: VTR data only (Table 11, row 1)	Average value of landings/year: with lobster & Jonah crab adjustment	Average value of landings/year: with dockside sales adjustment (15% premium on RI lobster & JC landings)	Total impact/year "dockside sales" column multiplied by upstream & downstream multipliers, except RI lobster & JC
WLA	total	570,861	768,663	787,376	1,408,023
Brayton Point ECA	total	61,863	82,430	84,830	149,528
Falmouth ECA	total	42,207	43,121	43,231	81,757
WLA	MA	214,255	288,494	288,494	579,295
Brayton Point ECA	MA	27,635	36,823	36,823	73,941
Falmouth ECA	MA	15,633	15,971	15,971	32,070

MA multipliers (2021) from IMPLAN: 1.373 upstream
1.635 downstream

For-hire charter fishing survey (2022)

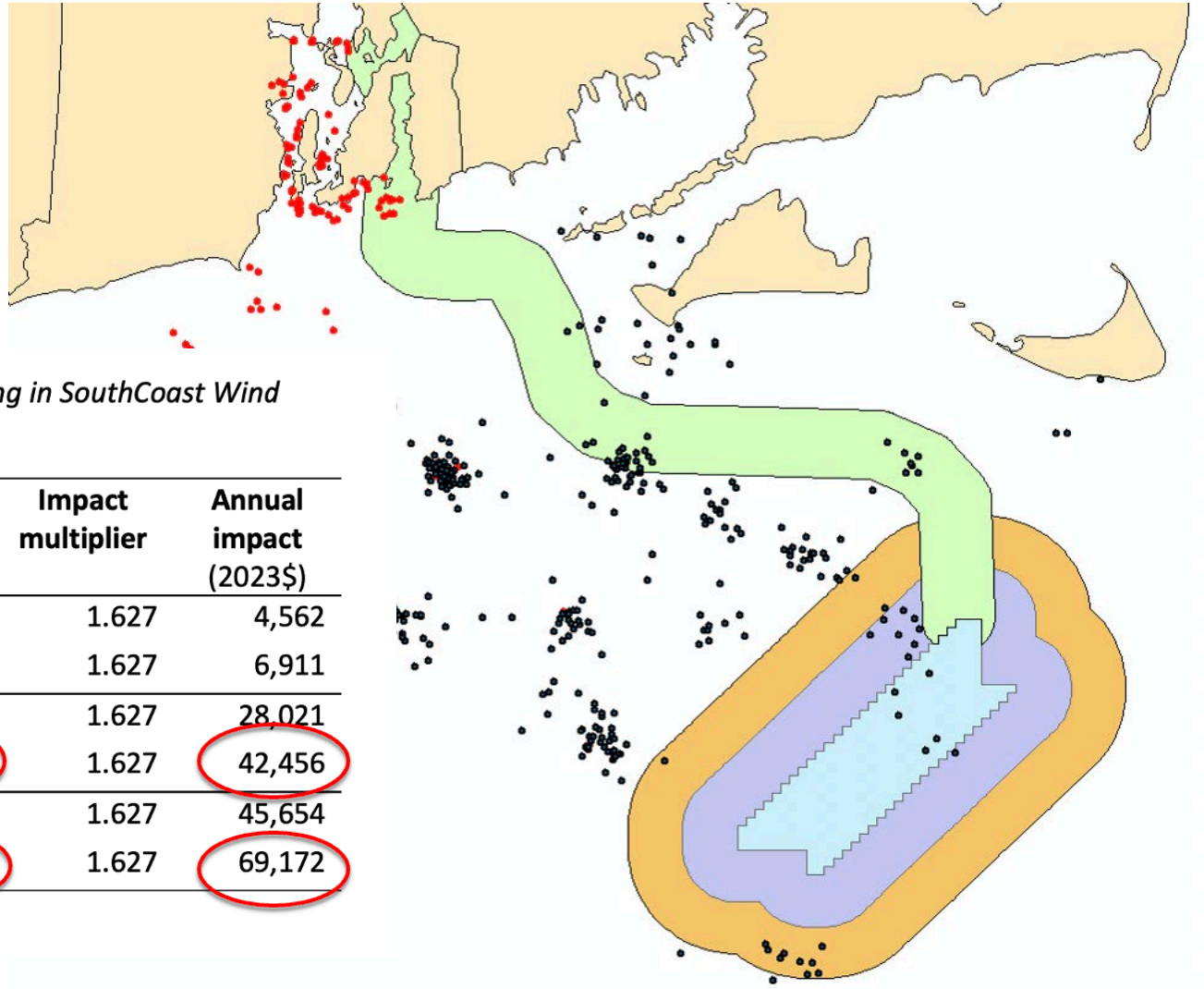


Table 17. Annual revenue and economic impact from MA-based charter fishing in SouthCoast Wind areas.

Area	Annual anglers	Revenue per angler (2023$)	Scale factor	Annual revenue (2023$)	Impact multiplier	Annual impact (2023$)
WLA	11.9	116.23	2.03	2,804	1.627	4,562
			3.07	4,248	1.627	6,911
WLA + 15km	73.1	116.23	2.03	17,222	1.627	28,021
			3.07	26,095	1.627	42,456
ECRA Brayton Pt	119.1	116.23	2.03	28,060	1.627	45,654
			3.07	42,515	1.627	69,172

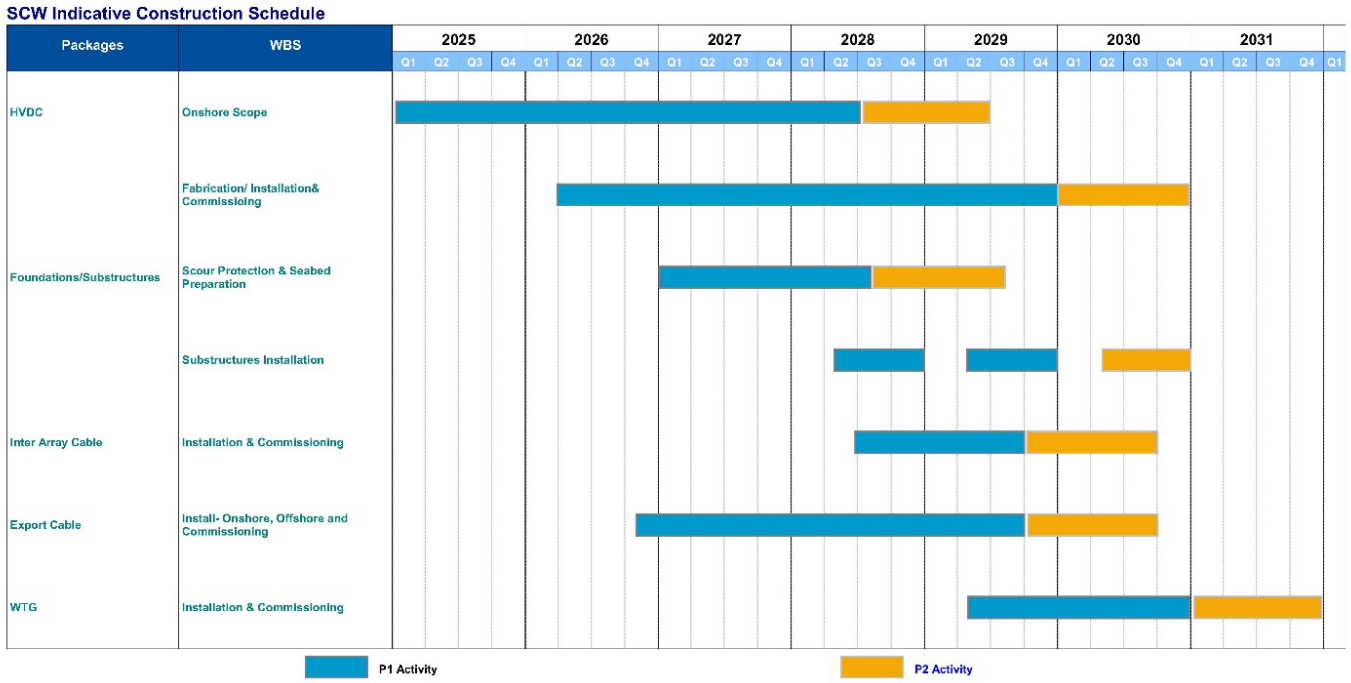
Construction Schedule Assumptions

Wind Lease Area

- 2 phases, 2027 to 2031
- Pile driving in 2028, 2029, and 2030

Export Cables

- Both cable sets in Brayton Point Export Cable Corridor
- Project 1 cables: summer/fall 2028, up to 183 days
- Project 2 cables: late 2029/early 2030, up to 183 days



Commercial Fishing Exposure Assumptions

- Construction
  - Constrained access effects
    - Wind Lease Area (WLA): 2 phases
    - Export Cables (EC): both cables to Brayton Point
  - Availability effects
    - WLA: pile driving (finfish), seafloor disturbance (shellfish)
    - EC Route: seafloor disturbance (shellfish)
- Operations
  - WLA: up to 10% reduction due to access constraints
  - BOEM draft guidance estimate
  - EC Route: no effects expected
- Decommissioning
  - Similar to construction; shorter time and less noise

Categories of Potential Exposure		Assumptions/Effects	Duration
Availability effects due to construction	WLA+15km	100% of finfish leave 50% of area (a)	2028, 2029, 2030
	WLA	Lobster/crab landings reduced 20% (b) Other shellfish landings red. 20% (c)	2027 – 2030 2027 – 2033
	Brayton Point ECC (Project 1)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2028 12 months 2028 2028 - 2032
	Brayton Point ECC (Project 2)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2029/30 12 months 2029/30 2029 - 2033
Constrained access effects due to construction	WLA	No fishing in 25% of area (g)	2027 – 2031
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2028 6 months 2028
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2029/30 6 months 2029/30
Effects during operations	WLA	Landings reduced by up to 10% (j)	2031 – 2061
	Brayton Point ECC	None	
Availability effects due to decom.	WLA	None beyond constrained access	
	Brayton Point ECC (Project 1)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2060 12 months 2060 2060 - 2064
	Brayton Point ECC (Project 2)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2061 12 months 2061 2061 – 2065
Constrained access effects during decom.	WLA	No fishing in 25% of area (n)	2060, 2061
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2060 6 months 2060
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2061 6 months 2061

Commercial Fishing Exposure Details: Construction

Categories of Potential Exposure		Assumptions/Effects	Duration
Availability effects due to construction	WLA+15km	100% of finfish leave 50% of area (a)	2028, 2029, 2030
	WLA	Lobster/crab landings reduced 20% (b) Other shellfish landings red. 20% (c)	2027 – 2030 2027 – 2033
	Brayton Point ECC (Project 1)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2028 12 months 2028 2028 - 2032
	Brayton Point ECC (Project 2)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2029/30 12 months 2029/30 2029 - 2033
Constrained access effects due to construction	WLA	No fishing in 25% of area (g)	2027 – 2031
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2028 6 months 2028
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2029/30 6 months 2029/30

Charter Fishing Exposure

Assumptions

- No charter fishing revenue from 50% of WLA + 15km during pile driving (2028, 29, and 30) and during decommissioning in 2060 and 61
- No charter fishing revenue from 10 km wide ECRA during cable installation in 2028, 29, and 30, and during decommissioning in 2060 and 61

Results (Present value in 2023$):

- WLA+: $43,000 in revenue, $70,000 in impact
- Brayton Point EC: $39,000 in revenue, $64,000 in impact

Overall MA Fishing Exposure: Results

Present value (2023$), at 5% real discount rate

Categories of Potential Exposure		MA Direct Landed Value/Revenue (2023$)
Construction-related effects	WLA+	$1,586,000
	Brayton Point ECC	$94,000
Effects during operations	WLA	$310,000
	ECCs	---
Decommissioning-related effects	WLA	$23,000
	Brayton Point ECC	$21,000
Subtotal MA commercial direct effects		**$2,034,000**
MA for-hire charter fishing direct effects		$82,000
Total MA direct effects		**$2,116,000**

Categories of Potential Exposure	MA Total Impact with Multipliers (2023$)
Subtotal MA commercial fishing	**$4,083,000**
MA for-hire charter fishing	$134,000
Total Massachusetts impacts	**$4,217,000**

SOUTHCOAST WIND

Fisheries Exposure Analysis in Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

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Fisheries Exposure in Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

Hauke Kite-Powell, Di Jin, and Michael Weir
Marine Policy Center
Woods Hole Oceanographic Institution

25 January 2024

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List of Abbreviations

COP – Construction and Operations Plan

ECA – Export Cable Area

ECC – Export Cable Corridor

ECR – Export Cable Route

ECWA – Export Cable Corridor Working Area

ECRA – Export Cable Route Area

GDP – Gross Domestic Product

MA DMF – Massachusetts Division of Marine Fisheries

NMFS – National Marine Fisheries Service

NOAA – National Oceanographic and Atmospheric Administration

PPI – Producer Price Index

RI CRMC – Rhode Island Coastal Resources Management Council

RI DEM – Rhode Island Department of Environmental Management

SBRM – Standardized Bycatch Reporting Methodology

VMS – Vessel Monitoring System

VTR – Vessel Trip Report

WLA – Wind Lease Area

WTG – Wind Turbine Generator

Summary

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be $787,000 (2023$), or $1,526/km^2/year. Of this, $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the 180 m wide SouthCoast Wind Export Cable Corridors to be $85,000 (2023$) for Brayton Point and $43,000 for Falmouth. Of this, $37,000 and $16,000, respectively, are landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 and $32,000, respectively, in Massachusetts.

We estimate that a total (lump sum) of up to $2,034,000 (2023$) of commercial fisheries value landed in Massachusetts is potentially exposed to the SouthCoast Wind Project development. It includes about $1,585,000 in direct landed value forgone due to construction-related effects in and around the Wind Lease Area, $94,000 in landed value forgone due to export cable installation, up to $310,000 from forgone fishing during the wind farm's operation, and $44,000 in present value of landings from decommissioning. Including indirect and induced effects, the potentially affected commercial landings result in about $4,083,000 in total (lump sum) present value economic impact in Massachusetts.

We estimate the average annual economic impact from Massachusetts-based for-hire charter fishing in and around the SouthCoast Wind project areas to be between $119,000 and $181,000. We estimate that a total (lump sum) of about $134,000 (2023$) in economic impact from Massachusetts-based charter fishing is potentially exposed during construction and decommissioning activities in the SouthCoast Wind Project areas.

There is considerable variability in the baseline data of landings and landed value from the SouthCoast Wind Lease Area and Export Cable Corridors. Baseline future landings will vary due to natural and fisheries-related fluctuations in stocks and prices. There is also uncertainty about the impact of wind farm construction and operation on fish stocks and landings, and about the ways that fishers will adapt their fishing practices in response to wind farm development. We consider our combined estimate of $4.22 million in 2023$ present value economic impact to Massachusetts from SouthCoast Wind development on commercial and charter fishing to be a conservative upper bound on likely actual impacts.

Introduction

This report estimates the level of pre-development fishing operations intersecting with, and landings and landed value from, the SouthCoast Wind Lease Area (WLA) and Export Cable Corridors (ECCs) (Figure 1) associated with landings and revenue generated in Massachusetts ports, and the potential exposure of Massachusetts-based commercial and for-hire charter fishing to SouthCoast Wind Project construction, operations, and decommissioning.

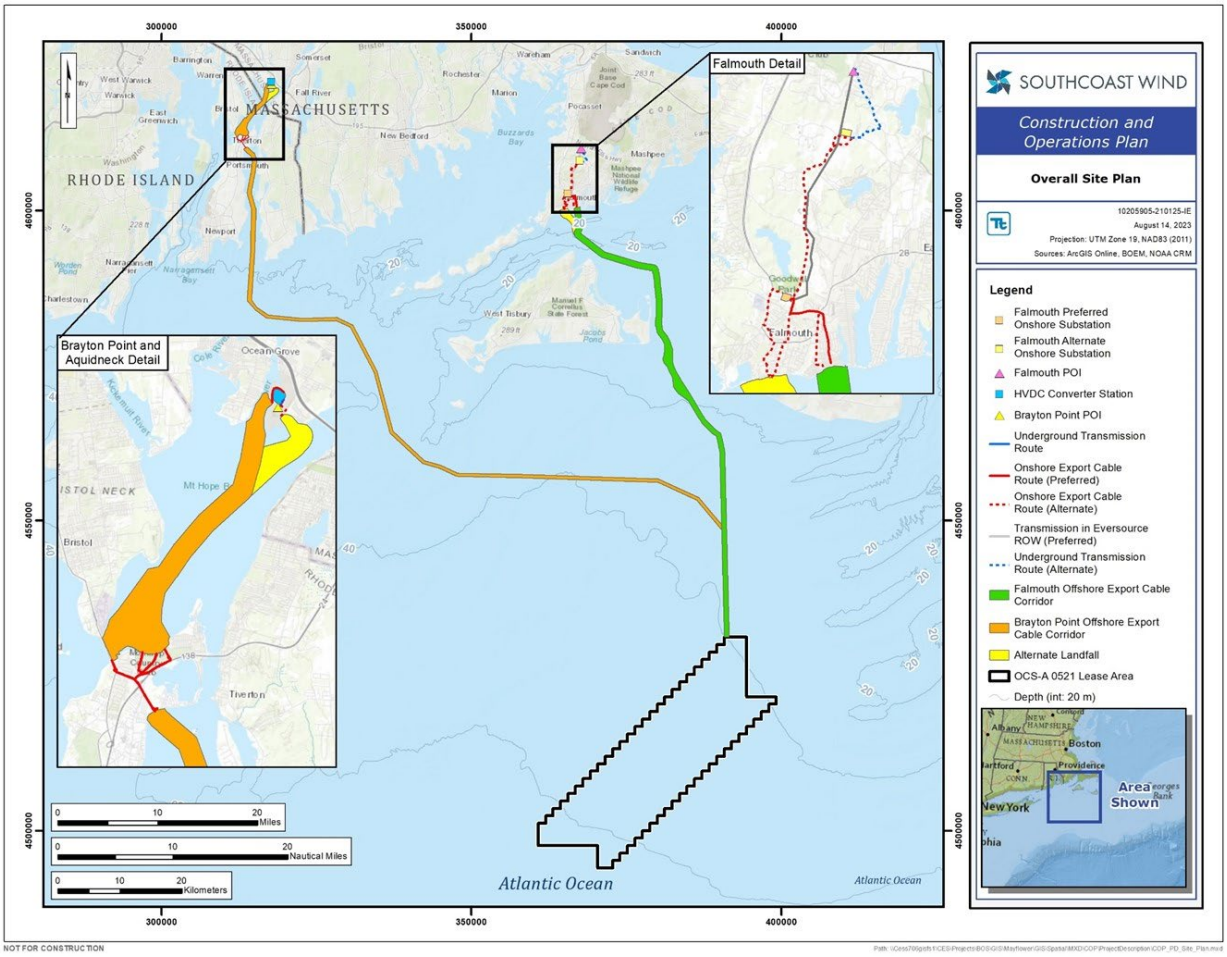

Figure 1. SouthCoast Wind Lease Area and export cable routes. Source: SouthCoast Wind.

The WLA for SouthCoast Wind lies in federal waters, some 75 km south of the Muskeget Channel between Martha's Vineyard and Nantucket, and has a footprint of 516 km^2. The ECC to Brayton Point is 103 km in length, and runs from the northern edge of the WLA first to the north and west across Rhode Island Sound, then up the Sakonnet River to its landing location at Brayton Point in Somerset, MA. The ECC to Falmouth runs north from the WLA through the Muskeget Channel and then northwest across Nantucket Sound to Falmouth.

SouthCoast Wind plans to develop the WLA in two phases (Project 1 and Project 2), each with its own export cables. SouthCoast Wind's preferred approach is to use the Brayton Point ECC for both set of export cables. While both the Brayton Point and Falmouth ECCs are covered in this analysis, the summary exposure and impact values presented in the conclusions assume that SouthCoast Wind's two sets of export cables will both utilize the Brayton Point ECC.

To estimate commercial fish landings along the ECAs, we define a 10km wide Export Cable Route Area (ECRA) extending 5km on either side of each cable route. The 10km wide ECRA has no physical significance in the context of the SouthCoast Wind Project, and is defined only for the purpose of identifying fisheries landings data that reflect what may be landed from fishing along the export cable route. Likewise, the Export Cable Corridors (ECCs) defined by SouthCoast, 700 m wide for the Brayton Point cable route and 1,000 m wide for the Falmouth route, represent only the envelope within which the cables will potentially be located. Only portions of the narrow, 180m wide ECA centered on the export cables may be disturbed in the process of burying and decommissioning the cables.

Table 1 shows the approximate length and area of these features for the SouthCoast Wind Project. In the sections that follow, fishery landings and values for the Export Cable Routes are estimated and reported for the ECAs, as defined above.

Table 1. SouthCoast Wind area parameters

Wind Lease Area footprint (km^2)	516
Brayton Point Export Cable Route length (km)	156
Area of 10km Brayton Point Export Cable Route Area (ECRA) (km^2)	1,571
Area of Brayton Point Export Cable Corridor (ECC) (km^2)	28.3
Falmouth Export Cable Route length (km)	83
Area of 10km Falmouth Export Cable Route Area (ECRA) (km^2)	905
Area of Falmouth Export Cable Corridor (ECC) (km^2)	16.3

Methodology

Our approach to estimating the potential impact of SouthCoast Wind development on commercial fishing is to first estimate the annual landed weight and value of fish and invertebrates from the SouthCoast Wind WLA and ECAs, and then to estimate the fraction of this annual value that may be exposed to wind farm construction, operation, and decommissioning. Our assessment method is consistent with the general framework described in the reports by Kirkpatrick *et al.*/BOEM (2017a and 2017b) on socio-economic impact of offshore wind energy development on commercial fisheries, and builds on the approach of Livermore (RI DEM 2017, 2018, and 2019), which develops high-end estimates of fishery impacts by including in baseline estimates the entire trip revenues from all trips that overlap with a wind lease area, regardless of how much fishing occurred inside or outside the area.

Separately, we estimate the gross revenue associated with for-hire charter boat fishing activity originating in Massachusetts, and the fraction of this revenue that may be exposed to SouthCoast Wind development.

We estimate the annual commercial landings and landed value of fish from the SouthCoast Wind WLA and ECAs using a dataset provided by NOAA's National Marine Fisheries Service. This dataset uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data to produce a more accurate spatial allocation of landings from each fishing trip (DePiper 2014; Benjamin *et al.* 2018). As we document below, there has been considerable variability in annual landings from these areas over the past decade; we use the average landings and landed value from 2008 to 2021 as indicative of what the areas may yield in the future.

We then estimate the fraction of this average annual value that may be at risk ("exposed") due to SouthCoast Wind development, based on the nature and schedule of construction activities, operating plans, and decommissioning plans, and on information from the scientific literature on the effects of wind farm construction and operation on commercial fish stocks and landings. Throughout this report, we use "landed value" to refer to the direct value of fisheries landings, "impact" to refer to the economic activity generated by fisheries, including indirect and induced effects (see below), and "exposure" to refer to the portion of landed value or impacts that may be at risk due to wind farm development.

The effect of offshore wind farm construction and operation on marine ecosystems, fish stocks and fish behavior, and fishery landings is an area of ongoing research. To date, almost all offshore wind farm development has taken place outside the US. The only wind farm fully operational off the coast of New England from which lessons might be drawn directly for SouthCoast Wind at the time of writing this report is the Block Island Wind Farm, a five-turbine, 30 MW project about 4 miles from Block Island, RI.

Investigations of offshore wind farms outside the US have found both positive and negative impacts on marine biota, habitats, and ecological function. The impacts include the aggregation of finfish and other marine life via the creation of artificial reefs (Bergström *et al.* 2014; Langhamer 2012; Lindeboom *et al.* 2011; Wilhelmsson and Malm 2008) and disturbance of existing ecosystems (Bergström *et al.* 2014; Wilhelmsson *et al*. 2006). Bartley *et al.* (2019) have reported on monitoring of physical and chemical conditions in the benthic environment around Block Island Wind Farm turbine towers over the two years since the towers were installed; they found some changes in the benthos in the immediate tower foundation footprint at one out of three turbine towers they investigated, and found no changes beyond 30 m from any of the towers studied.

In their 2018 study, ten Brink and Dalton interviewed commercial and recreational fishers active in the waters around the Block Island Wind Farm about the perceived effects of the farm on fish stocks and fishing activity. Respondents reported murky water, underwater noise, and vibration during construction, and a lower abundance of fish such as striped bass on the side of Block Island closest to the wind farm site during the construction time window. They also reported the presence of shellfish and finfish on and around the wind turbine towers, including an increase in the abundance of cod, within months of the conclusion of construction activities. The transient negative effect on mobile species within 5-10 km of wind farm construction activities observed at Block Island is consistent with findings from Europe (Bergström *et al.* 2014; Vallejo *et al.* 2017).

Hooper *et al.* (2017) report on a survey of recreational fishers and wind farms in the United Kingdom. The authors found that most fishers in their survey either had fished near a wind farm or were interested in doing so, and concluded that most UK anglers were unlikely to change their behavior in response to wind farm development.

More recently, Dalton *et al.* (2020) reported on surveys of Rhode Island recreational boaters' preferences for boating in the vicinity of offshore wind farms. Although some survey respondents identified as fishers, the survey did not explicitly target boaters interested in fishing; the mean age of respondents was above 62 years, mean boat length in excess of 37 feet, and more than 43% of respondents owned sailboats. Overall, boaters expressed a preference for not boating near (within 100 ft) of an offshore wind turbine; but boaters who fish were less negatively impacted by boating near a turbine, and boaters who had visited the Block Island Wind Farm were more accepting of trips near turbine towers than other boaters.

Given the current state of knowledge about the effects of wind farm construction and operation on fish stocks and fishery landings (Hogan *et al.* 2023), we consider five categories of possible exposure for commercial fishing from the SouthCoast Wind Project:

- Transient effects on fish availability due to construction activities and noise
- Transient effects due to constrained access to certain areas during construction
- Changes in fishing in the WLA during operations
- Transient effects due to constrained access to certain areas during decommissioning
- Transient effects on fish availability due to decommissioning activities

We also consider transient effects on the for-hire charter fishing industry due to construction and decommissioning of the wind farm. To the extent that for-hire charter fishing vessels from Massachusetts use the WLA and ECAs, it is possible that their activities may be affected during construction and decommissioning. We consider it unlikely that the SouthCoast Wind development will negatively affect the personal recreational fishing activities of Massachusetts boaters.

Estimating the effect of wind farm development on fishing activity and landings is complicated by several sources of variability and uncertainty. There is considerable year-to-year fluctuation in the historical baseline commercial landings from the wind development areas; and future fishery landings from these areas are likely to differ from historical baselines due to climate change effects (Free *et al.* 2019; Oremus 2019). There is uncertainty about the extent and duration of effects of wind farm construction on fish availability in the vicinity of the wind farm, and about the habitat and other effects (if any) of the wind farm over decades of operation (Hogan *et al.* 2023). There is also uncertainty about the response of the commercial fishing industry and of for-hire charter fishing vessels to the altered "landscape" resulting from wind farm development. The current state of the science about wind farm effects on commercial fishing does not support a precise estimate of effects on fish stocks; and the future decisions of fishers are by their nature not precisely predictable, especially decades into the future, because they depend on personal assessments and decisions of individual fishers.

Acknowledging these sources of variability and uncertainty, we seek to develop a realistic, conservative estimate of the potential effect of SouthCoast Wind development on Massachusetts commercial landings, landed value, and charter boat revenue. We make conservative assumptions about fishing industry response, assuming that landings from an area where access is constrained during construction, operations, or decommissioning are simply forgone, and not compensated by landings from fishing elsewhere instead. Further, we estimate impact as the landed value (gross revenue) at risk, not the net income or profit. Landed value is, by definition, larger than net income or profit from fishing. For these reasons, we consider our impacts estimate to represent an upper bound on the likely net effects of the wind farm on the Massachusetts fishing industry.

Baseline commercial fishery landings and values, 2008-2021

Commercial Fisheries Data Description

NOAA has been collecting and improving their Vessel Trip Report (VTR) data for decades. The data have been widely used for fisheries research, management, and economic impact assessments. To gauge landings value and quantity at the spatial scale required for the SouthCoast Wind Lease Area and export cable routes, NOAA has recently developed a procedure to produce high-resolution spatial information using a combination of VTR and fishery observer data. As described below, we follow the general approach developed by NOAA, which is the best approach at present, with a recognition that relevant data are not perfect. All estimates of fishery landings and values in this report are based on these NMFS data. The data have not been amended, adjusted, or augmented in any way, with two exceptions: we make adjustments to the lobster and Jonah crab landed values to account for likely underrepresentation of these species due to differences in reporting requirements for federal and state permit holders; and we make adjustments to the Rhode Island lobster and Jonah crab landings to account for dockside sales. These adjustments are described in detail in the section on Adjustment of Lobster and Jonah Crab Data below. The adjusted data appear only in Tables 11 and 12 below.

The data presented below summarize estimates of fisheries landings and values for fishing trips that intersected with the SouthCoast Wind Lease Area (WLA) or its Export Cable Route Area (ECRA), from 2008 to 2021 (calendar years). Modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data were queried for spatial overlap with the WLA and the ECRA, and linked to dealer data for value and landings information. As detailed in DePiper (2014) and Benjamin *et al.* (2018), to improve the spatial resolution of VTR, a spatial distribution model was developed by combining vessel trip information from VTR with matching NOAA fishery observer data, including geocoordinates of detailed fishing locations. From this model, landings and value can be summarized for a specified geographic area according to (1) species, (2) gear type, (3) port of landing, and (4) state of landing.

In essence, the DePiper approach utilizes a spatial model to distribute the total landings for each commercial fishing trip over a circular area with its center located at the geocoordinate reported in the VTR, following a distribution decreasing with the radius. The model was estimated using VTR data (for the centroid) and vessel observer data (for haul beginning and endpoints). DePiper (2014) reported that the observer data matched VTR records well (488,251 hauls in the observer data were matched to 27,358 VTR records, representing 87.5% of all hauls with either a beginning or end point of a haul recorded).

The primary purpose of the observer data collection is to monitor fishery bycatch. NOAA's Standardized Bycatch Reporting Methodology (SBRM) dictates what types of vessels (gear, species, area of operation, etc.), participating in various fisheries, should be sampled and at what rate. The numbers of sea days needed to achieve a 30% coefficient of variation (CV = standard deviation divided by mean) of total discards for each species group were derived for different SBRM fleets covering different gears, access areas, states, and mesh sizes (NEFSC 2013). For Massachusetts vessels, the observer program covered close to 20% of trips with trawl gear, around 5% of trips with dredge gear, and around 20% of trips with gillnet gear (Jin 2015).

Following the DePiper approach, the resulting high spatial resolution data were converted into raster maps. Use of this VTR raster model produces a more accurate estimate of the spatial distribution of landings than other approaches that rely entirely on the self-reported VTR/clam logbook locations,

which associate all landings from the trip with a single point location. At 10 nautical mile resolution, the confidence intervals of the DePiper model estimates are around 90% for trip lengths of one to two days.

The only alternative to the DePiper approach is a model to distribute the total landings from a VTR report over the vessel's track using the Vessel Monitoring System (VMS) data. The main challenge for this approach is accurate identification of fishing and non-fishing segments of a trip. Muench *et al.* (2018) have shown that using vessel speed alone can lead to a severe misrepresentation of fishing locations. NOAA has adopted the DePiper approach as a standard procedure to generate spatial data; and we agree with NOAA that this is the best approach currently available. The main advantages of the DePiper approach are that (1) it is based on observations of actual fishing locations noted by observers at sea, and (2) it provides a systematic and consistent way to meet the increasing demand for spatial fishing data for relatively small areas in the ocean, which is important for cross project comparison.

Landings associated with the Export Cable Areas are calculated by applying the ratio of footprint areas shown in Table 1 to the landings estimated for the Export Cable Route Area. This assumes that landings are distributed uniformly across the fished sections of the ECRA.

In order to maintain the legally required data confidentiality, summaries by species, gear type, and landing location are presented individually. In addition, for records that did not meet the "rule of three" (three or more unique dealers and three or more unique permits), values are summarized in a category labeled "ALL OTHERS." Note also:

- All landed values have been converted to 2023 dollars using the Producer Price Index for "unprocessed and prepared seafood."
- Pounds are reported in Landed Pounds, unless otherwise noted.
- Data summarized here are from federal sources only.
- Fishing vessels that carry only lobster permits for federal waters are not subject to VTR requirements. Landings from trips with no VTR are not reflected in this summary.
- Other fisheries exist in state waters that may not be reflected in data from federal sources (e.g. whelk, quahog, striped bass).

We also obtained the average monthly number of trips intersecting with each area, for the period of 2008 to 2021.

Commercial Fishery Landings from Wind Lease Area and Export Cable Corridors

Table 2 shows the average annual level and standard deviation of total values and landings associated with fishing in the SouthCoast WLA and the ECAs from 2008 to 2021.

The average annual landings from the SouthCoast WLA are about 493,000 lbs (standard deviation 298,000 lbs) with a value of about $571,000 (standard deviation $140,000). Average annual landings from the Brayton Point ECA are about 61,000 lbs (standard deviation 30,000 lbs) with a value of $62,000 (standard deviation $16,000). Average annual landings from the Falmouth ECA are about 28,000 lbs (standard deviation 12,000 lbs) with a value of $42,000 (standard deviation $19,000).

Table 2. Average annual value and quantity of commercial fisheries landings by area

Area	*Mean* Value/year (2023$)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2023$)	*Standard Deviation* Landings/year (lbs)
SouthCoast WLA	570,861	492,824	139,818	297,932
Brayton Point ECA	61,863	61,147	15,698	30,302
Falmouth ECA	42,207	28,076	18,801	11,878

Table 3 shows the total landings and values, for each year from 2008 to 2021, associated with fishing in the SouthCoast WLA and the ECAs.

Table 4 summarizes the average annual landings and value of fisheries production from the SouthCoast Wind WLA and the ECAs by the top species or species groups. Jonah Crab and Longfin squid are among the species generating the greatest value from the SouthCoast Wind WLA during the 2008-2021 time period. The unusually high landings reported in 2010 are due to about 1 million lbs of herring landed from the area that year. Full data on landings by species can be found in Tables A1 to A3 in the Appendix.

Table 3. Annual value and quantity of commercial fisheries landings by area.

Area	SouthCoast WLA		Brayton Point ECA		Falmouth ECA	
Year	Value (2023$)	Landings (lbs)	Value (2023$)	Landings (lbs)	Value (2023$)	Landings (lbs)
2008	576,087	507,909	77,946	74,342	41,155	31,262
2009	507,153	435,991	57,984	64,216	26,258	21,616
2010	579,124	1,474,217	50,824	77,621	21,089	47,172
2011	318,346	225,495	55,577	57,318	21,858	11,827
2012	466,509	339,675	61,841	92,477	49,865	28,962
2013	477,113	377,424	62,185	134,331	23,630	14,428
2014	476,466	343,378	61,786	71,599	47,387	32,311
2015	449,827	312,035	73,543	54,892	54,611	30,480
2016	727,054	580,188	99,625	75,375	88,325	54,388
2017	619,432	524,306	49,263	29,039	43,149	25,904
2018	649,644	490,070	39,125	21,311	38,895	19,191
2019	881,716	477,266	55,923	33,399	55,651	28,743
2020	577,184	400,376	44,583	31,145	22,763	15,563
2021	686,402	411,206	75,878	38,992	56,267	31,215

Table 4. Average annual landings of major species by area, 2008-2021.

	Mean		***Standard Deviation***	
Area/Species	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast WLA				
Jonah Crab	95,258	93,024	54,977	43,231
Longfin Squid	89,715	57,894	55,760	35,371
Summer Flounder	58,874	17,641	57,881	18,957
Scup	50,583	56,725	51,310	57,549
Silver Hake	46,737	57,789	35,033	38,177
Monkfish	46,113	24,712	23,480	8,967
Golden Tilefish	40,936	8,494	42,300	8,724
American Lobster	36,610	6,049	18,527	3,766
Sea Scallop	30,639	2,749	39,611	4,102
Brayton Point ECA				
Longfin Squid	15,786	10,329	11,259	7,264
American Lobster	12,770	1,958	3,052	453
Summer Flounder	6,373	1,540	2,111	666
ALL_OTHERS	4,948	5,596	3,037	4,131
Falmouth ECA				
Longfin Squid	26,947	17,003	17,674	11,111
Channeled Whelk	3,991	385	1,711	132
Summer Flounder	2,731	696	2,293	661
ALL_OTHERS	1,481	1,520	1,211	1,391
Scup	1,102	1,328	731	873
Silver Hake	1,101	1,496	622	895

Both mobile (e.g., trawl and dredge) and fixed (e.g., pots and gillnet) gears are used in fishing operations. The trawl gear is primarily used for harvesting groundfish, dredge for scallops, and pots for lobster and crabs. The fixed gears are fished using trawls (a series of lobster pots attached to one line) with string lengths of 0.4–0.8 km (up to 1.829 km) or gillnets with typical string lengths of 0.2–3.0 km. Tables 5a, 5b, and 5c break out annual landings for each area by gear type. Bottom trawls and lobster pots generate the most significant landings in the WLA, followed by sinking gillnets. In the ECAs, bottom trawls are also the most significant gear type. The "ALL_OTHERS" category includes landings using purse seines, other seines, and weirs/traps, and others that fall under the "rule of three" exclusion.

Table 5a. Average annual landings in SouthCoast WLA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2023$)	Landings/year (lbs)	Value/year (2023$)	Landings/year (lbs)
ALL_OTHERS	12,040	10,279	26,231	15,670
Dredge – Clam	4,290	3,386	7,384	5,674
Dredge – Scallop	29,839	2,712	40,002	4,129
Gillnet – Sink	66,458	60,314	29,234	24,306
Handline	-	-	-	-
Longline – Bottom	34,461	8,168	41,427	10,523
Pot – Lobster	135,124	103,776	53,782	42,542
Pot – Other	3,712	2,851	3,152	2,396
Trawl – Bottom	277,376	228,593	92,373	60,195
Trawl – Midwater	7,561	72,744	27,191	265,385

Table 5b. Average annual landings in SouthCoast Brayton Point ECA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2023$)	Landings/year (lbs)	Value/year (2023$)	Landings/year (lbs)
ALL_OTHERS	2,207	2,540	3,707	4,665
Dredge – Clam	3,041	3,316	2,975	3,419
Dredge – Scallop	2,791	248	2,604	279
Gillnet – Sink	4,122	4,132	1,928	2,431
Handline	297	77	252	58
Longline – Bottom	-	-	-	-
Pot – Lobster	13,904	3,157	2,798	745
Pot – Other	3,526	716	1,576	363
Trawl – Bottom	29,879	31,729	12,362	10,455
Trawl – Midwater	2,096	15,231	3,209	23,313

Table 5c. Average annual landings in SouthCoast Falmouth ECA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2020 $)	Landings/year (lbs)	Value/year (2020 $)	Landings/year (lbs)
ALL_OTHERS	706	761	1,339	1,384
Dredge – Clam	992	1,014	1,228	1,261
Dredge – Scallop	565	47	474	43
Gillnet – Sink	310	321	521	653
Handline	103	25	85	19
Longline – Bottom	10	2	39	9
Pot – Lobster	562	304	161	134
Pot – Other	4,978	703	1,764	178
Trawl – Bottom	33,660	22,128	18,085	11,218
Trawl – Midwater	323	2,772	1,083	9,568

Table 6 summarizes annual landings and landed value for the major ports receiving landings from the two areas. Point Judith (Rhode Island) and New Bedford (Massachusetts) are the most significant ports for landings and landed value from the SouthCoast Wind Lease Areas and ECAs.

Table 6. Average annual landings at major ports in Rhode Island and Massachusetts.

	Mean		***Standard Deviation***	
Area/Port	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast WLA				
Point Judith, RI	159,899	135,373	49,867	40,053
New Bedford, MA	135,150	152,610	61,911	203,985
Newport, RI	35,769	29,544	26,190	22,135
Chatham, MA	26,883	22,826	17,468	15,863
Brayton Point ECA				
Point Judith, RI	19,690	15,609	8,680	6,563
New Bedford, MA	17,143	24,085	5,883	19,869
Falmouth ECA				
Point Judith, RI	19,774	13,613	11,696	7,445
New Bedford, MA	4,227	5,144	1,917	7,451

Tables 7a and 7b show average annual landings and landed value from the two areas by state where the catch is landed. Rhode Island and Massachusetts together account for more than 75% of landings and landed value from the WLA and about 85 to 90% of landings from the ECAs. The “others” category includes landings in Maine, New Hampshire, Connecticut, New York, New Jersey, Maryland, North Carolina, and Virginia, as well as data flagged by the “rule of three” exclusion.

Table 7a. Average annual landings in SouthCoast WLA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	216,016	188,750	63,730	54,585
Massachusetts	214,255	236,135	59,652	281,278
Others	140,591	67,939	--	--

Table 7b. Average annual landings in SouthCoast Brayton Point ECA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	28,868	25,999	9,508	8,365
Massachusetts	27,635	31,305	7,675	24,392
Others	5,360	3,843	--	--

Table 7c. Average annual landings in SouthCoast Falmouth ECA by state.

	Mean		*Standard Deviation*	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	20,317	14,235	11,985	7,664
Massachusetts	15,633	10,276	4,525	9,224
Others	6,258	3,565	--	--

Landed value and trips by month

Table 8 and Figures 2 and 3 show the average monthly landings and values from the two areas. Table 9 reports the average monthly number of fishing trips that intersect each area. Note that the trip numbers in Table 9 are for the 10 km wide ECRAs, whereas the landed value shown in Table 8 and Figures 3 are for cable routes are for the 180 m wide ECAs only.

Table 8. Average monthly value of landings, 2008-2021 (2023$).

Month	**SouthCoast Wind WLA**	**Brayton Point ECA**	**Falmouth ECA**
Jan	30,465	2,397	402
Feb	26,673	1,420	221
Mar	26,361	1,350	241
Apr	23,286	2,292	462
May	38,561	5,285	6,929
Jun	68,891	11,041	12,168
Jul	61,918	13,092	10,228
Aug	80,364	10,241	5,244
Sep	90,409	6,150	2,569
Oct	47,370	2,979	1,836
Nov	33,103	2,598	1,292
Dec	43,460	3,020	614

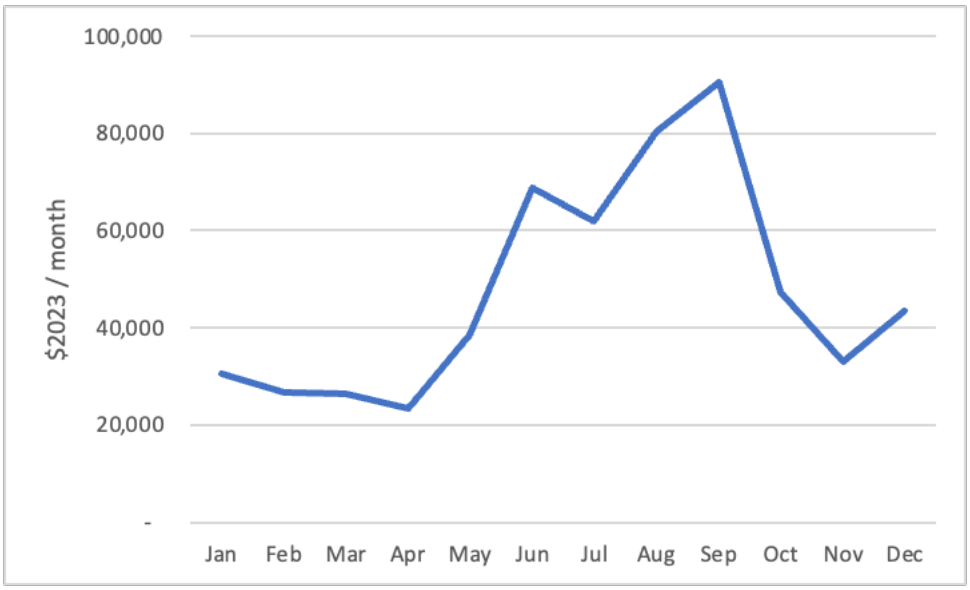

Figure 2. Average monthly value of landings, SouthCoast WLA, 2008-2021.

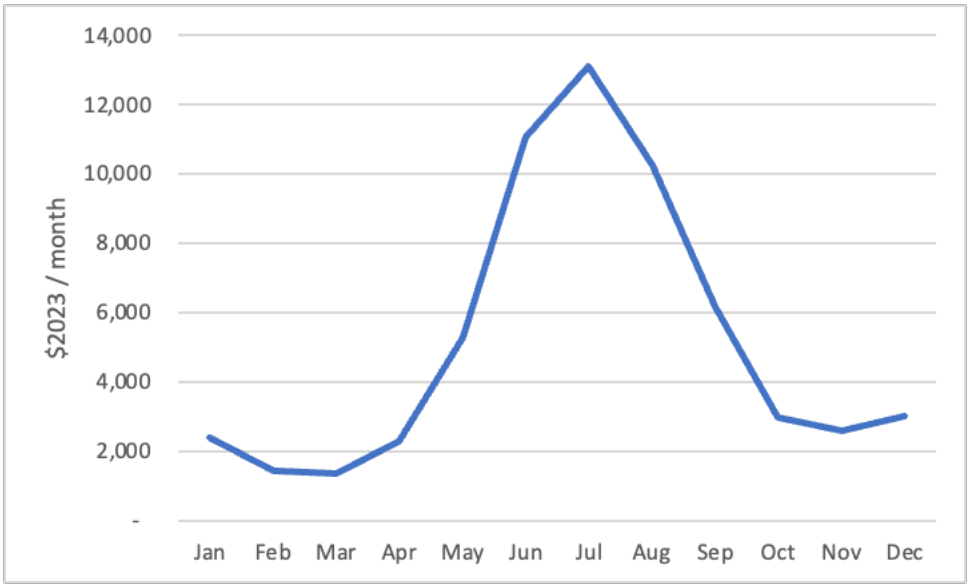

Figure 3a. Average monthly value of landings, SouthCoast Brayton Point ECA, 2008-2021.

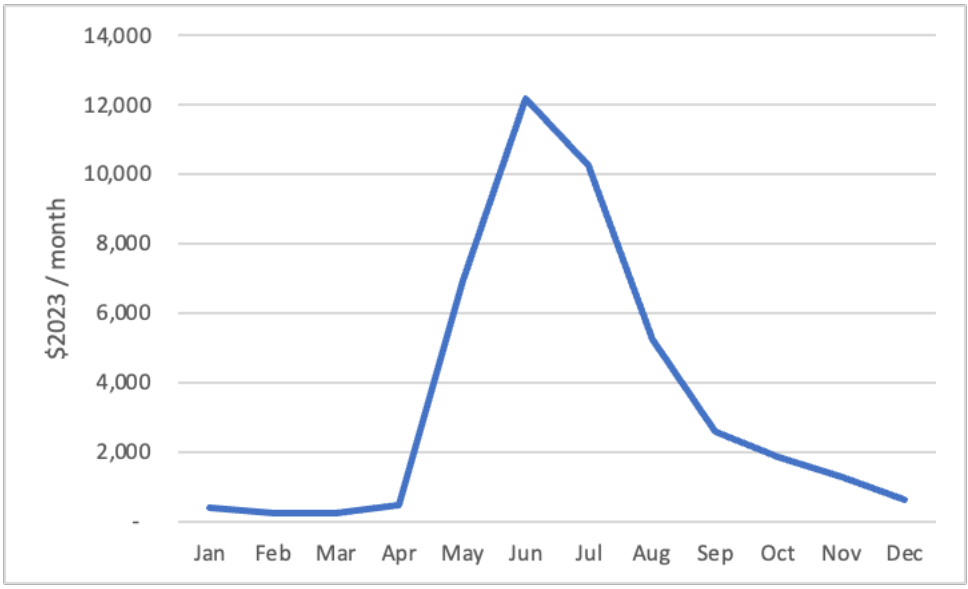

Figure 3b. Average monthly value of landings, SouthCoast Falmouth ECA, 2008-2021.

Table 9. Average monthly number of fishing trips, 2008-2021.

Month	SouthCoast Wind WLA	Brayton Point ECRA	Falmouth ECRA
Jan	406	570	179
Feb	419	285	144
Mar	511	321	167
Apr	412	647	205
May	437	3,007	1,201
Jun	771	3,641	1,623
Jul	892	3,990	1,983
Aug	654	3,404	1,491
Sep	468	2,874	841
Oct	286	2,347	564
Nov	310	2,094	392
Dec	419	1,141	234

Inter-annual price adjustments

We use the Bureau of Labor Statistics' Producer Price Index (PPI) for "unprocessed and prepared seafood"[1] to convert ex-vessel value of fish landings, because this index is specifically for the fishery sector. PPI is a family of indexes that measures the average change over time in selling prices received by domestic producers of goods and services; they measure price change from the perspective of the seller. In contrast, the Bureau of Economic Analysis' general Gross Domestic Product (GDP) deflator[2]

[1] https://www.bls.gov/ppi/#data

[2] https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey

measures changes in the prices of goods and services produced in the United States, including those exported to other countries, and captures price changes across all economic sectors. Table 10 shows both indexes from 2000 to 2021.

Note that the variation in the sector (i.e., fishery) specific price index is considerably larger than that of the GDP deflator. PPI decreases have been observed in several years since 2000. The GDP deflator exhibits a steady trend. We recognize that many seafood prices rose sharply in 2021, as reflected by the sharp increase in fish PPI for that year. We consider it unlikely that this will significantly alter the long-term trend, and maintain that the historical average is the best predictor of future values.

We report all values in 2023$ for consistency. These values can be easily adjusted to any other-year dollars by applying the appropriate index adjustment. Landed value may be adjusted using the PPI index. For impact values, including upstream and downstream effects (see below), it is more appropriate to use the GDP deflator to adjust, because the multipliers capture economy-wide impacts.

Table 10. Price indexes.

Year	GDP implicit price deflator	Percent change	PPI fish	Percent change
2000	78.0		198.1	
2001	79.8	2.25%	190.8	-3.69%
2002	81.0	1.56%	191.2	0.21%
2003	82.6	1.97%	195.3	2.14%
2004	84.8	2.68%	206.3	5.63%
2005	87.5	3.14%	222.6	7.90%
2006	90.2	3.09%	237.4	6.65%
2007	92.6	2.70%	242.8	2.27%
2008	94.4	1.92%	255.4	5.19%
2009	95.0	0.64%	250.9	-1.76%
2010	96.2	1.20%	272.4	8.57%
2011	98.2	2.08%	287.6	5.58%
2012	100.0	1.87%	287.6	-0.02%
2013	101.8	1.75%	299.4	4.12%
2014	103.7	1.87%	322.4	7.68%
2015	104.7	1.00%	322.0	-0.13%
2016	105.7	1.00%	327.6	1.74%
2017	107.7	1.90%	337.9	3.15%
2018	110.3	2.39%	344.5	1.96%
2019	112.3	1.79%	349.9	1.55%
2020	113.6	1.21%	350.8	0.27%
2021	118.4	4.15%	413.0	17.74%
Annual average		2.01%		3.66%

Adjustment of lobster and Jonah crab data

As noted above, lobster vessels that carry only lobster permits are not subject to a Vessel Trip Report (VTR) requirement. Trips without VTR are not reflected in the numbers shown in Tables 2 through 9 (cf. King 2019). To account for potentially underrepresented lobster and Jonah crab landings, and for dockside sales (see below), we make adjustments to the landed value data as shown in Table 11. Data in the first three rows are based on VTR data, and are taken from Table 2 and Tables A1 through A3 in the Appendix. An earlier study by Industrial Economics (2015) indicates that active lobster vessels not subject to trip report requirements in Lobster Management Area 2 may account for as much as 57% of the total lobster fishing activity in that area. (Lobster Management Area 2[3] encompasses the waters south of Rhode Island and Cape Cod to a distance of about 40 nm, and overlaps with the SouthCoast Wind WLA.) We assume conservatively that landings from 60% of the lobster vessels in the SouthCoast Wind WLA and ECRAs/ECAs could therefore be underrepresented, and that the VTR data represent 40% of the true lobster and Jonah crab revenues. We use this as an adjustment factor, and estimate the adjusted lobster and Jonah crab revenues at 2.5 times of those in the VTR data.

Some fraction of lobster and Jonah crab landings are sold directly from boats at dockside, at a price above that reported in the dealer information on which the NOAA values above are based. Neither the fraction of landings sold in this way nor the price premium is known exactly. Based on information provided by a group of Rhode Island fishermen (pers. comm., 24 Nov. 2020), we estimate that a 15% premium on the landed value derived from NOAA data (Table 11) adequately captures this dockside sales effect for Rhode Island landings. Dockside sales are not a common practice in Massachusetts (Mass. DMF pers. comm. May 2021), so we do not apply this multiplier to Massachusetts landings.

The combined adjustment for VTR data and dockside sales is shown in rows 5 and 6 in Table 11. The net increase is shown in row 7, and the adjusted total annual landed values are shown in row 8. This adjustment results in a 37 to 38% increase in the estimated total annual landed value for the WLA and the Brayton Point ECA, and 2 to 3% increase for the Falmouth ECA.

Table 11. Adjustment of landed value for landings not captured in VTR data and for RI dockside sales.

Value (2023$)	**WLA**	**Brayton Point ECA**	**Falmouth ECA**
1. Avg. VTR total $/year (Table 2)	570,861	61,863	42,207
2. Avg. VTR lobster $/year (Tables A1-A3)	36,610	12,770	354
3. Avg. VTR Jonah crab $/year (Tables A1-A3)	95,258	941	255
4. % of total captured by VTR	40%	40%	40%
5. Adjusted lobster $/year (incl. RI dockside sales)	96,721	34,160	949
6. Adjusted Jonah crab $/year (incl. RI dockside sales)	251,661	2,518	684
7. Net increase over VTR $/year (row 5+6-2-3)	216,514	22,967	1,023
8. Adjusted total $/year	787,376	84,830	43,231
9. Adjusted increase over VTR total value	37.9%	37.1%	2.4%

[3] http://fisheries.noaa.gov/resource/map/lobster-management-areas

With all adjustments, we estimate the average annual landed value in Massachusetts from the SouthCoast WLA to be about $288,000 (2023$), about $37,000 from the Brayton Point ECA, and about $16,000 from the Falmouth ECA.

Estimated indirect and induced economic impacts

Economic impact multipliers reflect the linkages between economic activity in different sectors of the economy. For example, when landings increase in the commercial fishing sector, there is an associated increase in the purchases of ice and other supplies in the region, and an increase in onshore transportation and processing of seafood. The resulting increases in economic activity in the commercial fishing supply and transportation and processing sectors are indirect effects of increased landings. In addition, because fishermen and workers in the supply, transportation, and processing industries earn greater income as a result of this increased activity, and spend some of that extra income on local goods and services, there is also an induced effect of greater spending in other sectors. The multipliers capture the combined effect of indirect and induced spending that results from higher commercial landings.

We have developed regional economic models for Massachusetts using the IMPLAN model software (IMPLAN 2004) and data for 2021. IMPLAN software and data are commercial products widely used by researchers and management agencies to perform economic impact analyses for a user specified study region (IMPLAN 2004; Steinback and Thunberg 2006; Hoagland *et al.* 2015; UMass Dartmouth 2018; Cape Cod Commission 2020). IMPLAN was initially developed for the US Forest Service. It is a modular input-output model that works down to the individual postal zip code level for most zip codes in the United States. The IMPLAN database consists of two major parts: (1) a national-level technology matrix and (2) estimates of sectoral activity for final demand, final payments, gross output, and employment for each zip code. This 546-sector gross-domestic-product-based model divides the US economy into sectors based on North American Industry Classification System codes[4], and is based on the US Commerce Department's national input-output studies, the national income data, and related Federal economic surveys. In IMPLAN, national average technology coefficients are used to develop the direct coefficients for sectors at local levels. As noted, we use 2021 IMPLAN data for Massachusetts for our analysis. Based on the 2021 model and data, the upstream output multiplier for the commercial fishing industry in Massachusetts is 1.373.

Our analysis is limited to economic activity and impact in Massachusetts; and this multiplier reflects upstream economic activity that takes place in Massachusetts, not in other states. Its value depends in part on how much of their inputs (fuel, ice, bait, etc.) Massachusetts fishermen purchase from local versus out-of-state suppliers. Because those purchase decisions can change from year to year, the multiplier can also change over time. For example, the 2021 upstream multiplier for Massachusetts commercial fishing (1.373) used in our analysis is lower than that from 2019 (1.770). Within Massachusetts, the multiplier varies from a low of 1.10 in Norfolk County to a high of 1.52 in Plymouth County. Including upstream activity that takes place in other states, the national upstream multiplier for Massachusetts commercial fishing is 1.84.

[4] https://www.census.gov/naics/

We have also taken into account downstream economic activity, such as seafood processing, that may take place at Massachusetts businesses as a result of commercial fisheries landings. This linkage is less direct than the upstream activities, because not all seafood landed in a state is processed in the state, and seafood processors may import more seafood from elsewhere for processing when in-state landings fall short. Nonetheless, we add a downstream adjustment of 0.635, using 2021 IMPLAN data, to the multiplier for Massachusetts landings, bringing the combined multiplier to 2.008, to account for both upstream effects and downstream effects to seafood processors. We apply the combined upstream and downstream multiplier to all landings except lobster and Jonah crab landed in Rhode Island, which are adjusted for dockside sales and receive only the upstream multiplier. The corresponding combined multiplier for Rhode Island landings is 1.822; for landings in other states, we use the average of the Massachusetts and Rhode Island multipliers.

The economic impact multiplier captures the linkages between the fishing industry sector and other sectors in the Massachusetts economy. While we use a single output multiplier for the entire commercial fishing sector in a given state, we recognize that the multiplier may in fact vary across specific fisheries, species, and gear due to differences in factor inputs for fishing operations and post processing of fish landed. We use a single multiplier for the entire commercial fishing sector, reflecting an average across all gear types and species. Economy-wide inflation affects all sectors in the economy but usually does not alter the general structure of the economy. Therefore, although the baseline economic values increase with rising prices, the multiplier does not. We also recognize that other types of multipliers, such as those focusing on employment effects, have been used in other analyses. We maintain that the output multipliers we use provide a robust and accurate measure of indirect and inducted effects averaged across the fishing sectors.

Table 12. Estimated annual economic impact in Massachusetts (all values in 2023$)

		Average value of landings/year			**Total impact/year**
Area	**State**	VTR data only (Table 11, row 1)	with lobster & Jonah crab adjustment	with dockside sales adjustment (15% premium on RI lobster & JC landings)	"dockside sales" column multiplied by upstream & downstream multipliers, except RI lobster & JC
WLA	total	570,861	768,663	787,376	1,408,023
Brayton Point ECA	total	61,863	82,430	84,830	149,528
Falmouth ECA	total	42,207	43,121	43,231	81,757
WLA	MA	214,255	288,494	288,494	579,295
Brayton Point ECA	MA	27,635	36,823	36,823	73,941
Falmouth ECA	MA	15,633	15,971	15,971	32,070

Using these multipliers, and including the lobster and Jonah crab adjustment described in the previous section, we estimate the average annual total economic impact from commercial fishing activity in the SouthCoast Wind Project Area (i.e., the WLA, Brayton Point ECA, and Falmouth ECA) to be about $690,000 (2023$) in Massachusetts. This is broken down in Table 12, which shows the estimated value for Massachusetts fishing from the SouthCoast Wind WLA to be about $579,000, from the Brayton Point ECA to be about $74,000, and from the Falmouth ECA to be about $32,000. Including landings in other states, the total average annual economic impact from commercial fishing activity in the WLA is $1.41 million and in the Brayton Point and Falmouth ECAs it is $150,000 and $82,000, respectively. These estimates are based on average annual landings value from 2008 to 2021, with lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements.

Exposure of commercial fishery resources and fishing to wind farm development

The SouthCoast Wind construction schedule (SouthCoast Wind Energy LLC 2023) envisions construction activity in the WLA taking place from 2027 to 2031, with pile driving between 2028 and 2030 (Figure 4). This work is expected to proceed in two phases, with roughly half of the WLA developed in the first phase (Project 1) and the other half in the second phase (Project 2). As noted, SouthCoast Wind's preferred approach is to install both export cables in the Brayton Point ECC; this scenario is reflected in Table 13 below. Work in the Export Cable Corridor is also expected to take place in two phases: the installation of the first set of cables (for Project 1) is scheduled in the Brayton Point ECC for up to 183 days (six months) during summer/fall of 2028, and the second cable in the Brayton Point ECC for up to 183 days (six months) during late 2029 and early 2030. Although it is not the preferred ECC for Project 2, installation of the Project 2 export cables in the Falmouth ECC remains in the Project Design Envelope as a variant option; and we include an assessment of the exposure values for this alternative, with up to 107 days (3.5 months) of installation-related work in the Falmouth ECC during late 2029 and early 2030.

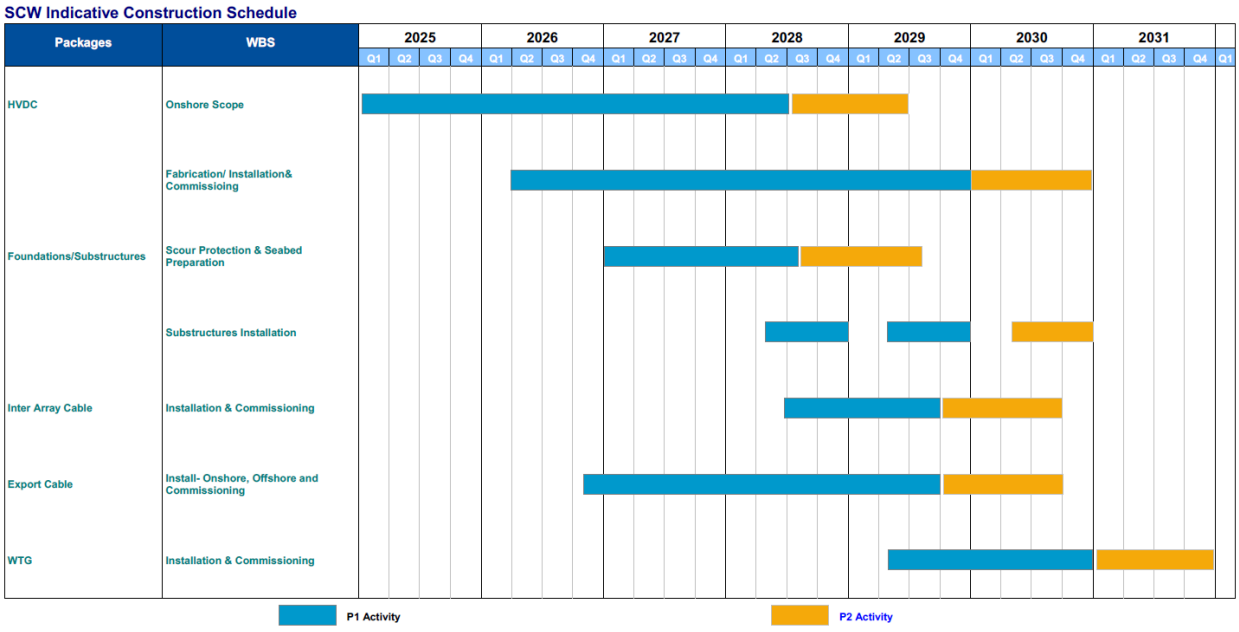

Figure 4. Indicative construction schedule. Source: SouthCoast Wind (2023)

In the following sections, we consider five categories of possible exposure of commercial fishery landings and landed value from the SouthCoast Wind Project areas:

- Transient effects on fish availability due to construction activities and noise
- Transient effects due to constrained access to certain areas during construction
- Changes in fishing in the WLA during operations
- Transient effects due to constrained access to certain areas during decommissioning
- Transient effects on fish availability due to decommissioning activities

The assumptions and effects on fish availability and fishing activity/landings are summarized in Table 13 for each category and Project area. In the sections that follow Table 13, we describe how we arrived at the assumptions, with references in the text corresponding to the row codes (a), (b), (c), etc. in the table. The assumptions are based in part on information from the SouthCoast Wind Construction and Operations Plan (SouthCoast Wind Energy LLC 2022), from additional information provided by SouthCoast Wind (Figure 4), and from acoustic modeling work for foundation installation (JASCO 2022).

If the Falmouth ECC is used for Project 2, the assumptions shown in Table 13 for Project 2 remain the same for availability effects. For constrained access effects, the duration is reduced from 6 months to 3.5 months.

The baseline values for each Project area and species group are shown in Table 14.

Transient availability effects due to construction

We estimate construction effects for each Project area separately based on these schedules. To convert future values to a common basis, we apply a real discount rate of 5% – the average of the rate usually applied in natural resource valuation (3%) and the rate usually applied by the US government for public investment and regulatory analyses (7%), and present all results in 2023$.

Construction noise during drilling and pile driving, and disturbance of bottom sediments and rocks, is likely to have an impact on fish and shellfish in and around the SouthCoast Wind WLA. Mobile species may leave the area because of construction noise, and species that rely on seafloor habitat may be injured or displaced.

Our estimate of the effect of construction in and around the WLA is based on a maximum scenario for pile driving, involving 16 m diameter monopiles, each installed within 24 hours, using a 6,600 kJ hammer, and 10 dB of noise attenuation. We assume that pile driving may extend over three years as outlined above, in half of the WLA at any given time. We consider separately the likely effect of pile driving and turbine tower installation on shellfish (lobster, scallops, and crabs) and on finfish.

We assume conservatively that all finfish will leave all areas in and around the WLA where pile driving noise exceeds 160 dB. There is no scientific evidence that the 150 dB threshold sometimes cited for “temporary behavioral changes” (Cal Trans 2015) leads to substantive relocation of finfish; and even 160 dB is far below any documented injury threshold. The SouthCoast Wind acoustic exposure analysis (JASCO 2022) models noise propagation from pile driving at two tower locations in the SouthCoast Wind layout. The distance at which pile driving noise with 10 dB of attenuation at the source drops to 150 dB for these two tower locations is found in tables 39 and 40 on pages 52 and 53 of JASCO (2022). The relevant distances are between 13 and 15 km.

Table 13. Assumptions for exposure of commercial fisheries to wind farm development.

Categories of Potential Exposure		Assumptions/Effects	Duration
Availability effects due to construction	WLA+15km	100% of finfish leave 50% of area (a)	2028, 2029, 2030
	WLA	Lobster/crab landings reduced 20% (b) Other shellfish landings red. 20% (c)	2027 – 2030 2027 – 2033
	Brayton Point ECC (Project 1)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2028 12 months 2028 2028 - 2032
	Brayton Point ECC (Project 2)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2029/30 12 months 2029/30 2029 - 2033
Constrained access effects due to construction	WLA	No fishing in 25% of area (g)	2027 – 2031
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2028 6 months 2028
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2029/30 6 months 2029/30
Effects during operations	WLA	Landings reduced by up to 10% (j)	2031 – 2061
	Brayton Point ECC	None	
Availability effects due to decom.	WLA	None beyond constrained access	
	Brayton Point ECC (Project 1)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2060 12 months 2060 2060 - 2064
	Brayton Point ECC (Project 2)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2061 12 months 2061 2061 – 2065
Constrained access effects during decom.	WLA	No fishing in 25% of area (n)	2060, 2061
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2060 6 months 2060
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2061 6 months 2061

(a), (b), (c) etc. refer to detailed explanations in the text that follows

Table 14. Baseline landed values (2023$) used for exposure calculations.

			Brayton Point ECC		Falmouth ECC	
	WLA	**WLA +15km**	**1.6km ECWA**	**180m ECA**	**1.6km ECWA**	**180m ECA**
Total landed value:	**787,376**		**734,869**	**83,685**	**384,274**	**43,231**
Lobster and crabs	351,896		328,004	36.900	14,833	1,669
Other shellfish	32,259		44,857	5,046	48,847	5,495
Finfish	403,220	2,476,430	371,007	41,738	320,594	36,067
MA landed value:	**288,494**		**328,921**	**37,004**	**141,964**	**15,971**
Lobster and crabs	128,935		145,036	16,317	5,480	616
Other shellfish	11,820		19,835	2,231	18,046	2,030
Finfish	147,739	1,078,786	164,051	18,456	118,438	13,324

Based on these values, we estimate that the maximum range for pile driving noise with 10 dB of attenuation in the SouthCoast Wind setting is 15 km for 160 dB. We therefore assume conservatively that all finfish leave the portion of the WLA where construction work is taking place, and a 15 km buffer zone around this area, for the duration of pile driving (total of three years; Table 13 (a)). This is consistent with reported anecdotal observations by fishers around the Block Island Wind Farm (ten Brink and Dalton 2018), which suggest that the construction noise effect may extend 5-10 km from its source, and that many finfish will return to the area within months of the end of construction. To estimate the value associated with this effect for SouthCoast Wind, we obtained data from NOAA on average annual landings from a region enclosed by a 15 km buffer around the SouthCoast WLA. The annual value of Massachusetts finfish landings reported by NOAA for this region is $1,078,786 (2023$). At any time during pile driving, we assume that 50% of this value is foregone, to reflect the two phases of WLA tower installations. The discounted value (at 5%) of these Massachusetts landings for the 2028 to 2030 construction years is $1,208,468 (2023$).

We also consider loss of shellfish due to construction noise and burial resulting from foundation installation and inter-array cable work. The closest approximation in the literature for a construction noise injury/mortality threshold for shellfish is the "mortality and potential mortal injury" 24-hour exposure threshold of 216 dB for "fish without swim bladders" (Popper *et al.* 2014; JASCO 2022). This level of exposure will extend no more than 420 m from tower locations (JASCO 2022, p. 52, Table 39, "Fish without swim bladder"), a radius that covers 16% of the WLA footprint assuming all potential tower locations are built out.

To be conservative, we increase the estimate of the effect to 20% of the WLA footprint, and assume that 20% of the lobster, crab, scallop, and other shellfish populations within the WLA are adversely affected by pile driving noise, seabed disturbance around foundations, and cable installation during construction, and thus lost to fishing (Table 13 (b and c)) for all of the construction years in which seabed disturbance may take place. We assume that lobster and crab will repopulate the portions of the WLA from which they are displaced within a year after construction work ends, and that scallop and other non-mobile shellfish stocks in those portions of the WLA will rebuild over the course of four years (Table 13(c)).

Along the Export Cable Routes, the greatest effects are likely to be due to habitat disruption along the immediate cable routes; cable laying does not involve the same disturbance from drilling or pile driving as turbine tower installation. We therefore consider significant displacement of mobile species from the ECAs and ECWAs to be unlikely. The habitat disruptions that impact non-mobile benthic species are likely to extend on average no more than 5-10 m on either side of the immediate cable route – at most 12% of the ECA and 2% of the ECWA area. To be conservative, we model a 25% reduction in landings of all shellfish (including lobster and crabs) for two years and all non-mobile shellfish (such as scallops and whelk) over five years from the ECAs (Table 13 (e and f)), and a 10% reduction in landings for all species for one year from the 1.6 km ECWAs (Table 13 (d)).

Transient effects from constrained access during construction

During wind farm construction activities, fishing may be temporarily constrained in parts of the WLA and along the Export Cable Routes. We assume that a 500 m radius construction safety zone will be required around tower locations during construction activities, and around any vessel installing cables. In practice, during these construction and cable-laying activities, some fishing that would have taken place in those areas is likely to shift to other nearby locations, replacing some of the forgone landings. If fishers prefer to fish within the construction areas, that is likely because these are thought to be more productive than alternatives. As an upper bound on effects from these temporary constraints, we estimate the full average value of landings linked to the affected areas.

We assume conservatively that fishing is constrained in 25% of the SouthCoast WLA for five years (Table 13 (g)), and in 10% of the 1.6 km ECWAs for during cable installation activities (Table 13 (h)). In addition, we assume that fishing is constrained within all of the ECAs immediately around the export cable routes during cable installation activities (Table 13 (i)).

We use as a basis for our calculations the average annual values for each area (Table 14), prorated according to the availability effects described above and the fraction of the year affected, discounted to 2023 at 5%, and adjusted to 2023$.[5] Note that the assumption about all finfish leaving the WLA (plus 15 km buffer) means that there is no further effect on finfish landings from constrained access in the WLA. To be conservative, we do not adjust for double-counting of effects in the overlap between the 15 km buffer around the WLA and the ECAs.

Table 15 shows the combined results of the availability and constrained access effects (Table 13 (a)-(i)). The total value of Massachusetts landings associated with construction effects is estimated to be about $1.59 million (2023$) for the WLA, $55,000 for the Brayton Point Export Cable Route, and $20,000 for the Falmouth Export Cable Route.

[5] We use the St. Louis Fed's GDP Implicit Price Deflator data (https://fred.stlouisfed.org/data/GDPDEF.txt) for April 2021 and April 2023 to adjust 2020$ to 2023$ (11.5%).

Table 15. Estimated value of landings associated with construction effects.

Area	Massachusetts landed value (2023$)
SouthCoast WLA / WLA + 15km	1,585,422
Brayton Point ECA / ECWA	55,012
Falmouth ECA / ECWA	20,158

Effects due to fishing constraints during operations

If fishing activity is constrained at certain locations within the wind farm area during the operating life of the Project, it may be appropriate to treat these areas as lost to fishing during that time. For example, areas in the immediate vicinity of turbine towers may not be accessible to bottom trawl fishing once the wind farm is built. Fishers are likely to adapt to such constraints by shifting fishing effort slightly from previous locations or tracks. This sort of adaptation by the fishing industry is made easier by the regular one-by-one nautical mile east-west/north-south grid spacing for wind turbine towers that has been adopted for SouthCoast Wind and other offshore wind projects in the region. Because it is not possible to know exactly how the fishing industry will respond to this change in future years, or what the implications of that adaptation will be for catch and landings, we assume here that the landings from affected areas are simply not realized. This is a conservative assumption that likely overstates the actual loss of landings due to wind farm development.

Fishing activity constraints during wind farm operations apply only to the WLA; we do not expect any constraints along the Export Cable Routes during operations. The footprint of the SouthCoast Wind Lease Area is 51,600 hectares, of which permanent structures occupy less than 10 hectares, or 0.02% of the total area. A 100 m radius area around each of the turbine towers accounts for about 0.7% of the total WLA, suggesting that less than 1% of the WLA area may be lost to fishing. Mobile gear (dredge, trawl) fishing accounts for about half of landed value from the SouthCoast WLA. We assume conservatively that up to 10% of total baseline landings from all stocks within the WLA may be lost to fishing during operations (Table 13 (j)).

This estimate includes occasional disruption of fishing activity during Project maintenance activities. WTGs in the SouthCoast Wind Project area are expected to require regular maintenance. While specific maintenance methods and maintenance intervals are not known at this time, it is possible that maintenance activities in the Project area occur in proximity to fishing activity. The impact of maintenance activities to fishermen is expected to be minimal and captured by the conservative assumption of up to 10% reduction in baseline landings from the WLA.

Since the SouthCoast Wind Project will be operating for 30 years, we estimate the potential loss associated with these forgone landings by calculating the present value of 10% of baseline landings for a 30-year period beginning in 2031.

The resulting estimate is that up to $310,433 in present value (2023$) of Massachusetts landings from the SouthCoast Wind Lease Area are exposed during Project operations. As discussed in more detail

below, applying the BOEM draft guidelines (BOEM 2022) to the WLA during the operations years of the Project results in a present value estimate of $871,208.

Transient effects from constrained access and availability effects during decommissioning

After approximately 30 years of operations, SouthCoast Wind plans to decommission the Project. We estimate that the duration of decommissioning, and resulting access constraints in the WLA during decommissioning, will extend over two years, one for each phase of the Project. Because relatively little noise is associated with decommissioning compared to construction, we do not model decommissioning effects in the WLA beyond the effects that overlap with access constraints (Table 13 (n)).

We expect that access constraints during decommissioning along the export cable routes will be similar to those during cable laying operations, but likely for a shorter duration. We therefore model access constraints on 10% of the Brayton Point ECWA and 100% of the ECA as each cable is decommissioned (Table 13 (o) and (p)). If the Falmouth ECC is used for the Project 2 cables, the duration is reduced to 3.5 months. Because cable removal is less disruptive to the seabed than burial, we model half of the availability effect for decommissioning as we do for cable installation (Table 13 (l) and (m)).

We then discount the value of affected landings from decommissioning to 2023$ by applying a 5% discount rate. The resulting present value (2023$) estimate of potential lost landings in Massachusetts due to access constraint and availability effects during decommissioning is about $23,000 for the WLA, $11,000 for the Brayton Point ECC, and $2,000 for the Falmouth ECC.

In summary, we estimate that up to $1.92 million (2023$) in total Massachusetts landed value from commercial fishing in and around the SouthCoast Wind Lease Area is potentially exposed to development of the SouthCoast Wind Project. This includes about $1,585,000 due to construction, up to $310,000 during operations, and $23,000 during decommissioning. The total Massachusetts commercial fishing landed value exposure estimate for the Brayton Point Export Cable Route is $66,000, and for the Falmouth Export Cable Route is $24,000.

Applying the upstream and downstream multipliers as described above results in a present value estimate of $1.93 million (2023$) in indirect and induced effects in Massachusetts associated with the WLA, for a total impact of $3.85 million. The total impact values for the Export Cable Routes are $132,000 for the Brayton Point route and $49,000 for the Falmouth route.

BOEM draft guidelines for mitigation impacts to fisheries

In 2022, the Bureau of Ocean Energy Management (BOEM) of the US Department of the Interior issued draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf (BOEM 2022). These draft guidelines discuss “best management practices and mitigation measures to reduce potential impacts to commercial and recreational fisheries.” These include provisions for “compensation for lost fishing income,” based on “ex-vessel value of the fish landed,” and the recommendation that lessees consider making available funds for compensatory mitigation in the amount of “100 percent of revenue exposure for the first year after construction, 80 percent of revenue exposure 2 years after construction, 70 percent of revenue exposure 3 years after construction, 60 percent after four years, and 50 percent after five years post construction.”

The BOEM draft guidelines are intended to ensure that adequate funds are available to compensate lost fishing income, and are not intended to produce a project-specific estimate of likely actual losses. For example, it is highly unlikely that no fishery landings of any kind will be realized from the project area in the first year after construction ("100 percent of revenue exposure"); and the draft guidelines contain no provisions for adjustment of these values in light of the specific parameters of the project, such as turbine tower spacing. As such, the value structure suggested by BOEM in the draft guidelines should not be interpreted as equivalent to the expected losses estimated in this report.

With that caveat, we estimate that the present value (in 2023$) of the amounts BOEM recommends making available for potential losses to Massachusetts-based commercial fishing during the first five years of operations amount to $750,000 (2023$). Using the BOEM draft guidelines and assuming 10% reduction from landings in the WLA in years 6 to 30 results in a total Massachusetts landed value estimate for the WLA of $2.48 million, $560,000 more than our estimate reported above. Including indirect and induced effects, this translates to $4.98 million, or $1.13 million more than our estimate above. We note, however, that BOEM acknowledges that using total ex-vessel landed value as the basis for these amounts is likely to result in an over-estimation of net income loss, since net income is revenue minus expenses, and suggests that using total ex-vessel landed value "is likely to be sufficient to cover shoreside income loss" as well, without applying further multipliers.

Massachusetts-based charter fishing

To obtain data on for-hire charter fishing activity in and around the SouthCoast Wind Lease Area and Brayton Point Export Cable Corridor, we conducted an online survey of Rhode Island- and Massachusetts-based charter vessel operators. The survey asked operators to identify their fishing locations on a chart, and report for each location

- the total number of annual for-hire fishing trips that vessel took in each of the years 2017-2021,
- the average number of passengers onboard for-hire trips in each of the years 2017-2021, and
- the average amount of time spent targeting highly migratory species (HMS) relative to bottom fishing or trolling for other species during for-hire trips.

The survey was first distributed on April 18, 2022 through email lists maintained by Rhode Island Department of Environmental Management (RI DEM), Rhode Island Coastal Resources Management Council (RI CRMC) and Massachusetts Division of Marine Fisheries (MA DMF), and also via email by for-hire fishing industry representatives, including the Rhode Island Party and Charter Boat Association. The survey was active from April 18, 2022 until May 14, 2022.

The survey received 91 total responses from for-hire charter owners and/or operators. Sixty-six of these respondents (72%) reported that they fish in the area depicted in Figure 5. These 66 respondents reported 62 unique vessels, and reported effort data for 29 of those vessels across the five-year period of 2017-2021 (black dots in Figure 5).

To capture for-hire effort focused specifically within Narragansett Bay, a second survey was conducted in October 2022 distributed among 17 for-hire charter captains known to fish primarily in Narragansett Bay as identified by members of the for-hire industry. This survey received a total of four responses

reporting activity for four unique vessels not captured in the first survey wave (red dots in Figure 5). The second survey design was identical to that of the first wave with the addition of charts for Narragansett Bay. Combined results for the two surveys are shown in Table 16.

Because we have no survey data specific to the waters around the Falmouth ECC, we use Brayton Point ECC results as a proxy for charter fishing around the Falmouth ECC.

Table 16. For-hire charter fishing survey summary statistics.

Description	Number
Fished in the area and responded to the survey	70
Provided vessel names	66
of which based in Massachusetts	37.5
Provided annual vessel trip numbers	35
Observations with vessel trips reported (2017-2021)	229
Total trips per year	1 – 235
Average total trips per year	46.74
Passengers per vessel trip	2 – 25
Average passengers per vessel trip	5.24
Identified fishing locations on maps	33
of which based in Massachusetts	18.5

Similar studies published in the peer-reviewed academic literature using paper mail, email, or mixed mode survey distributions typically have survey response rates around 20-30% (e.g., Dalton *et al*. 2020, Carr-Harris and Steinback 2020). Based on discussions with for-hire industry representatives, approximately 100 vessels actively engage in for-hire fishing activity in the waters depicted in Figure 5, suggesting the fishing reported by survey respondents accounts for about 33% of the total. The combined response rate for the primary population of interest is within an appropriate range to consider our survey distribution a success. An important note to also consider is that there are vessels in our sample that require the submission of federal VTRs. A common trend identified in the data was that some respondents did not provide data for their vessels that require VTRs. This is not a problem for this analysis as this effort data is already accounted for by the NOAA databases and summary reports used as a baseline for our subsequent analyses.

Table 17. Number of Massachusetts-based vessel trips and anglers by year, SouthCoast WLA.

Year	WLA		WLA + 15 km buffer	
	Vessel Trips	Anglers	Vessel Trips	Anglers
2017	0	0	10	35
2018	2	10	10	34
2019	6.5	28.5	10.5	40.5
2020	2	6	15	75
2021	5	15	45	181
Average	**3.1**	**11.9**	**18.1**	**73.1**

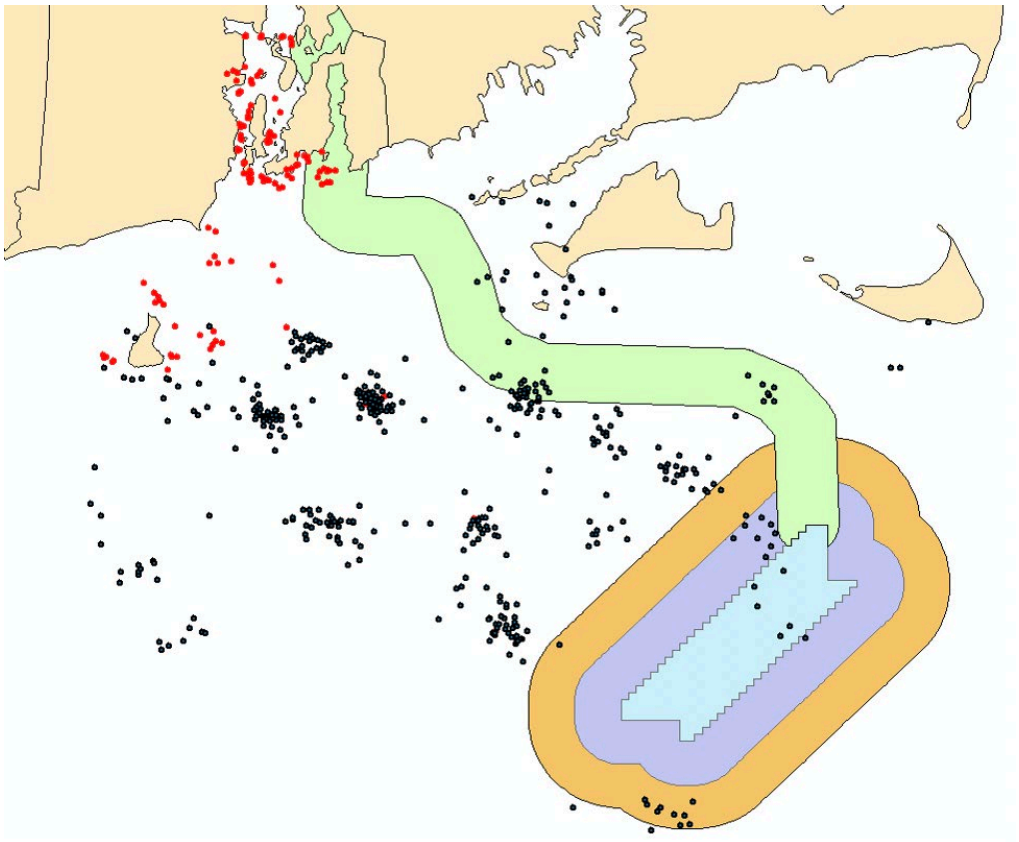

Figure 5. Charter fishing locations, 2017-2021, identified in survey responses. WLA is shown in blue with 7.5 and 15 km buffers, and ECRA in green.

The number of anglers per year is estimated by multiplying the vessel trip number in a year and the average number of anglers per trip in that year for each vessel, and the results are then summed across vessels by area. Tables 17 and 18 show the annual vessel trips and angler counts in the survey responses for charter vessels based in Massachusetts.

Table 18. Number of Massachusetts-based vessel trips and anglers by year, Brayton Point ECRA.

Year	Vessel Trips	Anglers
2017	11	48
2018	14.5	63.5
2019	14	65
2020	5	15
2021	7	25
Average	**10.3**	**43.3**

We use the revenue per angler estimates from NOAA shown in Table 19 below for our revenue calculation. We recognize that the per angler revenue from charter boats may be an order of magnitude

larger than that from party boats. The data in Table 19 represent an average across both sectors, influenced by the fact that many more people participate in party boat fishing than in charter fishing. There is no per-angler revenue data specific to the SouthCoast Wind WLA available from NOAA as of the writing of this report. We therefore rely on estimates from nearby lease areas (Bay State Wind and Vineyard Wind 1) as a proxy of what we expect SouthCoast Wind WLA revenues to be.

Table 19. SouthCoast Wind area for-hire vessel revenue. Sources: NMFS 2023a and 2023b.

Year	Revenue per angler (2023$)
2009	111.50
2010	92.92
2011	159.29
2015	134.57
2016	106.19
2018	92.92
Average	**116.23**

The annual revenue for each area is estimated by multiplying the number of anglers (Tables 17 and 18) by the average revenue per angler ($116.23). The result is then adjusted using a scale factor. For a low-end estimate, the scale factor is the ratio of the number of Massachusetts vessels responding to the survey (37.5) to the number of these vessels for which specific fishing locations were provided (18.5). For a high-end estimate, we increase the scale factor to reflect the estimated total of 100 vessels operating in the survey area (see above), versus the 66 for which survey responses were received. Finally, an economic impact multiplier is used to reflect the overall economic impacts associated with the charter fishing direct revenue. As with commercial fishing, we recognize that this multiplier will in fact vary with different types of charter fishing (e.g. sport fishing charters versus party boats). The multiplier we use is calculated using data in the NOAA report by Lovell *et al*. (2020), and reflects an average across different types of charter fishing. The Lovell *et al.* study is based on data from NOAA's 2016-2017 National Marine Recreational Fishing Expenditure Survey; we are not aware of any more recent data on the for-hire charter fishing industry. The results are shown in Table 20.

Table 20. Annual revenue and economic impact from MA-based charter fishing in SouthCoast Wind areas.

Area	Annual anglers	Revenue per angler (2023$)	Scale factor	Annual revenue (2023$)	Impact multiplier	Annual impact (2023$)
WLA	11.9	116.23	2.027	2,804	1.627	4,562
			3.071	4,248	1.627	6,911
WLA + 15km	73.1	116.23	2.027	17,222	1.627	28,021
			3.071	26,092	1.627	42,452
Brayton Point ECRA	119.1	116.23	2.027	28,060	1.627	45,654
			3.071	42,512	1.627	69,167

As Figure 5 and Table 17 illustrate, there is little evidence of charter fishing within the SouthCoast WLA, with more activity reported in the 15 km buffer area. We assume conservatively that the value of charter fishing at the SouthCoast Wind development areas, including the 15 km buffer around the entire WLA, is foregone in the construction years when pile driving takes place, since we expect finfish to leave this area due to construction noise, and also in the decommissioning year of the project. This is likely an overestimate of the actual impact, since charter fishing that would have taken place in these areas may in fact be carried out elsewhere.

Given the fact that much of the charter fishing around the SouthCoast WLA takes place outside the WLA footprint, and the 1 nm spacing of the turbine towers, we expect that charter fishing boats will be able to operate in and near the WLA with minor adjustments to current practice once construction is complete. We therefore do not expect charter fishing revenue to be materially impacted during the operations phase of the Project.

We therefore base our calculation of exposure on the WLA with 15 km buffer and the Brayton Point ECRA, ignoring any overlap. We use the high-end revenue and impact estimates for the WLA + 15 km ($26,092 and $42,452 per year, respectively), and assume that 50% of this value is forgone during the pile driving years, and all of it during the decommissioning years. We assume that charter fishing is prevented in the Brayton Point and Falmouth ECRAs during all cable installation work, for up to six months as described above. Because we do not have charter fishing data specific to the Falmouth Export Cable Route, we assume conservatively that the high-end revenue and impact estimates for the Brayton Point ECRA ($42,512 and $69,167 per year, respectively) are valid proxies for the Falmouth ECRA. Using a 5% discount rate, and adjusting to 2023$, the present value of these effects, using the high-end estimates, is about $43,000 (2023$) in revenue and $70,000 in total impact for the WLA in Massachusetts, $20,000 and $33,000 respectively for the Brayton Point Export Cable Route, and $19,000 and $31,000 respectively for the Falmouth Export Cable Route. The impact estimated for Massachusett-based charter fishing from construction, operations, and decommissioning of the SouthCoast Wind Project is therefore at most $134,000.

As noted above, we consider it unlikely that the SouthCoast Wind development will substantially change the personal recreational fishing activities of Massachusetts boaters.

Conclusions

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be $787,000 (2023$), or $1,526/km^2/year. Of this, $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the 180 m wide SouthCoast Wind Export Cable Areas to be $85,000 (2023$) for Brayton Point and $43,000 for Falmouth. Of this, $37,000 and $16,000, respectively, are landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 and $32,000, respectively, in Massachusetts.

Massachusetts-based charter fishing revenue generated in and around the SouthCoast Wind development areas (Lease Area and Brayton Point and Falmouth Export Cable Corridors) is estimated to be between $73,000 and $111,000 per year (2023$). Including multipliers, this generates total annual economic impacts of $119,000 to $181,000 in Massachusetts. We do not have data on charter fishing specific to the Falmouth Export Cable Corridor, and suggest using the Brayton Point ECC values as a proxy for the Falmouth ECC.

We estimate that a total (lump sum) of up to $1,918,000 (2023$) of commercial fisheries value landed in Massachusetts is potentially exposed to SouthCoast Wind Lease Area development. This includes about $1,585,000 in direct landed value forgone due to construction activities, $310,000 from forgone landings during the wind farm's operation, and $23,000 in present value of foregone landings due to decommissioning.

Applying the BOEM draft guidelines to the first five years of operations results in an additional $560,000 in estimated operating exposure. We note that the BOEM draft guidelines are intended to ensure that adequate funds are available to compensate lost fishing income, and are not intended to produce a project-specific estimate of likely actual losses. As such the BOEM framework is not directly compatible with the estimates presented in this report.

We estimate the total Massachusetts commercial fishing exposure for development of the Brayton Point Export Cable Route to be $115,000 (2023$) in landed value, assuming that both export cables use the Brayton Point ECC. If the Project 2 cable uses the Falmouth ECC, the exposure values are $60,000 for the Brayton Point and $24,000 for the Falmouth Export Cable Route.

Applying the upstream and downstream multipliers as described above results in a present value estimate of $1.93 million (2023$) in indirect and induced effects in Massachusetts associated with the WLA, for a total impact of $3.85 million. The total impact values for the Export Cable Routes are $231,000 for the cables on the Brayton Point route, or $132,000 for Brayton Point and $49,000 for Falmouth if the Project 2 export cables use the Falmouth ECC.

Massachusetts-based charter fishing revenue exposure to the SouthCoast Wind development is estimated to have a present value of $82,000 (2023$), resulting in $134,000 in present value of impacts in Massachusetts.

Including indirect and induced effects, the potentially affected commercial landings and charter fishing revenue together result in about $4,217,000 in total (lump sum, 2023$) present value economic impact in Massachusetts. Table 21 summarizes these values.

There is considerable variability in the baseline data of landings and landed value from the SouthCoast Wind Project areas. Baseline future landings will vary due to natural and fisheries-related fluctuations in stocks that are likely to be amplified by climate change effects. There is also uncertainty about the impact of wind farm construction and operation on fish stocks and landings, and about the ways that fishers will adapt their fishing practices in response to wind farm development. We consider our combined estimate of $4.22 million in economic impacts to Massachusetts from SouthCoast Wind development effects on commercial and charter fishing to be a conservative upper bound on likely actual impacts.

Table 21. Estimated Massachusetts fishing industries exposure from SouthCoast Wind development

Categories of Potential Exposure		**MA Direct Landed Value/Revenue (2023$)**
Construction-related effects	WLA+	$1,586,000
	Brayton Point ECC[6]	$94,000
Effects during operations	WLA	$310,000
	ECCs	---
Decommissioning-related effects	WLA	$23,000
	Brayton Point ECC[6]	$21,000
Subtotal MA commercial direct effects		**$2,034,000**
MA for-hire charter fishing direct effects		$82,000
Total MA direct effects		**$2,116,000**

Categories of Potential Exposure	**MA Total Impact with Multipliers (2023$)**
Subtotal MA commercial fishing	**$4,083,000**
MA for-hire charter fishing	$134,000
Total Massachusetts impacts	**$4,217,000**

[6] Should SouthCoast Wind utilize the Falmouth ECC for Project 2, the total present value of Massachusetts commercial landings exposed to SouthCoast ECC development decreases from $115,000 to $90,000, and the associated impacts decrease from $231,000 to $181,000.

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Appendix

Table A1. Average annual landings by species from the SouthCoast WLA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

Species	*Mean*		*Standard Deviation*	
	Value/year (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	10,641	10,424	10,936	12,336
AM. PLAICE FLOUNDER	47	25	43	24
AMERICAN EEL	4	4	5	5
AMERICAN LOBSTER	36,610	6,049	18,527	3,766
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	15	16	38	42
ATLANTIC HALIBUT	29	3	58	7
ATLANTIC HERRING	8,991	79,572	28,397	271,050
ATLANTIC MACKEREL	893	1,575	1,316	2,110
BLACK SEA BASS	3,795	981	4,689	1,199
BLUE CRAB	5	2	20	9
BLUEFIN TUNA	-	-	-	-
BLUEFISH	1,252	1,315	531	657
BLUELINE TILEFISH	33	11	72	23
BONITO	9	5	29	16
BUTTERFISH	5,941	7,999	4,044	5,782
CANCER CRAB	-	-	-	-
CHANNELED WHELK	813	97	2,343	286
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	480	181	438	168
CONCHS	13	8	47	31
CONGER EEL	98	121	82	83
CUNNER	-	-	-	-
CUSK	0	0	1	1
DOGFISH SMOOTH	374	426	375	485
DOGFISH SPINY	1,886	6,537	1,486	4,960
DOLPHINFISH	1	0	5	1
FOURSPOT FLOUNDER	30	74	67	171
GOLDEN TILEFISH	40,936	8,494	42,300	8,724
HADDOCK	417	433	612	987
HORSESHOE CRAB	1	1	2	2
ILLEX SQUID	2,037	3,401	3,000	5,525
JOHN DORY	81	58	80	56
JONAH CRAB	95,258	93,024	54,977	43,231
KING MACKEREL	-	-	-	-
KING WHITING	1,280	1,149	4,329	3,850
KNOBBED WHELK	6	1	14	2

LIGHTNING WHELK	-	-	-	-
LITTLE TUNA	0	0	1	0
LONGFIN SQUID	89,715	57,894	55,760	35,371
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	46,113	24,712	23,480	8,967
MULLETS	0	0	0	0
NK CRAB	0	0	2	2
NK EEL	22	18	43	35
NK SEATROUT	1	1	2	3
NK TILEFISH	0	0	1	0
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	666	757	2,042	2,365
OTHER FISH	0	0	1	1
POLLOCK	44	35	42	36
RED CRAB	-	-	-	-
RED HAKE	2,437	6,268	2,554	6,706
REDFISH	24	31	31	45
ROCK CRAB	3,508	5,173	7,716	11,731
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	2	3	4	5
SCUP	50,583	56,725	51,310	57,549
SEA RAVEN	-	-	-	-
SEA ROBINS	2	10	3	11
SEA SCALLOP	30,639	2,749	39,611	4,102
SILVER HAKE	46,737	57,789	35,033	38,177
SKATES	25,129	38,782	12,212	22,278
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	14	5	47	16
SQUETEAGUE WEAKFISH	48	19	45	17
STRIPED BASS	31	7	41	9
SUMMER FLOUNDER	58,874	17,641	57,881	18,957
SURF CLAM	788	685	2,950	2,561
SWORDFISH	-	-	-	-
TAUTOG	8	2	12	3
THRESHER SHARK	-	-	-	-
TRIGGERFISH	1	1	3	2
WHITE HAKE	308	159	841	401
WINTER FLOUNDER	1,317	455	1,474	568
WITCH FLOUNDER	56	23	54	23
WOLFFISHES	0	0	1	1
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	1,814	890	2,517	1,282

Table A2. Average annual landings by species from the SouthCoast Wind Brayton Point ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECA.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	2,303	1,428	6,986	4,210
ALL_OTHERS	274,877	310,907	168,718	229,521
AM. PLAICE FLOUNDER	268	136	246	123
AMERICAN EEL	16	5	38	9
AMERICAN LOBSTER	709,460	108,796	169,582	25,185
AMERICAN SHAD	2	2	5	4
ATLANTIC CROAKER	18	32	41	84
ATLANTIC HALIBUT	38	4	30	3
ATLANTIC HERRING	138,611	952,673	206,077	1,417,581
ATLANTIC MACKEREL	12,614	39,171	16,993	80,425
BLACK SEA BASS	109,272	23,662	35,050	10,251
BLUE CRAB	1,391	1,407	4,937	5,040
BLUEFIN TUNA	5	1	17	3
BLUEFISH	30,407	41,417	17,979	27,093
BLUELINE TILEFISH	15	5	40	13
BONITO	8,242	2,681	5,958	2,277
BUTTERFISH	28,548	33,437	15,989	17,949
CANCER CRAB	-	57	-	130
CHANNELED WHELK	105,555	10,840	68,262	7,459
CHUB MACKEREL	11	12	43	45
COBIA	1	0	3	1
COD	6,972	2,295	4,622	1,450
CONCHS	13,436	2,679	35,331	6,551
CONGER EEL	283	391	281	434
CUNNER	266	110	746	260
CUSK	4	3	5	4
DOGFISH SMOOTH	3,330	4,777	2,694	4,493
DOGFISH SPINY	20,572	68,345	28,651	91,918
DOLPHINFISH	4	1	17	4
FOURSPOT FLOUNDER	22	42	55	123
GOLDEN TILEFISH	5,048	1,070	5,599	1,161
HADDOCK	1,808	1,223	1,414	1,036
HORSESHOE CRAB	217	197	197	224
ILLEX SQUID	1,867	3,599	2,881	6,328
JOHN DORY	89	63	122	85
JONAH CRAB	52,297	55,260	30,697	31,883
KING MACKEREL	0	0	1	0
KING WHITING	2,152	1,946	4,176	3,954
KNOBBED WHELK	1,765	446	2,928	708

LIGHTNING WHELK	153	49	463	137
LITTLE TUNA	1,962	3,257	2,864	5,089
LONGFIN SQUID	877,015	573,828	625,512	403,553
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	119	315	221	642
MONKFISH	62,175	29,835	33,865	12,183
MULLETS	-	-	-	-
NK CRAB	82	78	129	89
NK EEL	21	18	27	20
NK SEATROUT	137	300	148	350
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	0	0	0	0
NORTHERN SEA ROBIN	0	2	2	8
OCEAN POUT	5	8	18	28
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,740	1,757	4,157	3,908
OTHER FISH	49	50	181	179
POLLOCK	289	236	233	209
RED CRAB	-	-	-	-
RED HAKE	6,178	16,464	1,668	4,760
REDFISH	151	196	139	169
ROCK CRAB	6,522	8,240	7,927	9,230
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	53	79	131	205
SCUP	142,379	168,197	63,861	79,535
SEA RAVEN	61	40	75	46
SEA ROBINS	178	496	202	356
SEA SCALLOP	155,767	13,132	141,862	13,922
SILVER HAKE	102,572	139,468	51,088	77,190
SKATES	139,206	665,273	75,862	449,248
SPANISH MACKEREL	6	4	15	11
SPOT	6	11	15	28
SPOTTED HAKE	-	8	-	29
SPOTTED WEAKFISH	16	5	34	11
SQUETEAGUE WEAKFISH	1,468	592	1,213	465
STRIPED BASS	9,125	1,772	8,622	1,726
SUMMER FLOUNDER	354,034	85,559	117,270	37,004
SURF CLAM	3,836	3,561	12,526	11,688
SWORDFISH	-	-	-	-
TAUTOG	7,409	1,998	3,390	1,034
THRESHER SHARK	60	53	226	197
TRIGGERFISH	145	90	96	56
WHITE HAKE	1,310	747	3,154	1,664
WINTER FLOUNDER	18,568	6,471	20,051	7,502
WITCH FLOUNDER	353	142	344	140
WOLFFISHES	3	3	8	6
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	11,896	5,598	16,996	8,847

Table A3. Average annual landings by species from the SouthCoast Wind Falmouth ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECC.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	82,301	84,424	67,280	77,303
AM. PLAICE FLOUNDER	633	320	492	264
AMERICAN EEL	72	6	164	17
AMERICAN LOBSTER	19,669	3,209	7,076	1,417
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	1	1	5	4
ATLANTIC HALIBUT	57	6	34	4
ATLANTIC HERRING	18,539	164,170	50,435	521,579
ATLANTIC MACKEREL	6,102	9,917	11,205	15,124
BLACK SEA BASS	38,516	9,889	26,687	7,528
BLUE CRAB	-	-	-	-
BLUEFIN TUNA	-	-	-	-
BLUEFISH	5,920	6,171	2,857	3,432
BLUELINE TILEFISH	19	6	58	18
BONITO	25	9	77	24
BUTTERFISH	11,119	14,159	4,839	5,669
CANCER CRAB	-	-	-	-
CHANNELED WHELK	221,713	21,398	95,053	7,318
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	4,426	1,697	4,555	1,696
CONCHS	23,515	4,630	33,533	6,114
CONGER EEL	32	40	26	33
CUNNER	-	-	-	-
CUSK	5	5	5	4
DOGFISH SMOOTH	1,733	1,783	1,056	1,047
DOGFISH SPINY	1,835	6,290	3,801	11,969
DOLPHINFISH	-	-	-	-
FOURSPOT FLOUNDER	6	5	21	17
GOLDEN TILEFISH	5,101	1,047	5,911	1,234
HADDOCK	3,288	2,126	1,459	1,166
HORSESHOE CRAB	1,717	1,234	1,558	967
ILLEX SQUID	3,594	6,410	5,156	8,560
JOHN DORY	81	59	152	106
JONAH CRAB	14,167	13,750	8,718	7,785
KING MACKEREL	-	-	-	-
KING WHITING	2,058	1,936	4,966	4,625
KNOBBED WHELK	15,307	3,348	11,216	2,242

LIGHTNING WHELK	1,051	408	2,450	886
LITTLE TUNA	-	-	-	-
LONGFIN SQUID	1,497,032	944,608	981,874	617,252
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	10,452	4,821	5,972	2,946
MULLETS	-	-	-	-
NK CRAB	2	2	8	9
NK EEL	2	2	3	3
NK SEATROUT	0	0	1	1
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,553	1,551	3,810	3,487
OTHER FISH	26	32	98	119
POLLOCK	1,106	846	1,039	816
RED CRAB	-	-	-	-
RED HAKE	3,252	8,490	1,771	5,528
REDFISH	427	561	310	353
ROCK CRAB	364	478	568	755
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	5	5	13	14
SCUP	61,232	73,793	40,608	48,513
SEA RAVEN	-	-	-	-
SEA ROBINS	17	60	20	69
SEA SCALLOP	36,238	2,935	22,543	2,109
SILVER HAKE	61,153	83,124	34,548	49,724
SKATES	13,788	28,616	22,543	30,876
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	1	0	3	1
SQUETEAGUE WEAKFISH	34	14	23	10
STRIPED BASS	3,378	666	3,063	530
SUMMER FLOUNDER	151,745	38,662	127,402	36,708
SURF CLAM	7,473	6,691	18,915	17,062
SWORDFISH	-	-	-	-
TAUTOG	858	196	567	109
THRESHER SHARK	-	-	-	-
TRIGGERFISH	53	31	79	49
WHITE HAKE	1,776	953	3,629	1,923
WINTER FLOUNDER	5,977	2,085	5,507	2,080
WITCH FLOUNDER	695	285	611	283
WOLFFISHES	5	4	13	11
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	3,606	1,800	4,890	2,445

SOUTHCOAST WIND

Fisheries Exposure Analysis in Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

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Fisheries Exposure in Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

Hauke Kite-Powell, Di Jin, and Michael Weir
Marine Policy Center
Woods Hole Oceanographic Institution

25 January 2024

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List of Abbreviations

COP – Construction and Operations Plan

ECA – Export Cable Area

ECC – Export Cable Corridor

ECR – Export Cable Route

ECWA – Export Cable Corridor Working Area

ECRA – Export Cable Route Area

GDP – Gross Domestic Product

MA DMF – Massachusetts Division of Marine Fisheries

NMFS – National Marine Fisheries Service

NOAA – National Oceanographic and Atmospheric Administration

PPI – Producer Price Index

RI CRMC – Rhode Island Coastal Resources Management Council

RI DEM – Rhode Island Department of Environmental Management

SBRM – Standardized Bycatch Reporting Methodology

VMS – Vessel Monitoring System

VTR – Vessel Trip Report

WLA – Wind Lease Area

WTG – Wind Turbine Generator

Summary

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be $787,000 (2023$), or $1,526/km^2/year. Of this, $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the 180 m wide SouthCoast Wind Export Cable Corridors to be $85,000 (2023$) for Brayton Point and $43,000 for Falmouth. Of this, $37,000 and $16,000, respectively, are landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 and $32,000, respectively, in Massachusetts.

We estimate that a total (lump sum) of up to $2,034,000 (2023$) of commercial fisheries value landed in Massachusetts is potentially exposed to the SouthCoast Wind Project development. It includes about $1,585,000 in direct landed value forgone due to construction-related effects in and around the Wind Lease Area, $94,000 in landed value forgone due to export cable installation, up to $310,000 from forgone fishing during the wind farm's operation, and $44,000 in present value of landings from decommissioning. Including indirect and induced effects, the potentially affected commercial landings result in about $4,083,000 in total (lump sum) present value economic impact in Massachusetts.

We estimate the average annual economic impact from Massachusetts-based for-hire charter fishing in and around the SouthCoast Wind project areas to be between $119,000 and $181,000. We estimate that a total (lump sum) of about $134,000 (2023$) in economic impact from Massachusetts-based charter fishing is potentially exposed during construction and decommissioning activities in the SouthCoast Wind Project areas.

There is considerable variability in the baseline data of landings and landed value from the SouthCoast Wind Lease Area and Export Cable Corridors. Baseline future landings will vary due to natural and fisheries-related fluctuations in stocks and prices. There is also uncertainty about the impact of wind farm construction and operation on fish stocks and landings, and about the ways that fishers will adapt their fishing practices in response to wind farm development. We consider our combined estimate of $4.22 million in 2023$ present value economic impact to Massachusetts from SouthCoast Wind development on commercial and charter fishing to be a conservative upper bound on likely actual impacts.

Introduction

This report estimates the level of pre-development fishing operations intersecting with, and landings and landed value from, the SouthCoast Wind Lease Area (WLA) and Export Cable Corridors (ECCs) (Figure 1) associated with landings and revenue generated in Massachusetts ports, and the potential exposure of Massachusetts-based commercial and for-hire charter fishing to SouthCoast Wind Project construction, operations, and decommissioning.

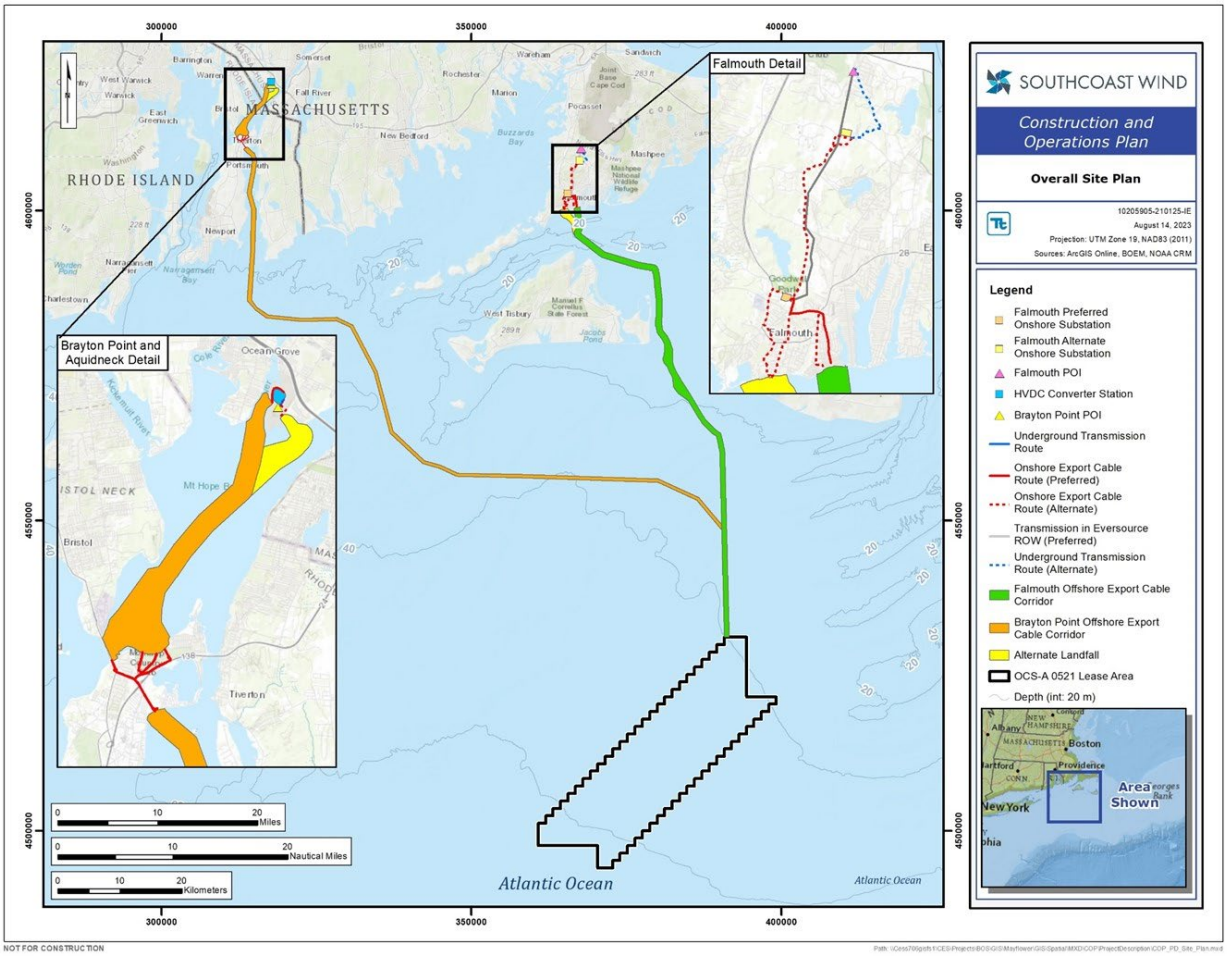

Figure 1. SouthCoast Wind Lease Area and export cable routes. Source: SouthCoast Wind.

The WLA for SouthCoast Wind lies in federal waters, some 75 km south of the Muskeget Channel between Martha's Vineyard and Nantucket, and has a footprint of 516 km^2. The ECC to Brayton Point is 103 km in length, and runs from the northern edge of the WLA first to the north and west across Rhode Island Sound, then up the Sakonnet River to its landing location at Brayton Point in Somerset, MA. The ECC to Falmouth runs north from the WLA through the Muskeget Channel and then northwest across Nantucket Sound to Falmouth.

SouthCoast Wind plans to develop the WLA in two phases (Project 1 and Project 2), each with its own export cables. SouthCoast Wind's preferred approach is to use the Brayton Point ECC for both set of export cables. While both the Brayton Point and Falmouth ECCs are covered in this analysis, the summary exposure and impact values presented in the conclusions assume that SouthCoast Wind's two sets of export cables will both utilize the Brayton Point ECC.

To estimate commercial fish landings along the ECAs, we define a 10km wide Export Cable Route Area (ECRA) extending 5km on either side of each cable route. The 10km wide ECRA has no physical significance in the context of the SouthCoast Wind Project, and is defined only for the purpose of identifying fisheries landings data that reflect what may be landed from fishing along the export cable route. Likewise, the Export Cable Corridors (ECCs) defined by SouthCoast, 700 m wide for the Brayton Point cable route and 1,000 m wide for the Falmouth route, represent only the envelope within which the cables will potentially be located. Only portions of the narrow, 180m wide ECA centered on the export cables may be disturbed in the process of burying and decommissioning the cables.

Table 1 shows the approximate length and area of these features for the SouthCoast Wind Project. In the sections that follow, fishery landings and values for the Export Cable Routes are estimated and reported for the ECAs, as defined above.

Table 1. SouthCoast Wind area parameters

Wind Lease Area footprint (km^2)	516
Brayton Point Export Cable Route length (km)	156
Area of 10km Brayton Point Export Cable Route Area (ECRA) (km^2)	1,571
Area of Brayton Point Export Cable Corridor (ECC) (km^2)	28.3
Falmouth Export Cable Route length (km)	83
Area of 10km Falmouth Export Cable Route Area (ECRA) (km^2)	905
Area of Falmouth Export Cable Corridor (ECC) (km^2)	16.3

Methodology

Our approach to estimating the potential impact of SouthCoast Wind development on commercial fishing is to first estimate the annual landed weight and value of fish and invertebrates from the SouthCoast Wind WLA and ECAs, and then to estimate the fraction of this annual value that may be exposed to wind farm construction, operation, and decommissioning. Our assessment method is consistent with the general framework described in the reports by Kirkpatrick *et al.*/BOEM (2017a and 2017b) on socio-economic impact of offshore wind energy development on commercial fisheries, and builds on the approach of Livermore (RI DEM 2017, 2018, and 2019), which develops high-end estimates of fishery impacts by including in baseline estimates the entire trip revenues from all trips that overlap with a wind lease area, regardless of how much fishing occurred inside or outside the area.

Separately, we estimate the gross revenue associated with for-hire charter boat fishing activity originating in Massachusetts, and the fraction of this revenue that may be exposed to SouthCoast Wind development.

We estimate the annual commercial landings and landed value of fish from the SouthCoast Wind WLA and ECAs using a dataset provided by NOAA's National Marine Fisheries Service. This dataset uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data to produce a more accurate spatial allocation of landings from each fishing trip (DePiper 2014; Benjamin *et al.* 2018). As we document below, there has been considerable variability in annual landings from these areas over the past decade; we use the average landings and landed value from 2008 to 2021 as indicative of what the areas may yield in the future.

We then estimate the fraction of this average annual value that may be at risk ("exposed") due to SouthCoast Wind development, based on the nature and schedule of construction activities, operating plans, and decommissioning plans, and on information from the scientific literature on the effects of wind farm construction and operation on commercial fish stocks and landings. Throughout this report, we use "landed value" to refer to the direct value of fisheries landings, "impact" to refer to the economic activity generated by fisheries, including indirect and induced effects (see below), and "exposure" to refer to the portion of landed value or impacts that may be at risk due to wind farm development.

The effect of offshore wind farm construction and operation on marine ecosystems, fish stocks and fish behavior, and fishery landings is an area of ongoing research. To date, almost all offshore wind farm development has taken place outside the US. The only wind farm fully operational off the coast of New England from which lessons might be drawn directly for SouthCoast Wind at the time of writing this report is the Block Island Wind Farm, a five-turbine, 30 MW project about 4 miles from Block Island, RI.

Investigations of offshore wind farms outside the US have found both positive and negative impacts on marine biota, habitats, and ecological function. The impacts include the aggregation of finfish and other marine life via the creation of artificial reefs (Bergström *et al.* 2014; Langhamer 2012; Lindeboom *et al.* 2011; Wilhelmsson and Malm 2008) and disturbance of existing ecosystems (Bergström *et al.* 2014; Wilhelmsson *et al*. 2006). Bartley *et al.* (2019) have reported on monitoring of physical and chemical conditions in the benthic environment around Block Island Wind Farm turbine towers over the two years since the towers were installed; they found some changes in the benthos in the immediate tower foundation footprint at one out of three turbine towers they investigated, and found no changes beyond 30 m from any of the towers studied.

In their 2018 study, ten Brink and Dalton interviewed commercial and recreational fishers active in the waters around the Block Island Wind Farm about the perceived effects of the farm on fish stocks and fishing activity. Respondents reported murky water, underwater noise, and vibration during construction, and a lower abundance of fish such as striped bass on the side of Block Island closest to the wind farm site during the construction time window. They also reported the presence of shellfish and finfish on and around the wind turbine towers, including an increase in the abundance of cod, within months of the conclusion of construction activities. The transient negative effect on mobile species within 5-10 km of wind farm construction activities observed at Block Island is consistent with findings from Europe (Bergström *et al.* 2014; Vallejo *et al.* 2017).

Hooper *et al.* (2017) report on a survey of recreational fishers and wind farms in the United Kingdom. The authors found that most fishers in their survey either had fished near a wind farm or were interested in doing so, and concluded that most UK anglers were unlikely to change their behavior in response to wind farm development.

More recently, Dalton *et al.* (2020) reported on surveys of Rhode Island recreational boaters' preferences for boating in the vicinity of offshore wind farms. Although some survey respondents identified as fishers, the survey did not explicitly target boaters interested in fishing; the mean age of respondents was above 62 years, mean boat length in excess of 37 feet, and more than 43% of respondents owned sailboats. Overall, boaters expressed a preference for not boating near (within 100 ft) of an offshore wind turbine; but boaters who fish were less negatively impacted by boating near a turbine, and boaters who had visited the Block Island Wind Farm were more accepting of trips near turbine towers than other boaters.

Given the current state of knowledge about the effects of wind farm construction and operation on fish stocks and fishery landings (Hogan *et al.* 2023), we consider five categories of possible exposure for commercial fishing from the SouthCoast Wind Project:

- Transient effects on fish availability due to construction activities and noise
- Transient effects due to constrained access to certain areas during construction
- Changes in fishing in the WLA during operations
- Transient effects due to constrained access to certain areas during decommissioning
- Transient effects on fish availability due to decommissioning activities

We also consider transient effects on the for-hire charter fishing industry due to construction and decommissioning of the wind farm. To the extent that for-hire charter fishing vessels from Massachusetts use the WLA and ECAs, it is possible that their activities may be affected during construction and decommissioning. We consider it unlikely that the SouthCoast Wind development will negatively affect the personal recreational fishing activities of Massachusetts boaters.

Estimating the effect of wind farm development on fishing activity and landings is complicated by several sources of variability and uncertainty. There is considerable year-to-year fluctuation in the historical baseline commercial landings from the wind development areas; and future fishery landings from these areas are likely to differ from historical baselines due to climate change effects (Free *et al.* 2019; Oremus 2019). There is uncertainty about the extent and duration of effects of wind farm construction on fish availability in the vicinity of the wind farm, and about the habitat and other effects (if any) of the wind farm over decades of operation (Hogan *et al.* 2023). There is also uncertainty about the response of the commercial fishing industry and of for-hire charter fishing vessels to the altered "landscape" resulting from wind farm development. The current state of the science about wind farm effects on commercial fishing does not support a precise estimate of effects on fish stocks; and the future decisions of fishers are by their nature not precisely predictable, especially decades into the future, because they depend on personal assessments and decisions of individual fishers.

Acknowledging these sources of variability and uncertainty, we seek to develop a realistic, conservative estimate of the potential effect of SouthCoast Wind development on Massachusetts commercial landings, landed value, and charter boat revenue. We make conservative assumptions about fishing industry response, assuming that landings from an area where access is constrained during construction, operations, or decommissioning are simply forgone, and not compensated by landings from fishing elsewhere instead. Further, we estimate impact as the landed value (gross revenue) at risk, not the net income or profit. Landed value is, by definition, larger than net income or profit from fishing. For these reasons, we consider our impacts estimate to represent an upper bound on the likely net effects of the wind farm on the Massachusetts fishing industry.

Baseline commercial fishery landings and values, 2008-2021

Commercial Fisheries Data Description

NOAA has been collecting and improving their Vessel Trip Report (VTR) data for decades. The data have been widely used for fisheries research, management, and economic impact assessments. To gauge landings value and quantity at the spatial scale required for the SouthCoast Wind Lease Area and export cable routes, NOAA has recently developed a procedure to produce high-resolution spatial information using a combination of VTR and fishery observer data. As described below, we follow the general approach developed by NOAA, which is the best approach at present, with a recognition that relevant data are not perfect. All estimates of fishery landings and values in this report are based on these NMFS data. The data have not been amended, adjusted, or augmented in any way, with two exceptions: we make adjustments to the lobster and Jonah crab landed values to account for likely underrepresentation of these species due to differences in reporting requirements for federal and state permit holders; and we make adjustments to the Rhode Island lobster and Jonah crab landings to account for dockside sales. These adjustments are described in detail in the section on Adjustment of Lobster and Jonah Crab Data below. The adjusted data appear only in Tables 11 and 12 below.

The data presented below summarize estimates of fisheries landings and values for fishing trips that intersected with the SouthCoast Wind Lease Area (WLA) or its Export Cable Route Area (ECRA), from 2008 to 2021 (calendar years). Modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data were queried for spatial overlap with the WLA and the ECRA, and linked to dealer data for value and landings information. As detailed in DePiper (2014) and Benjamin *et al.* (2018), to improve the spatial resolution of VTR, a spatial distribution model was developed by combining vessel trip information from VTR with matching NOAA fishery observer data, including geocoordinates of detailed fishing locations. From this model, landings and value can be summarized for a specified geographic area according to (1) species, (2) gear type, (3) port of landing, and (4) state of landing.

In essence, the DePiper approach utilizes a spatial model to distribute the total landings for each commercial fishing trip over a circular area with its center located at the geocoordinate reported in the VTR, following a distribution decreasing with the radius. The model was estimated using VTR data (for the centroid) and vessel observer data (for haul beginning and endpoints). DePiper (2014) reported that the observer data matched VTR records well (488,251 hauls in the observer data were matched to 27,358 VTR records, representing 87.5% of all hauls with either a beginning or end point of a haul recorded).

The primary purpose of the observer data collection is to monitor fishery bycatch. NOAA's Standardized Bycatch Reporting Methodology (SBRM) dictates what types of vessels (gear, species, area of operation, etc.), participating in various fisheries, should be sampled and at what rate. The numbers of sea days needed to achieve a 30% coefficient of variation (CV = standard deviation divided by mean) of total discards for each species group were derived for different SBRM fleets covering different gears, access areas, states, and mesh sizes (NEFSC 2013). For Massachusetts vessels, the observer program covered close to 20% of trips with trawl gear, around 5% of trips with dredge gear, and around 20% of trips with gillnet gear (Jin 2015).

Following the DePiper approach, the resulting high spatial resolution data were converted into raster maps. Use of this VTR raster model produces a more accurate estimate of the spatial distribution of landings than other approaches that rely entirely on the self-reported VTR/clam logbook locations,

which associate all landings from the trip with a single point location. At 10 nautical mile resolution, the confidence intervals of the DePiper model estimates are around 90% for trip lengths of one to two days.

The only alternative to the DePiper approach is a model to distribute the total landings from a VTR report over the vessel's track using the Vessel Monitoring System (VMS) data. The main challenge for this approach is accurate identification of fishing and non-fishing segments of a trip. Muench *et al.* (2018) have shown that using vessel speed alone can lead to a severe misrepresentation of fishing locations. NOAA has adopted the DePiper approach as a standard procedure to generate spatial data; and we agree with NOAA that this is the best approach currently available. The main advantages of the DePiper approach are that (1) it is based on observations of actual fishing locations noted by observers at sea, and (2) it provides a systematic and consistent way to meet the increasing demand for spatial fishing data for relatively small areas in the ocean, which is important for cross project comparison.

Landings associated with the Export Cable Areas are calculated by applying the ratio of footprint areas shown in Table 1 to the landings estimated for the Export Cable Route Area. This assumes that landings are distributed uniformly across the fished sections of the ECRA.

In order to maintain the legally required data confidentiality, summaries by species, gear type, and landing location are presented individually. In addition, for records that did not meet the "rule of three" (three or more unique dealers and three or more unique permits), values are summarized in a category labeled "ALL OTHERS." Note also:

- All landed values have been converted to 2023 dollars using the Producer Price Index for "unprocessed and prepared seafood."
- Pounds are reported in Landed Pounds, unless otherwise noted.
- Data summarized here are from federal sources only.
- Fishing vessels that carry only lobster permits for federal waters are not subject to VTR requirements. Landings from trips with no VTR are not reflected in this summary.
- Other fisheries exist in state waters that may not be reflected in data from federal sources (e.g. whelk, quahog, striped bass).

We also obtained the average monthly number of trips intersecting with each area, for the period of 2008 to 2021.

Commercial Fishery Landings from Wind Lease Area and Export Cable Corridors

Table 2 shows the average annual level and standard deviation of total values and landings associated with fishing in the SouthCoast WLA and the ECAs from 2008 to 2021.

The average annual landings from the SouthCoast WLA are about 493,000 lbs (standard deviation 298,000 lbs) with a value of about $571,000 (standard deviation $140,000). Average annual landings from the Brayton Point ECA are about 61,000 lbs (standard deviation 30,000 lbs) with a value of $62,000 (standard deviation $16,000). Average annual landings from the Falmouth ECA are about 28,000 lbs (standard deviation 12,000 lbs) with a value of $42,000 (standard deviation $19,000).

Table 2. Average annual value and quantity of commercial fisheries landings by area

Area	*Mean* Value/year (2023$)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2023$)	*Standard Deviation* Landings/year (lbs)
SouthCoast WLA	570,861	492,824	139,818	297,932
Brayton Point ECA	61,863	61,147	15,698	30,302
Falmouth ECA	42,207	28,076	18,801	11,878

Table 3 shows the total landings and values, for each year from 2008 to 2021, associated with fishing in the SouthCoast WLA and the ECAs.

Table 4 summarizes the average annual landings and value of fisheries production from the SouthCoast Wind WLA and the ECAs by the top species or species groups. Jonah Crab and Longfin squid are among the species generating the greatest value from the SouthCoast Wind WLA during the 2008-2021 time period. The unusually high landings reported in 2010 are due to about 1 million lbs of herring landed from the area that year. Full data on landings by species can be found in Tables A1 to A3 in the Appendix.

Table 3. Annual value and quantity of commercial fisheries landings by area.

Area	SouthCoast WLA		Brayton Point ECA		Falmouth ECA	
Year	Value (2023$)	Landings (lbs)	Value (2023$)	Landings (lbs)	Value (2023$)	Landings (lbs)
2008	576,087	507,909	77,946	74,342	41,155	31,262
2009	507,153	435,991	57,984	64,216	26,258	21,616
2010	579,124	1,474,217	50,824	77,621	21,089	47,172
2011	318,346	225,495	55,577	57,318	21,858	11,827
2012	466,509	339,675	61,841	92,477	49,865	28,962
2013	477,113	377,424	62,185	134,331	23,630	14,428
2014	476,466	343,378	61,786	71,599	47,387	32,311
2015	449,827	312,035	73,543	54,892	54,611	30,480
2016	727,054	580,188	99,625	75,375	88,325	54,388
2017	619,432	524,306	49,263	29,039	43,149	25,904
2018	649,644	490,070	39,125	21,311	38,895	19,191
2019	881,716	477,266	55,923	33,399	55,651	28,743
2020	577,184	400,376	44,583	31,145	22,763	15,563
2021	686,402	411,206	75,878	38,992	56,267	31,215

Table 4. Average annual landings of major species by area, 2008-2021.

	Mean		***Standard Deviation***	
Area/Species	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast WLA				
Jonah Crab	95,258	93,024	54,977	43,231
Longfin Squid	89,715	57,894	55,760	35,371
Summer Flounder	58,874	17,641	57,881	18,957
Scup	50,583	56,725	51,310	57,549
Silver Hake	46,737	57,789	35,033	38,177
Monkfish	46,113	24,712	23,480	8,967
Golden Tilefish	40,936	8,494	42,300	8,724
American Lobster	36,610	6,049	18,527	3,766
Sea Scallop	30,639	2,749	39,611	4,102
Brayton Point ECA				
Longfin Squid	15,786	10,329	11,259	7,264
American Lobster	12,770	1,958	3,052	453
Summer Flounder	6,373	1,540	2,111	666
ALL_OTHERS	4,948	5,596	3,037	4,131
Falmouth ECA				
Longfin Squid	26,947	17,003	17,674	11,111
Channeled Whelk	3,991	385	1,711	132
Summer Flounder	2,731	696	2,293	661
ALL_OTHERS	1,481	1,520	1,211	1,391
Scup	1,102	1,328	731	873
Silver Hake	1,101	1,496	622	895

Both mobile (e.g., trawl and dredge) and fixed (e.g., pots and gillnet) gears are used in fishing operations. The trawl gear is primarily used for harvesting groundfish, dredge for scallops, and pots for lobster and crabs. The fixed gears are fished using trawls (a series of lobster pots attached to one line) with string lengths of 0.4–0.8 km (up to 1.829 km) or gillnets with typical string lengths of 0.2–3.0 km. Tables 5a, 5b, and 5c break out annual landings for each area by gear type. Bottom trawls and lobster pots generate the most significant landings in the WLA, followed by sinking gillnets. In the ECAs, bottom trawls are also the most significant gear type. The "ALL_OTHERS" category includes landings using purse seines, other seines, and weirs/traps, and others that fall under the "rule of three" exclusion.

Table 5a. Average annual landings in SouthCoast WLA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2023$)	Landings/year (lbs)	Value/year (2023$)	Landings/year (lbs)
ALL_OTHERS	12,040	10,279	26,231	15,670
Dredge – Clam	4,290	3,386	7,384	5,674
Dredge – Scallop	29,839	2,712	40,002	4,129
Gillnet – Sink	66,458	60,314	29,234	24,306
Handline	-	-	-	-
Longline – Bottom	34,461	8,168	41,427	10,523
Pot – Lobster	135,124	103,776	53,782	42,542
Pot – Other	3,712	2,851	3,152	2,396
Trawl – Bottom	277,376	228,593	92,373	60,195
Trawl – Midwater	7,561	72,744	27,191	265,385

Table 5b. Average annual landings in SouthCoast Brayton Point ECA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2023$)	Landings/year (lbs)	Value/year (2023$)	Landings/year (lbs)
ALL_OTHERS	2,207	2,540	3,707	4,665
Dredge – Clam	3,041	3,316	2,975	3,419
Dredge – Scallop	2,791	248	2,604	279
Gillnet – Sink	4,122	4,132	1,928	2,431
Handline	297	77	252	58
Longline – Bottom	-	-	-	-
Pot – Lobster	13,904	3,157	2,798	745
Pot – Other	3,526	716	1,576	363
Trawl – Bottom	29,879	31,729	12,362	10,455
Trawl – Midwater	2,096	15,231	3,209	23,313

Table 5c. Average annual landings in SouthCoast Falmouth ECA by gear type.

Gear	Mean		Standard Deviation	
	Value/year (2020 $)	Landings/year (lbs)	Value/year (2020 $)	Landings/year (lbs)
ALL_OTHERS	706	761	1,339	1,384
Dredge – Clam	992	1,014	1,228	1,261
Dredge – Scallop	565	47	474	43
Gillnet – Sink	310	321	521	653
Handline	103	25	85	19
Longline – Bottom	10	2	39	9
Pot – Lobster	562	304	161	134
Pot – Other	4,978	703	1,764	178
Trawl – Bottom	33,660	22,128	18,085	11,218
Trawl – Midwater	323	2,772	1,083	9,568

Table 6 summarizes annual landings and landed value for the major ports receiving landings from the two areas. Point Judith (Rhode Island) and New Bedford (Massachusetts) are the most significant ports for landings and landed value from the SouthCoast Wind Lease Areas and ECAs.

Table 6. Average annual landings at major ports in Rhode Island and Massachusetts.

	Mean		***Standard Deviation***	
Area/Port	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast WLA				
Point Judith, RI	159,899	135,373	49,867	40,053
New Bedford, MA	135,150	152,610	61,911	203,985
Newport, RI	35,769	29,544	26,190	22,135
Chatham, MA	26,883	22,826	17,468	15,863
Brayton Point ECA				
Point Judith, RI	19,690	15,609	8,680	6,563
New Bedford, MA	17,143	24,085	5,883	19,869
Falmouth ECA				
Point Judith, RI	19,774	13,613	11,696	7,445
New Bedford, MA	4,227	5,144	1,917	7,451

Tables 7a and 7b show average annual landings and landed value from the two areas by state where the catch is landed. Rhode Island and Massachusetts together account for more than 75% of landings and landed value from the WLA and about 85 to 90% of landings from the ECAs. The “others” category includes landings in Maine, New Hampshire, Connecticut, New York, New Jersey, Maryland, North Carolina, and Virginia, as well as data flagged by the “rule of three” exclusion.

Table 7a. Average annual landings in SouthCoast WLA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	216,016	188,750	63,730	54,585
Massachusetts	214,255	236,135	59,652	281,278
Others	140,591	67,939	--	--

Table 7b. Average annual landings in SouthCoast Brayton Point ECA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	28,868	25,999	9,508	8,365
Massachusetts	27,635	31,305	7,675	24,392
Others	5,360	3,843	--	--

Table 7c. Average annual landings in SouthCoast Falmouth ECA by state.

	Mean		*Standard Deviation*	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	20,317	14,235	11,985	7,664
Massachusetts	15,633	10,276	4,525	9,224
Others	6,258	3,565	--	--

Landed value and trips by month

Table 8 and Figures 2 and 3 show the average monthly landings and values from the two areas. Table 9 reports the average monthly number of fishing trips that intersect each area. Note that the trip numbers in Table 9 are for the 10 km wide ECRAs, whereas the landed value shown in Table 8 and Figures 3 are for cable routes are for the 180 m wide ECAs only.

Table 8. Average monthly value of landings, 2008-2021 (2023$).

Month	**SouthCoast Wind WLA**	**Brayton Point ECA**	**Falmouth ECA**
Jan	30,465	2,397	402
Feb	26,673	1,420	221
Mar	26,361	1,350	241
Apr	23,286	2,292	462
May	38,561	5,285	6,929
Jun	68,891	11,041	12,168
Jul	61,918	13,092	10,228
Aug	80,364	10,241	5,244
Sep	90,409	6,150	2,569
Oct	47,370	2,979	1,836
Nov	33,103	2,598	1,292
Dec	43,460	3,020	614

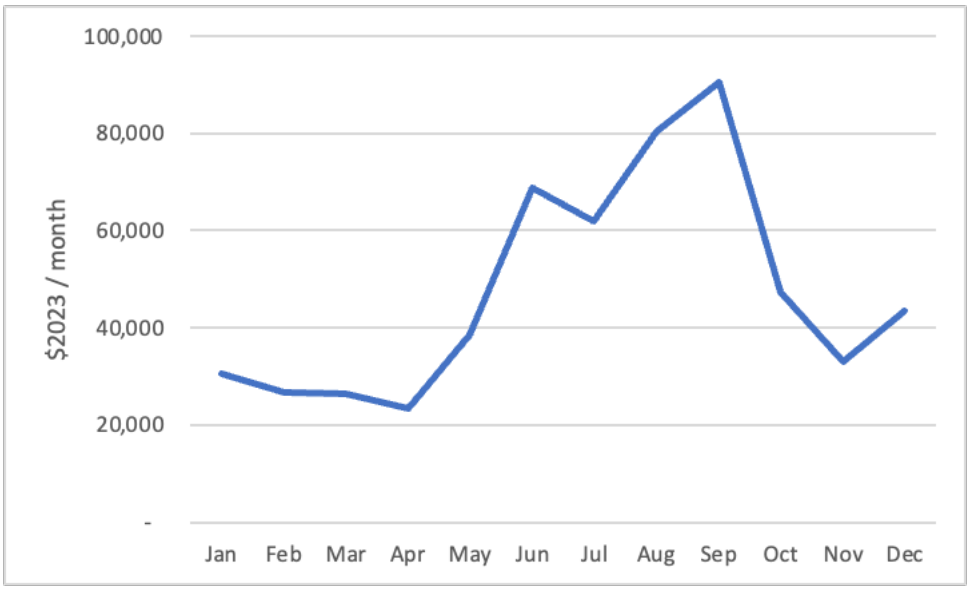

Figure 2. Average monthly value of landings, SouthCoast WLA, 2008-2021.

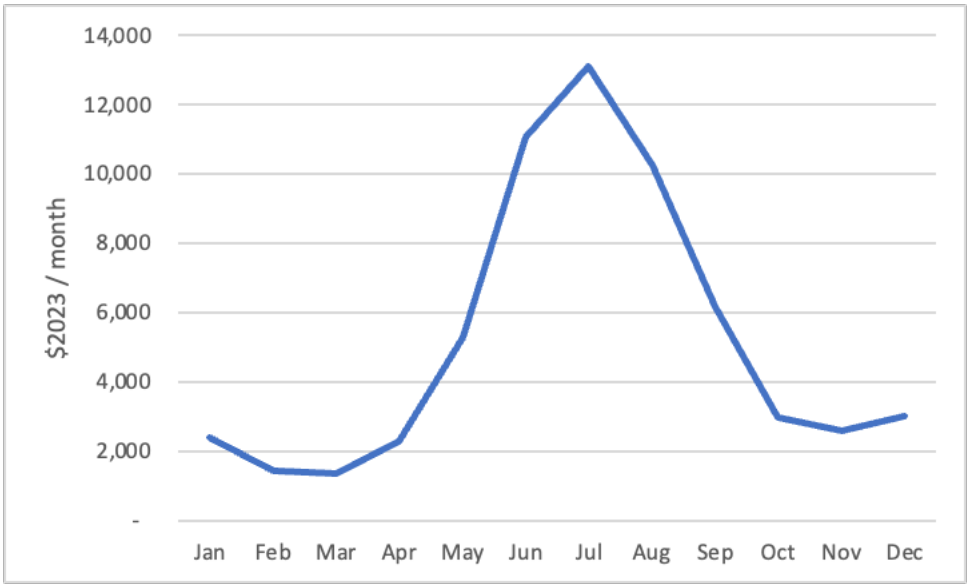

Figure 3a. Average monthly value of landings, SouthCoast Brayton Point ECA, 2008-2021.

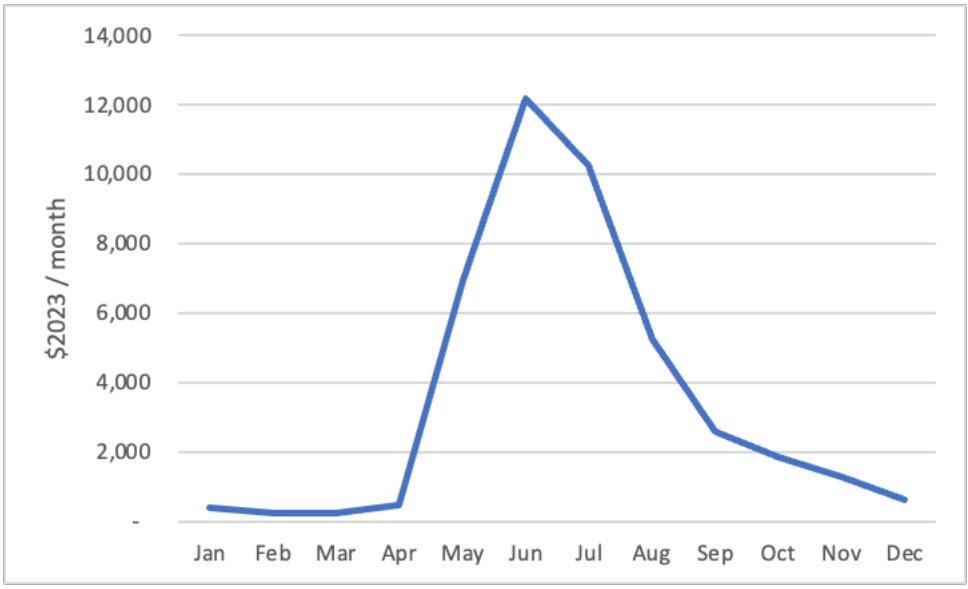

Figure 3b. Average monthly value of landings, SouthCoast Falmouth ECA, 2008-2021.

Table 9. Average monthly number of fishing trips, 2008-2021.

Month	SouthCoast Wind WLA	Brayton Point ECRA	Falmouth ECRA
Jan	406	570	179
Feb	419	285	144
Mar	511	321	167
Apr	412	647	205
May	437	3,007	1,201
Jun	771	3,641	1,623
Jul	892	3,990	1,983
Aug	654	3,404	1,491
Sep	468	2,874	841
Oct	286	2,347	564
Nov	310	2,094	392
Dec	419	1,141	234

Inter-annual price adjustments

We use the Bureau of Labor Statistics' Producer Price Index (PPI) for "unprocessed and prepared seafood"[1] to convert ex-vessel value of fish landings, because this index is specifically for the fishery sector. PPI is a family of indexes that measures the average change over time in selling prices received by domestic producers of goods and services; they measure price change from the perspective of the seller. In contrast, the Bureau of Economic Analysis' general Gross Domestic Product (GDP) deflator[2]

[1] https://www.bls.gov/ppi/#data

[2] https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey

measures changes in the prices of goods and services produced in the United States, including those exported to other countries, and captures price changes across all economic sectors. Table 10 shows both indexes from 2000 to 2021.

Note that the variation in the sector (i.e., fishery) specific price index is considerably larger than that of the GDP deflator. PPI decreases have been observed in several years since 2000. The GDP deflator exhibits a steady trend. We recognize that many seafood prices rose sharply in 2021, as reflected by the sharp increase in fish PPI for that year. We consider it unlikely that this will significantly alter the long-term trend, and maintain that the historical average is the best predictor of future values.

We report all values in 2023$ for consistency. These values can be easily adjusted to any other-year dollars by applying the appropriate index adjustment. Landed value may be adjusted using the PPI index. For impact values, including upstream and downstream effects (see below), it is more appropriate to use the GDP deflator to adjust, because the multipliers capture economy-wide impacts.

Table 10. Price indexes.

Year	GDP implicit price deflator	Percent change	PPI fish	Percent change
2000	78.0		198.1	
2001	79.8	2.25%	190.8	-3.69%
2002	81.0	1.56%	191.2	0.21%
2003	82.6	1.97%	195.3	2.14%
2004	84.8	2.68%	206.3	5.63%
2005	87.5	3.14%	222.6	7.90%
2006	90.2	3.09%	237.4	6.65%
2007	92.6	2.70%	242.8	2.27%
2008	94.4	1.92%	255.4	5.19%
2009	95.0	0.64%	250.9	-1.76%
2010	96.2	1.20%	272.4	8.57%
2011	98.2	2.08%	287.6	5.58%
2012	100.0	1.87%	287.6	-0.02%
2013	101.8	1.75%	299.4	4.12%
2014	103.7	1.87%	322.4	7.68%
2015	104.7	1.00%	322.0	-0.13%
2016	105.7	1.00%	327.6	1.74%
2017	107.7	1.90%	337.9	3.15%
2018	110.3	2.39%	344.5	1.96%
2019	112.3	1.79%	349.9	1.55%
2020	113.6	1.21%	350.8	0.27%
2021	118.4	4.15%	413.0	17.74%
Annual average		2.01%		3.66%

Adjustment of lobster and Jonah crab data

As noted above, lobster vessels that carry only lobster permits are not subject to a Vessel Trip Report (VTR) requirement. Trips without VTR are not reflected in the numbers shown in Tables 2 through 9 (cf. King 2019). To account for potentially underrepresented lobster and Jonah crab landings, and for dockside sales (see below), we make adjustments to the landed value data as shown in Table 11. Data in the first three rows are based on VTR data, and are taken from Table 2 and Tables A1 through A3 in the Appendix. An earlier study by Industrial Economics (2015) indicates that active lobster vessels not subject to trip report requirements in Lobster Management Area 2 may account for as much as 57% of the total lobster fishing activity in that area. (Lobster Management Area 2[3] encompasses the waters south of Rhode Island and Cape Cod to a distance of about 40 nm, and overlaps with the SouthCoast Wind WLA.) We assume conservatively that landings from 60% of the lobster vessels in the SouthCoast Wind WLA and ECRAs/ECAs could therefore be underrepresented, and that the VTR data represent 40% of the true lobster and Jonah crab revenues. We use this as an adjustment factor, and estimate the adjusted lobster and Jonah crab revenues at 2.5 times of those in the VTR data.

Some fraction of lobster and Jonah crab landings are sold directly from boats at dockside, at a price above that reported in the dealer information on which the NOAA values above are based. Neither the fraction of landings sold in this way nor the price premium is known exactly. Based on information provided by a group of Rhode Island fishermen (pers. comm., 24 Nov. 2020), we estimate that a 15% premium on the landed value derived from NOAA data (Table 11) adequately captures this dockside sales effect for Rhode Island landings. Dockside sales are not a common practice in Massachusetts (Mass. DMF pers. comm. May 2021), so we do not apply this multiplier to Massachusetts landings.

The combined adjustment for VTR data and dockside sales is shown in rows 5 and 6 in Table 11. The net increase is shown in row 7, and the adjusted total annual landed values are shown in row 8. This adjustment results in a 37 to 38% increase in the estimated total annual landed value for the WLA and the Brayton Point ECA, and 2 to 3% increase for the Falmouth ECA.

Table 11. Adjustment of landed value for landings not captured in VTR data and for RI dockside sales.

Value (2023$)	**WLA**	**Brayton Point ECA**	**Falmouth ECA**
1. Avg. VTR total $/year (Table 2)	570,861	61,863	42,207
2. Avg. VTR lobster $/year (Tables A1-A3)	36,610	12,770	354
3. Avg. VTR Jonah crab $/year (Tables A1-A3)	95,258	941	255
4. % of total captured by VTR	40%	40%	40%
5. Adjusted lobster $/year (incl. RI dockside sales)	96,721	34,160	949
6. Adjusted Jonah crab $/year (incl. RI dockside sales)	251,661	2,518	684
7. Net increase over VTR $/year (row 5+6-2-3)	216,514	22,967	1,023
8. Adjusted total $/year	787,376	84,830	43,231
9. Adjusted increase over VTR total value	37.9%	37.1%	2.4%

[3] http://fisheries.noaa.gov/resource/map/lobster-management-areas

With all adjustments, we estimate the average annual landed value in Massachusetts from the SouthCoast WLA to be about $288,000 (2023$), about $37,000 from the Brayton Point ECA, and about $16,000 from the Falmouth ECA.

Estimated indirect and induced economic impacts

Economic impact multipliers reflect the linkages between economic activity in different sectors of the economy. For example, when landings increase in the commercial fishing sector, there is an associated increase in the purchases of ice and other supplies in the region, and an increase in onshore transportation and processing of seafood. The resulting increases in economic activity in the commercial fishing supply and transportation and processing sectors are indirect effects of increased landings. In addition, because fishermen and workers in the supply, transportation, and processing industries earn greater income as a result of this increased activity, and spend some of that extra income on local goods and services, there is also an induced effect of greater spending in other sectors. The multipliers capture the combined effect of indirect and induced spending that results from higher commercial landings.

We have developed regional economic models for Massachusetts using the IMPLAN model software (IMPLAN 2004) and data for 2021. IMPLAN software and data are commercial products widely used by researchers and management agencies to perform economic impact analyses for a user specified study region (IMPLAN 2004; Steinback and Thunberg 2006; Hoagland *et al.* 2015; UMass Dartmouth 2018; Cape Cod Commission 2020). IMPLAN was initially developed for the US Forest Service. It is a modular input-output model that works down to the individual postal zip code level for most zip codes in the United States. The IMPLAN database consists of two major parts: (1) a national-level technology matrix and (2) estimates of sectoral activity for final demand, final payments, gross output, and employment for each zip code. This 546-sector gross-domestic-product-based model divides the US economy into sectors based on North American Industry Classification System codes[4], and is based on the US Commerce Department's national input-output studies, the national income data, and related Federal economic surveys. In IMPLAN, national average technology coefficients are used to develop the direct coefficients for sectors at local levels. As noted, we use 2021 IMPLAN data for Massachusetts for our analysis. Based on the 2021 model and data, the upstream output multiplier for the commercial fishing industry in Massachusetts is 1.373.

Our analysis is limited to economic activity and impact in Massachusetts; and this multiplier reflects upstream economic activity that takes place in Massachusetts, not in other states. Its value depends in part on how much of their inputs (fuel, ice, bait, etc.) Massachusetts fishermen purchase from local versus out-of-state suppliers. Because those purchase decisions can change from year to year, the multiplier can also change over time. For example, the 2021 upstream multiplier for Massachusetts commercial fishing (1.373) used in our analysis is lower than that from 2019 (1.770). Within Massachusetts, the multiplier varies from a low of 1.10 in Norfolk County to a high of 1.52 in Plymouth County. Including upstream activity that takes place in other states, the national upstream multiplier for Massachusetts commercial fishing is 1.84.

[4] https://www.census.gov/naics/

We have also taken into account downstream economic activity, such as seafood processing, that may take place at Massachusetts businesses as a result of commercial fisheries landings. This linkage is less direct than the upstream activities, because not all seafood landed in a state is processed in the state, and seafood processors may import more seafood from elsewhere for processing when in-state landings fall short. Nonetheless, we add a downstream adjustment of 0.635, using 2021 IMPLAN data, to the multiplier for Massachusetts landings, bringing the combined multiplier to 2.008, to account for both upstream effects and downstream effects to seafood processors. We apply the combined upstream and downstream multiplier to all landings except lobster and Jonah crab landed in Rhode Island, which are adjusted for dockside sales and receive only the upstream multiplier. The corresponding combined multiplier for Rhode Island landings is 1.822; for landings in other states, we use the average of the Massachusetts and Rhode Island multipliers.

The economic impact multiplier captures the linkages between the fishing industry sector and other sectors in the Massachusetts economy. While we use a single output multiplier for the entire commercial fishing sector in a given state, we recognize that the multiplier may in fact vary across specific fisheries, species, and gear due to differences in factor inputs for fishing operations and post processing of fish landed. We use a single multiplier for the entire commercial fishing sector, reflecting an average across all gear types and species. Economy-wide inflation affects all sectors in the economy but usually does not alter the general structure of the economy. Therefore, although the baseline economic values increase with rising prices, the multiplier does not. We also recognize that other types of multipliers, such as those focusing on employment effects, have been used in other analyses. We maintain that the output multipliers we use provide a robust and accurate measure of indirect and inducted effects averaged across the fishing sectors.

Table 12. Estimated annual economic impact in Massachusetts (all values in 2023$)

		Average value of landings/year			**Total impact/year**
Area	**State**	VTR data only (Table 11, row 1)	with lobster & Jonah crab adjustment	with dockside sales adjustment (15% premium on RI lobster & JC landings)	"dockside sales" column multiplied by upstream & downstream multipliers, except RI lobster & JC
WLA	total	570,861	768,663	787,376	1,408,023
Brayton Point ECA	total	61,863	82,430	84,830	149,528
Falmouth ECA	total	42,207	43,121	43,231	81,757
WLA	MA	214,255	288,494	288,494	579,295
Brayton Point ECA	MA	27,635	36,823	36,823	73,941
Falmouth ECA	MA	15,633	15,971	15,971	32,070

Using these multipliers, and including the lobster and Jonah crab adjustment described in the previous section, we estimate the average annual total economic impact from commercial fishing activity in the SouthCoast Wind Project Area (i.e., the WLA, Brayton Point ECA, and Falmouth ECA) to be about $690,000 (2023$) in Massachusetts. This is broken down in Table 12, which shows the estimated value for Massachusetts fishing from the SouthCoast Wind WLA to be about $579,000, from the Brayton Point ECA to be about $74,000, and from the Falmouth ECA to be about $32,000. Including landings in other states, the total average annual economic impact from commercial fishing activity in the WLA is $1.41 million and in the Brayton Point and Falmouth ECAs it is $150,000 and $82,000, respectively. These estimates are based on average annual landings value from 2008 to 2021, with lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements.

Exposure of commercial fishery resources and fishing to wind farm development

The SouthCoast Wind construction schedule (SouthCoast Wind Energy LLC 2023) envisions construction activity in the WLA taking place from 2027 to 2031, with pile driving between 2028 and 2030 (Figure 4). This work is expected to proceed in two phases, with roughly half of the WLA developed in the first phase (Project 1) and the other half in the second phase (Project 2). As noted, SouthCoast Wind's preferred approach is to install both export cables in the Brayton Point ECC; this scenario is reflected in Table 13 below. Work in the Export Cable Corridor is also expected to take place in two phases: the installation of the first set of cables (for Project 1) is scheduled in the Brayton Point ECC for up to 183 days (six months) during summer/fall of 2028, and the second cable in the Brayton Point ECC for up to 183 days (six months) during late 2029 and early 2030. Although it is not the preferred ECC for Project 2, installation of the Project 2 export cables in the Falmouth ECC remains in the Project Design Envelope as a variant option; and we include an assessment of the exposure values for this alternative, with up to 107 days (3.5 months) of installation-related work in the Falmouth ECC during late 2029 and early 2030.

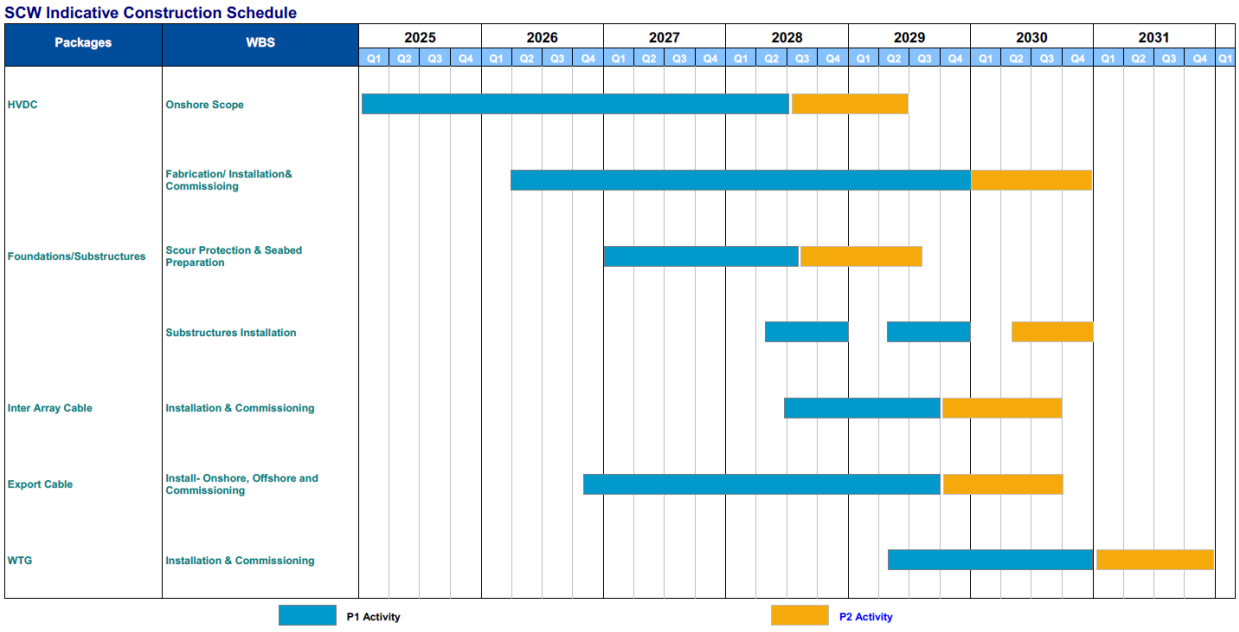

Figure 4. Indicative construction schedule. Source: SouthCoast Wind (2023)

In the following sections, we consider five categories of possible exposure of commercial fishery landings and landed value from the SouthCoast Wind Project areas:

- Transient effects on fish availability due to construction activities and noise
- Transient effects due to constrained access to certain areas during construction
- Changes in fishing in the WLA during operations
- Transient effects due to constrained access to certain areas during decommissioning
- Transient effects on fish availability due to decommissioning activities

The assumptions and effects on fish availability and fishing activity/landings are summarized in Table 13 for each category and Project area. In the sections that follow Table 13, we describe how we arrived at the assumptions, with references in the text corresponding to the row codes (a), (b), (c), etc. in the table. The assumptions are based in part on information from the SouthCoast Wind Construction and Operations Plan (SouthCoast Wind Energy LLC 2022), from additional information provided by SouthCoast Wind (Figure 4), and from acoustic modeling work for foundation installation (JASCO 2022).

If the Falmouth ECC is used for Project 2, the assumptions shown in Table 13 for Project 2 remain the same for availability effects. For constrained access effects, the duration is reduced from 6 months to 3.5 months.

The baseline values for each Project area and species group are shown in Table 14.

Transient availability effects due to construction

We estimate construction effects for each Project area separately based on these schedules. To convert future values to a common basis, we apply a real discount rate of 5% – the average of the rate usually applied in natural resource valuation (3%) and the rate usually applied by the US government for public investment and regulatory analyses (7%), and present all results in 2023$.

Construction noise during drilling and pile driving, and disturbance of bottom sediments and rocks, is likely to have an impact on fish and shellfish in and around the SouthCoast Wind WLA. Mobile species may leave the area because of construction noise, and species that rely on seafloor habitat may be injured or displaced.

Our estimate of the effect of construction in and around the WLA is based on a maximum scenario for pile driving, involving 16 m diameter monopiles, each installed within 24 hours, using a 6,600 kJ hammer, and 10 dB of noise attenuation. We assume that pile driving may extend over three years as outlined above, in half of the WLA at any given time. We consider separately the likely effect of pile driving and turbine tower installation on shellfish (lobster, scallops, and crabs) and on finfish.

We assume conservatively that all finfish will leave all areas in and around the WLA where pile driving noise exceeds 160 dB. There is no scientific evidence that the 150 dB threshold sometimes cited for “temporary behavioral changes” (Cal Trans 2015) leads to substantive relocation of finfish; and even 160 dB is far below any documented injury threshold. The SouthCoast Wind acoustic exposure analysis (JASCO 2022) models noise propagation from pile driving at two tower locations in the SouthCoast Wind layout. The distance at which pile driving noise with 10 dB of attenuation at the source drops to 150 dB for these two tower locations is found in tables 39 and 40 on pages 52 and 53 of JASCO (2022). The relevant distances are between 13 and 15 km.

Table 13. Assumptions for exposure of commercial fisheries to wind farm development.

Categories of Potential Exposure		Assumptions/Effects	Duration
Availability effects due to construction	WLA+15km	100% of finfish leave 50% of area (a)	2028, 2029, 2030
	WLA	Lobster/crab landings reduced 20% (b) Other shellfish landings red. 20% (c)	2027 – 2030 2027 – 2033
	Brayton Point ECC (Project 1)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2028 12 months 2028 2028 - 2032
	Brayton Point ECC (Project 2)	All landings reduced 10% in ECWA (d) Lobster/crab landings reduced 25% in ECA (e) Other shellfish landings reduced 25% in ECA (f)	12 months 2029/30 12 months 2029/30 2029 - 2033
Constrained access effects due to construction	WLA	No fishing in 25% of area (g)	2027 – 2031
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2028 6 months 2028
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (h) No fishing in 100% of ECA (i)	6 months 2029/30 6 months 2029/30
Effects during operations	WLA	Landings reduced by up to 10% (j)	2031 – 2061
	Brayton Point ECC	None	
Availability effects due to decom.	WLA	None beyond constrained access	
	Brayton Point ECC (Project 1)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2060 12 months 2060 2060 - 2064
	Brayton Point ECC (Project 2)	All landings reduced 10% (k) Lobster/crab landings reduced 12.5% (l) Other shellfish landings reduced 12.5% (m)	12 months 2061 12 months 2061 2061 – 2065
Constrained access effects during decom.	WLA	No fishing in 25% of area (n)	2060, 2061
	Brayton Point ECC (Project 1)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2060 6 months 2060
	Brayton Point ECC (Project 2)	No fishing in 10% of ECWA (o) No fishing in 100% of ECA (p)	6 months 2061 6 months 2061

(a), (b), (c) etc. refer to detailed explanations in the text that follows

Table 14. Baseline landed values (2023$) used for exposure calculations.

			Brayton Point ECC		Falmouth ECC	
	WLA	**WLA +15km**	**1.6km ECWA**	**180m ECA**	**1.6km ECWA**	**180m ECA**
Total landed value:	**787,376**		**734,869**	**83,685**	**384,274**	**43,231**
Lobster and crabs	351,896		328,004	36.900	14,833	1,669
Other shellfish	32,259		44,857	5,046	48,847	5,495
Finfish	403,220	2,476,430	371,007	41,738	320,594	36,067
MA landed value:	**288,494**		**328,921**	**37,004**	**141,964**	**15,971**
Lobster and crabs	128,935		145,036	16,317	5,480	616
Other shellfish	11,820		19,835	2,231	18,046	2,030
Finfish	147,739	1,078,786	164,051	18,456	118,438	13,324

Based on these values, we estimate that the maximum range for pile driving noise with 10 dB of attenuation in the SouthCoast Wind setting is 15 km for 160 dB. We therefore assume conservatively that all finfish leave the portion of the WLA where construction work is taking place, and a 15 km buffer zone around this area, for the duration of pile driving (total of three years; Table 13 (a)). This is consistent with reported anecdotal observations by fishers around the Block Island Wind Farm (ten Brink and Dalton 2018), which suggest that the construction noise effect may extend 5-10 km from its source, and that many finfish will return to the area within months of the end of construction. To estimate the value associated with this effect for SouthCoast Wind, we obtained data from NOAA on average annual landings from a region enclosed by a 15 km buffer around the SouthCoast WLA. The annual value of Massachusetts finfish landings reported by NOAA for this region is $1,078,786 (2023$). At any time during pile driving, we assume that 50% of this value is foregone, to reflect the two phases of WLA tower installations. The discounted value (at 5%) of these Massachusetts landings for the 2028 to 2030 construction years is $1,208,468 (2023$).

We also consider loss of shellfish due to construction noise and burial resulting from foundation installation and inter-array cable work. The closest approximation in the literature for a construction noise injury/mortality threshold for shellfish is the "mortality and potential mortal injury" 24-hour exposure threshold of 216 dB for "fish without swim bladders" (Popper *et al.* 2014; JASCO 2022). This level of exposure will extend no more than 420 m from tower locations (JASCO 2022, p. 52, Table 39, "Fish without swim bladder"), a radius that covers 16% of the WLA footprint assuming all potential tower locations are built out.

To be conservative, we increase the estimate of the effect to 20% of the WLA footprint, and assume that 20% of the lobster, crab, scallop, and other shellfish populations within the WLA are adversely affected by pile driving noise, seabed disturbance around foundations, and cable installation during construction, and thus lost to fishing (Table 13 (b and c)) for all of the construction years in which seabed disturbance may take place. We assume that lobster and crab will repopulate the portions of the WLA from which they are displaced within a year after construction work ends, and that scallop and other non-mobile shellfish stocks in those portions of the WLA will rebuild over the course of four years (Table 13(c)).

Along the Export Cable Routes, the greatest effects are likely to be due to habitat disruption along the immediate cable routes; cable laying does not involve the same disturbance from drilling or pile driving as turbine tower installation. We therefore consider significant displacement of mobile species from the ECAs and ECWAs to be unlikely. The habitat disruptions that impact non-mobile benthic species are likely to extend on average no more than 5-10 m on either side of the immediate cable route – at most 12% of the ECA and 2% of the ECWA area. To be conservative, we model a 25% reduction in landings of all shellfish (including lobster and crabs) for two years and all non-mobile shellfish (such as scallops and whelk) over five years from the ECAs (Table 13 (e and f)), and a 10% reduction in landings for all species for one year from the 1.6 km ECWAs (Table 13 (d)).

Transient effects from constrained access during construction

During wind farm construction activities, fishing may be temporarily constrained in parts of the WLA and along the Export Cable Routes. We assume that a 500 m radius construction safety zone will be required around tower locations during construction activities, and around any vessel installing cables. In practice, during these construction and cable-laying activities, some fishing that would have taken place in those areas is likely to shift to other nearby locations, replacing some of the forgone landings. If fishers prefer to fish within the construction areas, that is likely because these are thought to be more productive than alternatives. As an upper bound on effects from these temporary constraints, we estimate the full average value of landings linked to the affected areas.

We assume conservatively that fishing is constrained in 25% of the SouthCoast WLA for five years (Table 13 (g)), and in 10% of the 1.6 km ECWAs for during cable installation activities (Table 13 (h)). In addition, we assume that fishing is constrained within all of the ECAs immediately around the export cable routes during cable installation activities (Table 13 (i)).

We use as a basis for our calculations the average annual values for each area (Table 14), prorated according to the availability effects described above and the fraction of the year affected, discounted to 2023 at 5%, and adjusted to 2023$.[5] Note that the assumption about all finfish leaving the WLA (plus 15 km buffer) means that there is no further effect on finfish landings from constrained access in the WLA. To be conservative, we do not adjust for double-counting of effects in the overlap between the 15 km buffer around the WLA and the ECAs.

Table 15 shows the combined results of the availability and constrained access effects (Table 13 (a)-(i)). The total value of Massachusetts landings associated with construction effects is estimated to be about $1.59 million (2023$) for the WLA, $55,000 for the Brayton Point Export Cable Route, and $20,000 for the Falmouth Export Cable Route.

[5] We use the St. Louis Fed's GDP Implicit Price Deflator data (https://fred.stlouisfed.org/data/GDPDEF.txt) for April 2021 and April 2023 to adjust 2020$ to 2023$ (11.5%).

Table 15. Estimated value of landings associated with construction effects.

Area	Massachusetts landed value (2023$)
SouthCoast WLA / WLA + 15km	1,585,422
Brayton Point ECA / ECWA	55,012
Falmouth ECA / ECWA	20,158

Effects due to fishing constraints during operations

If fishing activity is constrained at certain locations within the wind farm area during the operating life of the Project, it may be appropriate to treat these areas as lost to fishing during that time. For example, areas in the immediate vicinity of turbine towers may not be accessible to bottom trawl fishing once the wind farm is built. Fishers are likely to adapt to such constraints by shifting fishing effort slightly from previous locations or tracks. This sort of adaptation by the fishing industry is made easier by the regular one-by-one nautical mile east-west/north-south grid spacing for wind turbine towers that has been adopted for SouthCoast Wind and other offshore wind projects in the region. Because it is not possible to know exactly how the fishing industry will respond to this change in future years, or what the implications of that adaptation will be for catch and landings, we assume here that the landings from affected areas are simply not realized. This is a conservative assumption that likely overstates the actual loss of landings due to wind farm development.

Fishing activity constraints during wind farm operations apply only to the WLA; we do not expect any constraints along the Export Cable Routes during operations. The footprint of the SouthCoast Wind Lease Area is 51,600 hectares, of which permanent structures occupy less than 10 hectares, or 0.02% of the total area. A 100 m radius area around each of the turbine towers accounts for about 0.7% of the total WLA, suggesting that less than 1% of the WLA area may be lost to fishing. Mobile gear (dredge, trawl) fishing accounts for about half of landed value from the SouthCoast WLA. We assume conservatively that up to 10% of total baseline landings from all stocks within the WLA may be lost to fishing during operations (Table 13 (j)).

This estimate includes occasional disruption of fishing activity during Project maintenance activities. WTGs in the SouthCoast Wind Project area are expected to require regular maintenance. While specific maintenance methods and maintenance intervals are not known at this time, it is possible that maintenance activities in the Project area occur in proximity to fishing activity. The impact of maintenance activities to fishermen is expected to be minimal and captured by the conservative assumption of up to 10% reduction in baseline landings from the WLA.

Since the SouthCoast Wind Project will be operating for 30 years, we estimate the potential loss associated with these forgone landings by calculating the present value of 10% of baseline landings for a 30-year period beginning in 2031.

The resulting estimate is that up to $310,433 in present value (2023$) of Massachusetts landings from the SouthCoast Wind Lease Area are exposed during Project operations. As discussed in more detail

below, applying the BOEM draft guidelines (BOEM 2022) to the WLA during the operations years of the Project results in a present value estimate of $871,208.

Transient effects from constrained access and availability effects during decommissioning

After approximately 30 years of operations, SouthCoast Wind plans to decommission the Project. We estimate that the duration of decommissioning, and resulting access constraints in the WLA during decommissioning, will extend over two years, one for each phase of the Project. Because relatively little noise is associated with decommissioning compared to construction, we do not model decommissioning effects in the WLA beyond the effects that overlap with access constraints (Table 13 (n)).

We expect that access constraints during decommissioning along the export cable routes will be similar to those during cable laying operations, but likely for a shorter duration. We therefore model access constraints on 10% of the Brayton Point ECWA and 100% of the ECA as each cable is decommissioned (Table 13 (o) and (p)). If the Falmouth ECC is used for the Project 2 cables, the duration is reduced to 3.5 months. Because cable removal is less disruptive to the seabed than burial, we model half of the availability effect for decommissioning as we do for cable installation (Table 13 (l) and (m)).

We then discount the value of affected landings from decommissioning to 2023$ by applying a 5% discount rate. The resulting present value (2023$) estimate of potential lost landings in Massachusetts due to access constraint and availability effects during decommissioning is about $23,000 for the WLA, $11,000 for the Brayton Point ECC, and $2,000 for the Falmouth ECC.

In summary, we estimate that up to $1.92 million (2023$) in total Massachusetts landed value from commercial fishing in and around the SouthCoast Wind Lease Area is potentially exposed to development of the SouthCoast Wind Project. This includes about $1,585,000 due to construction, up to $310,000 during operations, and $23,000 during decommissioning. The total Massachusetts commercial fishing landed value exposure estimate for the Brayton Point Export Cable Route is $66,000, and for the Falmouth Export Cable Route is $24,000.

Applying the upstream and downstream multipliers as described above results in a present value estimate of $1.93 million (2023$) in indirect and induced effects in Massachusetts associated with the WLA, for a total impact of $3.85 million. The total impact values for the Export Cable Routes are $132,000 for the Brayton Point route and $49,000 for the Falmouth route.

BOEM draft guidelines for mitigation impacts to fisheries

In 2022, the Bureau of Ocean Energy Management (BOEM) of the US Department of the Interior issued draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf (BOEM 2022). These draft guidelines discuss “best management practices and mitigation measures to reduce potential impacts to commercial and recreational fisheries.” These include provisions for “compensation for lost fishing income,” based on “ex-vessel value of the fish landed,” and the recommendation that lessees consider making available funds for compensatory mitigation in the amount of “100 percent of revenue exposure for the first year after construction, 80 percent of revenue exposure 2 years after construction, 70 percent of revenue exposure 3 years after construction, 60 percent after four years, and 50 percent after five years post construction.”

The BOEM draft guidelines are intended to ensure that adequate funds are available to compensate lost fishing income, and are not intended to produce a project-specific estimate of likely actual losses. For example, it is highly unlikely that no fishery landings of any kind will be realized from the project area in the first year after construction ("100 percent of revenue exposure"); and the draft guidelines contain no provisions for adjustment of these values in light of the specific parameters of the project, such as turbine tower spacing. As such, the value structure suggested by BOEM in the draft guidelines should not be interpreted as equivalent to the expected losses estimated in this report.

With that caveat, we estimate that the present value (in 2023$) of the amounts BOEM recommends making available for potential losses to Massachusetts-based commercial fishing during the first five years of operations amount to $750,000 (2023$). Using the BOEM draft guidelines and assuming 10% reduction from landings in the WLA in years 6 to 30 results in a total Massachusetts landed value estimate for the WLA of $2.48 million, $560,000 more than our estimate reported above. Including indirect and induced effects, this translates to $4.98 million, or $1.13 million more than our estimate above. We note, however, that BOEM acknowledges that using total ex-vessel landed value as the basis for these amounts is likely to result in an over-estimation of net income loss, since net income is revenue minus expenses, and suggests that using total ex-vessel landed value "is likely to be sufficient to cover shoreside income loss" as well, without applying further multipliers.

Massachusetts-based charter fishing

To obtain data on for-hire charter fishing activity in and around the SouthCoast Wind Lease Area and Brayton Point Export Cable Corridor, we conducted an online survey of Rhode Island- and Massachusetts-based charter vessel operators. The survey asked operators to identify their fishing locations on a chart, and report for each location

- the total number of annual for-hire fishing trips that vessel took in each of the years 2017-2021,
- the average number of passengers onboard for-hire trips in each of the years 2017-2021, and
- the average amount of time spent targeting highly migratory species (HMS) relative to bottom fishing or trolling for other species during for-hire trips.

The survey was first distributed on April 18, 2022 through email lists maintained by Rhode Island Department of Environmental Management (RI DEM), Rhode Island Coastal Resources Management Council (RI CRMC) and Massachusetts Division of Marine Fisheries (MA DMF), and also via email by for-hire fishing industry representatives, including the Rhode Island Party and Charter Boat Association. The survey was active from April 18, 2022 until May 14, 2022.

The survey received 91 total responses from for-hire charter owners and/or operators. Sixty-six of these respondents (72%) reported that they fish in the area depicted in Figure 5. These 66 respondents reported 62 unique vessels, and reported effort data for 29 of those vessels across the five-year period of 2017-2021 (black dots in Figure 5).

To capture for-hire effort focused specifically within Narragansett Bay, a second survey was conducted in October 2022 distributed among 17 for-hire charter captains known to fish primarily in Narragansett Bay as identified by members of the for-hire industry. This survey received a total of four responses

reporting activity for four unique vessels not captured in the first survey wave (red dots in Figure 5). The second survey design was identical to that of the first wave with the addition of charts for Narragansett Bay. Combined results for the two surveys are shown in Table 16.

Because we have no survey data specific to the waters around the Falmouth ECC, we use Brayton Point ECC results as a proxy for charter fishing around the Falmouth ECC.

Table 16. For-hire charter fishing survey summary statistics.

Description	Number
Fished in the area and responded to the survey	70
Provided vessel names	66
of which based in Massachusetts	37.5
Provided annual vessel trip numbers	35
Observations with vessel trips reported (2017-2021)	229
Total trips per year	1 – 235
Average total trips per year	46.74
Passengers per vessel trip	2 – 25
Average passengers per vessel trip	5.24
Identified fishing locations on maps	33
of which based in Massachusetts	18.5

Similar studies published in the peer-reviewed academic literature using paper mail, email, or mixed mode survey distributions typically have survey response rates around 20-30% (e.g., Dalton *et al*. 2020, Carr-Harris and Steinback 2020). Based on discussions with for-hire industry representatives, approximately 100 vessels actively engage in for-hire fishing activity in the waters depicted in Figure 5, suggesting the fishing reported by survey respondents accounts for about 33% of the total. The combined response rate for the primary population of interest is within an appropriate range to consider our survey distribution a success. An important note to also consider is that there are vessels in our sample that require the submission of federal VTRs. A common trend identified in the data was that some respondents did not provide data for their vessels that require VTRs. This is not a problem for this analysis as this effort data is already accounted for by the NOAA databases and summary reports used as a baseline for our subsequent analyses.

Table 17. Number of Massachusetts-based vessel trips and anglers by year, SouthCoast WLA.

Year	WLA		WLA + 15 km buffer	
	Vessel Trips	Anglers	Vessel Trips	Anglers
2017	0	0	10	35
2018	2	10	10	34
2019	6.5	28.5	10.5	40.5
2020	2	6	15	75
2021	5	15	45	181
Average	**3.1**	**11.9**	**18.1**	**73.1**

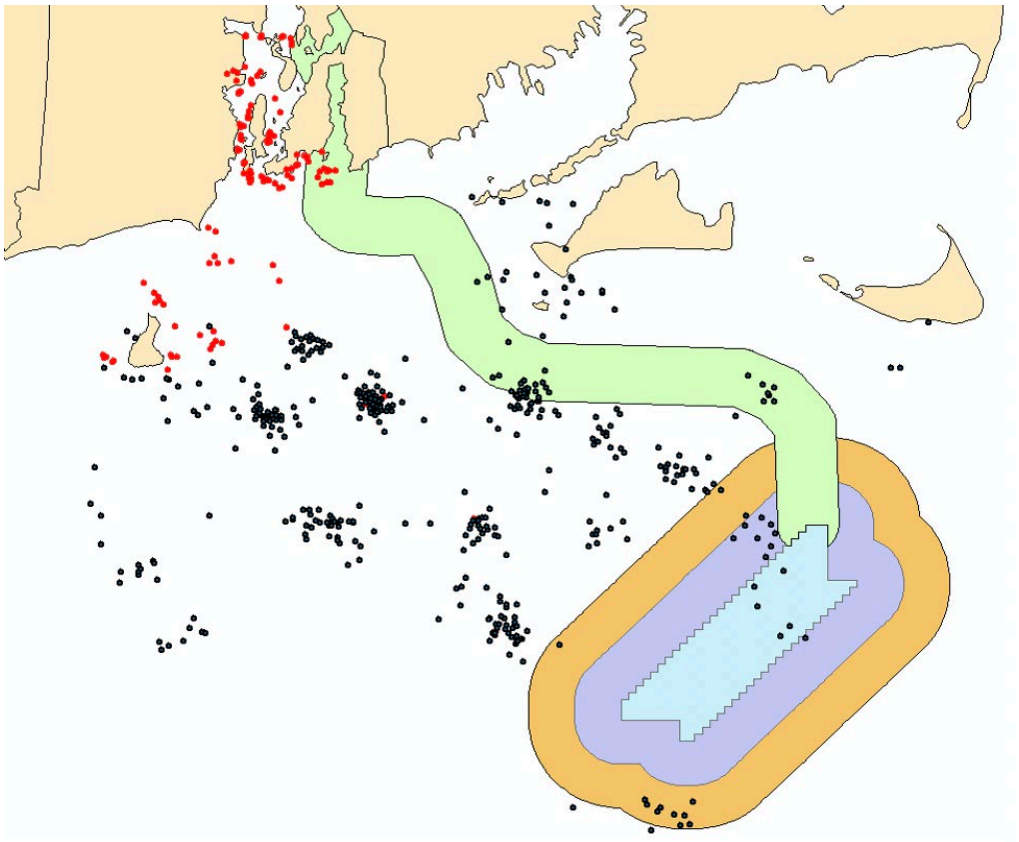

Figure 5. Charter fishing locations, 2017-2021, identified in survey responses. WLA is shown in blue with 7.5 and 15 km buffers, and ECRA in green.

The number of anglers per year is estimated by multiplying the vessel trip number in a year and the average number of anglers per trip in that year for each vessel, and the results are then summed across vessels by area. Tables 17 and 18 show the annual vessel trips and angler counts in the survey responses for charter vessels based in Massachusetts.

Table 18. Number of Massachusetts-based vessel trips and anglers by year, Brayton Point ECRA.

Year	Vessel Trips	Anglers
2017	11	48
2018	14.5	63.5
2019	14	65
2020	5	15
2021	7	25
Average	**10.3**	**43.3**

We use the revenue per angler estimates from NOAA shown in Table 19 below for our revenue calculation. We recognize that the per angler revenue from charter boats may be an order of magnitude

larger than that from party boats. The data in Table 19 represent an average across both sectors, influenced by the fact that many more people participate in party boat fishing than in charter fishing. There is no per-angler revenue data specific to the SouthCoast Wind WLA available from NOAA as of the writing of this report. We therefore rely on estimates from nearby lease areas (Bay State Wind and Vineyard Wind 1) as a proxy of what we expect SouthCoast Wind WLA revenues to be.

Table 19. SouthCoast Wind area for-hire vessel revenue. Sources: NMFS 2023a and 2023b.

Year	Revenue per angler (2023$)
2009	111.50
2010	92.92
2011	159.29
2015	134.57
2016	106.19
2018	92.92
Average	**116.23**

The annual revenue for each area is estimated by multiplying the number of anglers (Tables 17 and 18) by the average revenue per angler ($116.23). The result is then adjusted using a scale factor. For a low-end estimate, the scale factor is the ratio of the number of Massachusetts vessels responding to the survey (37.5) to the number of these vessels for which specific fishing locations were provided (18.5). For a high-end estimate, we increase the scale factor to reflect the estimated total of 100 vessels operating in the survey area (see above), versus the 66 for which survey responses were received. Finally, an economic impact multiplier is used to reflect the overall economic impacts associated with the charter fishing direct revenue. As with commercial fishing, we recognize that this multiplier will in fact vary with different types of charter fishing (e.g. sport fishing charters versus party boats). The multiplier we use is calculated using data in the NOAA report by Lovell *et al*. (2020), and reflects an average across different types of charter fishing. The Lovell *et al.* study is based on data from NOAA's 2016-2017 National Marine Recreational Fishing Expenditure Survey; we are not aware of any more recent data on the for-hire charter fishing industry. The results are shown in Table 20.

Table 20. Annual revenue and economic impact from MA-based charter fishing in SouthCoast Wind areas.

Area	Annual anglers	Revenue per angler (2023$)	Scale factor	Annual revenue (2023$)	Impact multiplier	Annual impact (2023$)
WLA	11.9	116.23	2.027	2,804	1.627	4,562
			3.071	4,248	1.627	6,911
WLA + 15km	73.1	116.23	2.027	17,222	1.627	28,021
			3.071	26,092	1.627	42,452
Brayton Point ECRA	119.1	116.23	2.027	28,060	1.627	45,654
			3.071	42,512	1.627	69,167

As Figure 5 and Table 17 illustrate, there is little evidence of charter fishing within the SouthCoast WLA, with more activity reported in the 15 km buffer area. We assume conservatively that the value of charter fishing at the SouthCoast Wind development areas, including the 15 km buffer around the entire WLA, is foregone in the construction years when pile driving takes place, since we expect finfish to leave this area due to construction noise, and also in the decommissioning year of the project. This is likely an overestimate of the actual impact, since charter fishing that would have taken place in these areas may in fact be carried out elsewhere.

Given the fact that much of the charter fishing around the SouthCoast WLA takes place outside the WLA footprint, and the 1 nm spacing of the turbine towers, we expect that charter fishing boats will be able to operate in and near the WLA with minor adjustments to current practice once construction is complete. We therefore do not expect charter fishing revenue to be materially impacted during the operations phase of the Project.

We therefore base our calculation of exposure on the WLA with 15 km buffer and the Brayton Point ECRA, ignoring any overlap. We use the high-end revenue and impact estimates for the WLA + 15 km ($26,092 and $42,452 per year, respectively), and assume that 50% of this value is forgone during the pile driving years, and all of it during the decommissioning years. We assume that charter fishing is prevented in the Brayton Point and Falmouth ECRAs during all cable installation work, for up to six months as described above. Because we do not have charter fishing data specific to the Falmouth Export Cable Route, we assume conservatively that the high-end revenue and impact estimates for the Brayton Point ECRA ($42,512 and $69,167 per year, respectively) are valid proxies for the Falmouth ECRA. Using a 5% discount rate, and adjusting to 2023$, the present value of these effects, using the high-end estimates, is about $43,000 (2023$) in revenue and $70,000 in total impact for the WLA in Massachusetts, $20,000 and $33,000 respectively for the Brayton Point Export Cable Route, and $19,000 and $31,000 respectively for the Falmouth Export Cable Route. The impact estimated for Massachusett-based charter fishing from construction, operations, and decommissioning of the SouthCoast Wind Project is therefore at most $134,000.

As noted above, we consider it unlikely that the SouthCoast Wind development will substantially change the personal recreational fishing activities of Massachusetts boaters.

Conclusions

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be $787,000 (2023$), or $1,526/km^2/year. Of this, $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the 180 m wide SouthCoast Wind Export Cable Areas to be $85,000 (2023$) for Brayton Point and $43,000 for Falmouth. Of this, $37,000 and $16,000, respectively, are landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 and $32,000, respectively, in Massachusetts.

Massachusetts-based charter fishing revenue generated in and around the SouthCoast Wind development areas (Lease Area and Brayton Point and Falmouth Export Cable Corridors) is estimated to be between $73,000 and $111,000 per year (2023$). Including multipliers, this generates total annual economic impacts of $119,000 to $181,000 in Massachusetts. We do not have data on charter fishing specific to the Falmouth Export Cable Corridor, and suggest using the Brayton Point ECC values as a proxy for the Falmouth ECC.

We estimate that a total (lump sum) of up to $1,918,000 (2023$) of commercial fisheries value landed in Massachusetts is potentially exposed to SouthCoast Wind Lease Area development. This includes about $1,585,000 in direct landed value forgone due to construction activities, $310,000 from forgone landings during the wind farm's operation, and $23,000 in present value of foregone landings due to decommissioning.

Applying the BOEM draft guidelines to the first five years of operations results in an additional $560,000 in estimated operating exposure. We note that the BOEM draft guidelines are intended to ensure that adequate funds are available to compensate lost fishing income, and are not intended to produce a project-specific estimate of likely actual losses. As such the BOEM framework is not directly compatible with the estimates presented in this report.

We estimate the total Massachusetts commercial fishing exposure for development of the Brayton Point Export Cable Route to be $115,000 (2023$) in landed value, assuming that both export cables use the Brayton Point ECC. If the Project 2 cable uses the Falmouth ECC, the exposure values are $60,000 for the Brayton Point and $24,000 for the Falmouth Export Cable Route.

Applying the upstream and downstream multipliers as described above results in a present value estimate of $1.93 million (2023$) in indirect and induced effects in Massachusetts associated with the WLA, for a total impact of $3.85 million. The total impact values for the Export Cable Routes are $231,000 for the cables on the Brayton Point route, or $132,000 for Brayton Point and $49,000 for Falmouth if the Project 2 export cables use the Falmouth ECC.

Massachusetts-based charter fishing revenue exposure to the SouthCoast Wind development is estimated to have a present value of $82,000 (2023$), resulting in $134,000 in present value of impacts in Massachusetts.

Including indirect and induced effects, the potentially affected commercial landings and charter fishing revenue together result in about $4,217,000 in total (lump sum, 2023$) present value economic impact in Massachusetts. Table 21 summarizes these values.

There is considerable variability in the baseline data of landings and landed value from the SouthCoast Wind Project areas. Baseline future landings will vary due to natural and fisheries-related fluctuations in stocks that are likely to be amplified by climate change effects. There is also uncertainty about the impact of wind farm construction and operation on fish stocks and landings, and about the ways that fishers will adapt their fishing practices in response to wind farm development. We consider our combined estimate of $4.22 million in economic impacts to Massachusetts from SouthCoast Wind development effects on commercial and charter fishing to be a conservative upper bound on likely actual impacts.

Table 21. Estimated Massachusetts fishing industries exposure from SouthCoast Wind development

Categories of Potential Exposure		**MA Direct Landed Value/Revenue (2023$)**
Construction-related effects	WLA+	$1,586,000
	Brayton Point ECC[6]	$94,000
Effects during operations	WLA	$310,000
	ECCs	---
Decommissioning-related effects	WLA	$23,000
	Brayton Point ECC[6]	$21,000
Subtotal MA commercial direct effects		**$2,034,000**
MA for-hire charter fishing direct effects		$82,000
Total MA direct effects		**$2,116,000**

Categories of Potential Exposure	**MA Total Impact with Multipliers (2023$)**
Subtotal MA commercial fishing	**$4,083,000**
MA for-hire charter fishing	$134,000
Total Massachusetts impacts	**$4,217,000**

[6] Should SouthCoast Wind utilize the Falmouth ECC for Project 2, the total present value of Massachusetts commercial landings exposed to SouthCoast ECC development decreases from $115,000 to $90,000, and the associated impacts decrease from $231,000 to $181,000.

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Appendix

Table A1. Average annual landings by species from the SouthCoast WLA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

Species	*Mean*		*Standard Deviation*	
	Value/year (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	10,641	10,424	10,936	12,336
AM. PLAICE FLOUNDER	47	25	43	24
AMERICAN EEL	4	4	5	5
AMERICAN LOBSTER	36,610	6,049	18,527	3,766
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	15	16	38	42
ATLANTIC HALIBUT	29	3	58	7
ATLANTIC HERRING	8,991	79,572	28,397	271,050
ATLANTIC MACKEREL	893	1,575	1,316	2,110
BLACK SEA BASS	3,795	981	4,689	1,199
BLUE CRAB	5	2	20	9
BLUEFIN TUNA	-	-	-	-
BLUEFISH	1,252	1,315	531	657
BLUELINE TILEFISH	33	11	72	23
BONITO	9	5	29	16
BUTTERFISH	5,941	7,999	4,044	5,782
CANCER CRAB	-	-	-	-
CHANNELED WHELK	813	97	2,343	286
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	480	181	438	168
CONCHS	13	8	47	31
CONGER EEL	98	121	82	83
CUNNER	-	-	-	-
CUSK	0	0	1	1
DOGFISH SMOOTH	374	426	375	485
DOGFISH SPINY	1,886	6,537	1,486	4,960
DOLPHINFISH	1	0	5	1
FOURSPOT FLOUNDER	30	74	67	171
GOLDEN TILEFISH	40,936	8,494	42,300	8,724
HADDOCK	417	433	612	987
HORSESHOE CRAB	1	1	2	2
ILLEX SQUID	2,037	3,401	3,000	5,525
JOHN DORY	81	58	80	56
JONAH CRAB	95,258	93,024	54,977	43,231
KING MACKEREL	-	-	-	-
KING WHITING	1,280	1,149	4,329	3,850
KNOBBED WHELK	6	1	14	2

LIGHTNING WHELK	-	-	-	-
LITTLE TUNA	0	0	1	0
LONGFIN SQUID	89,715	57,894	55,760	35,371
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	46,113	24,712	23,480	8,967
MULLETS	0	0	0	0
NK CRAB	0	0	2	2
NK EEL	22	18	43	35
NK SEATROUT	1	1	2	3
NK TILEFISH	0	0	1	0
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	666	757	2,042	2,365
OTHER FISH	0	0	1	1
POLLOCK	44	35	42	36
RED CRAB	-	-	-	-
RED HAKE	2,437	6,268	2,554	6,706
REDFISH	24	31	31	45
ROCK CRAB	3,508	5,173	7,716	11,731
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	2	3	4	5
SCUP	50,583	56,725	51,310	57,549
SEA RAVEN	-	-	-	-
SEA ROBINS	2	10	3	11
SEA SCALLOP	30,639	2,749	39,611	4,102
SILVER HAKE	46,737	57,789	35,033	38,177
SKATES	25,129	38,782	12,212	22,278
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	14	5	47	16
SQUETEAGUE WEAKFISH	48	19	45	17
STRIPED BASS	31	7	41	9
SUMMER FLOUNDER	58,874	17,641	57,881	18,957
SURF CLAM	788	685	2,950	2,561
SWORDFISH	-	-	-	-
TAUTOG	8	2	12	3
THRESHER SHARK	-	-	-	-
TRIGGERFISH	1	1	3	2
WHITE HAKE	308	159	841	401
WINTER FLOUNDER	1,317	455	1,474	568
WITCH FLOUNDER	56	23	54	23
WOLFFISHES	0	0	1	1
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	1,814	890	2,517	1,282

Table A2. Average annual landings by species from the SouthCoast Wind Brayton Point ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECA.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	2,303	1,428	6,986	4,210
ALL_OTHERS	274,877	310,907	168,718	229,521
AM. PLAICE FLOUNDER	268	136	246	123
AMERICAN EEL	16	5	38	9
AMERICAN LOBSTER	709,460	108,796	169,582	25,185
AMERICAN SHAD	2	2	5	4
ATLANTIC CROAKER	18	32	41	84
ATLANTIC HALIBUT	38	4	30	3
ATLANTIC HERRING	138,611	952,673	206,077	1,417,581
ATLANTIC MACKEREL	12,614	39,171	16,993	80,425
BLACK SEA BASS	109,272	23,662	35,050	10,251
BLUE CRAB	1,391	1,407	4,937	5,040
BLUEFIN TUNA	5	1	17	3
BLUEFISH	30,407	41,417	17,979	27,093
BLUELINE TILEFISH	15	5	40	13
BONITO	8,242	2,681	5,958	2,277
BUTTERFISH	28,548	33,437	15,989	17,949
CANCER CRAB	-	57	-	130
CHANNELED WHELK	105,555	10,840	68,262	7,459
CHUB MACKEREL	11	12	43	45
COBIA	1	0	3	1
COD	6,972	2,295	4,622	1,450
CONCHS	13,436	2,679	35,331	6,551
CONGER EEL	283	391	281	434
CUNNER	266	110	746	260
CUSK	4	3	5	4
DOGFISH SMOOTH	3,330	4,777	2,694	4,493
DOGFISH SPINY	20,572	68,345	28,651	91,918
DOLPHINFISH	4	1	17	4
FOURSPOT FLOUNDER	22	42	55	123
GOLDEN TILEFISH	5,048	1,070	5,599	1,161
HADDOCK	1,808	1,223	1,414	1,036
HORSESHOE CRAB	217	197	197	224
ILLEX SQUID	1,867	3,599	2,881	6,328
JOHN DORY	89	63	122	85
JONAH CRAB	52,297	55,260	30,697	31,883
KING MACKEREL	0	0	1	0
KING WHITING	2,152	1,946	4,176	3,954
KNOBBED WHELK	1,765	446	2,928	708

LIGHTNING WHELK	153	49	463	137
LITTLE TUNA	1,962	3,257	2,864	5,089
LONGFIN SQUID	877,015	573,828	625,512	403,553
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	119	315	221	642
MONKFISH	62,175	29,835	33,865	12,183
MULLETS	-	-	-	-
NK CRAB	82	78	129	89
NK EEL	21	18	27	20
NK SEATROUT	137	300	148	350
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	0	0	0	0
NORTHERN SEA ROBIN	0	2	2	8
OCEAN POUT	5	8	18	28
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,740	1,757	4,157	3,908
OTHER FISH	49	50	181	179
POLLOCK	289	236	233	209
RED CRAB	-	-	-	-
RED HAKE	6,178	16,464	1,668	4,760
REDFISH	151	196	139	169
ROCK CRAB	6,522	8,240	7,927	9,230
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	53	79	131	205
SCUP	142,379	168,197	63,861	79,535
SEA RAVEN	61	40	75	46
SEA ROBINS	178	496	202	356
SEA SCALLOP	155,767	13,132	141,862	13,922
SILVER HAKE	102,572	139,468	51,088	77,190
SKATES	139,206	665,273	75,862	449,248
SPANISH MACKEREL	6	4	15	11
SPOT	6	11	15	28
SPOTTED HAKE	-	8	-	29
SPOTTED WEAKFISH	16	5	34	11
SQUETEAGUE WEAKFISH	1,468	592	1,213	465
STRIPED BASS	9,125	1,772	8,622	1,726
SUMMER FLOUNDER	354,034	85,559	117,270	37,004
SURF CLAM	3,836	3,561	12,526	11,688
SWORDFISH	-	-	-	-
TAUTOG	7,409	1,998	3,390	1,034
THRESHER SHARK	60	53	226	197
TRIGGERFISH	145	90	96	56
WHITE HAKE	1,310	747	3,154	1,664
WINTER FLOUNDER	18,568	6,471	20,051	7,502
WITCH FLOUNDER	353	142	344	140
WOLFFISHES	3	3	8	6
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	11,896	5,598	16,996	8,847

Table A3. Average annual landings by species from the SouthCoast Wind Falmouth ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECC.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	82,301	84,424	67,280	77,303
AM. PLAICE FLOUNDER	633	320	492	264
AMERICAN EEL	72	6	164	17
AMERICAN LOBSTER	19,669	3,209	7,076	1,417
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	1	1	5	4
ATLANTIC HALIBUT	57	6	34	4
ATLANTIC HERRING	18,539	164,170	50,435	521,579
ATLANTIC MACKEREL	6,102	9,917	11,205	15,124
BLACK SEA BASS	38,516	9,889	26,687	7,528
BLUE CRAB	-	-	-	-
BLUEFIN TUNA	-	-	-	-
BLUEFISH	5,920	6,171	2,857	3,432
BLUELINE TILEFISH	19	6	58	18
BONITO	25	9	77	24
BUTTERFISH	11,119	14,159	4,839	5,669
CANCER CRAB	-	-	-	-
CHANNELED WHELK	221,713	21,398	95,053	7,318
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	4,426	1,697	4,555	1,696
CONCHS	23,515	4,630	33,533	6,114
CONGER EEL	32	40	26	33
CUNNER	-	-	-	-
CUSK	5	5	5	4
DOGFISH SMOOTH	1,733	1,783	1,056	1,047
DOGFISH SPINY	1,835	6,290	3,801	11,969
DOLPHINFISH	-	-	-	-
FOURSPOT FLOUNDER	6	5	21	17
GOLDEN TILEFISH	5,101	1,047	5,911	1,234
HADDOCK	3,288	2,126	1,459	1,166
HORSESHOE CRAB	1,717	1,234	1,558	967
ILLEX SQUID	3,594	6,410	5,156	8,560
JOHN DORY	81	59	152	106
JONAH CRAB	14,167	13,750	8,718	7,785
KING MACKEREL	-	-	-	-
KING WHITING	2,058	1,936	4,966	4,625
KNOBBED WHELK	15,307	3,348	11,216	2,242

LIGHTNING WHELK	1,051	408	2,450	886
LITTLE TUNA	-	-	-	-
LONGFIN SQUID	1,497,032	944,608	981,874	617,252
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	10,452	4,821	5,972	2,946
MULLETS	-	-	-	-
NK CRAB	2	2	8	9
NK EEL	2	2	3	3
NK SEATROUT	0	0	1	1
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,553	1,551	3,810	3,487
OTHER FISH	26	32	98	119
POLLOCK	1,106	846	1,039	816
RED CRAB	-	-	-	-
RED HAKE	3,252	8,490	1,771	5,528
REDFISH	427	561	310	353
ROCK CRAB	364	478	568	755
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	5	5	13	14
SCUP	61,232	73,793	40,608	48,513
SEA RAVEN	-	-	-	-
SEA ROBINS	17	60	20	69
SEA SCALLOP	36,238	2,935	22,543	2,109
SILVER HAKE	61,153	83,124	34,548	49,724
SKATES	13,788	28,616	22,543	30,876
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	1	0	3	1
SQUETEAGUE WEAKFISH	34	14	23	10
STRIPED BASS	3,378	666	3,063	530
SUMMER FLOUNDER	151,745	38,662	127,402	36,708
SURF CLAM	7,473	6,691	18,915	17,062
SWORDFISH	-	-	-	-
TAUTOG	858	196	567	109
THRESHER SHARK	-	-	-	-
TRIGGERFISH	53	31	79	49
WHITE HAKE	1,776	953	3,629	1,923
WINTER FLOUNDER	5,977	2,085	5,507	2,080
WITCH FLOUNDER	695	285	611	283
WOLFFISHES	5	4	13	11
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	3,606	1,800	4,890	2,445

SOUTHCOAST WIND

Fisheries Baseline Analysis for Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

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Fisheries Baseline Analysis for Massachusetts from the SouthCoast Wind Lease Area and Export Cable Routes

Hauke Kite-Powell, Di Jin, and Michael Weir
Marine Policy Center
Woods Hole Oceanographic Institution

13 October 2023

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List of Abbreviations

COP – Construction and Operations Plan

ECA – Export Cable Area

ECC – Export Cable Corridor

ECR – Export Cable Route

ECC WA – Export Cable Corridor Working Area

ECRA – Export Cable Route Area

GDP – Gross Domestic Product

MA DMF – Massachusetts Division of Marine Fisheries

NMFS – National Marine Fisheries Service

NOAA – National Oceanographic and Atmospheric Administration

PPI – Producer Price Index

RICRMC – Rhode Island Coastal Resources Management Council

RIDEM – Rhode Island Department of Environmental Management

SBRM – Standardized Bycatch Reporting Methodology

VMS – Vessel Monitoring System

VTR – Vessel Trip Report

WLA – Wind Lease Area

Summary

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be $787,000 (2023$), or $1,526/km^2/year. Of this, $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the 180 m wide SouthCoast Wind Export Cable Areas to be $85,000 (2023$) for Brayton Point and $43,000 for Falmouth. Of this, $37,000 and $16,000, respectively, are landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 and $32,000, respectively, in Massachusetts.

Massachusetts-based charter fishing revenue generated in and around the SouthCoast Wind development areas (Lease Area and Brayton Point Export Cable Corridor) is estimated to be between $45,000 and $69,000 (2023$). Including multipliers, this generates total annual economic impacts of $74,000 to $112,000 in Massachusetts.

Introduction

This report estimates the level of pre-development fishing operations intersecting with, and landings and landed value from, the SouthCoast Wind Lease Area (WLA) and Export Cable Areas (ECAs) (Figure 1) associated with landings and revenue generated in Massachusetts ports, and the potential exposure of Massachusetts-based commercial and for-hire charter fishing to SouthCoast Wind project construction, operations, and decommissioning.

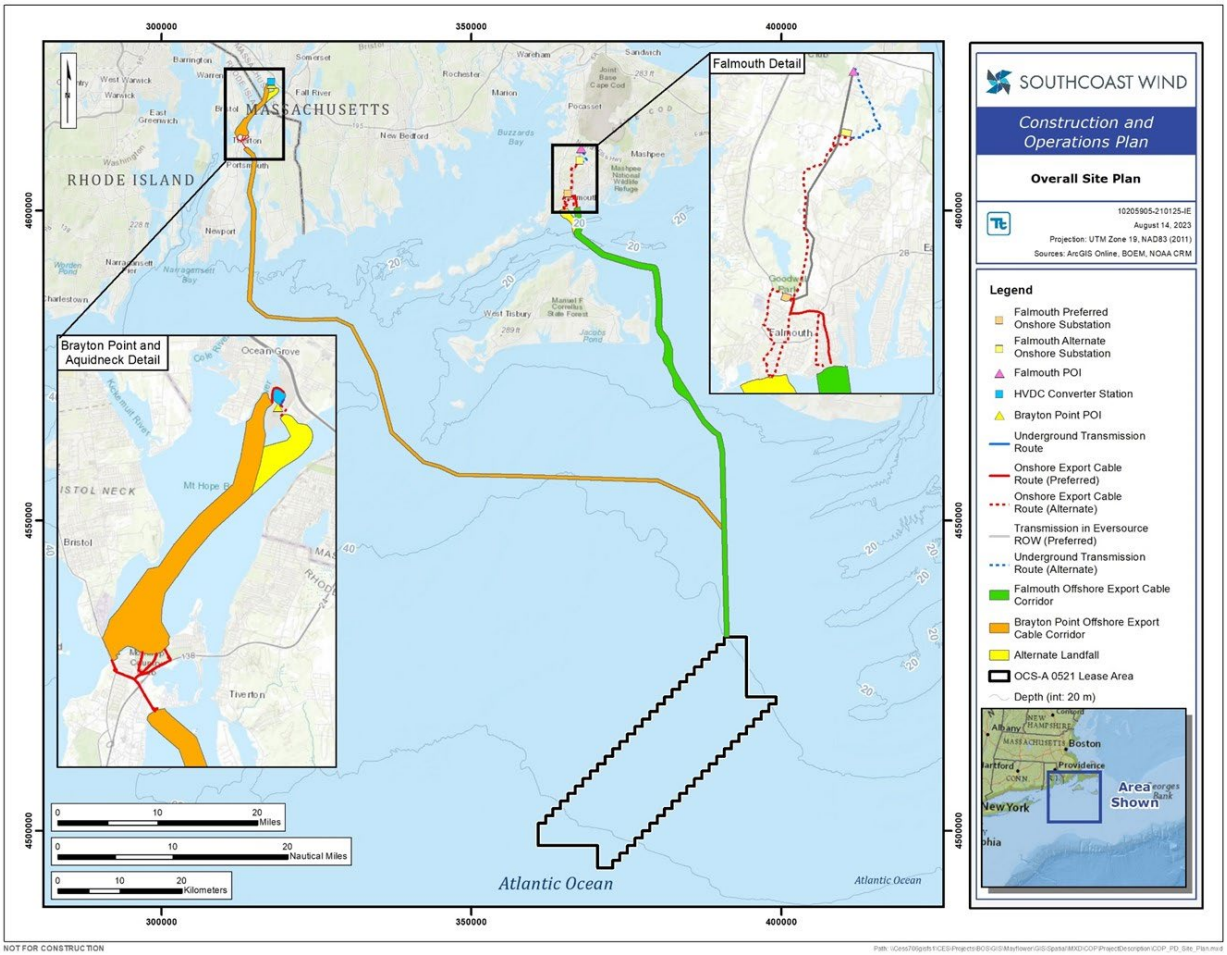

Figure 1. SouthCoast Wind Lease Area and Export Cable Corridors. Source: SouthCoast Wind.

The WLA for SouthCoast Wind (OCS-A 0521) lies in federal waters, some 75 km south of the Muskeget Channel between Martha's Vineyard and Nantucket, and has a footprint of 516 km^2. The ECC to Brayton Point is 103 km in length, and runs from the northern edge of the WLA first to the north and west across Rhode Island Sound, then up the Sakonnet River to its landing location at Brayton Point, Somerset, MA. The ECC to Falmouth runs north from the WLA through the Muskeget Channel and then northwest across Nantucket Sound to Falmouth.

To estimate commercial fish landings along the ECAs, we define a 10km wide Export Cable Route Area (ECRA) extending 5km on either side of each cable route. The 10km wide ECRA has no physical significance in the context of the SouthCoast Wind project, and is defined only for the purpose of identifying fisheries landings data that reflect what may be landed from fishing along the export cable route. Likewise, the Export Cable Corridors defined by SouthCoast, 700 m wide for the Brayton Point route and 1,000 m wide for the Falmouth route, represent only the envelope within which the cables will potentially be located. Only portions of the narrow, 180m wide ECA centered on the export cables may be disturbed in the process of burying the cables.

Table 1 shows the approximate length and area of these features for the SouthCoast Wind project. In the sections that follow, fishery landings and values for the Export Cable Routes are estimated and reported for the ECAs, as defined above.

Table 1. SouthCoast Wind area parameters

Wind Lease Area (WLA) footprint (km^2)	516
Brayton Point Export Cable Route (ECR) length (km)	148
Footprint of 10km Brayton Point Export Cable Route Area (ECRA) (km^2)	1,571
Footprint of 180 m Brayton Point Export Cable Area (ECA) (km^2)	28.3
Falmouth Export Cable Route (ECR) length (km)	91
Footprint of 10km Falmouth Export Cable Route Area (ECRA) (km^2)	905
Footprint of 180 m Falmouth Export Cable Area (ECA) (km^2)	16.3

Methodology

Our approach to estimating the potential impact of SouthCoast Wind development on commercial fishing is to first estimate the annual landed weight and value of fish and invertebrates from the SouthCoast Wind WLA and ECAs, and then to estimate the fraction of this annual value that may be exposed to wind farm construction, operation, and decommissioning. Our assessment method is consistent with the general framework described in the reports by Kirkpatrick *et al.*/BOEM (2017a and 2017b) on socio-economic impact of offshore wind energy development on commercial fisheries, and builds on the approach of Livermore (RIDEM 2017, 2018, and 2019), which develops high-end estimates of fishery impacts by including in baseline estimates the entire trip revenues from all trips that overlap with a wind lease area, regardless of how much fishing occurred inside or outside the area.

Separately, we estimate the gross revenue associated with for-hire charter boat fishing activity originating in Massachusetts, and the fraction of this revenue that may be exposed to SouthCoast Wind development.

We estimate the annual commercial landings and landed value of fish from the SouthCoast Wind WLA and ECAs using a dataset provided by NOAA's National Marine Fisheries Service. This dataset uses modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data to produce a more accurate spatial allocation of landings from each fishing trip (DePiper 2014; Benjamin *et al.* 2018). As we document below, there has been considerable variability in annual landings from these

areas over the past decade; we use the average landings and landed value from 2008 to 2021 as indicative of what the areas may yield in the future.

Throughout this report, we use "landed value" to refer to the direct value of fisheries landings, "impact" to refer to the economic activity generated by fisheries, including indirect and induced effects (see below), and "exposure" to refer to the portion of landed value or impacts that may be at risk due to wind farm development.

Baseline commercial fishery landings and values, 2008-2021

Commercial Fisheries Data Description

NOAA has been collecting and improving their Vessel Trip Report (VTR) data for decades. The data have been widely used for fisheries research, management, and economic impact assessments. To gauge landings value and quantity at the spatial scale required for the SouthCoast Wind Lease Area and export cable route, NOAA has recently developed a procedure to produce high-resolution spatial information using a combination of VTR and fishery observer data. As described below, we follow the general approach developed by NOAA, which is the best approach at present, with a recognition that relevant data are not perfect. All estimates of fishery landings and values in this report are based on these NMFS data. The data have not been amended, adjusted, or augmented in any way, with two exceptions: we make adjustments to the lobster and Jonah crab landed values to account for possible underreporting; and we make adjustments to the Rhode Island lobster and Jonah crab landings to account for dockside sales. These adjustments are described in detail in the section on Adjustment of Lobster and Jonah Crab Data below. The adjusted data appear only in Tables 11 and 12 below.

The data presented below summarize estimates of fisheries landings and values for fishing trips that intersected with the SouthCoast Wind Lease Area (WLA) or its Export Cable Route Area (ECRA), from 2008 to 2021 (calendar years). Modeled representations of federal Vessel Trip Report (VTR) and clam logbook fishing trip data were queried for spatial overlap with the WLA and the ECRA, and linked to dealer data for value and landings information. As detailed in DePiper (2014) and Benjamin *et al.* (2018), to improve the spatial resolution of VTR, a spatial distribution model was developed by combining vessel trip information from VTR with matching NOAA fishery observer data, including geocoordinates of detailed fishing locations. From this model, landings and value can be summarized for a specified geographic area according to (1) species, (2) gear type, (3) port of landing, and (4) state of landing.

In essence, the DePiper approach utilizes a spatial model to distribute the total landings for each commercial fishing trip over a circular area with its center located at the geocoordinate reported in the VTR, following a distribution decreasing with the radius. The model was estimated using VTR data (for the centroid) and vessel observer data (for haul beginning and endpoints). DePiper (2014) reported that the observer data matched VTR records well (488,251 hauls in the observer data were matched to 27,358 VTR records, representing 87.5% of all hauls with either a beginning or end point of a haul recorded).

The primary purpose of the observer data collection is to monitor fishery bycatch. NOAA's Standardized Bycatch Reporting Methodology (SBRM) dictates what types of vessels (gear, species, area of operation, etc.), participating in various fisheries, should be sampled and at what rate. The numbers of sea days needed to achieve a 30% coefficient of variation (CV = standard deviation divided by mean) of total

discards for each species group were derived for different SBRM fleets covering different gears, access areas, states, and mesh sizes (NEFSC 2013). For Massachusetts vessels, the observer program covered close to 20% of trips with trawl gear, around 5% of trips with dredge gear, and around 20% of trips with gillnet gear (Jin 2015).

Following the DePiper approach, the resulting high spatial resolution data were converted into raster maps. Use of this VTR raster model produces a more accurate estimate of the spatial distribution of landings than other approaches that rely entirely on the self-reported VTR/clam logbook locations, which associate all landings from the trip with a single point location. At 10 nautical mile resolution, the confidence intervals of the DePiper model estimates are around 90% for trip lengths of one to two days.

The only alternative to the DePiper approach is a model to distribute the total landings from a VTR report over the vessel's track using the Vessel Monitoring System (VMS) data. The main challenge for this approach is accurate identification of fishing and non-fishing segments of a trip. Muench *et al.* (2018) have shown that using vessel speed alone can lead to a severe misrepresentation of fishing locations. NOAA has adopted the DePiper approach as a standard procedure to generate spatial data; and we agree with NOAA that this is the best approach currently available. The main advantages of the DePiper approach are that (1) it is based on observations of actual fishing locations noted by observers at sea, and (2) it provides a systematic and consistent way to meet the increasing demand for spatial fishing data for relatively small areas in the ocean, which is important for cross project comparison.

Landings associated with the Export Cable Areas are calculated by applying the ratio of footprint areas shown in Table 1 to the landings estimated for the Export Cable Route Area. This assumes that landings are distributed uniformly across the fished sections of the ECRA.

In order to maintain the legally required data confidentiality, summaries by species, gear type, and landing location are presented individually. In addition, for records that did not meet the "rule of three" (three or more unique dealers and three or more unique permits), values are summarized in a category labeled "ALL OTHERS." Note also:

- All landed values have been converted to 2023 dollars using the Producer Price Index for "unprocessed and prepared seafood."
- Pounds are reported in Landed Pounds, unless otherwise noted.
- Data summarized here are from federal sources only.
- Fishing vessels that carry only lobster permits for federal waters are not subject to VTR requirements. Landings from trips with no VTR are not reflected in this summary.
- Other fisheries exist in state waters that may not be reflected in data from federal sources (e.g. whelk, quahog, striped bass).

We also obtained the average monthly number of trips intersecting with each area, for the period of 2008 to 2021.

Commercial Fishery Landings from Wind Lease Area and Export Cable Areas

Table 2 shows the average annual level and standard deviation of total values and landings associated with fishing in the SouthCoast Wind WLA and the ECAs from 2008 to 2021.

The average annual landings from the SouthCoast Wind WLA are about 493,000 lbs (standard deviation 298,000 lbs) with a value of about $571,000 (standard deviation $140,000). Average annual landings

from the Brayton Point ECA are about 61,000 lbs (standard deviation 30,000 lbs) with a value of $62,000 (standard deviation $16,000). Average annual landings from the Falmouth ECA are about 28,000 lbs (standard deviation 12,000 lbs) with a value of $42,000 (standard deviation $19,000).

Table 2. Average annual value and quantity of commercial fisheries landings by area

Area	***Mean***		***Standard Deviation***	
	Value/year (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast Wind WLA	570,861	492,824	139,818	297,932
Brayton Point ECA	61,863	61,147	15,698	30,302
Falmouth ECA	42,207	28,076	18,801	11,878

Table 3 shows the total landings and values, for each year from 2008 to 2021, associated with fishing in the SouthCoast Wind WLA and the ECAs.

Table 4 summarizes the average annual landings and value of fisheries production from the SouthCoast Wind WLA and the ECAs by the top species or species groups. Jonah Crab and Longfin squid are among the species generating the greatest value from the SouthCoast Wind WLA during the 2008-2021 time period. The unusually high landings reported in 2010 are due to about 1 million lbs of herring landed from the area that year. Full data on landings by species can be found in Tables A1 to A3 in the Appendix.

Table 3. Annual value and quantity of commercial fisheries landings by area.

Area	**SouthCoast Wind WLA**		**Brayton Point ECA**		**Falmouth ECA**	
Year	**Value** (2023$)	**Landings** (lbs)	**Value** (2023$)	**Landings** (lbs)	**Value** (2023$)	**Landings** (lbs)
2008	576,087	507,909	77,946	74,342	41,155	31,262
2009	507,153	435,991	57,984	64,216	26,258	21,616
2010	579,124	1,474,217	50,824	77,621	21,089	47,172
2011	318,346	225,495	55,577	57,318	21,858	11,827
2012	466,509	339,675	61,841	92,477	49,865	28,962
2013	477,113	377,424	62,185	134,331	23,630	14,428
2014	476,466	343,378	61,786	71,599	47,387	32,311
2015	449,827	312,035	73,543	54,892	54,611	30,480
2016	727,054	580,188	99,625	75,375	88,325	54,388
2017	619,432	524,306	49,263	29,039	43,149	25,904
2018	649,644	490,070	39,125	21,311	38,895	19,191
2019	881,716	477,266	55,923	33,399	55,651	28,743
2020	577,184	400,376	44,583	31,145	22,763	15,563
2021	686,402	411,206	75,878	38,992	56,267	31,215

Table 4. Average annual landings of major species by area, 2008-2021.

	Mean		***Standard Deviation***	
Area/Species	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast Wind WLA				
Jonah Crab	95,258	93,024	54,977	43,231
Longfin Squid	89,715	57,894	55,760	35,371
Summer Flounder	58,874	17,641	57,881	18,957
Scup	50,583	56,725	51,310	57,549
Silver Hake	46,737	57,789	35,033	38,177
Monkfish	46,113	24,712	23,480	8,967
Golden Tilefish	40,936	8,494	42,300	8,724
American Lobster	36,610	6,049	18,527	3,766
Sea Scallop	30,639	2,749	39,611	4,102
Brayton Point ECA				
Longfin Squid	15,786	10,329	11,259	7,264
American Lobster	12,770	1,958	3,052	453
Summer Flounder	6,373	1,540	2,111	666
ALL_OTHERS	4,948	5,596	3,037	4,131
Falmouth ECA				
Longfin Squid	26,947	17,003	17,674	11,111
Channeled Whelk	3,991	385	1,711	132
Summer Flounder	2,731	696	2,293	661
ALL_OTHERS	1,481	1,520	1,211	1,391
Scup	1,102	1,328	731	873
Silver Hake	1,101	1,496	622	895

Both mobile (e.g., trawl and dredge) and fixed (e.g., pots and gillnet) gears are used in fishing operations. The trawl gear is primarily used for harvesting groundfish, dredge for scallops, and pots for lobster and crabs. The fixed gears are fished using trawls (a series of lobster pots attached to one line) with string lengths of 0.4–0.8 km (up to 1.829 km) or gillnets with typical string lengths of 0.2–3.0 km. Tables 5a, 5b, and 5c break out annual landings for each area by gear type. Bottom trawls and lobster pots generate the most significant landings in the WLA, followed by sinking gillnets. In the ECAs, bottom trawls are also the most significant gear type. The "ALL_OTHERS" category includes landings using purse seines, other seines, and weirs/traps, and others that fall under the "rule of three" exclusion.

Table 5a. Average annual landings in SouthCoast Wind WLA by gear type.

Gear	*Mean*		*Standard Deviation*	
	Value/year (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
ALL_OTHERS	12,040	10,279	26,231	15,670
Dredge – Clam	4,290	3,386	7,384	5,674
Dredge – Scallop	29,839	2,712	40,002	4,129
Gillnet – Sink	66,458	60,314	29,234	24,306
Handline	-	-	-	-
Longline – Bottom	34,461	8,168	41,427	10,523
Pot – Lobster	135,124	103,776	53,782	42,542
Pot – Other	3,712	2,851	3,152	2,396
Trawl – Bottom	277,376	228,593	92,373	60,195
Trawl – Midwater	7,561	72,744	27,191	265,385

Table 5b. Average annual landings in the Brayton Point ECA by gear type.

Gear	*Mean*		*Standard Deviation*	
	Value/year (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
ALL_OTHERS	2,207	2,540	3,707	4,665
Dredge – Clam	3,041	3,316	2,975	3,419
Dredge – Scallop	2,791	248	2,604	279
Gillnet – Sink	4,122	4,132	1,928	2,431
Handline	297	77	252	58
Longline – Bottom	-	-	-	-
Pot – Lobster	13,904	3,157	2,798	745
Pot – Other	3,526	716	1,576	363
Trawl – Bottom	29,879	31,729	12,362	10,455
Trawl – Midwater	2,096	15,231	3,209	23,313

Table 5c. Average annual landings in the Falmouth ECA by gear type.

Gear	*Mean*		*Standard Deviation*	
	Value/year (2020 $)	**Landings/year** (lbs)	**Value/year** (2020 $)	**Landings/year** (lbs)
ALL_OTHERS	706	761	1,339	1,384
Dredge – Clam	992	1,014	1,228	1,261
Dredge – Scallop	565	47	474	43
Gillnet – Sink	310	321	521	653
Handline	103	25	85	19
Longline – Bottom	10	2	39	9
Pot – Lobster	562	304	161	134
Pot – Other	4,978	703	1,764	178
Trawl – Bottom	33,660	22,128	18,085	11,218
Trawl – Midwater	323	2,772	1,083	9,568

Table 6 summarizes annual landings and landed value for the major ports receiving landings from the two areas. Point Judith (Rhode Island) and New Bedford (Massachusetts) are the most significant ports for landings and landed value from the SouthCoast Wind Lease Areas and ECAs.

Table 6. Average annual landings at major ports in Rhode Island and Massachusetts.

	Mean		***Standard Deviation***	
Area/Port	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
SouthCoast Wind WLA				
Point Judith, RI	159,899	135,373	49,867	40,053
New Bedford, MA	135,150	152,610	61,911	203,985
Newport, RI	35,769	29,544	26,190	22,135
Chatham, MA	26,883	22,826	17,468	15,863
Brayton Point ECA				
Point Judith, RI	19,690	15,609	8,680	6,563
New Bedford, MA	17,143	24,085	5,883	19,869
Falmouth ECA				
Point Judith, RI	19,774	13,613	11,696	7,445
New Bedford, MA	4,227	5,144	1,917	7,451

Tables 7a and 7b show average annual landings and landed value from the two areas by state where the catch is landed. Rhode Island and Massachusetts together account for more than 75% of landings and landed value from the WLA and about 85 to 90% of landings from the ECAs. The "others" category includes landings in Maine, New Hampshire, Connecticut, New York, New Jersey, Maryland, North Carolina, and Virginia, as well as data flagged by the "rule of three" exclusion.

Table 7a. Average annual landings in SouthCoast Wind WLA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	216,016	188,750	63,730	54,585
Massachusetts	214,255	236,135	59,652	281,278
Others	140,591	67,939	--	--

Table 7b. Average annual landings in the Brayton Point ECA by state.

	Mean		***Standard Deviation***	
State	**Value/year** (2023$)	**Landings/year** (lbs)	**Value/year** (2023$)	**Landings/year** (lbs)
Rhode Island	28,868	25,999	9,508	8,365
Massachusetts	27,635	31,305	7,675	24,392
Others	5,360	3,843	--	--

Table 7c. Average annual landings in the Falmouth ECA by state.

State	*Mean* Value/year (2023$)	*Mean* Landings/year (lbs)	*Standard Deviation* Value/year (2023$)	*Standard Deviation* Landings/year (lbs)
Rhode Island	20,317	14,235	11,985	7,664
Massachusetts	15,633	10,276	4,525	9,224
Others	6,258	3,565	--	--

Landed value and trips by month

Table 8 and Figures 2 and 3 show the average monthly landings and values from the two areas. Table 9 reports the average monthly number of fishing trips that intersect each area. Note that the trip numbers in Table 9 are for the 10 km wide ECRAs, whereas the landed value shown in Table 8 and Figures 3 are for cable routes are for the 180 m wide ECAs only.

Table 8. Average monthly value of landings, 2008-2021 (2023$).

Month	SouthCoast Wind WLA	Brayton Point ECA	Falmouth ECA
Jan	30,465	2,397	402
Feb	26,673	1,420	221
Mar	26,361	1,350	241
Apr	23,286	2,292	462
May	38,561	5,285	6,929
Jun	68,891	11,041	12,168
Jul	61,918	13,092	10,228
Aug	80,364	10,241	5,244
Sep	90,409	6,150	2,569
Oct	47,370	2,979	1,836
Nov	33,103	2,598	1,292
Dec	43,460	3,020	614

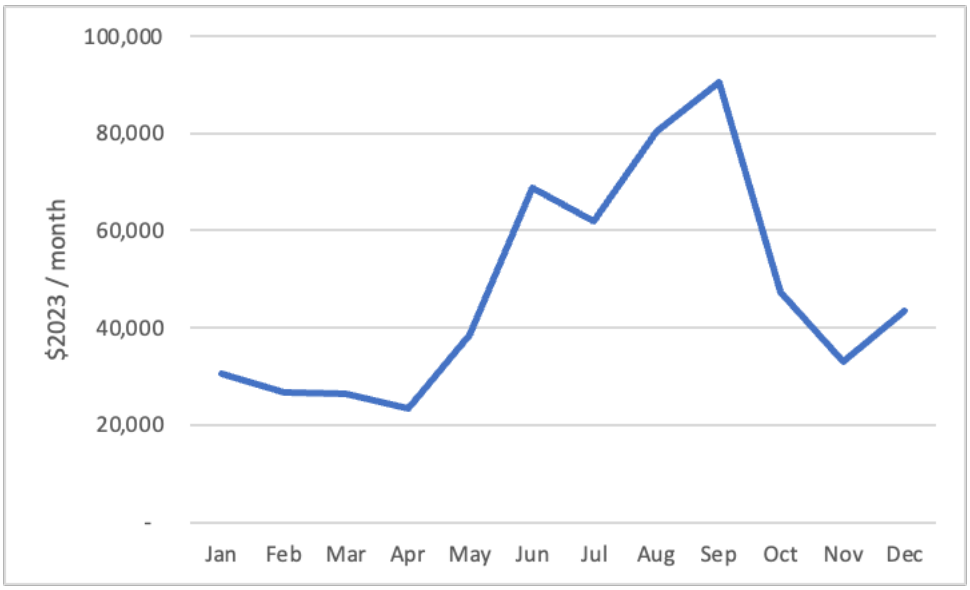

Figure 2. Average monthly value of landings, SouthCoast Wind WLA, 2008-2021.

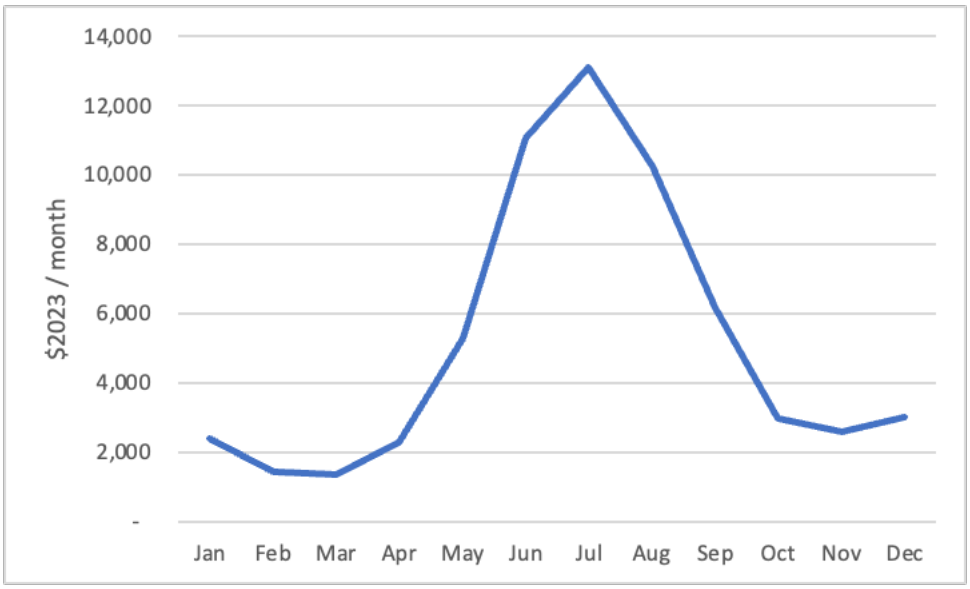

Figure 3a. Average monthly value of landings, Brayton Point ECA, 2008-2021.

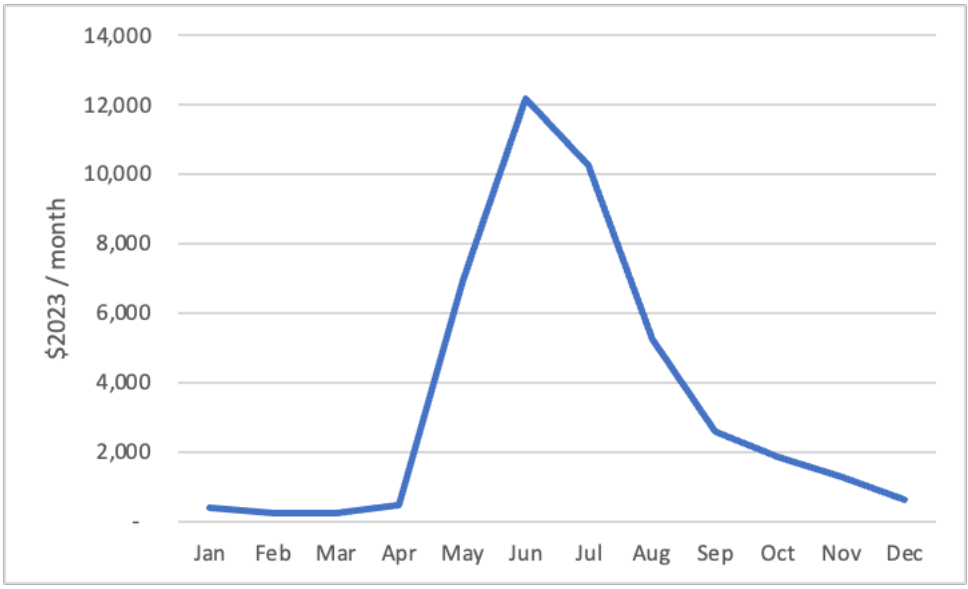

Figure 3b. Average monthly value of landings, Falmouth ECA, 2008-2021.

Table 9. Average monthly number of fishing trips, 2008-2021.

Month	SouthCoast Wind WLA	Brayton Point ECRA	Falmouth ECRA
Jan	406	570	179
Feb	419	285	144
Mar	511	321	167
Apr	412	647	205
May	437	3,007	1,201
Jun	771	3,641	1,623
Jul	892	3,990	1,983
Aug	654	3,404	1,491
Sep	468	2,874	841
Oct	286	2,347	564
Nov	310	2,094	392
Dec	419	1,141	234

Inter-annual price adjustments

We use the Bureau of Labor Statistics' Producer Price Index (PPI) for "unprocessed and prepared seafood"[1] to convert ex-vessel value of fish landings, because this index is specifically for the fishery sector. PPI is a family of indexes that measures the average change over time in selling prices received by domestic producers of goods and services; they measure price change from the perspective of the seller. In contrast, the Bureau of Economic Analysis' general Gross Domestic Product (GDP) deflator[2]

[1] https://www.bls.gov/ppi/#data

[2] https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey

measures changes in the prices of goods and services produced in the United States, including those exported to other countries, and captures price changes across all economic sectors. Table 10 shows both indexes from 2000 to 2021.

Note that the variation in the sector (i.e., fishery) specific price index is considerably larger than that of the GDP deflator. PPI decreases have been observed in several years since 2000. The GDP deflator exhibits a steady trend. We recognize that many seafood prices rose sharply in 2021, as reflected by the sharp increase in fish PPI for that year. We consider it unlikely that this will significantly alter the long-term trend, and maintain that the historical average is the best predictor of future values.

We report all values in 2023$ for consistency. These values can be easily adjusted to any other-year dollars by applying the appropriate index adjustment. Landed value may be adjusted using the PPI index. For impact values, including upstream and downstream effects (see below), it is more appropriate to use the GDP deflator to adjust, because the multipliers capture economy-wide impacts.

Table 10. Price indexes.

Year	GDP implicit price deflator	Percent change	PPI fish	Percent change
2000	78.0		198.1	
2001	79.8	2.25%	190.8	-3.69%
2002	81.0	1.56%	191.2	0.21%
2003	82.6	1.97%	195.3	2.14%
2004	84.8	2.68%	206.3	5.63%
2005	87.5	3.14%	222.6	7.90%
2006	90.2	3.09%	237.4	6.65%
2007	92.6	2.70%	242.8	2.27%
2008	94.4	1.92%	255.4	5.19%
2009	95.0	0.64%	250.9	-1.76%
2010	96.2	1.20%	272.4	8.57%
2011	98.2	2.08%	287.6	5.58%
2012	100.0	1.87%	287.6	-0.02%
2013	101.8	1.75%	299.4	4.12%
2014	103.7	1.87%	322.4	7.68%
2015	104.7	1.00%	322.0	-0.13%
2016	105.7	1.00%	327.6	1.74%
2017	107.7	1.90%	337.9	3.15%
2018	110.3	2.39%	344.5	1.96%
2019	112.3	1.79%	349.9	1.55%
2020	113.6	1.21%	350.8	0.27%
2021	118.8	4.49%	413.0	17.74%
2022	127.1	7.04%	440.7	6.71%
2023	130.9	3.00%	431.1	-2.19%
Annual average		2.28%		3.53%

Adjustment of lobster and Jonah crab data

As noted above, lobster vessels that carry only lobster permits are not subject to a Vessel Trip Report (VTR) requirement. Trips without VTR are not reflected in the numbers shown in Tables 2 through 9 (cf. King 2019). To account for potentially unreported lobster and Jonah crab landings, and for dockside sales (see below), we make adjustments to the landed value data as shown in Table 11. Data in the first three rows are based on VTR data, and are taken from Table 2 and Tables A1 through A3 in the Appendix. An earlier study by Industrial Economics (2015) indicates that active lobster vessels not subject to trip report requirements in Lobster Management Area 2 may account for as much as 57% of the total lobster fishing activity in that area. (Lobster Management Area 2[3] encompasses the waters south of Rhode Island and Cape Cod to a distance of about 40 nm, and overlaps with the SouthCoast Wind WLA.) We assume conservatively that landings from 60% of the lobster vessels in the SouthCoast Wind WLA and ECRAs/ECAs could therefore be unreported, and that the VTR data represent 40% of the true lobster and Jonah crab revenues. We use this as an adjustment factor, and estimate the adjusted lobster and Jonah crab revenues at 2.5 times of those in the VTR data.

Some fraction of lobster and Jonah crab landings are sold directly from boats at dockside, at a price above that reported in the dealer information on which the NOAA values above are based. Neither the fraction of landings sold in this way nor the price premium is known exactly. Based on information provided by a group of Rhode Island fishermen (pers. comm., 24 Nov. 2020), we estimate that a 15% premium on the landed value derived from NOAA data (Table 11) adequately captures this dockside sales effect for Rhode Island landings. Dockside sales are not a common practice in Massachusetts (Mass. DMF pers. comm. May 2021), so we do not apply this multiplier to Massachusetts landings.

The combined adjustment for VTR data and dockside sales is shown in rows 5 and 6 in Table 11. The net increase is shown in row 7, and the adjusted total annual landed values are shown in row 8. This adjustment results in a 37 to 38% increase in the estimated total annual landed value for the WLA and the Brayton Point ECA, and 2 to 3% increase for the Falmouth ECA.

Table 11. Adjustment of landed value for landings not captured in VTR data and for RI dockside sales.

Value (2023$)	**WLA**	**Brayton Point ECA**	**Falmouth ECA**
Avg. VTR total $/year (Table 2)	570,861	61,863	42,207
Avg. VTR lobster $/year (Tables A1-A3)	36,610	12,770	354
Avg. VTR Jonah crab $/year (Tables A1-A3)	95,258	941	255
% of total captured by VTR	40%	40%	40%
Adjusted lobster $/year (incl. RI dockside sales)	96,721	34,160	949
Adjusted Jonah crab $/year (incl. RI dockside sales)	251,661	2,518	684
Net increase over VTR $/year (row 5+6-2-3)	216,514	22,967	1,023
Adjusted total $/year	787,376	84,830	43,231
Adjusted increase over VTR total value	37.9%	37.1%	2.4%

[3] http://fisheries.noaa.gov/resource/map/lobster-management-areas

With all adjustments, we estimate the average annual landed value in Massachusetts from the SouthCoast WLA to be about $288,000 (2023$), about $37,000 from the Brayton Point ECA, and about $16,000 from the Falmouth ECA.

Estimated indirect and induced economic impacts

Economic impact multipliers reflect the linkages between economic activity in different sectors of the economy. For example, when landings increase in the commercial fishing sector, there is an associated increase in the purchases of ice and other supplies in the region, and an increase in onshore transportation and processing of seafood. The resulting increases in economic activity in the commercial fishing supply and transportation and processing sectors are indirect effects of increased landings. In addition, because fishermen and workers in the supply, transportation, and processing industries earn greater income as a result of this increased activity, and spend some of that extra income on local goods and services, there is also an induced effect of greater spending in other sectors. The multipliers capture the combined effect of indirect and induced spending that results from higher commercial landings.

We have developed regional economic models for Massachusetts using the IMPLAN model software (IMPLAN 2004) and data for 2021. IMPLAN software and data are commercial products widely used by researchers and management agencies to perform economic impact analyses for a user specified study region (IMPLAN 2004; Steinback and Thunberg 2006; Hoagland *et al.* 2015; UMass Dartmouth 2018; Cape Cod Commission 2020). IMPLAN was initially developed for the US Forest Service. It is a modular input-output model that works down to the individual postal zip code level for most zip codes in the United States. The IMPLAN database consists of two major parts: (1) a national-level technology matrix and (2) estimates of sectoral activity for final demand, final payments, gross output, and employment for each zip code. This 546-sector gross-domestic-product-based model divides the US economy into sectors based on North American Industry Classification System codes[4], and is based on the US Commerce Department's national input-output studies, the national income data, and related Federal economic surveys. In IMPLAN, national average technology coefficients are used to develop the direct coefficients for sectors at local levels. As noted, we use 2021 IMPLAN data for Massachusetts for our analysis. Based on the 2021 model and data, the upstream output multiplier for the commercial fishing industry in Massachusetts is 1.373.

We have also taken into account downstream economic activity, such as seafood processing, that may take place at Massachusetts businesses as a result of commercial fisheries landings. This linkage is less direct than the upstream activities, because not all seafood landed in a state is processed in the state, and seafood processors may import more seafood from elsewhere for processing when in-state landings fall short. Nonetheless, we add a downstream adjustment of 0.635, using 2021 IMPLAN data, to the multiplier for Massachusetts landings, bringing the combined multiplier to 2.008, to account for both upstream effects and downstream effects to seafood processors. We apply the combined upstream and downstream multiplier to all landings except lobster and Jonah crab landed in Rhode Island, which are adjusted for dockside sales and receive only the upstream multiplier. The corresponding combined

[4] https://www.census.gov/naics/

multiplier for Rhode Island landings is 1.822; for landings in other states, we use the average of the Massachusetts and Rhode Island multipliers.

The economic impact multiplier captures the linkages between the fishing industry sector and other sectors in the Massachusetts economy. While we use a single output multiplier for the entire commercial fishing sector in a given state, we recognize that the multiplier may in fact vary across specific fisheries, species, and gear due to differences in factor inputs for fishing operations and post processing of fish landed. We use a single multiplier for the entire commercial fishing sector, reflecting an average across all gear types and species. Economy-wide inflation affects all sectors in the economy but usually does not alter the general structure of the economy. Therefore, although the baseline economic values increase with rising prices, the multiplier does not. We also recognize that other types of multipliers, such as those focusing on employment effects, have been used in other analyses. We maintain that the output multipliers we use provide a robust and accurate measure of indirect and inducted effects averaged across the fishing sectors.

Table 12. Estimated annual economic impact in Massachusetts (all values in 2023$)

		Average value of landings/year			**Total impact/year**
Area	**State**	VTR data only (Table 11, row 1)	with lobster & Jonah crab adjustment	with dockside sales adjustment (15% premium on RI lobster & JC landings)	"dockside sales" column multiplied by upstream & downstream multipliers, except RI lobster & JC
WLA	total	570,861	768,663	787,376	1,408,023
Brayton Point ECA	total	61,863	82,430	84,830	149,528
Falmouth ECA	total	42,207	43,121	43,231	81,757
WLA	MA	214,255	288,494	288,494	579,295
Brayton Point ECA	MA	27,635	36,823	36,823	73,941
Falmouth ECA	MA	15,633	15,971	15,971	32,070

Using these multipliers, and including the lobster and Jonah crab adjustment described in the previous section, we estimate the average annual total economic impact from commercial fishing activity in the SouthCoast WLA to be about $579,000 (2023$) in Massachusetts (Table 12). We also estimate the average annual total economic impact from commercial fishing activity in the Brayton Point ECA to be about $74,000 in Massachusetts, and from the Falmouth ECA about $32,000. Including landings in other states, the total average annual economic impact from commercial fishing activity in the WLA is $1.41 million and in the ECAs it is $150,000 and $82,000, respectively. These estimates are based on average annual landings value from 2008 to 2021, with lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements.

Using these multipliers, and including the lobster and Jonah crab adjustment described in the previous section, we estimate the average annual total economic impact from commercial fishing activity in the

SouthCoast Wind Project Area (i.e., the WLA, Brayton Point ECA, and Falmouth ECA) to be about $690,000 (2023$) in Massachusetts. This is broken down in Table 12, which shows the estimated value for Massachusetts fishing from the SouthCoast Wind WLA to be about $579,000, from the Brayton Point ECA to be about $74,000, and from the Falmouth ECA to be about $32,000. Including landings in other states, the total average annual economic impact from commercial fishing activity in the WLA is $1.41 million and in the ECAs it is $150,000 and $82,000, respectively. These estimates are based on average annual landings value from 2008 to 2021, with lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements.

Massachusetts-based charter fishing

To obtain data on for-hire charter fishing activity in and around the SouthCoast Wind Lease Area and Brayton Point Export Cable Corridor, we conducted an online survey of Rhode Island- and Massachusetts-based charter vessel operators. The survey asked operators to identify their fishing locations on a chart, and report for each location

- the total number of annual for-hire fishing trips that vessel took in each of the years 2017-2021,
- the average number of passengers onboard for-hire trips in each of the years 2017-2021, and
- the average amount of time spent targeting highly migratory species (HMS) relative to bottom fishing or trolling for other species during for-hire trips.

The survey was first distributed on April 18, 2022 through email lists maintained by Rhode Island Department of Environmental Management (RIDEM), Rhode Island Coastal Resources Management Council (RICRMC) and Massachusetts Division of Marine Fisheries (MADMF), and also via email by for-hire fishing industry representatives, including the Rhode Island Party and Charter Boat Association. The survey was active from April 18, 2022 until May 14, 2022. The survey received 91 total responses from for-hire charter owners and/or operators. Sixty-six of these respondents (72%) reported that they fish in the area depicted in Figure 4. These 66 respondents reported 62 unique vessels, and reported effort data for 29 of those vessels across the five-year period of 2017-2021 (black dots in Figure 4).

Table 13. For-hire charter fishing survey summary statistics.

Description	Number
Fished in the area and responded to the survey	70
Provided vessel names	66
of which based in Massachusetts	37.5
Provided annual vessel trip numbers	35
Observations with vessel trips reported (2017-2021)	229
Total trips per year	1 – 235
Average total trips per year	46.74
Passengers per vessel trip	2 – 25
Average passengers per vessel trip	5.24
Identified fishing locations on maps	33
of which based in Massachusetts	18.5

To capture for-hire effort focused specifically within Narragansett Bay, a second survey was conducted in October 2022 distributed among 17 for-hire charter captains known to fish primarily in Narragansett Bay as identified by members of the for-hire industry. This survey received a total of 4 responses reporting activity for 4 unique vessels not captured in the first survey wave (red dots in Figure 4). The second survey design was identical to that of the first wave with the addition of charts for Narragansett Bay. Combined results for the two surveys are shown in Table 13.

Similar studies published in the peer-reviewed academic literature using paper mail, email, or mixed mode survey distributions typically have survey response rates around 20-30% (e.g., Dalton *et al*. 2020, Carr-Harris and Steinback 2020). Based on discussions with for-hire industry representatives, approximately 100 vessels actively engage in for-hire fishing activity in the waters depicted in Figure 4, suggesting the fishing reported by survey respondents accounts for about 33% of the total. The combined response rate for the primary population of interest is within an appropriate range to consider our survey distribution a success. An important note to also consider is that there are vessels in our sample that require the submission of federal VTRs. A common trend identified in the data was that some respondents did not provide data for their vessels that require VTRs. This is not a problem for this analysis as this effort data is already accounted for by the NOAA databases and summary reports used as a baseline for our subsequent analyses.

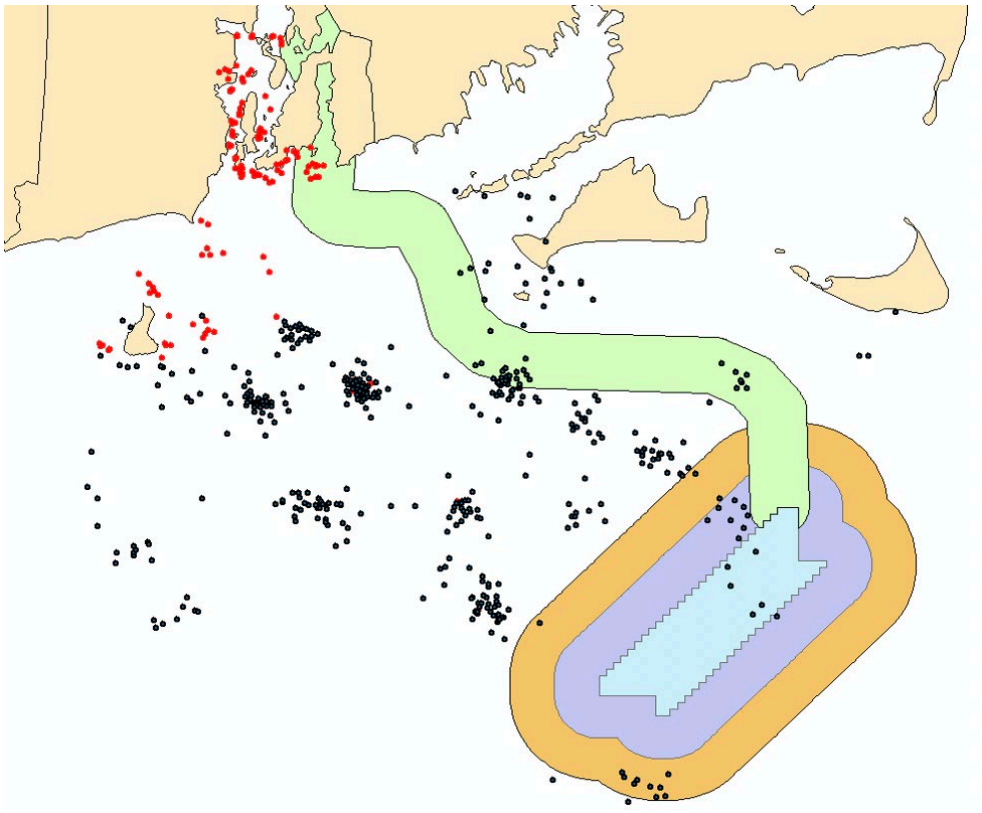

Figure 4. Charter fishing locations, 2017-2021, identified in survey responses. WLA is shown in blue with 7.5 and 15 km buffers, and Brayton Point ECRA in green. Black dots: first survey; red dots: second survey (see text above).

The number of anglers per year is estimated by multiplying the vessel trip number in a year and the average number of anglers per trip in that year for each vessel, and the results are then summed across vessels by area. Tables 14 and 15 show the annual vessel trips and angler counts in the survey responses for charter vessels based in Massachusetts.

Table 14. Number of Massachusetts-based vessel trips and anglers by year, SouthCoast Wind WLA.

Year	WLA		WLA + 15 km buffer	
	Vessel Trips	Anglers	Vessel Trips	Anglers
2017	0	0	10	35
2018	2	10	10	34
2019	6.5	28.5	10.5	40.5
2020	2	6	15	75
2021	5	15	45	181
Average	**3.1**	**11.9**	**18.1**	**73.1**

Table 15. Number of Massachusetts-based vessel trips and anglers by year, Brayton Point ECRA.

Year	Vessel Trips	Anglers
2017	24	58
2018	17.5	63.5
2019	25	80
2020	27	132
2021	60	262
Average	***30.7***	***119.1***

We use the revenue per angler estimates from NOAA shown in the Table 16 below for our revenue calculation. We recognize that the per angler revenue from charter boats may be an order of magnitude larger than that from party boats. The data in Table 16 represent an average across both sectors, influenced by the fact that many more people participate in party boat fishing than in charter fishing. There is no per-angler revenue data specific to the SouthCoast Wind WLA available from NOAA as of the writing of this report. We therefore rely on estimates from nearby lease areas (Bay State Wind and Vineyard Wind 1) as a proxy of what we expect SouthCoast Wind WLA revenues to be.

The annual revenue for each area is estimated by multiplying the number of anglers (Tables 14 and 15) by the average revenue per angler ($116.23). The result is then adjusted using a scale factor. For a low-end estimate, the scale factor is the ratio of the number of Massachusetts vessels responding to the survey (37.5) to the number of these vessels for which specific fishing locations were provided (18.5). For a high-end estimate, we increase the scale factor to reflect the estimated total of 100 vessels operating in the survey area (see above), versus the 66 for which survey responses were received. Finally, an economic impact multiplier is used to reflect the overall economic impacts associated with the charter fishing direct revenue. As with commercial fishing, we recognize that this multiplier will in fact vary with different types of charter fishing (e.g. sport fishing charters versus party boats). The

multiplier we use is calculated using data in the NOAA report by Lovell *et al*. (2020), and reflects an average across different types of charter fishing. The results are shown in Table 17.

Table 16. Estimated SouthCoast Wind area for-hire vessel revenue. Sources: NMFS 2023a and 2023b

Year	Revenue per angler (2023$)
2009	111.50
2010	92.92
2011	159.29
2015	134.57
2016	106.19
2018	92.92
Average	**116.23**

Table 17. Annual revenue and economic impact from MA-based charter fishing in SouthCoast Wind areas.

Area	Annual anglers	Revenue per angler (2023$)	Scale factor	Annual revenue (2023$)	Impact multiplier	Annual impact (2023$)
WLA	11.9	116.23	2.03	2,804	1.627	4,562
			3.07	4,248	1.627	6,911
WLA + 15km	73.1	116.23	2.03	17,222	1.627	28,021
			3.07	26,095	1.627	42,456
Brayton Point	119.1	116.23	2.03	28,060	1.627	45,654
ECRA			3.07	42,515	1.627	69,172

Conclusions

Based on NOAA data from 2008 to 2021, and adjusting for underreporting of lobster and Jonah crab landings in the VTR data, and for some dockside sales of lobster and Jonah crab, we estimate the average annual value of commercial landings from the SouthCoast Wind Lease Area to be about $787,000 (2023$). Of this, about $288,000 is landed in Massachusetts. Including indirect and induced effects, these landings generate average annual economic impacts of $579,000 in Massachusetts.

We estimate the average annual value of commercial landings from the Brayton Point Export Cable Area to be about $85,000 (2023$). Of this, about $37,000 is landed in Massachusetts. These landings generate estimated total annual economic impacts of $74,000 in Massachusetts.

We estimate the average annual value of commercial landings from the Falmouth Export Cable Area to be about $43,000 (2023$). Of this, about $16,000 is landed in Massachusetts. These landings generate estimated total annual economic impacts of $32,000 in Massachusetts.

Given the above, we estimate the combined average annual value of commercial landings from the SouthCoast Wind WLA, Brayton Point ECA, and Falmouth ECA attributed to Massachusetts to be $690,000.

Massachusetts-based charter fishing revenue from the SouthCoast Wind development areas, including a 15 km buffer around the WLA and the Brayton Point ECRA, is estimated to be between $45,000 and $69,000 (2023$). Including multipliers, this generates total annual economic impacts of $74,000 to $112,000 in Massachusetts.

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Appendix

Table A1. Average annual landings by species from the SouthCoast WLA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR.

Species	*Mean*		*Standard Deviation*	
	Value/year (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	10,641	10,424	10,936	12,336
AM. PLAICE FLOUNDER	47	25	43	24
AMERICAN EEL	4	4	5	5
AMERICAN LOBSTER	36,610	6,049	18,527	3,766
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	15	16	38	42
ATLANTIC HALIBUT	29	3	58	7
ATLANTIC HERRING	8,991	79,572	28,397	271,050
ATLANTIC MACKEREL	893	1,575	1,316	2,110
BLACK SEA BASS	3,795	981	4,689	1,199
BLUE CRAB	5	2	20	9
BLUEFIN TUNA	-	-	-	-
BLUEFISH	1,252	1,315	531	657
BLUELINE TILEFISH	33	11	72	23
BONITO	9	5	29	16
BUTTERFISH	5,941	7,999	4,044	5,782
CANCER CRAB	-	-	-	-
CHANNELED WHELK	813	97	2,343	286
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	480	181	438	168
CONCHS	13	8	47	31
CONGER EEL	98	121	82	83
CUNNER	-	-	-	-
CUSK	0	0	1	1
DOGFISH SMOOTH	374	426	375	485
DOGFISH SPINY	1,886	6,537	1,486	4,960
DOLPHINFISH	1	0	5	1
FOURSPOT FLOUNDER	30	74	67	171
GOLDEN TILEFISH	40,936	8,494	42,300	8,724
HADDOCK	417	433	612	987
HORSESHOE CRAB	1	1	2	2
ILLEX SQUID	2,037	3,401	3,000	5,525
JOHN DORY	81	58	80	56
JONAH CRAB	95,258	93,024	54,977	43,231
KING MACKEREL	-	-	-	-
KING WHITING	1,280	1,149	4,329	3,850
KNOBBED WHELK	6	1	14	2

LIGHTNING WHELK	-	-	-	-
LITTLE TUNA	0	0	1	0
LONGFIN SQUID	89,715	57,894	55,760	35,371
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	46,113	24,712	23,480	8,967
MULLETS	0	0	0	0
NK CRAB	0	0	2	2
NK EEL	22	18	43	35
NK SEATROUT	1	1	2	3
NK TILEFISH	0	0	1	0
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	666	757	2,042	2,365
OTHER FISH	0	0	1	1
POLLOCK	44	35	42	36
RED CRAB	-	-	-	-
RED HAKE	2,437	6,268	2,554	6,706
REDFISH	24	31	31	45
ROCK CRAB	3,508	5,173	7,716	11,731
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	2	3	4	5
SCUP	50,583	56,725	51,310	57,549
SEA RAVEN	-	-	-	-
SEA ROBINS	2	10	3	11
SEA SCALLOP	30,639	2,749	39,611	4,102
SILVER HAKE	46,737	57,789	35,033	38,177
SKATES	25,129	38,782	12,212	22,278
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	14	5	47	16
SQUETEAGUE WEAKFISH	48	19	45	17
STRIPED BASS	31	7	41	9
SUMMER FLOUNDER	58,874	17,641	57,881	18,957
SURF CLAM	788	685	2,950	2,561
SWORDFISH	-	-	-	-
TAUTOG	8	2	12	3
THRESHER SHARK	-	-	-	-
TRIGGERFISH	1	1	3	2
WHITE HAKE	308	159	841	401
WINTER FLOUNDER	1,317	455	1,474	568
WITCH FLOUNDER	56	23	54	23
WOLFFISHES	0	0	1	1
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	1,814	890	2,517	1,282

Table A2. Average annual landings by species from the SouthCoast Wind Brayton Point ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECA.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	2,303	1,428	6,986	4,210
ALL_OTHERS	274,877	310,907	168,718	229,521
AM. PLAICE FLOUNDER	268	136	246	123
AMERICAN EEL	16	5	38	9
AMERICAN LOBSTER	709,460	108,796	169,582	25,185
AMERICAN SHAD	2	2	5	4
ATLANTIC CROAKER	18	32	41	84
ATLANTIC HALIBUT	38	4	30	3
ATLANTIC HERRING	138,611	952,673	206,077	1,417,581
ATLANTIC MACKEREL	12,614	39,171	16,993	80,425
BLACK SEA BASS	109,272	23,662	35,050	10,251
BLUE CRAB	1,391	1,407	4,937	5,040
BLUEFIN TUNA	5	1	17	3
BLUEFISH	30,407	41,417	17,979	27,093
BLUELINE TILEFISH	15	5	40	13
BONITO	8,242	2,681	5,958	2,277
BUTTERFISH	28,548	33,437	15,989	17,949
CANCER CRAB	-	57	-	130
CHANNELED WHELK	105,555	10,840	68,262	7,459
CHUB MACKEREL	11	12	43	45
COBIA	1	0	3	1
COD	6,972	2,295	4,622	1,450
CONCHS	13,436	2,679	35,331	6,551
CONGER EEL	283	391	281	434
CUNNER	266	110	746	260
CUSK	4	3	5	4
DOGFISH SMOOTH	3,330	4,777	2,694	4,493
DOGFISH SPINY	20,572	68,345	28,651	91,918
DOLPHINFISH	4	1	17	4
FOURSPOT FLOUNDER	22	42	55	123
GOLDEN TILEFISH	5,048	1,070	5,599	1,161
HADDOCK	1,808	1,223	1,414	1,036
HORSESHOE CRAB	217	197	197	224
ILLEX SQUID	1,867	3,599	2,881	6,328
JOHN DORY	89	63	122	85
JONAH CRAB	52,297	55,260	30,697	31,883
KING MACKEREL	0	0	1	0
KING WHITING	2,152	1,946	4,176	3,954
KNOBBED WHELK	1,765	446	2,928	708

LIGHTNING WHELK	153	49	463	137
LITTLE TUNA	1,962	3,257	2,864	5,089
LONGFIN SQUID	877,015	573,828	625,512	403,553
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	119	315	221	642
MONKFISH	62,175	29,835	33,865	12,183
MULLETS	-	-	-	-
NK CRAB	82	78	129	89
NK EEL	21	18	27	20
NK SEATROUT	137	300	148	350
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	0	0	0	0
NORTHERN SEA ROBIN	0	2	2	8
OCEAN POUT	5	8	18	28
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,740	1,757	4,157	3,908
OTHER FISH	49	50	181	179
POLLOCK	289	236	233	209
RED CRAB	-	-	-	-
RED HAKE	6,178	16,464	1,668	4,760
REDFISH	151	196	139	169
ROCK CRAB	6,522	8,240	7,927	9,230
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	53	79	131	205
SCUP	142,379	168,197	63,861	79,535
SEA RAVEN	61	40	75	46
SEA ROBINS	178	496	202	356
SEA SCALLOP	155,767	13,132	141,862	13,922
SILVER HAKE	102,572	139,468	51,088	77,190
SKATES	139,206	665,273	75,862	449,248
SPANISH MACKEREL	6	4	15	11
SPOT	6	11	15	28
SPOTTED HAKE	-	8	-	29
SPOTTED WEAKFISH	16	5	34	11
SQUETEAGUE WEAKFISH	1,468	592	1,213	465
STRIPED BASS	9,125	1,772	8,622	1,726
SUMMER FLOUNDER	354,034	85,559	117,270	37,004
SURF CLAM	3,836	3,561	12,526	11,688
SWORDFISH	-	-	-	-
TAUTOG	7,409	1,998	3,390	1,034
THRESHER SHARK	60	53	226	197
TRIGGERFISH	145	90	96	56
WHITE HAKE	1,310	747	3,154	1,664
WINTER FLOUNDER	18,568	6,471	20,051	7,502
WITCH FLOUNDER	353	142	344	140
WOLFFISHES	3	3	8	6
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	11,896	5,598	16,996	8,847

Table A3. Average annual landings by species from the SouthCoast Wind Falmouth ECRA, 2008-2021.

Note: lobster and Jonah crab data in this table have not been adjusted for landings not reported via VTR. (These data are for the 10km wide ECRA, not the 180 m wide ECA.)

	Mean		***Standard Deviation***	
Species	**Value/year** (2023 $)	**Landings/year** (lbs)	**Value/year** (2023 $)	**Landings/year** (lbs)
ALBACORE TUNA	-	-	-	-
ALL_OTHERS	82,301	84,424	67,280	77,303
AM. PLAICE FLOUNDER	633	320	492	264
AMERICAN EEL	72	6	164	17
AMERICAN LOBSTER	19,669	3,209	7,076	1,417
AMERICAN SHAD	-	-	-	-
ATLANTIC CROAKER	1	1	5	4
ATLANTIC HALIBUT	57	6	34	4
ATLANTIC HERRING	18,539	164,170	50,435	521,579
ATLANTIC MACKEREL	6,102	9,917	11,205	15,124
BLACK SEA BASS	38,516	9,889	26,687	7,528
BLUE CRAB	-	-	-	-
BLUEFIN TUNA	-	-	-	-
BLUEFISH	5,920	6,171	2,857	3,432
BLUELINE TILEFISH	19	6	58	18
BONITO	25	9	77	24
BUTTERFISH	11,119	14,159	4,839	5,669
CANCER CRAB	-	-	-	-
CHANNELED WHELK	221,713	21,398	95,053	7,318
CHUB MACKEREL	-	-	-	-
COBIA	-	-	-	-
COD	4,426	1,697	4,555	1,696
CONCHS	23,515	4,630	33,533	6,114
CONGER EEL	32	40	26	33
CUNNER	-	-	-	-
CUSK	5	5	5	4
DOGFISH SMOOTH	1,733	1,783	1,056	1,047
DOGFISH SPINY	1,835	6,290	3,801	11,969
DOLPHINFISH	-	-	-	-
FOURSPOT FLOUNDER	6	5	21	17
GOLDEN TILEFISH	5,101	1,047	5,911	1,234
HADDOCK	3,288	2,126	1,459	1,166
HORSESHOE CRAB	1,717	1,234	1,558	967
ILLEX SQUID	3,594	6,410	5,156	8,560
JOHN DORY	81	59	152	106
JONAH CRAB	14,167	13,750	8,718	7,785
KING MACKEREL	-	-	-	-
KING WHITING	2,058	1,936	4,966	4,625
KNOBBED WHELK	15,307	3,348	11,216	2,242

LIGHTNING WHELK	1,051	408	2,450	886
LITTLE TUNA	-	-	-	-
LONGFIN SQUID	1,497,032	944,608	981,874	617,252
MAKO SHORTFIN SHARK	-	-	-	-
MENHADEN	-	-	-	-
MONKFISH	10,452	4,821	5,972	2,946
MULLETS	-	-	-	-
NK CRAB	2	2	8	9
NK EEL	2	2	3	3
NK SEATROUT	0	0	1	1
NK TILEFISH	-	-	-	-
NORTHERN KINGFISH	-	-	-	-
NORTHERN SEA ROBIN	-	-	-	-
OCEAN POUT	-	-	-	-
OCEAN QUAHOG	-	-	-	-
OFFSHORE HAKE	1,553	1,551	3,810	3,487
OTHER FISH	26	32	98	119
POLLOCK	1,106	846	1,039	816
RED CRAB	-	-	-	-
RED HAKE	3,252	8,490	1,771	5,528
REDFISH	427	561	310	353
ROCK CRAB	364	478	568	755
SAND TILEFISH	-	-	-	-
SAND-DAB FLOUNDER	5	5	13	14
SCUP	61,232	73,793	40,608	48,513
SEA RAVEN	-	-	-	-
SEA ROBINS	17	60	20	69
SEA SCALLOP	36,238	2,935	22,543	2,109
SILVER HAKE	61,153	83,124	34,548	49,724
SKATES	13,788	28,616	22,543	30,876
SPANISH MACKEREL	-	-	-	-
SPOT	-	-	-	-
SPOTTED HAKE	-	-	-	-
SPOTTED WEAKFISH	1	0	3	1
SQUETEAGUE WEAKFISH	34	14	23	10
STRIPED BASS	3,378	666	3,063	530
SUMMER FLOUNDER	151,745	38,662	127,402	36,708
SURF CLAM	7,473	6,691	18,915	17,062
SWORDFISH	-	-	-	-
TAUTOG	858	196	567	109
THRESHER SHARK	-	-	-	-
TRIGGERFISH	53	31	79	49
WHITE HAKE	1,776	953	3,629	1,923
WINTER FLOUNDER	5,977	2,085	5,507	2,080
WITCH FLOUNDER	695	285	611	283
WOLFFISHES	5	4	13	11
YELLOWFIN TUNA	-	-	-	-
YELLOWTAIL FLOUNDER	3,606	1,800	4,890	2,445

NEW BEDFORD
PORT AUTHORITY

123 MacArthur Drive
New Bedford, MA 02740
TEL (508) 961-3000
WWW.PORTOFNEWBEDFORD.ORG

October 30, 2023

I am writing on behalf of the New Bedford Port Authority to offer some preliminary comments regarding the SouthCoast Wind Fisheries Baseline Assessment (the "Assessment"). As the organization that represents the most valuable fishing port in the nation and the hub for countless onshore businesses and families who rely on the industry, we believe that it is vital that the actual impact of the development of offshore wind on the economy and people of Massachusetts be established using the best available data, methods and information.

As is the case with all mitigation and methods proposed by offshore wind developers, the numbers and methodology offered in the summary drastically underestimate the likely significant impact of these developments. The data, assumptions and multipliers all favor the best-case scenario put forward by BOEM and the developers. There is no allowance for the unknown as to the impact on commercial fishing and shoreside businesses.

We would also note that the data sets used to determine the amounts included in the analysis are incomplete and insufficient to address the full economic impact of the proposed WEA on commercial fishing and the associated communities. NOAA itself has made it clear when providing their data to developers that the data is incomplete and likely does not capture the full extent of the impact, so much so that in the document Information Needs to Assess Fisheries Socioeconomic Impacts from Offshore Wind Energy Projects in the U.S. Greater Atlantic, NOAA, GARFO, August 2021, there is an entire section entitled "Region Fishery Operational Factors and Fishery Dependent Data Limitations."

In submission after submission, the NEFSC/NOAA and GARFO have stated that the use of VTR and FSD provides only a starting point in determining the true exposure to commercial fishing from offshore wind:

- VTR data do not explain the dynamic factors that influence landings and revenue. It would be incorrect to assume from the data that low catch means a low abundance of species.
- Redistribution of effort into other locations may result in other effects, but alternative fishing choices are difficult to predict.
- The primary focus here is on landings and ex-vessel revenues, the information provided should be considered a partial analysis; **optimally, broader societal impacts would need to be determined.**

Permit, Port and Fishery Revenue Exposure Analysis Updated NY Bight Wind Areas, Intergovernmental Renewable Energy Task Force Meeting New York, New York November 28, 2018. (Emphasis Added)

The fisheries data used by the developers was never meant to be used as a comprehensive data set to determine the full economic impact of offshore wind in commercial fishing. "Existing federal fishery monitoring efforts were designed to manage fisheries; they were not designed to manage offshore wind or to manage fisheries interactions." Evaluating Potential Impacts of Offshore Wind Development on Fishing Operations by Comparing Fine-and Coarse-Scale Fishery-Dependent Data*, Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, Allen-Jacobson, et. al. 2023. The Allen-Jacobsen paper goes on to offer suggestions as to using fine-scale data to truly address fisheries impacts. However, even the use of fine-scale data to address limitations on catch data and using that data in an exposure analysis still leaves an incomplete picture of economic impact:

> "Exposure analysis depends on historic fishing and revenue, which creates two limitations. First, existing fisheries data might or might not accurately depict spatial characterizations of future fishing (Battista et al. 2013). Importantly, accuracy increases with data availability, and some stakeholders have better records of landings. Second, exposure analysis cannot quantify and explicitly is not quantifying other components of economic impact. Our analysis aims to quantify only one part of the equation, exposure, which we think is a necessary and practical first step to evaluating potential impacts. Subsequent analyses should estimate other components of this equation to generate a more complete description of impacts." Allen-Jacobsen, p.10

There are multiple reliable studies and reports that conclude that the true multiplier for fisheries landings is far greater than the one used in the Assessment. Such reports consider the true impact of any WEA by considering the expected economic changes by using three metrics: job creation, output, and tax revenue. The Assessment provided barely covers one of these areas. Contrary to the representation in the Assessment, the multiplier used for upstream and downstream impacts is not even close to covering the true impact:

> "Changes to the economy are often measured at three levels of impact: direct, indirect, and induced. Here, total direct impacts often pertain to sales, income, and employment generated from initial purchases. Indirect impacts capture sales, income, and employment of industries that supply to the industry or project of focus. Induced impacts are sales, income, and employment resulting from expenditures by employees of the direct and indirect sectors of focus. A variety of tools and programs have been developed to estimate total economic impacts, including employment factors, the Regional Input/Output (I/O) Modeling System (RIMS II), the Jobs and Economic Development Impact (JEDI) model, and Impact Analysis for Planning (IMPLAN17; AECOM 2017). A common element of these tools and models is the use of multipliers that express intersectoral economic relationships and can be used to estimate total economic impacts resulting from expenditures in a particular sector. Overall, the total economic impacts are only a small component of the entire socioeconomic cost–benefit analysis, yet they are necessary for creating more complex cumulative analyses. Despite the lack of research capturing the full socioeconomic costs and benefits of OWFs, as suggested by the BOEM guidance document (AECOM 2017), there have been multiple

> efforts to estimate the total economic impact of various sectors of commercial and recreational fisheries. Scheld (2018) used the NOAA/NMFS Commercial Fishing and Seafood Industry I/O Model via IMPLAN software to identify the total amount of economic activity derived from total longfin inshore squid landings in the northeastern United States between 2013 and 2017. Scheld (2018) concluded that the examined fishing activity corresponded to an output multiplier of 7.64, meaning that every dollar received from ex vessel landings led to $7.64 in total economic output." Economic Impacts of Offshore Wind Farms on Fishing Industries: Perspectives, Methods, and Knowledge Gaps, Marina Chaji, Samantha Werner, Marine and Coastal Fisheries, Vol. 15, Issue 3, First published: 04 June 2023.

As we have noted in prior comments, there is a joint project between the Commercial Fisheries Research Foundation and the University of Rhode Island that used I/O modeling to estimate annual gross sales and jobs for the Rhode Island fisheries and seafood sector in 2016 (Sproul and Michaud 2018). The study used business listings from the Rhode Island Secretary of State Corporate Database and marketing databases to inform the I/O models. The study found that in 2016, the commercial fishing vessels, charters, processors, professional services, retail dealers, fishing service and supply, tackle shops, and wholesalers generated 3,147 jobs and $538.33 million in gross sales. In addition, there were 4,381 jobs and $419.83 million in output generated when considering spillover effects across the entire Rhode Island economy (Sproul and Michaud 2018). Using these numbers, the multiplier that should be used to assess the true impact of any WEA both upstream and downstream is far greater than the one used in the Assessment.

We strongly recommend that anyone reading the proffered Assessment first read the above-referenced Chaji and Werner report and the Fisheries and Offshore Wind Interactions: Synthesis of Science, NOAA technical memorandum NMFS-NE ; 291. Reading both reports will lead any reader to understand the lack of any truly definitive knowledge regarding the impact of any WEA on commercial fishing and the businesses and communities it supports. The problem is that the presentations prepared for wind developers continue to blatantly misrepresent their conclusions as being conservative and having made all assumptions in favor of the commercial fishing industry. In order for this to be true, the multiplier used and the assumptions made would lead to far higher exposure numbers.

The real issue is that, without actually making all assumptions in favor of commercial fishermen and their families and communities, the proffered numbers could be grossly underestimating the true impact of the WEA. The dangerous game being played is that when it comes time to find out who was right and who was wrong, that is if the Assessment and assumptions therein are too low, by then it will be too late to help the fishermen and the communities, but the turbines will still be spinning.

Very truly yours,

Blair S. Bailey

Blair S. Bailey
General Counsel

From: Beth Casoni <beth.casoni@lobstermen.com>
Sent: Tuesday, October 17, 2023 10:49 AM
To: pfield <pfield@cbi.org>; Emery, Hollie E (EEA) <Hollie.E.Emery@mass.gov>; Callaghan, Todd (EEA) <todd.callaghan@mass.gov>; Engler, Lisa Berry (EEA) <lisa.engler@mass.gov>
Cc: Abby Fullem <afullem@cbi.org>; Arthur Sawyer <sooky55@aol.com>; Bill Lister <billylister1956@gmail.com>; Bill souza <jlobsters@comcast.net>; Bob Nihtila Sr. <diseabreeze@aol.com>; Bob Ward <roalward@comcast.net>; Brendan Adams <FibFab25@yahoo.com>; Dave Magee <capecodlobster@comcast.net>; DAVID CASONI <lobsterteacher@hotmail.com>; Eric Lorentzen <ericreedlorentzen@gmail.com>; Jarrett Drake (MLA VP) <jarrett@drakelobster.com>; Mark Ring <mring4482@gmail.com>; Mike Bartlett <mbart217@aol.com>; Steve Holler <necka30@gmail.com>; Tom Tomkiewicz <fvbridgetminc@aol.com>
Subject: RE: SouthCoast Baseline Assessment

Good morning everyone,

Thank you for the opportunity to comment on the SouthCoast Wind Fisheries Baseline Analysis for Massachusetts. After reviewing this document, I have a couple of questions and concerns.

Unfortunately, the baseline data was collected using Vessel Trip Reporting (VRT) and observer data and both are not required on the lobster, Jonah crab or Channeled Whelk fisheries. As noted on pg.10 "the landings estimated for the Export Cable Route Area." These numbers need to be inclusive of all the fisheries data and not estimated.

1. Has any State data been incorporated from the Massachusetts Division of Marine Fisheries (DMF)?

2. On pg. 12, Table 4. Average annual landings of major species by area, 2008-2021 ; the Channeled Whelk landed seems to be missing data as the Falmouth Export Cable Area (ECA) goes right through Channeled Whelk fishing grounds and there is ZERO lobster landings in the ECA which raises concern about the data being used as there are several lobstermen fishing in and around the Falmouth ECA.

3. Pg. 22 First paragraph, last sentence - ….*with the lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements*. – Can we see what data sets were used for this section if possible?

4. Currently, the federally permitted lobster and Jonah crab fishery are now mandated to have vessel tracking devices installed on their vessels – Is there any data included in this report or have they asked the State for any vessel tracking data sets to show what effort is taking place in ALL of these areas described in the Baseline report?

5. There is a real concern with the fluctuating multiplier that is being used by the developers. The current multiplier that was used for SouthCoast is 2.008 when before the 2.205 multiplier per Woods Hole was used for Avangrid. Can the State ask for consistency on the multipliers so there is no deviation from one project to another?

Thank you for any feed back on these concerns.

Kind regards,

Beth Casoni
Executive Director
Massachusetts Lobstermen's Association
8 Otis Place
Scituate, MA 02066
781.545.6984

231213 responses to comments on MA baseline DRAFT

SouthCoast Wind responses in RED – December 13, 2023

Massachusetts Lobstermen's Association (Beth Casoni)

Thank you for the opportunity to comment on the SouthCoast Wind Fisheries Baseline Analysis for Massachusetts. After reviewing this document, I have a couple of questions and concerns.

Unfortunately, the baseline data was collected using Vessel Trip Reporting (VRT) and observer data and both are not required on the lobster, Jonah crab or Channeled Whelk fisheries. As noted on pg.10 "the landings estimated for the Export Cable Route Area." These numbers need to be inclusive of all the fisheries data and not estimated.

We do recognize that VTRs are not required for lobster, Jonah crab, or Channeled Whelk fisheries and that this likely leads to underreported landings and revenue for these species. The NOAA data set used does capture a portion of landings for all of these species as a result of trip reporting requirements for vessels that hold federal permits in addition to lobster/crab, and data were adjusted using a multiplier to account for underreported landings/revenue for these species in the project area.

Also, related to data being "estimated", since the ECCs make up a relatively small band of area, it is difficult to attribute fisheries landings and revenue data. Therefore, fisheries data from a much wider band (i.e., Export Cable Route Area, 5 km buffer on either side of the cable route) are used so that the estimated landings and revenue are more closely representative of the fishing activity that could occur within the area actually impacted during development of the Project.

1. Has any State data been incorporated from the Massachusetts Division of Marine Fisheries (DMF)?

State data from MA DMF have not been incorporated into the analysis - in the past, MA has not required state fisheries landings data sets to be included in the analysis. The analysis has been based on landings and revenue data from trips in federal waters.

2. On pg. 12, Table 4. Average annual landings of major species by area, 2008-2021 ; the Channeled Whelk landed seems to be missing data as the Falmouth Export Cable Area (ECA) goes right through Channeled Whelk fishing grounds and there is ZERO lobster landings in the ECA which raises concern about the data being used as there are several lobstermen fishing in and around the Falmouth ECA.

Both channeled whelk and lobster landing data are included in the Falmouth ECA data from NOAA; see Table A3.

3. Pg. 22 First paragraph, last sentence - ….*with the lobster and Jonah crab landed value adjusted to account for boats not subject to VTR requirements*. – Can we see what data sets were used for this section if possible?

The data supplied to us by NOAA used in the analysis can be shared and the majority of it can be found in the Appendix to the report.

Industrial Economics (2015) reported that in Lobster Management Area 2 vessels without VTR requirements accounted for 57% of the total number of vessels. We assume conservatively that landings from 60% of the lobster vessels could be unreported. We then applied an adjustment factor of 2.5 to the NOAA data.

4. Currently, the federally permitted lobster and Jonah crab fishery are now mandated to have vessel tracking devices installed on their vessels – Is there any data included in this report or have they asked the State for any vessel tracking data sets to show what effort is taking place in ALL of these areas described in the Baseline report?

The time window of data included in the baseline assessment is 2008 – 2021, which predates requirements that federally permitted lobster and Jonah crab fishermen have vessel tracking devices.

5. There is a real concern with the fluctuating multiplier that is being used by the developers. The current multiplier that was used for SouthCoast is 2.008 when before the 2.205 multiplier per Woods Hole was used for Avangrid. Can the State ask for consistency on the multipliers so there is no deviation from one project to another?

IMPLAN data and modeling software has been widely used by research organizations and government agencies across the country. We used the IMPLAN multiplier for 2021. These multipliers are not static. They reflect the relationship between sectors of the regional economy, which evolves over time.

We would be willing to discuss the necessity and usefulness of standardized multipliers with MA CZM, if useful.

New Bedford Port Authority (Blair Bailey)

As is the case with all mitigation and methods proposed by offshore wind developers, the numbers and methodology offered in the summary drastically underestimate the likely significant impact of these developments. The data, assumptions and multipliers all favor the best-case scenario put forward by BOEM and the developers. There is no allowance for the unknown as to the impact on commercial fishing and shoreside businesses.

We would also note that the data sets used to determine the amounts included in the analysis are incomplete and insufficient to address the full economic impact of the proposed WEA on commercial fishing and the associated communities. NOAA itself has made it clear when providing their data to developers that the data is incomplete and likely does not capture the full extent of the impact, so much so that in the document Information Needs to Assess Fisheries Socioeconomic Impacts from Offshore Wind Energy Projects in the U.S. Greater Atlantic, NOAA, GARFO, August 2021, there is an entire section entitled “Region Fishery Operational Factors and Fishery Dependent Data Limitations”

We acknowledge that data sets used in the baseline assessment for Massachusetts have limitations and that fishery dependent (e.g., Vessel Trip Reports, Vessel Monitoring System, dealer reports, etc.) and fishery independent (e.g., fishery survey) data often do not paint a complete picture of fishery operations within the region. Debates around fishery dependent data have been on-going for decades

and have been accounted for in fishery management through the use of conservative uncertainty buffers when regulators are making decisions around fishery catch limits (e.g., Acceptable Biological Catch vs Annual Catch Limits), assessing fish stocks (e.g., F_{msy} vs. F_{target}), and(or) considering changes to the way that fisheries operate in the future (e.g., use of harvest control rules, spatial extent of management boundaries, etc.). All of the above represent precautionary approaches that result in conservative measures, which is the model that this analysis has followed. For example, the baseline assessment has accounted for uncertainty in the following ways:

- Used high-end estimate for the commercial fishery total output multiplier (did not make adjustment for double counting in summing the upstream- and downstream- multipliers).
- Included all for-hire vessels in the 10 km wide Export Cable Route Area (ECRA), overestimating the potential impacts.
- Used high-end estimate for the scale factor in estimating for-hire impacts.

In submission after submission, the NEFSC/NOAA and GARFO have stated that the use of VTR and FSD provides only a starting point in determining the true exposure to commercial fishing from offshore wind:

· VTR data do not explain the dynamic factors that influence landings and revenue. It would be incorrect to assume from the data that low catch means a low abundance of species.

· Redistribution of effort into other locations may result in other effects, but alternative fishing choices are difficult to predict.

· The primary focus here is on landings and ex-vessel revenues, the information provided should be considered a partial analysis; optimally, broader societal impacts would need to be determined.

The quantitative estimates presented in the reports are based on the best data available following the best practice in fisheries economics. Specifically, we used the NOAA dataset because of its high spatial resolution, long time series, broad coverage of species, and consistent format (which is important for cross project comparison). We made our best effort to quantify different negative effects on the fishing industry and coastal economy.

Permit, Port and Fishery Revenue Exposure Analysis Updated NY Bight Wind Areas, Intergovernmental Renewable Energy Task Force Meeting New York, New York November 28, 2018. (Emphasis Added)
The fisheries data used by the developers was never meant to be used as a comprehensive data set to determine the full economic impact of offshore wind in commercial fishing. “Existing federal fishery monitoring efforts were designed to manage fisheries; they were not designed to manage offshore wind or to manage fisheries interactions.” Evaluating Potential Impacts of Offshore Wind Development on Fishing Operations by Comparing Fine-and Coarse-Scale Fishery-Dependent Data*, Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*, Allen-Jacobson, et. al. 2023. The Allen-Jacobsen paper goes on to offer suggestions as to using fine-scale data to truly address fisheries impacts.
The Allen-Jacobsen paper also identifies the overarching need for finer-scale data to be collected on an industry wide basis in order to improve exposure assessments such as that for the SouthCoast Wind Project area. SouthCoast Wind fully supports increasing the resolution and detail required in commercial and recreational/for-hire fishing reporting within the region to better address the shortcomings outlined in the Allen-Jacobsen paper and in these comments.

It should also be noted that the Allen-Jacobsen approach relies on the use of Study Fleet data, which are largely unavailable to the interested public, including research organizations working in support of offshore wind developers (e.g., Woods Hole Oceanographic Institution), and, more often than not, unavailable to fishery management organizations (e.g., New England Fishery Management Council) when requested for supporting the developing of management measures. In addition, the Study Fleet data used in the Allen-Jacobsen study is on only one species (longfin inshore squid). A comprehensive analysis will require data on all major species.

Working within the limitations of the data that are available, the baseline economic assessment has been based on a conservative approach for the spatial extent of the data considered, adjustments to data for underreported landings/revenue for particular species, and upstream/downstream multipliers to account for indirect effects of the project to local and regional economies. For example, we used high-end estimates for the commercial fishing output multiplier and for the for-hire vessel impact.

However, even the use of fine-scale data to address limitations on catch data and using that data in an exposure analysis still leaves an incomplete picture of economic impact:

> "Exposure analysis depends on historic fishing and revenue, which creates two limitations. First, existing fisheries data might or might not accurately depict spatial characterizations of future fishing (Battista et al. 2013). Importantly, accuracy increases with data availability, and some stakeholders have better records of landings. Second, exposure analysis cannot quantify and explicitly is not quantifying other components of economic impact. Our analysis aims to quantify only one part of the equation, exposure, which we think is a necessary and practical first step to evaluating potential impacts. Subsequent analyses should estimate other components of this equation to generate a more complete description of impacts." Allen-Jacobsen, p.10

There are multiple reliable studies and reports that conclude that the true multiplier for fisheries landings is far greater than the one used in the Assessment. Such reports consider the true impact of any WEA by considering the expected economic changes by using three metrics: job creation, output, and tax revenue. The Assessment provided barely covers one of these areas. Contrary to the representation in the Assessment, the multiplier used for upstream and downstream impacts is not even close to covering the true impact:

> "Changes to the economy are often measured at three levels of impact: direct, indirect, and induced. Here, total direct impacts often pertain to sales, income, and employment generated from initial purchases. Indirect impacts capture sales, income, and employment of industries that supply to the industry or project of focus. Induced impacts are sales, income, and employment resulting from expenditures by employees of the direct and indirect sectors of focus. A variety of tools and programs have been developed to estimate total economic impacts, including employment factors, the Regional Input/Output (I/O) Modeling System (RIMS II), the Jobs and Economic Development Impact (JEDI) model, and Impact Analysis for Planning (IMPLAN17; AECOM 2017). A common element of these tools and models is the use of multipliers that express intersectoral economic relationships and can be used to estimate total economic impacts resulting from expenditures in a particular sector. Overall, the total economic impacts are only a small component of the entire socioeconomic cost–benefit analysis, yet they

are necessary for creating more complex cumulative analyses. Despite the lack of research capturing the full socioeconomic costs and benefits of OWFs, as suggested by the BOEM guidance document (AECOM 2017), there have been multiple efforts to estimate the total economic impact of various sectors of commercial and recreational fisheries. Scheld (2018) used the NOAA/NMFS Commercial Fishing and Seafood Industry I/O Model via IMPLAN software to identify the total amount of economic activity derived from total longfin inshore squid landings in the northeastern United States between 2013 and 2017. Scheld (2018) concluded that the examined fishing activity corresponded to an output multiplier of 7.64, meaning that every dollar received from ex vessel landings led to $7.64 in total economic output." Economic Impacts of Offshore Wind Farms on Fishing Industries: perspectives, Methods, and Knowledge Gaps, Marina Chaji, Samantha Werner, Marine and Coastal Fisheries, Vol. 15, Issue 3, First published: 04 June 2023.

This is one of many multipliers examples outlined in the Chaji et al. paper and it is acknowledged that multipliers and I/O tools are commonly used to assess economic impacts, but that there are limitations to their use, largely hinging on the data available and quality of data.

The multipliers are typically different for different states due to variations in the economic structure of the fishing industry and seafood trade. They can also vary with the type of fishing and species being landed. As described in the report, we use the multiplier calculated from the IMPLAN model for Massachusetts, which is an average multiplier valid for the species composition of Massachusetts landings. IMPLAN data and modeling software have been widely used by research organizations and government agencies across the country. The output multiplier of 7.64 cited in Chaji and Werner is for a single species (longfin inshore squid) in the Northeast region. It is not applicable to our analysis due to differences in species composition and study area. Larger multipliers are associated with larger areas, because most indirect and induced effects stay in a large area, but not in a smaller area (e.g., purchase of supplies from outside of a state). Further, Scheld (2018) notes in their report that "Additionally, this analysis produced economic impact estimates using average landing conditions and assuming geographic homogeneity in expenditures and product distribution. Economic impact estimates provided here should therefore be interpreted as average impacts at the national level, rather than impacts expected in a particular year or state." As such, the multiplier derived by Scheld would overestimate impacts within a particular state associated with the longfin squid fishery.

As we have noted in prior comments, there is a joint project between the Commercial Fisheries Research Foundation and the University of Rhode Island that used I/O modeling to estimate annual gross sales and jobs for the Rhode Island fisheries and seafood sector in 2016 (Sproul and Michaud 2018). The study used business listings from the Rhode Island Secretary of State Corporate Database and marketing databases to inform the I/O models. The study found that in 2016, the commercial fishing vessels, charters, processors, professional services, retail dealers, fishing service and supply, tackle shops, and wholesalers generated 3,147 jobs and $538.33 million in gross sales. In addition, there were 4,381 jobs and $419.83 million in output generated when considering spillover effects across the entire Rhode Island economy (Sproul and Michaud 2018). Using these numbers, the multiplier that should be used to assess the true impact of any WEA both upstream and downstream is far greater than the one used in the Assessment.

Economic multipliers are not static. Sproul and Michaud's report (a multiplier of 3.06) is based on 2016 RI data. We used the IMPLAN multiplier for 2021 MA data.

We strongly recommend that anyone reading the proffered Assessment first read the above-referenced Chaji and Werner report and the Fisheries and Offshore Wind Interactions: Synthesis of Science, NOAA technical memorandum NMFS-NE ; 291. Reading both reports will lead any reader to understand the lack of any truly definitive knowledge regarding the impact of any WEA on commercial fishing and the businesses and communities it supports. The problem is that the presentations prepared for wind developers continue to blatantly misrepresent their conclusions as being conservative and having made all assumptions in favor of the commercial fishing industry. In order for this to be true, the multiplier used and the assumptions made would lead to far higher exposure numbers.

The real issue is that, without actually making all assumptions in favor of commercial fishermen and their families and communities, the proffered numbers could be grossly underestimating the true impact of the WEA. The dangerous game being played is that when it comes time to find out who was right and who was wrong, that is if the Assessment and assumptions therein are too low, by then it will be too late to help the fishermen and the communities, but the turbines will still be spinning.

The lack of truly definitive knowledge is an accurate description of the potential impacts of offshore wind on fisheries. This is also true for other marine and coastal projects. We have developed our analysis using the standard methods in marine resource economics and the best available data.