UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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Guidelines for Providing Information for Mitigating Impacts to Commercial and For-Hire Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585

Guidance Disclaimer

Except to the extent that the contents of this document derive from requirements established by statute, regulation, lease, contract, or other binding legal authority, the contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding legal requirements, related agency policies, and technical issues.

Furthermore, nothing in this document is intended to abrogate or derogate from treaty rights or rights held by any Tribe recognized by the Federal Government of the United States based upon its status as a Tribe recognized by the Federal Government of the United States.

I. Application of the Guidelines

This document is not intended to abrogate or derogate from treaty rights or rights held by any federally recognized Tribe. Guidance for impacts to treaty fishing may require additional considerations and consultations with Tribal governments.

Section IV(E)(ii) entitled, "Compensation for Lost Fishing Income (Fixed Bottom Foundations)," and Appendices A and B do not apply to floating offshore wind projects.[1] BOEM anticipates developing future additions to this guidance to further address floating offshore wind projects.

This guidance is intended to explain the requirements found in applicable statutes and regulations, particularly the BOEM renewable energy regulations at 30 CFR part 585. This guidance should not be viewed as changing any lease terms that are binding on individual leaseholders. Furthermore, these guidelines may be updated periodically based on public feedback, coordination with State governments, Tribal consultations, and evaluation by BOEM staff. Offshore wind energy lessees are the intended audience for this guidance. This guidance does not supplant BOEM's obligations to engage in government-to-government consultation with federally recognized Tribes and Alaska and Native Hawaiian Communities, or consultation with other Federal and State agencies as a part of the offshore wind energy project authorization

[1] Floating offshore wind projects use foundation designs with buoyant substructures moored to the seabed, as opposed to fixed-bottom foundations.

process.

In this guidance, the term "commercial fisheries" refers to commercial and processor businesses engaged in the action of catching or marketing fish and shellfish for sale from the U.S. Exclusive Economic Zone (EEZ). For purposes of this guidance, references to "fisheries" include both commercial and for-hire recreational fishing, but not private angling activities. Throughout this document, the term "for-hire recreational fisheries" refers to charter and headboat fishing operations that use vessels-for-hire engaged in recreational fishing in the U.S. EEZ that are hired for a charter fee by an individual or group of individuals (for the exclusive use of that individual or group of individuals).

II. Introduction to the Guidelines

As part of its approval of plans for the siting of renewable energy facilities[2] and their components on the Outer Continental Shelf (OCS), the U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM), requires lessees to submit information on social and economic conditions, including "recreational and commercial fishing (including typical fishing seasons, location, and type)" that could be affected by the lessee's proposed activities. *See*: 30 CFR 585.611(b)(7) for a Site Assessment Plan (SAP); 30 CFR 585.627(a)(7) for a Construction and Operations Plan (COP); and 30 CFR 585.646(b)(7) for a General Activities Plan (GAP)).[3] Further, 30 CFR 585.610(a)(8), 585.626(a)(13), and 585.645(a)(8) require that a SAP, COP, and GAP, respectively, include project-specific information, including proposed mitigation measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts.

The information required in the regulations assists BOEM in complying with the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. §§ 1337 *et seq.*)), the National Environmental Policy Act (NEPA) (42 U.S.C. §§ 4321 *et seq.*) and other relevant laws. Failure to submit the necessary information in a SAP, COP, or GAP may result in delay, disapproval of a plan, or approval of a plan with additional terms and conditions. See also 30 C.F.R. 585.613(e), 585.628(f), and 585.648(e). BSEE has the authority to enforce compliance with mitigation measures (either proposed by the lessee or proposed by BOEM) through terms and conditions of plan approval. Separately, BOEM could require mitigation plans as a term and condition of a lease. Lease requirements must be followed according to the terms set forth in the lease.

Between 2013 and 2014, BOEM held a series of workshops from Maine to North Carolina[4] to identify best management practices (BMP) and mitigation measures to reduce potential impacts from offshore wind development to commercial and recreational fisheries.[5] These workshops resulted in five BMP topics:

1. Fisheries communication and outreach

[2] See definition of "Facility" in 30 C.F.R. 585.113.
[3] These three plans are sometimes referred to as "plan(s)" because there are places in the document where the word "plan" is used instead of the acronym SAP, COP, or GAP.
[4] Maine, Massachusetts, Rhode Island, New Jersey, Maryland, Virginia, and North Carolina.
[5] Ecology and Environment, Inc. 2014. Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf Report on Best Management Practices and Mitigation Measures. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewal Energy Programs, Herndon, VA. OCS Study BOEM 2014-654.

2. Project siting, design, navigation, and access
3. Safety
4. Environmental monitoring
5. Financial compensation

BOEM issued guidance on the first topic—fisheries communication and outreach—in 2015 that was modified in 2020, entitled, *Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585.*[6]

The guidelines in this document pertain to the remaining four BMPs and provide suggestions for lessees to comply with BOEM's information requirements in the regulatory provisions listed above across all BOEM regions.

III. Authority and Regulations

Mitigation Responsibilities Under OCSLA

Subsection 8(p)(4) of OCSLA and the regulations at 30 CFR 585.102(a) require BOEM to ensure that any activity authorized under such subsection is carried out in a manner that provides for several goals, including: safety; protection of the environment; conservation of the natural resources of the OCS; prevention of interference with reasonable uses (as determined by the Secretary) of the U.S. EEZ, the high seas, and the territorial seas; coordination with relevant Federal agencies; and consideration of any other use of the sea or seabed, including use for a fishery. BOEM also has statutory obligations to evaluate the social and economic impacts of a potential project under NEPA (see below). BOEM's regulations emphasize that BOEM will coordinate with relevant Federal agencies involved in planning activities to avoid conflicts among users and to maximize the economic and ecological benefits of the OCS (30 CFR 585.102(a)(5)).

For BOEM to evaluate potential impacts to social and economic conditions of the fishing industry, a lessee's SAP, COP, or GAP must provide the necessary information to assist BOEM in determining whether the proposed activities could result in unreasonable interference with other uses of the OCS or could cause undue harm to the environment (see 30 CFR 585.606, 585.621, and 585.641). Moreover, the lessee's plans must provide proposed measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts (see 30 CFR 585.610(a)(8), 585.626(a)(13), and 585.645(a)(8)). BOEM will review the submitted SAP, COP, or GAP and any relevant supporting information to determine if the plan contains the information necessary to conduct BOEM's technical and environmental reviews. Upon completion of BOEM's technical and environmental reviews and other reviews required by Federal laws, BOEM may approve, disapprove, or approve with modifications the lessee's SAP, COP, or GAP.

[6] United States Department of the Interior, Bureau of Ocean Energy Management. 2020. Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585.

Relevant regulatory provisions for lessees within 30 CFR part 585, subpart G, include the following:

	Information Requirement	**Type of Plan**	**Regulatory Citation**
1.	Your plans must demonstrate that you have planned and are prepared to conduct the proposed activities in a manner that does not unreasonably interfere with other uses of the OCS and uses best management practices.	SAP, COP, and GAP	30 CFR 585.606(d), (g) (SAP); 30 CFR 585.621(d), (g) (COP); and 30 CFR 585.641(d), (g) (GAP).
2.	You must submit with your plans a list of agencies and persons[7] with whom you have communicated, or with whom you will communicate, regarding potential impacts associated with your proposed activities. This description must contain the contact information and the issues discussed.	SAP, COP, and GAP	30 CFR 585.610(a)(14) (SAP), 30 CFR 585.626(a)(15) (COP), 30 CFR 585.645(a)(16) (GAP)
3.	You must submit additional information requested by BOEM.	SAP, COP, and GAP	30 CFR 585.610(a) (17) (SAP), 30 CFR 585.626(a)(21) (COP), and 30 CFR 585.645(a)(20) (GAP)
4.	You must provide a description of the social and economic conditions of commercial and recreational fisheries that could be affected by the activities proposed in the plan.	SAP, COP, and GAP	30 CFR 585.611(b)(7) (SAP); 30 CFR 585.627(a)(7) (COP); and 30 CFR 585.646(b)(7) (GAP)
5.	BOEM may require additional information during the review of the plans and failure to provide the information may result in the disapproval of the plan.	SAP, COP, and GAP	30 CFR 585.613(d) (SAP); 30 CFR 585.628(e) (COP); 30 CFR 585.648(d) (GAP)
6.	You must provide proposed measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts.	SAP, COP	30 CFR 585.610(a)(8) (SAP); 30 CFR 585.626(a)(13) (COP); 30 CFR 585.645(a)(8) (GAP)

[7] Definition of "person" means, in addition to a natural person, an association (including partnerships and joint ventures); a Federal agency; a State; a political subdivision of a State; a Native American Tribal government; or a private, public, or municipal corporation (see 30 CFR 585.113).

Some of the actions described in these guidelines may be required of lessees under the terms and conditions of a specific lease or grant. A lease or grant may also have requirements for lessees that clarify or add to regulatory requirements and recommendations discussed in these guidelines. To the extent that there is a conflict between the terms of the lease or grant and these non-binding guidelines, the terms of the lease or grant control.

Mitigation under NEPA

The information described in this document is also important to the analysis of impacts under NEPA. Thus, BOEM is using the Council of Environmental Quality definition of mitigation (40 CFR 1508.1(y)), which includes:

1. Avoiding the adverse effect altogether by not taking a certain action or parts of an action.
2. Minimizing the adverse effect by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the adverse effect by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the adverse effect over time by preservation and maintenance operations during the life of the action.
5. Compensating for the adverse effect by replacing or providing substitute resources or environments.

IV. Recommended Practices for Mitigating Impacts to Commercial and For-Hire Recreational Fisheries

This section describes best practices divided into five sections, as described in section II above. Section A cross-references BOEM's additional guidance document that focuses on fisheries communication and outreach, as well as the current practice of including Fisheries Communications Plan requirements as either a condition of COP approval, or as a lease stipulation. Sections B through E below set forth measures identified in environmental analyses and public feedback that may mitigate the impacts of a proposed project to commercial and for-hire recreational fisheries.

This document addresses only mitigation of losses that arise from the existence of an offshore wind energy project. The types of potential losses discussed in this document do not cover losses that may occur as a result of environmental (including public health), regulatory, or market conditions from other than offshore wind energy activities. Nor does this document address the full range of compensation mechanisms that may already exist to aid fishermen when confronted with losses beyond offshore wind energy impacts. For example, the Federal Government has statutes and regulations that may compensate for other losses that may arise from a fishery disaster and provisions in the U.S. Tax Code that may provide tax relief for capital losses.

A. Fisheries Communication and Outreach

As reflected in the *Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585*, BOEM recommends that lessees engage with commercial and for-hire recreational fisheries and fisheries managers (Tribal, State, and Federal) prior to engaging in any activity in support of a plan.[8] That guidance document also describes the role of fisheries liaisons and fisheries representatives in facilitating communication between lessees and commercial and for-hire recreational fisheries. An "activity" consists of, but is not limited to, geophysical, geotechnical, biological, and cultural surveys and all activities described in a SAP, COP, or GAP. Several planning tools may help lessees identify Tribes, Native Hawaiian Organizations, indigenous communities and other communities with which to engage, including the National Oceanic and Atmospheric Administration (NOAA) and BOEM Ocean Reports tool, the Northeast Region Ocean Council's (NROC) Northeast Data Portal, the Mid-Atlantic Region Council on the Ocean's (MARCO) Mid-Atlantic Data Portal, the South Atlantic Fish Management Council (SAFMC) Digital Dashboard in the Atlantic, the Gulf of Mexico Alliance in the Gulf, the California Offshore Wind Energy Gateway, and the Oregon Offshore Wind Mapping Tool (OROWindMap) on the Pacific Coast. Additional community outreach may be necessary to identify potentially affected communities beyond the resources listed above.

This pre-activity engagement should be respectful of the views of the fishing communities consulted. The engagement should result in a public document describing the nature of the engagement and how the lessee has addressed, or plans to address, the measures identified by the fishing communities to mitigate the impacts of the proposed activity. The intent of this recommendation is to improve lessee communication, transparency, and accountability with fisheries that may be impacted by a project's OCS activities. As a result of this communication, the lessee's project design should reflect the current and future uses of the project area and mitigate potential adverse effects. The lessee should make reasonable efforts (e.g., efforts that are technically and economically feasible and practicable) to implement the project in a manner that avoids, minimizes, or mitigates adverse project effects on commercial and for-hire recreational fisheries. Early engagement with fishing communities can promote equitable mitigation and encourage participation in the development of mitigation plans for the entire spectrum of fishing communities.

[8] Guidance document available at: Regulatory Framework and Guidelines | Bureau of Ocean Energy Management

B. Project Siting, Design, Navigation, and Access

As described in section A above, BOEM recommends that offshore wind lessees meet with commercial and for-hire recreational fishing communities at the earliest stages of the facility design process. These meetings should take place before a lessee conducts site-specific data collection surveys, as this timing will best allow for consideration of facility design aspects, including wind turbine foundations, mooring systems (if applicable), inter-array cables, and export cables. In this document, BOEM differentiates between measures for static cables (e.g., cables placed on the seabed) and measures for dynamic cables (e.g., cables suspended in the water column.). Generally, dynamic cabling is only associated with deep-water floating offshore wind energy foundation projects. BOEM recognizes that there is not a standard facility design that will mitigate potential impacts to all fisheries in all regions. However, the lessee should consider, in consultation with fisheries stakeholders, whether the design elements described below are appropriate, practicable and economically and technically feasible for inclusion in their plan submittals.

Static cable design elements:

1. Consistent with BOEM engineering guidance, all static cables potentially impacted by fishing activity should be buried to a minimum depth of 2 feet below stable seabed where technically and economically feasible. Technical feasibility constraints include seabed conditions that preclude burial, such as telecommunication cable crossings. Deeper cable burial depths may be warranted depending on risks identified in cable route design.[9]
2. Lessees should avoid installation techniques that raise the profile of the seabed, such as the ejection or relocation of large boulders (>0.5 m) onto the surface or cable trench dredging. The ejection of this material may damage fishing gear. If raising the profile of the seabed is unavoidable, the lessee should propose measures in the COP to minimize the total area of impact through measures such as removing and/or consolidating potential obstructions in areas where bottom tending fishing gear is actively used. Another consideration is to restore berms resulting from cable trench dredging to match adjacent natural bathymetric contours (isobaths).
3. If needed, cable protection measures should reflect the existing conditions at the site. This mitigation measure ensures that seafloor cable protection does not introduce new obstructions for mobile fishing gear. Thus, the cable protection measures should be trawl-friendly with tapered or sloped edges. If cable protection is necessary in “non-trawlable” habitat, such as rocky habitat, then the lessee should consider using materials that mirror the benthic environment.
4. Where technically and economically feasible, cables should share corridors and the total cable footprint should be minimized.

[9] See: Carbon Trust. 2015. Cable Burial Risk Assessment Methodology: Guidance for the Preparation of Cable Burial Depth of Lowering Specification. CTC835.

Dynamic cable design elements:

1. Dynamic cables should be suspended at a depth that minimizes interactions with fishing operations, as identified using vessel monitoring system and fishing vessel trip report data and information on gear performance.
2. Where technically and economically feasible, cables should share corridors and the total cable footprint should be minimized.

Facility design elements:

1. The facility design should seek to maximize existing access to fisheries on balance with other siting constraints by considering:
   a. Transit within the project area and traditional fishing activities within the project area.
   b. Consolidation of infrastructure, where practicable and consistent with the project layout, to reduce space-use conflicts.
   c. Technologies to reduce total project area while meeting energy production commitments.
   d. Coordination of turbine and substation array layouts between adjacent neighboring lease areas to allow safe fishing operations and transit through multiple projects. In instances where layout design cannot accommodate two common lines of orientation across adjacent leases, the lessee should consider incorporating a setback noticeably greater than the WTG spacing within either wind farm, within which no surface structures may be constructed. See Navigation and Vessel Inspection Circular 02-23 CH1[10] for more details.
2. Turbine locations should be sited to avoid sensitive benthic features that support the production of commercially harvested species, such as natural and artificial reefs.
3. Facility planning should use nature inclusive designs,[11] where applicable, to maximize available habitat for fish.
4. Installation techniques and time windows that minimize disruption to fishing activities (e.g., simultaneous lay and burial, or conducting activity during the appropriate time of year).

C. Safety Measures

To improve safety at sea in and around offshore wind facilities, BOEM recommends that lessees consider the following measures in their plan submittals:

1. Charting all facilities and obstructions resulting from construction and operations of an offshore wind energy facility and providing that information to NOAA, U.S. Coast Guard (USCG), and navigational software companies.

[10] See: United States Coast Guard Navigation and Vessel Inspection Circulars.
[11] See: Evaluating Effectiveness of Nature Inclusive Design Materials.

2. Avoiding to the maximum extent practicable interactions with Unexploded Ordnance (UXO)/Munitions and Explosives of Concern (MEC). If avoidance is not a possible mitigation measure, submitted plans should follow all guidance,[12] [13] or applicable regulation regarding interaction with UXO/MEC.
3. Employing liaisons from the Tribal, commercial, and/or recreational fishing industry to provide safety and communication services during construction.
4. Monitoring cables in real-time during operations and reporting all potential hazard events to the USCG as soon as possible throughout the life of the project.
5. Using digital information technology platforms (e.g., smartphone applications, web pages) to bring together survey and construction schedules and locations in addition to standard local notices to mariners via the USCG.
6. Marking facilities with permanent identification of the project and company.
7. Providing training opportunities for the commercial fishing industry and for-hire recreational fishing industry to simulate safe navigation through a wind facility in various weather conditions and at various speeds.
8. Monitoring safety threats (e.g., radar disruption, ice shedding, vessel allisions and collisions, security threats, UXO/MEC, and impacts on search and rescue efforts) throughout the life of a project.
9. Consulting with the USCG to identify which structures would be most appropriate for Automatic Identification System transponders consistent with BOEM's Lighting and Marking Guidelines.[14]
10. Considering lessee-funded radar system upgrades for commercial and for-hire recreational fishing vessels (e.g. solid-state Doppler-based marine vessel radar systems).[15]

[12] Carton, G., DuVal, C., Trembanis, A., Edwards, M., Rognstad, M., Briggs, C., and Shjegstad, S. 2017. Munitions and Explosives of Concern Survey Methodology and In-Field Testing for Wind Energy Areas on the Atlantic Outer Continental Shelf . United States Department of the Interior, Bureau of Ocean Energy Management.
[13] Middleton, P., Salerno, J., and Barnhart, B. 2021. Supporting National Environmental Policy Act Documentation for Offshore Wind Energy Development Related to Munitions and Explosives of Concern and Unexploded Ordinances. United States Department of the Interior, Bureau of Ocean Energy Management.
[14] See: United States Department of the Interior, Bureau of Ocean Energy Management. 2021. *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development*.
[15] National Academies of Science Engineering and Medicine. 2022. *Wind Turbine Generator Impacts to Marine Vessel Radar*. Washington, D.C.: The National Academies Press.

D. Environmental Monitoring

BOEM recommends that lessees work with Tribal, State and Federal fisheries management agencies to explore the need and methods to monitor changes in fishing activity and productivity anticipated as a result of proposed offshore wind energy development. Separately, BOEM provides recommendations for conducting and reporting the results of baseline collection studies in separate guidelines available in BOEM's Guidance Portal. In 2021, the Responsible Offshore Science Alliance (rosascience.org) worked with State, Federal, and fisheries constituents to develop the Offshore Wind Monitoring Framework and Guidelines document.[16] This document is an important resource in understanding necessary considerations in developing pre-construction, construction, and post-construction fisheries monitoring surveys.

E. Financial Compensation

BOEM recommends that the lessee consider establishing a compensation process if a project is likely to result in lost gear or lost income to commercial or for-hire recreational fisheries. The compensation process should be equitable and fair across commercial and for-hire recreational fisheries and consider fund administration best practices and process consistency. The scope of impacts or losses that should be addressed by compensatory mitigation should be based on the impacts identified in the lessee's COP and BOEM's assessments analyzing the potential effects of the lessee's submitted plans, including various environmental documents like the Environmental Impact Statement for the COP.[17] BOEM recommends that a lessee accept substantiated claims from fishing interests (see Eligible Entities below).

In addition to the financial compensation described below, lessees and affected fishing communities may find it mutually beneficial to address potential impacts at a community level. As part of negotiations with affected commercial and for-hire recreational fishing communities, lessees may reach an agreement whereby compensation is paid based on fishing history in a project area, rather than proof of economic loss. This approach could result in a program that could reduce the administrative burden for all parties and resolve uncertainties about causation of impact and data supporting proof of impact. The lessee may develop measures that provide direct compensation based on the historical value of fishing (versus a program as described below), require a specific demonstration of economic loss, or are directed at the overall resilience of an impacted fishery (e.g., marketing/seafood promotion initiatives, gear development, and support programs that ensure safe and profitable fishing alongside offshore wind energy development). Other alternatives to direct compensation for economic loss could include fish and shellfish stock enhancement. These measures, along with the parties with whom the agreement has been reached, should be included in the Construction and Operations Plan prior to BOEM's environmental assessment of the COP. Lastly, where lessees and commercial and for-hire recreational fisheries anticipate unrecoverable losses, lessees could consider offering to buy out and retire fishing vessels and the permits assigned to those vessels under certain circumstances. Lessees would need to work with National Marine Fisheries Service (NMFS) and applicable States to permanently retire those fishing permits.

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[16] See: ROSA Offshore Wind Project Monitoring Framework and Guidelines

[17] If this guidance does not comport with the requirements of the Terms and Conditions of a lessee's COP approval, the Terms and Conditions of a lessee's COP approval must be met by the lessee.

i. Compensation for Gear Loss and Damage

At minimum, BOEM recommends following the standards for gear loss that exist for the Fisheries Contingency Fund claims process.[18] The lessee should consider reimbursements for fisheries gear loss and damage resulting from lessee's actions (e.g., a lessee-contracted survey vessel damaging fishing gear during survey operations). The lessee should also consider compensation for damaged gear resulting from interactions between the fishing industry and non-marked and/or non-charted obstructions that are the property of the lessee. A lessee may elect to reimburse for damages to or loss of fishing gear hung up on marked and charted obstructions that is unretrievable in order to limit interactions with lessee property.[19] Claims should be filed within 90 days after the date of first discovery of the incident and the lessee should review and respond within 30 days of receipt of a filed and substantiated claim. The lessee should consider fully compensating claimants for the repair or replacement of the damaged gear and up to 50-percent of gross income loss during the period from the discovery of the lost or damaged gear to when the gear is repaired or replaced. The lessee should also consider compensating claimants for reasonable[20] fees paid to an attorney, certified public accountant, or other consultant for the preparation of the claim contingent on the settlement of the claim.

ii. Compensation for Lost Fishing Income (Fixed Bottom Foundations)[21]

BOEM recommends the following minimum standards when determining the amount of compensation for lost fishing income for fixed bottom foundation offshore wind energy projects. The lessee should consider establishing adequate reserve funds (see below) to compensate for income lost as a direct result of the lessee's actions.

a. Determining Adequate Funds for Compensation

In the U.S. offshore energy sector, claims for financial loss by commercial and for-hire recreational fisheries have primarily focused on claims associated with lost gear and income associated with actual interactions between fishing gear and the property of offshore energy companies. There are no existing Federal regulations that require compensation for economic loss from displacement attributed to offshore wind energy installations. The closest Federal guidance regarding compensation for such financial loss in the fishery sector comes from fishery disaster declarations under the Magnuson-Stevens Act and section 12005 of the Coronavirus Aid, Relief, and Economic Security Act, also called the CARES Act, which provided financial assistance following the global pandemic.

[18] See generally, 50 CFR part 296; for additional information refer to NOAA's webpage: https://www.fisheries.noaa.gov/national/funding-and-financial-services/fishermens-contingency-fund-program.

[19] The compensation fund may monitor for potential claim abuse and take actions necessary to limit such abuse.

[20] Reasonable fees would not be expected to exceed 25% of the actual claim.

[21] This section of the guidance is only applicable to projects using a fixed bottom foundation (e.g., monopile, gravity base, or jacket structure). Given the state of floating foundation technology development (e.g., tension leg, catenary cable, and semi-submersible) and its potentially different impacts on commercial and for-hire recreational fishing activity, guidance for these types of foundation technologies will require additional consultation and outreach. BOEM expects many of the compensation elements for floating foundations to be similar to fixed bottom with different assumptions for construction and operation periods. BOEM will supplement this guidance for floating foundations as more is learned about the impacts of floating foundations.

In addition to compensation for interactions between fishing gear and lessee property which is covered under the "Compensation for Gear Loss and Damage" section, BOEM recommends that lessees consider providing compensation for economic loss from displacement attributed to offshore energy installations and further consider using fishing revenue exposure (i.e., the amount of ex-vessel revenue generated from the project area of potential displacement) for the purposes of determining the value of reserve funds to set aside for compensation.[22] As a general matter, BOEM considers the following to be a reasonable definition of the term "revenue exposure": the total ex-vessel value of the fish landed, usually presented in an annualized format. This measurement is not the direct estimate of net income loss (revenue exposure minus expenses) to the business, nor representative of the actual duration for which an impact may have occurred. The phrase "annualized revenue loss" means the percentage reduction, as applicable, in commercial, for-hire recreational, or processor fishery revenue for the 12 months during which the impact from the project occurred. The loss is derived by comparing the average annual revenue in the most recent 5 years to when there was no impact from the project.[23] Revenue loss may also be compared to overall trends within the region during the same period to account for other potential causes of income loss (weather, stock decrease, etc.).

Under the definition of "revenue exposure" that is described in the prior paragraph, BOEM generally expects that the annualized revenue loss is a portion of the total revenue exposure. In addition to "revenue exposure," lessees should use a shoreside support service multiplier in addition to revenue exposure to account for onshore economic impacts due to lower fisheries landings (see Appendix B for a discussion of shoreside revenue impact estimation).[24] Some localities may have a sector of fishing activity for which accurate revenue exposure data is unavailable. In those cases, the lessee should consider developing an additional multiplier for the missing information to ensure the adequacy of compensation funds. Revenue exposure analyses included in plans should use the Gross Domestic Product (GDP) Implicit Price Deflator for standardizing dollar amounts across years. The GDP Implicit Price Deflator is also the standard used by NMFS in fisheries management analyses.

b. Duration of Compensatory Mitigation

Construction

For purposes of determining compensation for losses to commercial and for-hire recreational fisheries, lessees should consider the percentage of the project area that would be rendered unavailable to fishing during active construction on the OCS. Lessees should consider compensation for lost income for the duration of foundation and submarine cable installation where exclusion from fishing grounds would be necessary for safety, or for income lost due to an activity that has resulted in the behavior of target

[22] Ex-vessel revenue is a measure of the dollar value of commercial landings, usually calculated as the price per pound at first purchase of the commercial landings multiplied by the total pounds landed. (NOAA Sustainable Fisheries Glossary). See Appendix A for a more in-depth description of revenue exposure estimates generated from the NMFS/GARFO fishery footprint analysis.

[23] See Appendix A for examples where a period other than the most recent 5 years may be appropriate.

[24] Shoreside support services represent onshore shoreside businesses, such as seafood processors and bait dealers.

fish species such that they are no longer available to the fishery (e.g., where the fish are not biting at hooks during elevated acoustic exposure).

Operations
As discussed above, the scope of impacts or losses caused by displacement and addressed by compensatory mitigation should be based on the impacts identified in various environmental documents analyzing the potential effects of the action proposed in the lessee's submitted plans. Generally, it should be assumed that there is an adjustment period for fisheries post construction. BOEM recommends that, at a minimum, lessees consider making the following payment structure available for claimants: 100 percent of revenue exposure for the first year after the termination of construction, 80 percent of revenue exposure for the second year after the termination of construction, 70 percent of revenue exposure for the third year after the termination of construction, 60 percent for the fourth year, and 50 percent for the fifth-year post construction. See Appendix A for further details. Compensatory mitigation beyond 5 years post-construction is not expected broadly across all fisheries, however based on the environmental review of the activities proposed in the COP and the fisheries that may be affected, compensation for longer durations and transition periods may be warranted. It should be noted that BOEM and BSEE have the regulatory authority to consider new mitigation measures (see section 285.633(a)(2)) and to require revisions to an approved COP if necessary (see section 585.634(b)).

Decommissioning
Since BOEM evaluates only conceptual decommissioning during COP approval, BOEM recommends that the lessee's decommissioning application required under 30 CFR 285.906 should include the measures to mitigate impacts to commercial and for-hire recreational fisheries that arise due to the lessee's decommissioning activities.

c. Management of Funds and Claim Administration
Any compensatory mitigation fund should include fiduciary governance, strong internal controls, and be designed to minimize administrative expenses. The Fund should be independently managed by a neutral third-party administrator and should include trustees or board members from fishing stakeholder groups. This neutral third-party administrator will process claims, manage and disburse funds, and handle appeals.[25] The Fund governance should include a process for evaluating the actuarial status of funds every five years, and for publicly reporting information on Fund disbursements and administrative costs at least annually. Any Fund should minimize costs by leveraging existing processes, procedures, and information.

[25] For the Northeast U.S., a coalition of eleven East Coast States identified a third-party regional fund administrator (https://offshorewindpower.org/fisheries-mitigation-project) for fisheries compensatory mitigation in November 2024.

A compensatory fund may be established at the project level, company level, or multiple lessee level. However, regardless of the mechanism by which mitigation funds are managed, each project's funds and documentation should be easily segregated for auditing purposes. Funds should remain available for two years after the completion of any given period to allow for sufficient time for incident discovery, claim filing, and review processes. If there are unused funds for compensation claims, the lessee and affected parties may reach a mutually beneficial agreement for the use of unused funds, or such unused funds may be rolled over to subsequent years as required for reserve funding or recouped by the lessee.

A variety of compensation models may mitigate project impacts, including programs that provide funds more directly to an impacted community to improve overall financial health of the fishing community for disbursement by community members. However, BOEM's suggested model is based on individual claims and directs funds to impacted businesses. This mechanism ensures that claims are commensurate with the impacts to the claimant rather than pooled into a more general fund that may benefit the fishing industry more broadly.

The lessee or third-party fund administrator should consider establishing a claims appeal or adjustment process. Appeals or adjustment actions should be considered if filed within 6 months of the original decision on the claim. BOEM recommends that a lessee or its neutral third-party fund administrator consider paying substantiated claims within one month of such substantiation. BOEM encourages lessees to make any claims process as simple as possible and to accommodate the use of a variety of different business records.

d. Eligible Entities

Lessees should consider the propriety of permitting claims from entities other than vessel owners, operators, and crew, including from shoreside businesses that can demonstrate in a claim that their business experienced a loss of income due to unrecovered economic activity resulting from displaced fisheries. Lessees may also consider a pre-application process to identify all eligible entities as early in the compensation development process as practicable. This pre-application process could facilitate more efficient claims processing. Information for considering vessel owner/operator eligibility for compensation include, but are not limited to:

- valid vessel registration and permits;
- valid operator registration and permits;
- fishing location information to provide historic evidence of disruption in the area of operations;
- income verification, sales notes, and fishing business account information for an agreed time period;
- validated fisheries landings data.

V. Review of Information Resources

In developing a fisheries mitigation plan, lessees may find the following information helpful. Additional resources are also found in footnotes throughout this document and Appendix C:

- Ecology and Environment, Inc. 2014. *Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf Report on Best Management Practices and Mitigation Measures*. A final report for the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewal Energy Programs, Herndon, VA. OCS Study BOEM 2014-654.
- National Marine Fisheries Service's (NMFS) Office of Science and Technology provides a baseline understanding of fishery social and economic conditions. The NMFS Human Dimensions Program maintains community profiles, social indicators, and social and cultural studies. Specific pages include:
  - NOAA: Fishing Community Profiles
  - NOAA: Social Indicators for Coastal Communities
  - NOAA: Fisheries Economics of the United States
- Bureau of Ocean Energy Management and National Marine Fisheries Service. 2017. *Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic*, Vol I. and Vol II.

VI. BOEM Guidance Document Statement

This guidance is not a rule, regulation, or other legally binding instrument, and the recommendations it contains may not apply to a particular situation based on the individual facts and circumstances. Nothing in this guidance is intended to modify or amend any Federal laws or regulations, or to create any rights or cause of action or trust obligation that any person or party may enforce through litigation or otherwise against the United States Government or any of its employees. To the extent that there is any inconsistency between the provisions of this guidance and any Federal regulations or laws, the regulations or laws will control.

VII. Paperwork Reduction Act Statement

These guidelines provide clarification, description, or interpretation of requirements contained in 30 CFR part 585, subpart G. An agency may not conduct or sponsor a collection of information unless it displays a currently valid OMB Control Number. OMB has approved the information collection requirements in the 30 CFR part 585, subpart G regulations under OMB Control Number 1010-0176 (see 30 CFR 585.115(e)(7)). These guidelines do not impose additional information collection requirements subject to the Paperwork Reduction Act of 1995.

Appendix A: General Impact Calculations (Fixed Bottom Foundations)

This Appendix sets out BOEM's recommendations for how Lessees may calculate proposed mitigation fund amounts in a mitigation plan. BOEM recommends calculating compensatory mitigation fund amounts from the exposed revenues for federally permitted commercial and for-hire recreational fishing vessels. These revenues are generally found in the Final Environmental Impact Statement (FEIS) for any given project but may also be obtained from NOAA Fisheries' Socioeconomic Impacts of Atlantic Offshore Wind Development website.[26] BOEM typically relies on the revenue data by State. When calculating reserve amounts for each project period, revenues should be normalized to the current year, using the GDP Implicit Price Deflator (U.S. Bureau of Economic Analysis,[27] "Table 1.1.9. Implicit Price Deflators for Gross Domestic Product").

For the reserve calculation, BOEM will assume the total exposed revenue for commercial fisheries is *a*, for-hire recreational fisheries is *b*, and the values are reported in the same year (y). We will also assume the implicit price deflator is therefore n_y. The implicit price deflator to normalize to the current year is (n_i). Note that the GDP implicit price deflator will likely change between years.

Table 1 lays out the reserve calculations for calculating the fund amounts for the commissioning and decommissioning project periods. The calculations may need to be multiplied by the number of years over which the construction (*k)* and decommissioning (*j)* will occur. Table 2 shows the calculations for subcomponents by operating year project periods. Lessees may roll forward unclaimed funds after 2 years, which could reduce the total fund amount. The total reserve amounts are documented in Tables A-1 and A-2.

For-Hire Recreational Fishing Shoreside Support Service Multiplier

BOEM does not recommend a shoreside support services multiplier for the for-hire recreational fishing sector. While BOEM recognizes there could be economic impacts to a vessel operator and crew, it is not anticipated that economic activity generated by clients of for-hire fishing trips would be lost to shoreside businesses due to other recreational opportunities, including other recreational fishing activity. If there is evidence that a shoreside support services multiplier should be applied to for-hire recreational fisheries, the lessee should document evidence supporting the calculation within the Shoreside Support Services report as required by a Lessee's Terms and Conditions of COP approval.

[26] Socioeconomic Impacts of Atlantic Offshore Wind Development
[27] Table 1.1.9. Implicit Price Deflators for Gross Domestic Product

Table A-1: Calculation Subcomponents for Construction and Decommissioning

Project Period	Base Annual Average Fishing Revenue Exposed to the Wind Farm Area	Shoreside Support Services Multiplier[1]	Exposure Ratio	Reserve Amount	Funds available through
Construction	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	M_a	1	$\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)$	Operating year 2 (or 2 years after construction is complete if multiple construction years are used)
Decommissioning[2]	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	M_a	1	$\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)$	Claims should be honored for at least 2 years after decommissioning activities are completed.

[1] The Lessee's calculations of the Impacts to Shoreside Support Services Multiplier should be reviewed by BOEM.

[2] Decommissioning funds may be required pending BSEE's approval of Lessee's decommissioning application. If Construction is expected to last *k* years and Decommissioning *j* years, the Lessee should calculate the reserve as follows:

$$k\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right] + j\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right].$$

Table A-2: Calculation Subcomponents by Operating Year

Project Period	Base Annual Average Fishing Revenue Exposed to the Wind Farm Area	Exposure Ratio	Adjusted Base Annual Average Fishing Revenue Exposed to the Wind Farm Area	Shoreside Support Services Multiplier[1]	Reserve Amount	Funds available through
Operating Year 1	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	1	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	M_a	$\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)$	Operating Year 3
Operating Year 2	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	0.8	$0.8\left[\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)\right]$	M_a	$0.8\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right]$	Operating Year 4
Operating Year 3	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	0.7	$0.7\left[\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)\right]$	M_a	$0.7\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right]$	Operating Year 5
Operating Year 4	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	0.6	$0.6\left[\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)\right]$	M_a	$0.6\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right]$	Operating Year 6
Operating Year 5	$\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)$	0.5	$0.5\left[\left(a \times \frac{n_i}{n_y}\right) + \left(b \times \frac{n_i}{n_y}\right)\right]$	M_a	$0.5\left[\left(a \times \frac{n_i}{n_y}\right)(1 + M_a) + \left(b \times \frac{n_i}{n_y}\right)\right]$	Operating Year 7

Notes:

[1] The Lessee's calculations of the Impacts to Shoreside Support Services Multiplier should be reviewed by BOEM.

[2] Rolling forward unclaimed funds from prior years may lower this total value.

Appendix B: Shoreside Support Services Multiplier Guidance (Fixed Bottom Foundation)

There are several potential methods for calculating a shoreside support services multiplier. One approach uses data from NOAA's Fisheries Economics of the United States (FEUS) report.[28] The data in the FEUS allows the lessee to calculate a multiplier with annually updated, publicly available data that has a documented methodology.[29]

Since the FEUS report provides State-level data, a lessee can calculate a total commercial shoreside support services multiplier. Examples of the 2022 FEUS data (for the Mid-Atlantic Region and Maryland) are shown in Tables B-1 and B-2. Data for additional years is provided online in the Fisheries Economics of the United States — Data Tool under the Fisheries Economics tab.[30]

Table B-1: 2022 Mid-Atlantic Region FEUS Data Example

Mid-Atlantic Region – Commercial Fisheries Landings Revenue

Key Species	Year	Area	Revenue
Total	2022	Delaware	$15,667,447
Total	2022	Maryland	$78,566,816
Total	2022	New Jersey	$141,849,176
Total	2022	New York	$38,886,533
Total	2022	Virginia	$168,986,458

Source: Fisheries Economics of the United States — Data Tool (noaa.gov)

[28] The FEUS report is updated annually and "takes a detailed look at the economic performance of commercial and recreational fisheries and other marine-related sectors on a State, regional, and national basis. It also describes how U.S. commercial and recreational fishing affects the economy, in terms of employment, sales, and value-added impacts."

[29] A lessee may propose an alternative approach for computing a shoreside support services multiplier that incorporates strong economic methodology and input-output modeling. This methodology should be tied to impacts derived from project development. The multiplier calculation described in this appendix includes induced economic impacts as they are included in the FEUS data. While induced impacts are included in this estimation, this fisheries mitigation guidance does not recommend compensatory mitigation include induced impacts. BOEM recommends compensating claims related to the first transactions of commercial harvesters. The following calculation reflects this intent.

[30] The most recent available data should be used for each project.

Table B-2: Commercial Impacts by State: Maryland Commercial Fisheries Example

State	Year	Impact Type	Imports	Impact Value	Sector
Maryland	2022	Value Added	Without Imports	$61,551,415	Commercial Harvesters
Maryland	2022	Value Added	Without Imports	$28,852,521	Seafood Processors & Dealers

Source: Fisheries Economics of the United States — Data Tool (noaa.gov)

Steps to Calculate a Commercial Shoreside Support Service Multiplier

Variables:
M_a = Total Commercial Shoreside Support Services Multiplier
$M_{a,S}$ = A given State's Commercial Shoreside Support Services Multiplier
c = Commercial exposed landings revenue
H = Commercial Harvesters: Value Added
P = Seafood Processors and Dealers: Value Added
W_S = Weight for a given State (S)
Si = A given State

Step 1: Identify Relevant FEUS Data

This shoreside support services multiplier calculation uses the total Landings Revenue value of commercial fisheries, along with the value added associated with commercial harvesters and seafood processors and dealers.[31] The value-added data without imports should be used. The relevant data for Maryland is shown in Table B-3.

Table B-3: Relevant 2022 FEUS Data for Maryland

Full Data Name	2022 Maryland (Thousands of dollars)
Landings Revenue	$78,567
Commercial Harvesters: Value Added	$61,551
Seafood Processors and Dealers: Value Added	$28,853

Step 2: Compute Shoreside Support Services Multiplier for each State

The shoreside support services multiplier for an individual State is calculated as:

[31] Value added is the value of an industry's output minus the cost of the industry's intermediate inputs. Value added is equivalent to the contribution of an industry to Gross Domestic Product (GDP).

$$M_{a,s} = 1 + \frac{(H + P)}{c}$$

Using 2022 data for Maryland, as an example, the following result is calculated:

$$M_{a,MD} = 1 + \frac{(61,551 + 28,853)}{78,567} = 2.15.$$ [32]

Step 3: Compute the State-Level Weighted Average Multiplier (W_S)

To estimate the total commercial shoreside support services multiplier (M_a), compute a multiplier for each State based on the State-level landings for a lease area as described in the FEIS for a particular project (see Table B-4).

Table B-4: Maryland Offshore Wind FEIS - Commercial Fishing Revenues and Landings

Table 3.6.1-2. Commercial fishing revenues (2022 U.S. dollars) and landings (pounds) by state within the Maryland Offshore Wind Project Lease Area (OCS-A 0490) displayed for the period between 2008 and 2022

State	Total 15-Year Revenue	Average Annual Revenue	Total 15- Year Landings	Average Annual Landings
Maryland	$1,243,000	$82,867	2,556,000	170,400
New Jersey	$940,000	$62,667	1,686,000	112,400
Massachusetts	$492,000	$32,800	127,000	8,467
Delaware	$485,000	$32,333	140,000	9,333
Virginia	$450,000	$30,000	92,000	6,133
Rhode Island	$131,000	$8,733	153,000	10,200
North Carolina	$50,000	$3,333	22,000	1,467
Connecticut	$14,000	$933	2,000	133
New York	$9,000	$600	4,000	267

Source: Developed using data from NMFS (2024).
Note: Data are for vessels issued federal fishing permits by GARFO. Landings and revenue are likely underestimated because they do not include vessels without GARFO permits and fishing for species managed by ASMFC or states and by NMFS for highly migratory species.

Source: Maryland Offshore Wind FEIS, Vol. 1 (boem.gov)

To calculate the State weights, divide the Annual Average Revenue found in the FEIS by the total Annual Average Revenue. Using Table B-4, the weighting for Maryland would be:

$$W_{MD} = \frac{c_{MD}}{c} = \frac{\$82,867}{\$254,266} = 0.33 .$$

Then multiply the weights for each State by the shoreside support services multiplier ($M_{a,Si}$) for each State and sum the results:

[32] This result is rounded to 2 decimal places.

$$\boldsymbol{M_a} = \left(\boldsymbol{W_{S1}} \times \boldsymbol{M_{a,S1}}\right) + \left(\boldsymbol{W_{S2}} \times \boldsymbol{M_{a,S2}}\right) + \cdots + \left(\boldsymbol{W_{Si}} \times \boldsymbol{M_{a,Si}}\right).$$

As a simplified example, assume a project had landings only in Virginia and Maryland. If:

$$W_{MD} = 0.6$$
$$W_{VA} = 0.4$$
$$M_{a,MD} = 2.15$$
$$M_{a,VA} = 2.17$$

Then:

$$M_a = (0.6 \times 2.15) + (0.4 \times 2.19) = 2.17.$$ [33]

[33] This result is rounded to 2 decimal places.

Appendix C. Data and Methodology for Developing Revenue Exposure Estimates in the Northeast Atlantic

This appendix has been developed to aid lessees with offshore wind energy leases specifically in the Northeast Atlantic, from Gulf of Maine to Cape Hatteras, to develop revenue exposure estimates for assessing potential effects of their projects in their construction and operations plans (COP) and develop compensatory mitigation of lost income to fisheries as a result of offshore wind energy development, as appropriate. The datasets discussed are exclusive to Northeast States and the National Marine Fisheries Service (NMFS) Greater Atlantic Regional Fisheries Office (GARFO). Guidance for revenue exposure data and methodologies for other regions may be developed later.

BOEM has developed this guidance in consultation with State and Federal partners, including NMFS. However, this guidance is wholly the product of BOEM. Fisheries science and identification of past, current, and future fishing activity in the Northeast Atlantic is highly dynamic and influenced by several factors, including but not limited to fisheries management, market conditions, potential biological impacts from offshore wind development, and changing conditions brought about by climate change. Thus, data representing fishing operations are inherently variable and complex, increasing the uncertainty when evaluating economic exposure and potential compensation estimates for individual wind energy projects.

Commercial Fisheries

As discussed in *Guidelines for Mitigating Impacts to Commercial and For-Hire Recreational Fisheries on the Outer Continental Shelf*, BOEM recommends that analyses of fisheries compensation plans begin with assessing the revenue exposure of actions proposed in the COP that may disrupt or displace fishing activity. Revenue exposure is the total amount of fishery revenue generated within a defined area (e.g., an offshore wind energy project area) and based on historical data that could be foregone if vessel operators no longer fish within that area due to offshore wind energy construction and operation activity. Specifically for the Northeast U.S., BOEM's Technical Working Group described revenue exposure as:

> the total amount of fishery harvest or landings and revenue generated within a defined area (e.g., an offshore wind energy project area) based on historical data that could be lost if vessel operators no longer fish within that area due to vessel, gear, or other physical impediments within or near an array, or are prohibited from fishing for other reasons such as navigation restriction or insurance requirements. Exposure is not the same as impact which may also include up and downstream losses, losses due to transit time and cost, and other potential losses. Potential fishing losses/costs include but are not limited to gear damage/loss and resulting lost fishing opportunity, displacement, increased transit times around projects and associated costs (fuel, loss of fishing time, etc.), loss of dock space,

> increased insurance costs, decreased quotas due to increased assessment uncertainty resulting from disrupted or decreased independent survey data, social and cultural value impacts to communities and devaluation of business are not reflected in these exposure products.

The "exposure products" referred to above is from the NMFS/GARFO fishery footprint and related socioeconomic impacts of Atlantic offshore wind development (see link in Table 1 below). However, it should be noted that revenue exposure derived exclusively from the NMFS/GARFO fishery footprint does not include factors such as revenue from State-managed fisheries that occur on the OCS, potential increased operational costs, project-specific contributions to cumulative impacts, and projections of future impacts based on species/fisheries trends. For example, there could be cyclical biological trends, market disruptions like a global pandemic, that could influence the annualized average revenue. Furthermore, that dataset does not include all fisheries affected by wind projects, particularly State-managed fisheries, such as Atlantic menhaden and conch/whelk fisheries. The design of these methods was based on the need to manage fisheries, not to address offshore wind assessments and compensatory mitigation programs. Basing compensation reserve funds only on NMFS/GARFO fishery footprint economic exposure may result in funds being inadequate to cover valid compensation claims raised throughout project preparation, construction, operations, and decommissioning for some fisheries. BOEM believes there is a high degree of confidence in revenue exposure for those derived data products for the following fisheries:[34]

- Atlantic Herring
- Bluefish
- Golden Tilefish
- Mackerel/Squid/Butterfish
- Monkfish
- Multispecies Large Mesh (American plaice, Atlantic cod, Atlantic halibut, Atlantic wolffish, Haddock, Ocean pout, Offshore hake, Pollock, Redfish, Red hake, Silver hake (whiting), White hake, Windowpane flounder, Winter flounder, Witch flounder, Yellowtail flounder)
- Multispecies Small Mesh (silver hake, offshore hake, and red hake)
- Red Crab
- Sea Scallop
- Skate
- Spiny Dogfish
- Summer Flounder/Scup/Black Sea Bass
- Surfclam/Ocean Quahog

[34] A full glossary of fisheries terms used in this appendix is found here: https://repository.library.noaa.gov/view/noaa/12856

While NMFS reports on other species in its fishery revenue exposure data product, the ones listed above are the most complete and accurate. It is the responsibility of the lessee to ensure that the spatial footprint available on the NMFS webpage accurately reflects the proposed action in the lessees' COP. If the information is not correct, the lessee should work with BOEM and NMFS to request an analysis based on the proposed action. Data requests should include all years of data from 2008 up to the current available year be used to calculate the annualized revenue exposure. This request should occur prior to the Lessee's COP submittal to BOEM. Considerations for "data-limited" species and recreational fishing are described separately below.

While the revenue exposure calculations are a great resource, BOEM recommends that lessees also evaluate data derived from vessel monitoring systems to better understand finer scale vessel activity, annual variation in fishing activity, and transit routes to fishing locations.

Within the NMFS/GARFO region, individual Federal Fishery Management Plans (FMP) required Federal permit holders to use vessel monitoring systems (VMS) over time. The following list includes the year in which each FMP required federally permitted vessels to begin using VMS. There are publicly available VMS data products listed in Table 1 below.

- Monkfish: optional and elective on a yearly basis
- Atlantic Herring: 2005
- Northeast Multispecies (groundfish): 2006
- Atlantic Scallops: 2006
- Surfclam/Ocean quahogs: 2008
- Atlantic Mackerel: 2014
- Longfin Squid/Butterfish: 2016
- Illex Squid: 2017

It should be noted that there are some limitations to VMS. Not all Federal FMPs require VMS and some fisheries are not covered by VMS at all (note what is covered above). If a vessel is issued a permit in another Federal FMP that requires VMS, trips taken in non-VMS fisheries are mostly represented by a "DOF-COM" VMS trip declaration (e.g., a commercial fishing trip that is declared out of an FMP managed by days-at-sea effort controls). This activity cannot be assigned to a specific FMP or target species (e.g., summer flounder) unless each trip is corroborated with a vessel trip report (VTR) or other reported information. Additionally, a vessel can "target" one species and catch another—even in greater amounts—on any trip, limiting the utility of VMS trip declarations of vessel intent. Data from VMS can be difficult to link to dealer reports.

Other limitations to VMS are related to assumptions used when analyzing the data. Fishing time/location can be misestimated by operational assumptions (speed and direction) that are affected by externalities (weather, sea state, mechanical issues) and fishing practices (e.g., drifting to repair gear, sort/shuck catch, and store product). Further, differentiating harvesting activity from vessel transit can be inferred using vessel speed and course adjustment, while vessel speed and different position ping rates (30-60 minutes) can limit the area. Vessel course changes can be influenced by several factors. Harvesting speeds vary by fishery, and transiting speed depends on the vessel, weather, sea state, and other factors.

Table 1. Derived Fishery Revenue Exposure Products

Derived Fishery Revenue Exposure Products	
SOURCE	**TITLE**
NOAA NMFS	Fishing Footprints for the New England/Mid-Atlantic Region, https://apps-nefsc.fisheries.noaa.gov/read/socialsci/fishing-footprints.php
NOAA NMFS	Socioeconomic Impacts of Atlantic Offshore Wind Development, https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development?utm_medium=email&utm_source=govdelivery
BOEM	*Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic*: OCS Study BOEM 2017-012, Kirkpatrick, et.al.,[35] https://espis.boem.gov/final%20reports/5580.pdf
RIDEM (2017)	Spatiotemporal and economic analysis of vessel monitoring system data within wind energy areas in the greater North Atlantic, http://www.crmc.ri.gov/windenergy/vineyardwind/VW_EconExposureCommFisheries.pdf
RIDEM (2018)	Addendum: Spatiotemporal and economic analysis of vessel monitoring system data within wind energy areas in the greater North Atlantic, http://www.crmc.ri.gov/windenergy/vineyardwind/RIDEM_VWFishValue_20190114.pdf
Original Fishery Data Sources	
NOAA/NMFS	Vessel Monitoring System data (aggregated data available on NROC and MARCO data portals, trip level data not publicly available)
NOAA/NMFS	Federal fishing vessel trip reports and dealer reports
ASMFC	Atlantic Coastal Cooperative Statistics Program (public data warehouse accessible via sign up)

Data-Limited Commercial Fisheries

There are several species where there are substantial limitations to existing data sets for calculating revenue exposure. These data-limited species include, but are not limited to, American lobster, Jonah crab, whelk, Atlantic menhaden, Atlantic croaker, and highly migratory species (HMS). These species may be captured in the NMFS/GARFO fishery footprint data sets, however, they may not fully represent the actual revenue exposure for that fishery. For example,

[35] Please note that this study is similar to the NMFS Fishing Footprints product, but its methodology is different and would require significant additional work to achieve the same result that NMFS reports on currently in its Footprints product.

species like whelk/conch, horseshoe crab, and tautog are likely to have less than 50% of their landings captured in the NMFS/GARFO fishery footprint dataset. Species like Jonah crab and lobster may have good representation in the NMFS/GARFO data in Southern New England but less so for inshore areas in the Gulf of Maine. The lessee is advised to evaluate data sources including fisheries stock assessments, Atlantic Coastal Cooperative Statistics Program, Federal and State fishery independent and dependent surveys, industry owned data and knowledge (that ensures proper use of proprietary information e.g., Fisheries Knowledge Trust), and/or high-resolution bathymetry/habitat mapping. From this information, it is possible to apply a multiplier based on what is in the NMFS/GARFO data and what is captured in other data sources. This concept is visualized in Figure A2 of Attachment 1, which provides an estimate of representativeness of NMFS/GARFO VTR landings data when compared to total landings. Attachment 1 to this Appendix describes the limits of some of these species. Ultimately, BOEM recommends working collaboratively with State and Federal fisheries management agencies regarding all revenue exposure data, but this is especially important for data-limited species.

Recreational Fisheries

Recreational fishing sectors in the northeast U.S. include NMFS/GARFO permitted charter and party vessels, HMS charter vessels, and private recreational angling. Of these three categories of recreational fishing, only the NMFS/GARFO permitted charter and party vessels are included in the socio-economic assessments developed by NMFS for each project area (See Table 1). Since there is no dealer sale for recreational fisheries, NMFS uses the results from industry surveys to assign a for-hire passenger fee per reported trip (https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development) to determine the revenue exposure for this sector. NMFS does not use the fishery footprint method for party/charter vessels. Party/charter data reflects only the point locations identified by the vessel operator and there is no independent data source to verify and model fishing location as available for commercial trips (i.e., there are no observers on party/charter trips).

For assessing impacts to recreational fishing sectors other than NMFS/GARFO charter and party vessels, BOEM recommends conducting similar exposure estimates to Kirkpatrick et al.[36] with the most recently available data and using at least 5 years of data. The exposure is calculated by using the average annual percent of those trips from each State that occurred in the U.S. EEZ. It should be noted that this method may also not be inclusive of all vessels as some (e.g., HMS) may be traveling to fishing grounds that are farther away than the suggested 30 miles used in Kirkpatrick et al. The recreational fishing industry should be consulted on these methods.

[36] https://espis.boem.gov/final%20reports/5580.pdf

Shoreside Seafood Businesses

As described in *Guidelines for Mitigating Impacts to Commercial and For-Hire Recreational Fisheries on the Outer Continental Shelf*, there may be impacts not only to harvesters, but also indirect costs to shoreside businesses. Shoreside businesses can generally be categorized as upstream (e.g., bait suppliers, ice suppliers, and other provisioning for harvest trips) and downstream (e.g., seafood dealers and processors). BOEM recommends using the Seafood Industry Impacts tool[37] (using State-specific economic impact tables based on the Fishery Economics of the United States report (2019) and IMPLAN (a cloud-based economic impact modeling software) to assess impacts to seafood dealers and processors, as well as upstream businesses. The Seafood Industry Impacts tool provides information on total impacts, as well as for commercial harvesters, seafood dealers and processors, importers, seafood distributors, and retail for jobs, sales, income, and value added for both with and without imports. However, there are other sources and methods, including fishery-specific methods or region-specific data, that may be applicable and should be considered.[38] Examples include:

Munroe, D.M., Powell, E.N., Klinck, J.M., Scheld, A.M., Borsetti, S., Hofmann, E.E. 2022. Understanding Economic Impacts to the Commercial Surfclam Fishing Industry from Offshore Wind Energy Development. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2022-065. 61 p

Bennet et al. (2021) Socio-economic monitoring and evaluation in fisheries https://www.sciencedirect.com/science/article/pii/S016578362100062X

Qu et al. (2021) Energy-food nexus in the marine environment: A macroeconomic analysis on offshore wind energy and seafood production in Scotland https://www.sciencedirect.com/science/article/pii/S0301421520307382.

Scheld, A.M., 2020. Economic Impacts Associated with the Commercial Fishery for Longfin Squid (Doryteuthis pealeii) in the Northeast U.S. Science Center for Marine Fisheries

De Backer et al (2019) Fishing activities in and around Belgian offshore wind farms. winmon_report_2019_final.pdf (naturalsciences.be)

King, et.al., Economic Exposure of Rhode Island Commercial Fisheries to the Vineyard Wind Project, 2019

Rhode Island Department of Environmental Management, Rhode Island Fishing Value in the Vineyard Wind Construction and Operations Plan Area, 2019

[37] Fisheries Economics of the United States: Data and Visualizations | NOAA Fisheries

Sproul letter, 31 May 2019 and King response, 14 November 2019, in Vineyard Wind's Construction and Operations Plan, volume 3, appendix 3. https://www.boem.gov/sites/default/files/documents/renewable-energy/Vineyard-Wind-COP-Volume-III-Appendix-III-P_0.pdf

Hoagland et al. (2015) An approach for analyzing the spatial welfare and distributional effects of ocean wind power siting: The Rhode Island/Massachusetts area of mutual interest https://www.sciencedirect.com/science/article/pii/S0308597X15000925

Murray (2016) Economic Activity Associated with SCeMFiS Supported Fishery Products available at https://scemfis.org/wp-content/uploads/2020/02/Ec_Impact-tjm_rm2.pdf

Each method has constraints and possible methodological biases. For instance, IMPLAN[39]/ input-output type models may overestimate downstream revenue impacts given they do not allow input substitution (e.g., a processing company may substitute imports in instances of reduced landings, which would reduce the magnitude of downstream losses/revenue impacts). Lessees should discuss methods to calculate indirect revenue exposure with State and NMFS/GARFO staff.

Standards for Reporting and Forecasting Revenue Exposure

When developing statistics on past fishery revenue exposure to forecast future revenue exposure and potential impacts from the proposed project, the lessee should consider information such as stock assessments, fisheries management actions, market conditions, and other factors that may influence revenue and landings over the period of the data analysis. For example, are fishery landings on an increasing or declining trend? What conditions are driving the trend? Are there old or new management measures that may result in a changed distribution of fishing effort? It is important to understand the data to accurately assess future revenue exposure and impacts.

Revenue exposure analyses included in plans should use the GDP Implicit Price Deflator for standardizing dollar amounts across years. The GDP Implicit Price Deflator is also the standard used by NMFS in fisheries management analyses.

[39] https://www.st.nmfs.noaa.gov/documents/Commercial%20Fishing%20IO%20Model.pdf

Attachment 1: Data-Limited Species Snapshots[40]

Whelk

Commercial Fishery: The whelk commercial fishery exists along the US Atlantic Coast and is mainly targeted by pots. Knobbed and channeled whelk are the primary species landed for most States, with lightning whelk also occurring in lesser amounts from Virginia to Georgia.

Where: US Atlantic Coast from Massachusetts to Georgia, with most of the commercial fishing occurring in the mid-Atlantic and New England regions.

Management: Whelk, sometimes called conch, is managed State by State, with minimum legal sizes (MLS) and reporting requirements varying by State. There is no FMP or Federal permit required.

Harvest and Data Reporting: Harvest occurs in both the EEZ and State-managed waters but no Federal reporting requirements exist. VTRs are submitted only by vessels that carry Federal permits for other species. Whelk is included in Federal VTRs as bycatch when targeting other species, and Federal VTR, dealer data, or fishing footprints should not be considered definitive sources of whelk catch and effort information.

All States have mandatory landings reports for whelk harvested in State waters. However, not all whelk landings are reported by species, dealer reporting is not mandatory among all States, gear type is not always reported, and not every State conducts biological sampling. The minimum landing size is not consistent among States, with some States lacking any kind of size regulation, which biases landings towards States with preferable regulations. Landings data are inconsistent among States (varies with type of gear used, average landings by pound, and recent landings trends).

Value of Commercial Fishery: Unspecified

Data Snapshot: Years of available data are unknown. A multi-State working group was established in 2021 to collect current information on the status of whelk along the coast, with the goal of producing a summary white paper in 2022.

Summary: Whelk data primarily reside within State-specific data programs and is unlikely to contain consistent location information. When the white paper is available in 2022, data summary should be reassessed.

[40] This list is not comprehensive of all data-limited species with the potential for OSW interaction, such as shrimp, smooth dogfish, spot, and others.

Jonah Crab (*Cancer borealis)*

Commercial Fishery: Jonah crabs were initially taken as bycatch in the lobster fishery along the Atlantic coast. Over the last two decades, landings have increased to a directed fishery in Southern New England, primarily using trap gear. In some areas, such as Maine, reports for Jonah crab may also include rock crab. The Jonah crab harvest in Maine is still a bycatch fishery. Note: The magnitude of the Jonah crab recreational fishery is unknown at this time but is believed to be quite small compared to the commercial fishery.

Where: Atlantic coast, with MA and RI the largest reported landings.

Management: Cooperatively managed by States and NOAA through the Atlantic States Marine Fisheries Commission (ASMFC). An FMP exists for Jonah crab, however, there are no stock assessments or established biological reference points for this stock. A stock assessment is planned for 2022.

Harvest and Data Reporting: At the Federal level, Jonah crab landings are reported on VTRs only if a vessel has a Federal permit for another species. There are no Federal report requirements specific to Jonah crab. Based on a preliminary evaluation, Federal VTRs capture most of the total annual Jonah crab harvest from 2014-2019. Federal VTR coverage is higher offshore, and lower closer to shore, and most landings are from offshore areas.

States have a variety of reporting requirements. Most harvesters targeting Jonah crab that are not required to fill out Federal VTRs, are required to file State harvester reports, which include inshore State Statistical Reporting Area, or NMFS sub areas, NMFS Statistical Areas in the EEZ and/or LCMA. Like lobster (see Lobster section, below), this changed in 2021 to report by ten-minute squares. The State harvester reports from Maine have the same subsampled limitations as lobster.

Value of Commercial Fishery: In the early 2000's landings began to increase. In 2019, landings totaled approximately 16 million pounds of Jonah crab, representing $13.1 million in ex-vessel value (https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states). Note that this is likely an underestimate of Jonah crab landings because of the species identification issues in Maine, but also that most landings are happening in southern New England. This could be underestimated as much as 1-2 million pounds in recent years, and as such would not be reflected by VTR's.

Data Snapshot: Data is available for ≥ 10 years, although data prior to 2008 may not be useful for assessing the current status. Federal VTRs likely capture most of the total Jonah crab harvest in recent years. NMFS statistical area data is consistently available across all States and Federal reports, with some latitude/longitude information available through VTRs.

Summary: Federal VTR coverage is reasonably good for harvest information. State data can supplement if needed in areas of lower VTR coverage.

Atlantic Menhaden (*Brevoortia tyranus)*

Commercial Fishery: Atlantic menhaden is the largest east coast fishery by volume and is executed primarily in both the EEZ and State-managed waters using purse seines. The fishery includes commercial bait and reduction harvest and operates from Maine through North Carolina, with State regulations varying down the coast. Note: Menhaden are also important bait in many recreational fisheries and are captured by cast nets or hook-and-line for recreational use.

Where: Commercial harvest occurs from Maine through North Carolina, with the highest commercial bait landings in NJ, ME, and MA. Reduction landings only occur in VA.

Management: ASMFC regulated the fishery and leads the stock assessments, but reduction harvest information is submitted to the NMFS Southeast Fishery Science Center (SFSC).

Harvest and Data Reporting: At the Federal level, bait landings are reported on VTRs and dealer reports only if a vessel has a Federal permit for another species. There are currently no Federal permits for the menhaden fishing. Atlantic menhaden catch is included in Federal VTRs as bycatch when targeting other species and Federal VTRs and dealer reports should not be considered the primary source of Atlantic menhaden catch and effort data.

States have a variety of reporting requirements. Approximately 50% of landings from 2018-2020 are captured on State-level VTRs, which include latitude/longitude fishing location information. The remaining bait harvest reported at the State level does not include fishing location information. Reduction landings, which only occur in Virginia, are reported through Captain's Daily Fishing Reports (CDFRs), which include detailed location and harvest information for each purse seine net set. CDFRs are submitted to the SFSC, but access to detailed information is limited due to data confidentiality. Most commercial menhaden landings in the Atlantic occur within 3 miles of shore (154,362 mt to 42,192 mt respectively).[41]

Value of Commercial Fishery: From 2011-2020, the total commercial landings average approximately 192,000 mt annually, of which about 142,300 mt are reduction and 49,600 mt are bait harvest. Monetary value of this fishery is unspecified. Note: Estimated recreational harvest in 2020 is approximately 1,157 mt, and monetary value is unspecified.

Data Snapshot: Data is available for ≥10 years. Federal VTRs capture about 7.5% of the total harvest. From 2018-2020, approximately 50% of bait landings are captured in State VTRs. The remaining bait landings are reported at the State level and are unlikely to include location information

Summary: State-specific harvest reports may be the best source for locationally linked data

[41] https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states

(depending on the State), but Federal VTRs should also be integrated because they have location data for every trip. Some sort of correction or extrapolation may be needed to fill gaps.

Atlantic Croaker *(Micropogonias undulatus)*

Commercial and Recreational Fisheries: Atlantic croaker can be found from the Gulf of Maine to Argentina, but along the US Atlantic coast, they are most abundant from the Chesapeake Bay to northern Florida. Croaker is targeted by commercial and recreational fishers. The primary commercial gear in North Carolina and Virginia is gillnets, although trawls have been historically used. Atlantic coast commercial landings of Atlantic croaker exhibit a cyclical pattern, with low harvests in the 1960s/1970s and the 1980s/1990s, and high harvests in the mid-to-late 1970s, mid-1990s to early 2000s. Recreational fishing landings have also been variable over the last four decades.

Where: Atlantic coast, although Virginia harvests the majority of recreational croaker while North Carolina lands the majority of commercial croaker, followed closely by Virginia.

Management: Managed by ASMFC using a traffic light approach.

Harvest and Data Reporting: Spatial data is not consistently available through VTR reports as croaker is not a federally managed species. Federal VTR coverage is higher offshore, and lower closer to shore. North Carolina harvest is tracked through the State's trip ticket system which has spatial data categorized as either ocean waters 0-3 miles or greater than 3 miles and north or south of Cape Hatteras. Virginia Ocean spatial data can only be categorized between State waters and the EEZ. Nearly all recreational harvest occurs within 3 miles of shore. Commercial harvest has more landings greater than 3 miles from shore than less than 3 miles from shore (https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states).

Value of Commercial and Recreational Fisheries: An estimated 5 million pounds of croaker were landed in 2020, with approximately 16% landed by the commercial sector and 84% harvested by recreational anglers. The monetary value of these fisheries is unspecified.

Data Snapshot: Data is available for ≥10 years. States have different levels of spatial categorization.

Summary: State harvest data may be the best source but is unlikely to contain latitude/longitude data.

Highly Migratory Species (HMS) - commercial and recreational fisheries

Fishery: Highly migratory species, such as tunas, sharks, swordfish, and billfish, travel long distances and cross domestic and international boundaries. They are targeted commercially and recreationally, using a variety of gears (longlines, seines, gillnets, and hand gear). HMS commercial fisheries are mostly offshore, while recreational fisheries may tend to overlap potential wind energy call areas. Tournaments and for-hire fisheries occur for HMS in the Atlantic

Where: US Atlantic Coast and Gulf of Mexico

Management: Atlantic HMS are managed by NOAA and require different permits for different activities.

Harvest and Data Reporting: Commercial VTR data is limited for HMS in the northeast. Commercial reports for HMS are in logbooks, including location and landings, with fishing efforts generally offshore of wind call areas. Dealer reports may be able to be matched with logbooks but would require a deep dive.

Recreational fishing may occur more in areas that can be impacted by wind energy. In 2018, over 20,000 HMS permits were issued and there were more than 200 HMS tournaments. Some recreational catches are reported at the Federal level, and some are reported at the State level (e.g., NC and MD).

Value of Fishery: Atlantic HMS recreational fishing is worth approximately $510 million. Although not readily available at the regional level and aggregated for all HMS species, in 2019 landings of tuna species alone by U.S. fishermen at ports in the United States, American Samoa, other U.S. territories, and foreign ports were 526.1 million pounds valued at $407 million. These tunas were also largely captured greater than 3 miles from shore.[42]

Data Snapshot: Years of available data are unknown.

Summary: Locational data may be difficult to determine from permits and reports. Landings and logbook data may contain some locational information, especially from commercial and tournament fishers. Pelagic survey and tagging could provide a proxy for species' distribution but aggregating that data to draw conclusions about impact may be difficult.

[42] https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states

American Lobster (*Homarus americanus)*

Commercial Fishery: The lobster commercial fishery is one of the most valuable fisheries along the US Atlantic Coast and is targeted primarily by pots. Historic stock numbers have fluctuated along the coast, but total commercial landings have steadily increased over the last three decades. Currently, Gulf of Maine/Georges Bank stock is at record high abundance, whereas Southern New England stock is depleted. Note: Lobster is harvested recreationally by pots and SCUBA, but overall recreational harvest is unknown and believed to be negligible compared to the commercial fishery.

Where: ME to NC, with most landings occurring in ME and northern New England.

Management: Cooperatively managed by the States and NOAA through the ASMFC. There are seven lobster conservation management areas (LMCA).

Harvest and Data Reporting: Federal VTR data varies by LCMA and NMFS Statistical Areas because VTRs were not historically required for vessels that did not hold other Federal permits.

Since 2008, 100% dealer reporting at the trip level has been required in all States. State and Federal dealer data includes statistics for value, landings, number of transactions, and port but generally cannot provide spatial data for where the lobsters were caught. For Maine, assumptions can be made for NMFS Statistical Area where lobsters were caught using dealer reported ports. Landings in other States cannot use the port as an approximation of area fished given the proximity of important ports to multiple areas, however, NMFS Statistical Areas, or smaller sub-areas, are reported in harvester reports to those States.

Since the early 2010s, 100% harvester logbook reporting has been required in all States except Maine. In most cases outside of Maine, this requirement to report to the State also applied to Federal permit holders exempt from VTR reporting. In most States, these harvester logbooks can be used to characterize the spatial footprint of the fishery, including activity occurring in Federal waters conducted by permit holders landing in that State, though it is generally limited to the large NMFS Statistical Area definitions. Spatial information was collected at the inshore State Statistical Reporting Area and/or NMFS Statistical Areas and LCMAs through 2020 and beginning in 2021, ten-minute square reporting, in addition to the traditional area reporting, became mandatory through ASMFC Addendum XXVI. This first year of higher resolution spatial data will become available for analysis later in 2022. For Maine, from 2008-2018, a randomly selected 10% of each zone and each license class were required to report via harvester logbooks. This changed to an optimized random selection in 2019. All States will require 100% harvester logbook reporting by 2023. A currently pending ASMFC Addendum XXIX may make vessel tracking mandatory for Federal permits in the coming years.

For several States including Connecticut, Massachusetts, and New York, State harvester logbooks reported inshore State Statistical Reporting Areas, which in many cases are equivalent

to NMFS sub-areas, and/or NMFS Statistical Areas as spatial units prior to 2021. Others solely required NMFS Statistical Areas. In Maine, the available harvester logbooks provide a coarse resolution of reports by Maine Lobster Management Zone and distance from shore (0-3nm, 3-12nm, and 12nm+). To offer a gross characterization of the Maine lobster fishery, a spatial layer has been developed using a combination of the Maine dealer and harvester logbook data to extrapolate the landings, trips, and value by zone and distance from shore. As noted above, selection of the 10% sub-sample of the Maine fleet, prior to 2019, was not based on activity, so the number of licenses reported annually within each zone, especially outside of 12 nautical miles, varies from few to none so multiple years are necessary to estimate the offshore areas. This creates a patchwork of polygons that can characterize the intensity of annual landings, value, or trips per square mile, but is unable to describe the importance of some habitats over others. This assumption of equal distribution of the resource over large areas provides uncertainty around the extrapolation in Maine and nuanced or detailed spatial analyses beyond the NMFS Statistical Areas or sub-areas are not feasible in any region.

Value of Commercial Fishery: In 2021, the ex-vessel value for Maine alone was estimated to be $725 million lbs. In 2019, approximately 126 million lbs. were landed coastwide, representing $630 million in ex-vessel value. In 2016, landings peaked at 159 million pounds coastwide.

Data Snapshot: Data is available for ≥10 years. For most States (excluding Maine), 100% dealer and 100% logbook reporting have been required since 2010, but spatial information may be variable prior to 2021. For Maine, a spatial analysis tool using dealer and harvester logbooks can extrapolate some landing, value, and trips by zone and distance from shore, but has some uncertainty about habitat importance and equal distribution.

Summary: Federal VTR coverage is higher offshore, but lowest where the highest landings occur inshore (See figures C-1 and C-2 below). Dealer and harvest logbooks may provide some spatial coverage for most States. Maine’s analysis tool can be useful but has some caveats.

Figure C-1. Percentage Combined 2014-2018 Lobster Landings by Statistical Area. The landings by Statistical Area were estimated by States through the ASMFC Lobster Assessment process. The Lobster Conservation Management Area (LCMA) lines are included for reference.

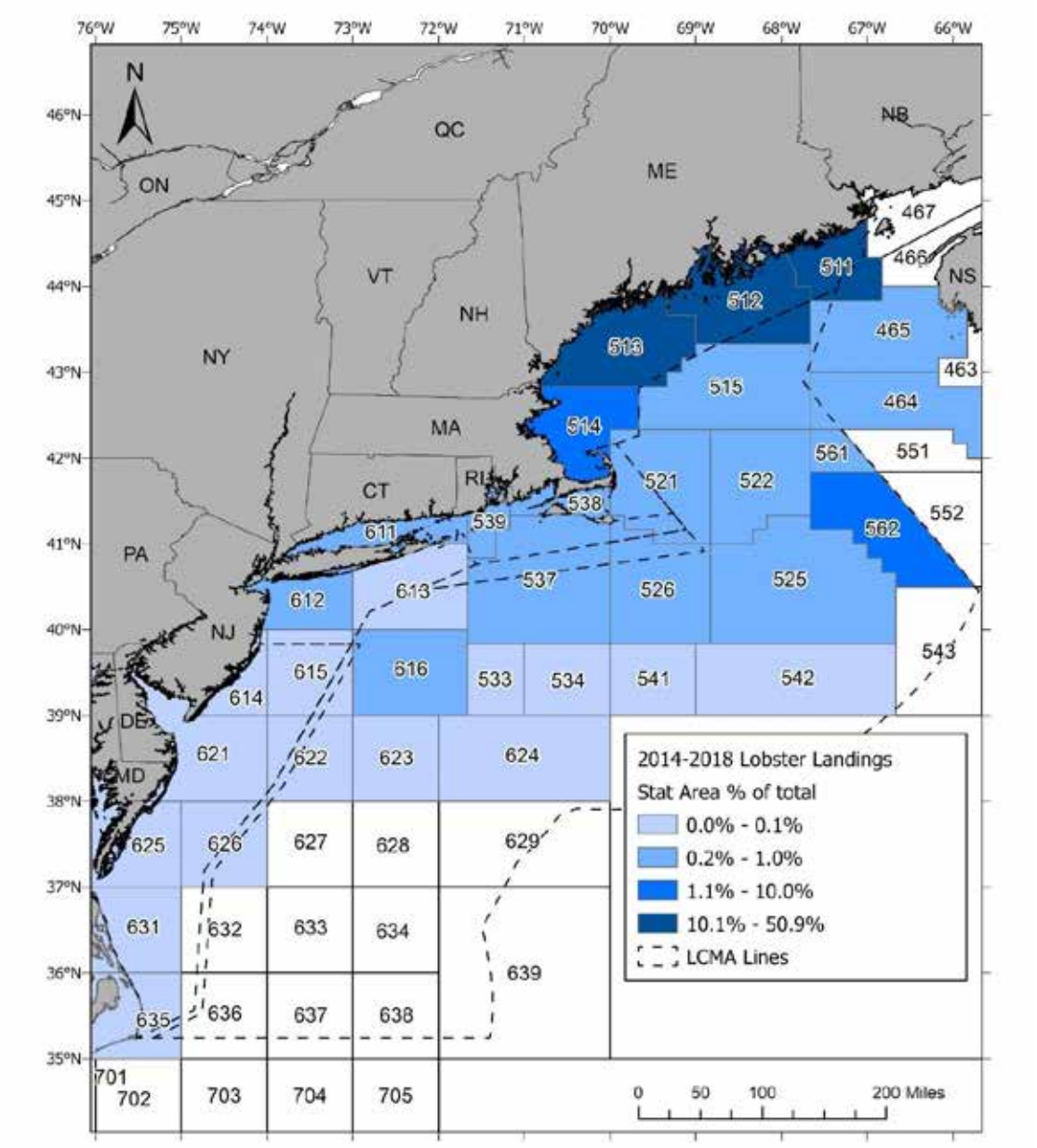

Figure C-2. 2014-2018 combined VTR Landings/Total Landings by Statistical Area. Some areas were grouped: 533/534/541/542 and 620's/630's. Areas in hatched blue have VTR landings that are greater than the assigned total landings for those statistical areas and should be used with caution. LCMA lines are overlayed for reference.