MARINE RESOURCES SUMMARY OF INDUSTRY ENGAGEMENT AND SITING INFORMATION FOR PROPOSED OFFSHORE WIND RESEARCH ARRAY

MAINE DEPARTMENT OF MARINE RESOURCES

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1 Summary of Work & Role of Department of Marine Resources

As an executive branch agency whose purpose, as established in statute, is to conserve and develop marine resources, conduct scientific research, promote and develop Maine's coastal fishing industry, and to advise local, state and federal official concerning activities in coastal waters, the Department of Marine Resources (DMR) is not an advocate for, or against, the proposed research array. Our role is to ensure that the Governor's Energy Office (GEO), who is the lead for this project, has all the information necessary regarding potential concerns, impacts, and opportunities related to this project to make informed decisions about how to move forward.

DMR was asked by GEO in 2020 to provide support for the development of this proposal. Specifically, DMR was asked to gather and analyze available geospatial information for an area that had been determined by GEO using preliminary siting criteria. These siting criteria included: 1) 20-40 statute miles from shore; 2) greater than 150 feet of water; 3) within 40 miles of headland within range of two potential interconnection points—Wyman Station, Yarmouth, Maine or Maine Yankee, Wiscasset, Maine; 4) benthic substrate of mud or gravel; 5) minimizing conflict with known fishing grounds; 6) avoiding highly trafficked areas; and 7) limiting visibility from shore. This resulted in an identified Large Area of Interest (Large AOI) of approximately 770 square miles. Detailed discussion of the data that DMR evaluated can be found beginning on page 6 of this document. Figure 1 shows an overview map of the Large Area of Interest.

DMR worked closely with GEO to provide informational and public input opportunities regarding the proposed research array, both for the general public as well as events specifically for fishing industry members and fishing representatives. DMR staff participated in all public meetings held by GEO, and also conducted an additional seven public meetings with Lobster Zone Councils and groundfishermen. DMR (and GEO) staff also had several meetings with fishing industry leaders and association directors throughout the winter of 2020/2021 to share information and solicit feedback. Additional one-on-one interviews were held as part of the data collection effort and are described beginning on page 22 of this document.

This document first provides a record of concerns identified by the fishing community (used here to refer to both commercial and recreational fishermen, their families and members of the broader fishing industry community such as advocacy and representative organizations). This may also include the views of some coastal residents but is not intended to characterize the perspective of municipalities or coastal residents in a universal manner. The concerns identified here may not be comprehensive and are not the opinions of DMR; rather they encompass the general range of topics and issues that were raised throughout DMR's outreach process. These concerns include issues that warrant additional research, as well as those that have a body of knowledge already developed in scientific literature, and also speak to some concerns that are outside of DMR's expertise or authorities. The State and Department's actions or answers responsive to these concerns are not captured in this document, but many are addressed in the Frequently Asked Questions sector of the GEO Offshore Wind Research Array website. Finally,

many of the questions and concerns raised are not yet answerable but may be able to be addressed through this proposed research array.

The other primary purpose of this document is to provide a summary of the approach DMR has used to gain a greater understanding of the Large AOI, with respect to the physical and biological features of the area and how existing commercial and recreational fisheries use the area. We integrate existing uses and development constraints to minimize impacts to marine resources and fisheries while advancing a Narrowed Area of Interest (Narrowed AOI) for consideration.

2 Fishing Industry & Fishing Community Concerns Regarding Offshore Wind

During the outreach and engagement period for the research array, Maine's fishing industry was facing a number of other significant issues that made it difficult to fully engage in dialogue around this project proposal. First, Maine's fixed gear fisheries (lobster and gillnet) are currently facing significant regulatory changes for the protection of North Atlantic right whales that are likely to dramatically change the operations of these fisheries in the future. A proposed rule impacting the lobster fishery and draft Biological Opinion (impacting a number of regional fisheries) was published during the stakeholder engagement and outreach period for the research array, and this important and complex issue took priority for many industry leaders and members who felt they were unable to divert attention to discussions around offshore wind. Second, although the entire state and nation are facing numerous challenges related to the ongoing COVID-19 pandemic, market impacts to the seafood sector from the pandemic caused economic harm that rippled throughout the sector, from harvesters through retail and restaurants, adding to trade policy impacts previously experienced in the export markets for several years prior. Industry consistently expressed frustration that the timeline for development of this project was too short, and that other more pressing policy matters required their full attention.

Remote communication methods, such as video conferencing and email/website-based information sharing, are not a desirable or reliable mechanism for effectively reaching fishing industry members in Maine but were the only possible options due to public health restrictions. Many industry members are not experienced with these platforms, rely primarily on mobile devices that make it difficult to follow visual presentations, or lack reliable internet connections needed to support effective teleconferencing technology. In the final month of the outreach period, DMR did offer small in-person meetings but only one group asked for such a meeting. Due to the pandemic and the time frame for application submission, additional in-person opportunities were not possible. We heard repeatedly from industry members that this conversation needed to be delayed until it could occur in person, so that a broader audience could be reached and given the opportunity to provide input in person.

The concerns most frequently identified about offshore wind by fishermen and fishing industry representatives focus on the potential growth and economics of offshore wind generally, not specifically this project. They are concerned about industrial scale development in the Gulf of Maine and are concerned that this project will open the door to increased development activity either in this location or elsewhere. They would like to better understand the drivers for

commercial scale offshore wind development and how this project might impact the speed with which commercial developments might be proposed. They also question whether, given increasing pressure for commercial development from renewable targets set by many states and the federal government, this project will be timely enough to inform future projects (as is one of the stated goals of the research array).

Fishermen and representatives from fishing communities were also strongly interested in seeing a detailed cost-benefit analysis that accounts for potential impact to their activity from both a resource and commercial perspective. Specifically, they identified concerns that their jobs were being undervalued compared to potential new jobs created by offshore wind platform construction and maintenance. They also raised concerns about the impact to all Maine residents, including whether the Maine ratepayers will see substantial increases from a power purchase agreement for the energy produced by the research array, and whether Maine would realize the benefits that are being outlined by the State in its justification for the project.

3 Fishing Industry & Fishing Community Concerns Specific to Maine's Proposed Research Array

From a siting perspective, fishermen emphasize that nowhere is a "good" location for offshore wind but acknowledge there may be places of less impact to fishing activity. Fishermen have been very reluctant to identify areas where less conflict might occur and strive to avoid pitting one sector or gear type against another by pushing the siting of the array into "someone else's backyard." They are concerned that impacts to resources and the ecosystem may occur regardless of where projects are sited. Fishing industry members and community representatives also regularly raised the concern that offshore wind was an additional constraint being placed on fishing activity when whale protection measures and other fishing restrictions were also occurring.

Environmental and ecosystem impacts are clearly a significant concern for the industry as well. DMR received many questions about how electro-magnetic fields around transmission and inter-array cables would impact commercially and recreationally important species. Impact to habitat, and especially essential fish habitat or habitat areas of particular concern, were identified as significant considerations for siting. Given the pressure on fixed gear fisheries in the Gulf of Maine related to protections for right whales, fishermen were also deeply concerned that the mooring systems might adversely impact whales or entangle fishing gear that could then cause a secondary entanglement for a whale. Any adverse impacts to whales from offshore wind are also likely to be difficult to assign purely to that development, and fishermen are very concerned that they will continue to bear the cost for future risk reductions that could be caused from offshore wind development rather than fishing gear.

When asked for feedback about the floating platform technology and mooring systems, fishermen had numerous questions and concerns. Given that dimensions and distances between anchors and moorings have yet to be determined, it was difficult for fishermen to provide specific

feedback. Generally, it was felt that the potential ability to fish around the structures will be significantly constrained by large anchor chains or synthetic catenary mooring lines between the turbines if they are sited 1 nm apart, even given that the majority of the scope will lay on the seabed. While decisions for anchoring could not be finalized without additional data on the substrate, the developer of the research array indicated openness to feedback from the fishing industry about what would enable greater potential for fishing within the array. However, with minimal details available given the early nature of the proposed project, it was difficult for fishermen to provide feedback. Much of the feedback DMR received was that these moorings will represent a hazard to both fixed and mobile gear and are likely to be too narrow a corridor between the turbines to safely fish inside the array. Testing fishing activity will require careful planning, safe conditions, and potentially, funding available to compensate for lost gear. Fishermen provided limited feedback about configuration or orientation of the lease, but transit corridors of a minimum of two miles seemed to be a more viable option for safe passage through the array and potential fishing activity within it.

Transmission cables were also a significant concern, both within and outside of the array. Within the array, both fixed and mobile gear fishermen were concerned that any potentially necessary mattressing to secure the cable to the seabed would present a hazard they would be unwilling to fish around out of safety concerns. Buried cable between turbines spaced farther apart seemed to be worth further consideration. Fishermen have heard stories of transmission cables not remaining buried in other offshore energy installations worldwide and are concerned that this could happen in the Gulf of Maine. Even if it is buried and fishing activity of any kind is allowed, mobile gear fishermen are concerned that repeated towing over the cable could result in its exposure and pose a safety risk. If it is mattressed, or fishing over the cable is not permitted, their valuable and historic tows may be interrupted. Fishermen of all gear types also are concerned about impacts to benthic habitat from the cable laying, whether through dredging or mattressing. Fishermen are also concerned that Maine's complex geology will result in cables being laid across seabed topography, especially since mud/soft bottom capable of deep burial is less common closer to shore. This would result in cables being unable to be buried, potentially hanging across higher points of topography, and requiring possible mattressing. This type of approach may pose safety hazards to fishing because gear can get caught on it more easily.

Survey work for the cable routes can also conflict with fishing activity; requiring gear to be moved, risking its loss, or involving operations that may interfere with short seasonal fisheries. Future survey work related to offshore wind development will require additional consideration and extensive coordination with area fishermen. As Maine is proposing to try to develop a shoreside support industry for job creation, fishermen fear maintenance for offshore wind farms may also increase vessel traffic that interferes with their fishing activity and increase competition for already-limited working waterfront. Finally, it is important to recognize that fishermen impacted by the cable route will be greater in number, and perhaps a different group altogether, than those impacted by siting of the research array or future developments. Identifying ways that all impacted fishermen can provide input into the decisions around cabling will be critical and should be viewed as an independent process from outreach addressing impacts from siting the turbines

themselves. Although DMR and GEO conducted outreach related to siting of the research array, New England Aqua Ventus will be responsible for the outreach related to siting of the cable route.

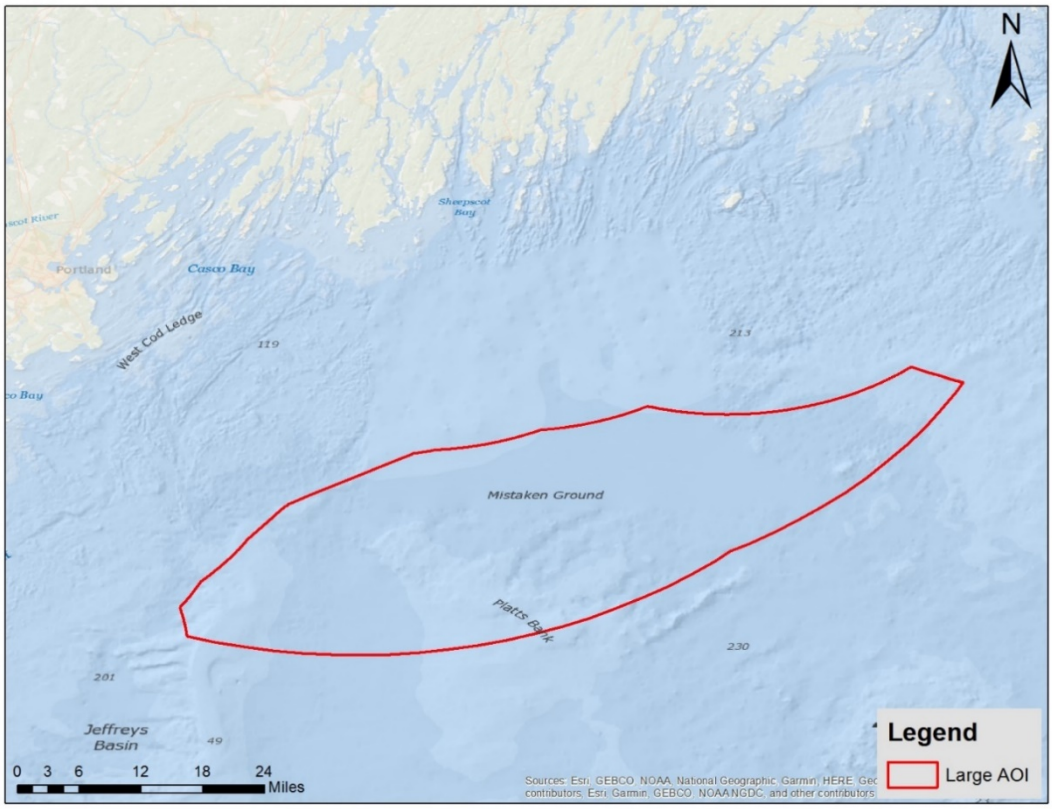

Figure 1: The Large Area of Interest for siting a 16 square mile wind research array.

4 Information Consulted and Received

The DMR made use of a wide array of publicly available data. Most of the information was accessed through public data portals and projected on maps of the Large AOI. Discussions with state and federal partners, commercial/recreational fishermen, fishing organizations and members of the public deepened our understanding of the data available and provided valuable suggestions for additional data sets that had direct relevancy to the siting discussion.

New data, specific to the Large AOI, was generated through data requests, survey responses and individual interviews. For landings and economic data, requests were submitted to the NOAA Northeast Fishery Science Center and internally through the DMR Landings Program. An online survey was conducted to identify interested parties and impacted individuals. Individual interview participants were identified by online survey results, direct contact to the DMR, or through referrals.

4.1 Federal Management Areas

There are several habitat management and groundfish closed areas, U.S. Coast Guard (USCG) restrictions, and U.S. Department of Defense (DOD) wind exclusion areas within the Gulf of Maine that preclude the development of offshore wind. Knowledge of these spatial closures were used to focus the area of interest for the offshore research array.

4.1.1 Habitat Management Areas

The habitat management areas (HMA) restrict fishing vessels that utilize mobile bottom-tending gear. Mobile bottom-tending gear refers to gear that comes in contact with the ocean bottom and is towed from a vessel which is then moved through the water during fishing in order to capture fish. Examples of mobile bottom-tending gear includes otter trawls, beam trawls, hydraulic and non-hydraulic dredges, and some seines. There are five HMAs sited in the Gulf of Maine: Eastern Maine, Jeffreys Bank, Ammen Rock, Cashes Ledge and Fippennies Ledge (Figure 2). The Western Gulf of Maine Closure (WGOM) area is considered an HMA, but also has additional designations.

4.1.2 Groundfish Closed Areas

Groundfish closed areas are present in the Gulf of Maine and may either be year-round, seasonal, or gear restricted areas. Areas that have been designated as groundfish closed areas have been chosen due to presence of essential groundfish habitat, juvenile nursery grounds, and/or presence of adult spawning aggregations.

There are two year-round groundfish closed areas in the Gulf of Maine: Cashes Ledge and Western Gulf of Maine (WGOM). There are also five seasonal cod protection closures, two of which have boundaries adjacent to the Maine coastline and extend to the south and east of WGOM from May 1 through June 30, annually.

Overlapping management designations occur within the WGOM groundfish closure, namely the designation of WGOM as an essential fish habitat (EFH) area. Areas denoted as EFH indicate areas of particular importance for the growth and reproduction of fish species. Additionally, the lower half of the WGOM has been designated as a dedicated habitat research area (DHRA). This designation went into effect in 2018 with the implementation of the Omnibus Habitat Amendment 2, that also created the above mentioned HMAs, to site areas of habitat interest specifically for conducting research related to benthic habitat in dynamic environments.

The Large AOI is situated west of Jeffreys Bank HMA and northeast of Cashes Ledge, Ammen Rock and Fippennies HMAs with no overlap. However, the western tip of the large AOI overlaps with the northeastern corner of the WGOM. Additionally, more than half of the AOI is situated in the GOM Cod Protection Closure II (NOAA website 2020).

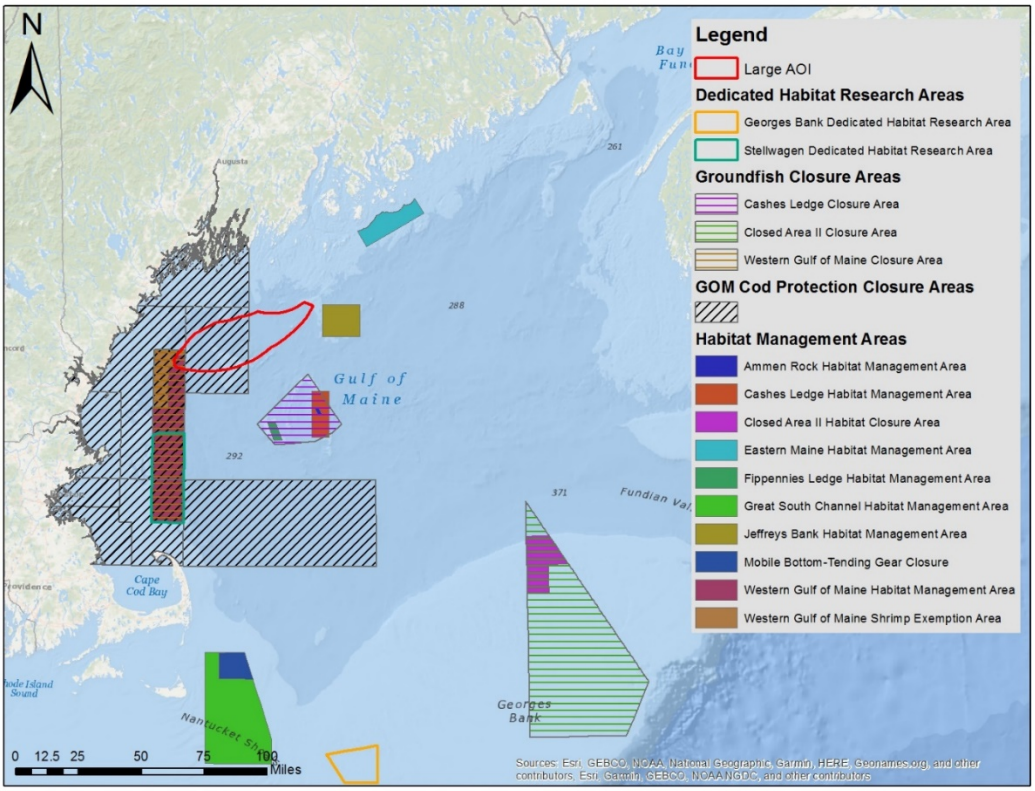

Figure 2: NOAA Areas of Interest in the Gulf of Maine.

4.1.3 Department of Defense Offshore Wind Mission Compatibility Assessments

The DOD has assessed the compatibility of offshore wind development with military assets and activities. This assessment categorized OCS wind development blocks into four categories based on their compatibility with military activities. Most notably, this layer indicates a significant area of 59 square miles in the eastern portion of the large wind area of interest as being Recommended for Wind Exclusion. These data and metadata are available here. See Figure 3 for details on the location of this area.

4.1.4 Shipping Lanes

Two major shipping lanes providing traffic separation schemes for Portland enter the broader wind area of interest. These shipping lanes are shown on Figure 3.

4.1.5 Shipping Lane Buffer

The USCG has recommended a 2 nm buffer adjacent to shipping lanes and a 5 nm buffer adjacent to the termination of a traffic separation scheme as part of the Atlantic Coast Port Access Route Study. Details of these criteria are examined on page 10 of the Enclosures. DMR has created buffers of existing shipping lane based on the USCG stipulations, as shown within the Large AOI on Figure 3. These transit buffers occupy 263 square miles of the Large AOI.

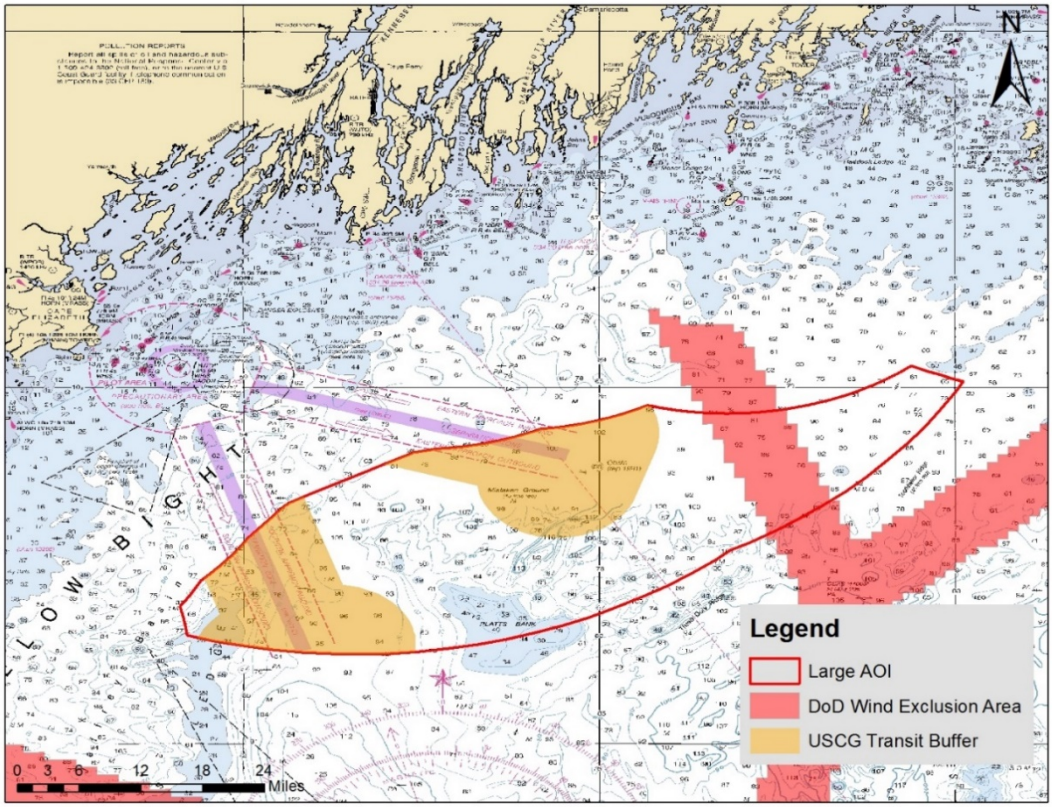

Figure 3: Map of the large AOI, DoD Wind Exclusion Area, and USCG Transit Buffer.

4.2 Northeast Ocean Data Portal

Many of the layers used for this siting discussion are available on the Northeast Ocean Data Portal (2021) (https://www.northeastoceandata.org/). Established in 2009, the Northeast Ocean Data Portal (NEODP) provides interactive maps and data on the ocean ecosystem, economy, and culture of the northeastern United States. The Portal was developed and is maintained by the Northeast Regional Ocean Council (NROC), but many organizations contribute.

4.2.1 Fishery Vessel Monitoring Systems

This series of maps provided by NEODP broadly characterizes Northeast multispecies (groundfish), Scallop, and Atlantic Herring commercial fishing vessel activity in the Northeast based on Vessel Monitoring System (VMS) data from 2006 through 2016 (full calendar years). The relative amount of vessel activity was indicated qualitatively from high (red) to low (blue). For purposes of this siting discussion, the displayed intensity was interpreted between zero (none) and three (high). The National Marine Fisheries Service (NMFS) describes VMS as "a satellite surveillance system primarily used to monitor the location and movement of commercial fishing vessels in the U.S." There are many New England fisheries not described through any VMS-derived maps.

4.2.2 Duke University Marine-Life Data and Analysis Team (MDAT)

The Department accessed species specific distribution and abundance using MDAT layers developed by Duke University. Predeveloped composite distribution and abundance maps were selected from the MDAT Individual Species products that characterize the predicted distribution and abundance of cetacean species or species guilds, or bird species, or the surveyed biomass of fish species. Marine mammals and species encountered by the NOAA Northeast Science Center trawl survey were used for characterization within the Large AOI. For more information on MDAT, see here.

4.2.3 Multibeam Sonar Surveys

Multibeam sonar surveys provide the highest resolution seafloor maps publicly available for analysis and visualization of bathymetry (water) depth, geological features and inference of bottom characteristics. High resolution bathymetry provided an essential tool for public communications, individual interviews and siting refinement within the Large AOI.

4.3 Commercial Fishery Landings

NOAA Fisheries has developed an analytical tool that estimates federal fishing activity in a specified area. These reports summarize landings by species, gear type, home port and fishery (Lee and DePiper 2018 and DePiper 2014). The summaries are based on combining data from Vessel Trip Reports (VTR),and dealer reports submitted by those issued a permit for managed species in federal waters (i.e., outside of three nautical miles from shore). VTR data provides a single point for each completed trip though an associated VMS may provide a track for the vessel. For fisheries represented, this provides spatially explicit data to estimate fishery use of the area. For fisheries not fully represented through VTRs and dealer data, such as lobster (reporting described below) and tuna, the reported use may be underrepresented or absent entirely. For brevity, we will report on impacted Federal Fishery Management Plans (FMP), impacted species, and ports.

The lobster fishery has a low coverage of federal VTRs because VTRs are not required for vessels that do not hold other federal permits. To provide a gross characterization of the Maine lobster fishery within the Large AOI, a combination of the Maine Dealer and Harvester Logbook Data can be used. The Dealer Data has 100% coverage of all trips and includes landings, trips, and port information where assumptions are made for the associated zone where species were caught.

The DMR Landings Program provided Harvester and Dealer Data to develop a revised estimate of lobster landings within the Large AOI. Harvester Data provides a coarse resolution of landings and effort data by zone and distance from shore (0-3 nm, 3-12 nm, >12 nm). Selection of the 10% sub-sample of the fleet, prior to 2019, was not based on activity, so the number of licenses that reported annually within each zone, especially outside of 12 nautical miles varies from few to none so multiple years are necessary to characterize the offshore areas. The Harvester Data provides a proportion of annual landings, trips, and value by the zone and distance from shore. These proportions are applied to the 100% Dealer Data to distribute the total landings, value,

and trips into each zone and distance from shore. This creates a patchwork of polygons that can characterize the intensity of annual landings, value, or trips per square mile, but is unable to characterize the importance of some habitats over others. Averages of 2016-2018 were used.

5 Characterization of the Large Area of Interest

5.1 Seafloor Characterization

The DMR and DMR's Maine Coastal Program consulted various data sources to gather information about the seafloor characteristics in the Large AOI. Available high-resolution bathymetry varies in the region and includes recently collected 4-8-meter grid size hydrographic quality bathymetry, older interpolated surveys, and the lowest quality lead line surveys from before the turn of the 20th century. The DMR Coastal Program worked with NOAA Office of Coast Survey to access recently acquired data in a large portion of the Large AOI that were not publicly available. These new surveys provided high-resolution data for over a third of the area (in the northern central and eastern portions) and were important in characterizing the area. There are still some regions of the Large AOI with extremely poor (red) or poor data quality (orange) (Figure 4). The Maine Geological Survey provided expert analysis using the available bathymetry maps to describe the geologic history, dominant features, and likely surficial sediment in the area. The DMR Coastal Program also consulted benthic habitat maps modeled by The Nature Conservancy (Greene et al. 2010) for a general understanding of the sediment and benthic species, however this habitat model is extremely limited for this area due to little underlying seafloor sampling information and so DMR also relied on expert understanding of benthic fauna assemblages and likely species dominance in the area based on recent surveys in similar depths and substrate types (Figure 4).

The Large AOI has several distinct bottom types (Figure 5). The shallowest banks are in two places. The northern end of Jeffreys Ledge extends into the far western region and fills most of the overlap in Lobster Management Zones F and G. This bank has depths from approximately 27 fathoms (165 ft, 50 m) at the shallowest, sloping down gradually on the eastern side to over 90 fathoms (540 ft, 165 m) (Figure 6). The shallowest depths are a sandy gravel and the flanks likely sand, based on studies southwest of the Large AOI (Ward et al., 2019). These are glacial sediments reworked by sea level excursions over the last 15,000 years. The second shallow area in the Large AOI is Platts Bank. This feature straddles the southern boundary, is relatively flat-topped in a shallowest depth range of less than 27 fathoms (165 ft, 50 m) to a broader expanse of 36-47 fathoms (220-280 ft, 67-85 m). These sediment on these areas are likely a gravel mixture supporting a wide variation in benthic species including arthropods, cnidarians (potentially soft corals), echinoderms, brachiopods and bryozoans (Greene et al. 2010). An area of shoals extends from Platts Bank that are likely gravelly sand with sand on the flanks. These shoals extend towards the northwest and form an approximately 2-mile wide deeper irregular valley between the northern edges of Jeffreys and Platts. Between these two banks there is a deep basin where the depths are greater than 90 fathoms (540 ft, 167 m) and the sediment is likely mud. This is the largest expanse of muddy soft bottom in the Large AOI. Uniform depths between the range of 90-100 fathoms (540-600 ft, 167-183 m) suggest sediment, likely mud, burial over bedrock hard

bottom. The benthic habitat in this area is likely dominated by annelids. Of note are numerous ice-berg keel marks or shallow troughs running in a south to southwest direction. These depressions do not appear to be seabed pockmarks that originate from natural gas escape (Figure 4).

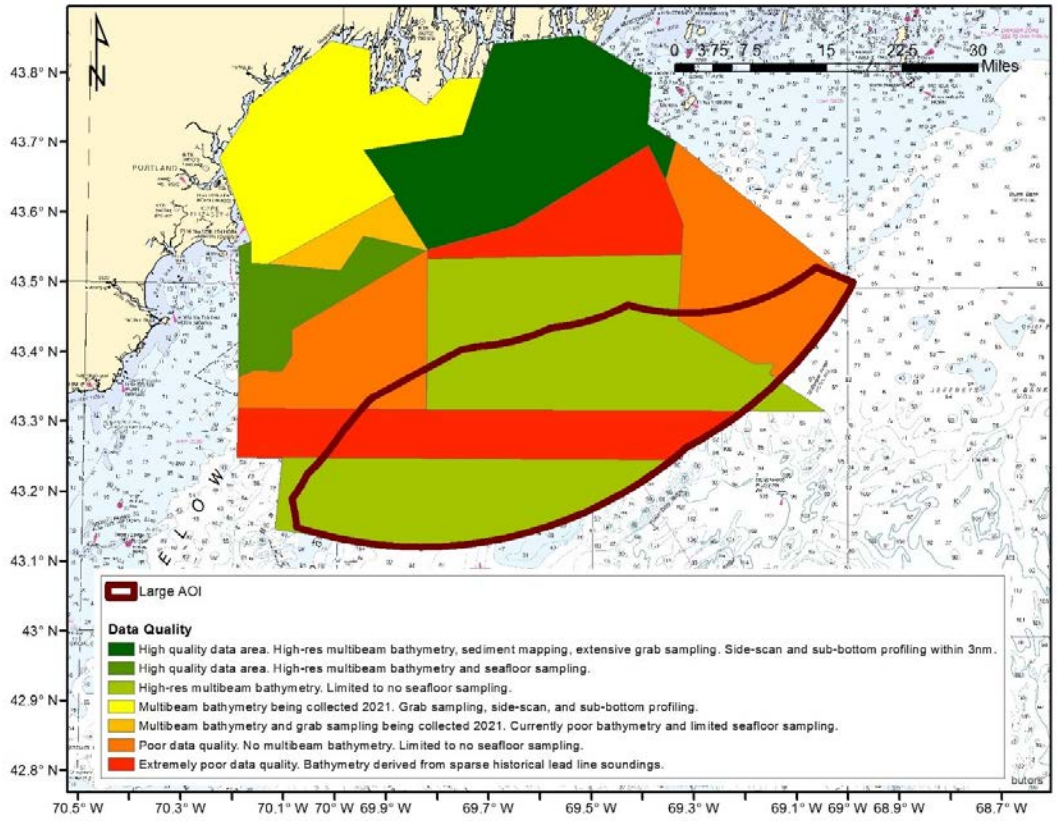

Figure 4: Seafloor Data Availability and Quality for areas within the Large AOI to the Maine Coast as of May 2021.

The central portion of Large AOI, composed of Mistaken Ground on the north side and extending south to Platts Bank (described above), is of moderate relief with a cover of glacial till including moraines and possibly eskers overlying shallow bedrock that give the bottom a ribbed structure at intermediate depths of 75-82 fathoms (450-490 ft, 137-150 m). Among these moraines are several deeper valleys extending to potentially over 108 fathoms (650 ft, 198 m) and are each approximately 1 mile wide and 6-10 miles long. The benthic species assemblages in this area are likely more complex than current models show as they were based on older bathymetry data that showed the area as more uniform than recent data collection shows. Because of the complexity apparent in new bathymetry and seafloor hardness maps, a wide variation of annelids, arthropods, mollusks, cnidarians (potentially soft corals), echinoderms, brachiopods and bryozoans are likely to be found in the area.

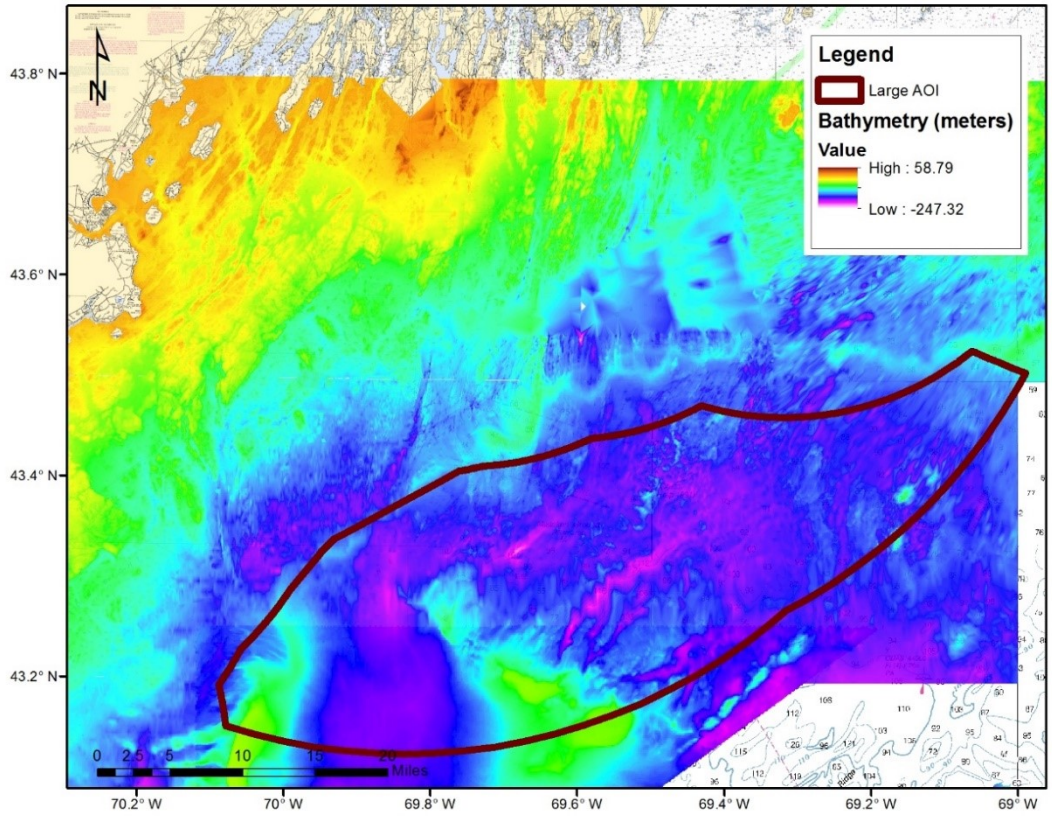

Figure 5: The bathymetry of Large AOI areas of high complexity (shoals, banks and ledges) and relatively low complexity basins.

The east central portion of the Large AOI is characterized by subdued relief (Figures 7 and 8) and is the second area in the Large AOI that contains a larger area where depths are consistently around 90 fathoms (540 ft, 167 m). The seafloor here is generally smooth and relatively flat in the vicinity of the eastern boundary of Lobster Management Zone E likely due to glacial sediments blanketing and subduing the bedrock relief. Recently acquired seafloor hardness data in a portion of this area show that surficial sediments here are likely mud in depths greater than 90 fathoms and a potential mix of sand and gravel deposited on shallow high ground. This large expanse of what is likely deep mud (sediment ground truthing would need to be performed to confirm this) would likely be dominated by annelids.

The easternmost portion of the Large AOI gradually shoals to the northeast with depths of 49-75 fathoms (295-450 ft, 90-137 m) and shows additional sediment deposition of pro-glacial sediment likely discharged from a calving ice margin grounded between the 12 nautical mile line and the Large AOI. North of the area, a large glacial moraine arcs across the seafloor. This position likely shed sediments into the AOI during glacial melting as the Laurentide Ice sheet thinned some 18,000-15,000 years ago. As a result, the bottom sediments are likely glacial mud, sand, and gravel subsequently reworked by surf and the burying of bedrock relief.

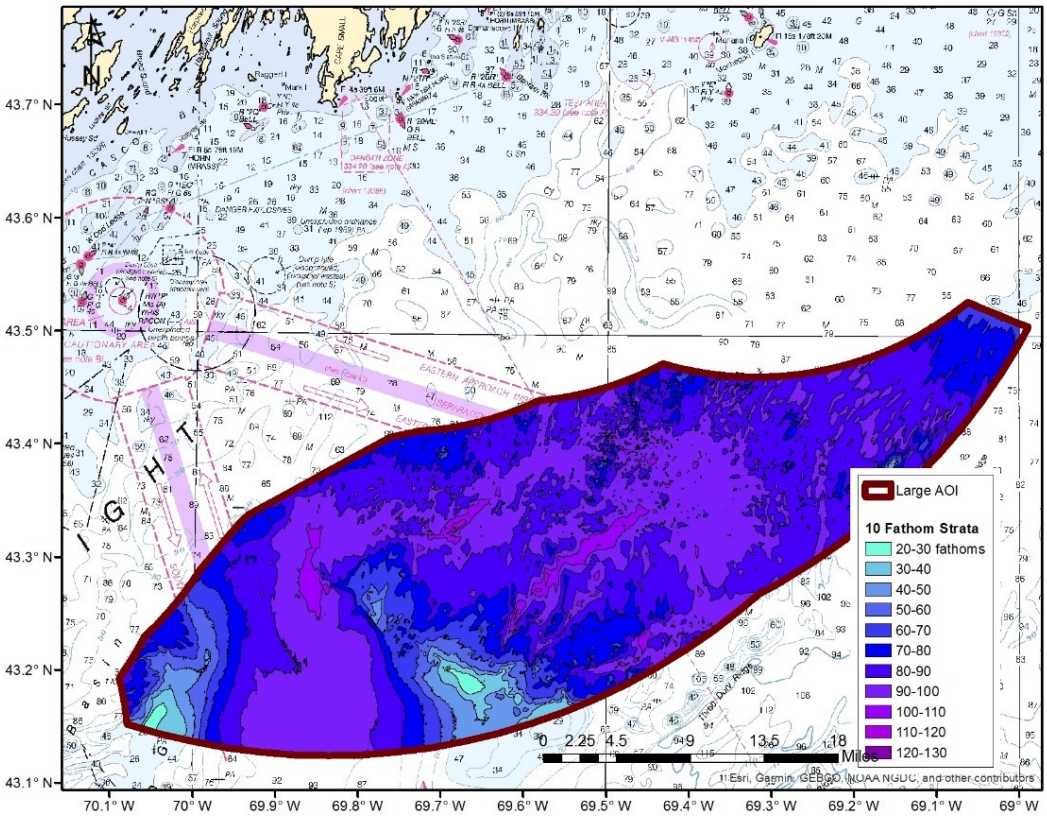

Figure 6: Depths in the Large AOI as ten-fathom strata.

The complexity of this area likely supports a range of benthic species assemblages, potentially dominated by annelids and arthropods (including shrimps) in the deeper, flatter areas and more complex assemblages in the northeast including arthropods, cnidarians (potentially soft corals), echinoderms, brachiopods and bryozoans (Greene et al. 2010).

In summary, the western half of the AOI has the most relief with an expansive deep muddy basin without exposed bedrock that is flanked by Jeffreys Ledge on the west and a complex of shoals extending landward in an NNW direction from Platts Bank. North and east of Platts Bank the relief is irregular with glacial ridges and shallows trending SSW-NNE. This irregular morphology is likely due to underlying bedrock structure with two notable narrow troughs. The central-eastern portion of the Large AOI contains another larger area with depths over 90 fathoms (540 ft, 167 m), and has a smoother seafloor due to reworking thousands of years ago when the shoreline occupied a position 33 fathoms (200 ft, 60 m) below present and surf and shoreline processes sorted glacial sediments. Sediment thickness in the eastern half likely increases as depths decrease due to the proximity of a glacial grounding line of the Laurentide Ice Sheet that shed sediment into the AOI. The benthic species assemblages in the AOI are likely reflective of the depths and dominate surficial sediment in each area, with annelids and shrimps in areas of deeper mud and complex assemblages of arthropods, cnidarians (potentially soft corals), echinoderms, brachiopods and bryozoans (Greene et al. 2010) in shallower, gravelly shoals and banks.

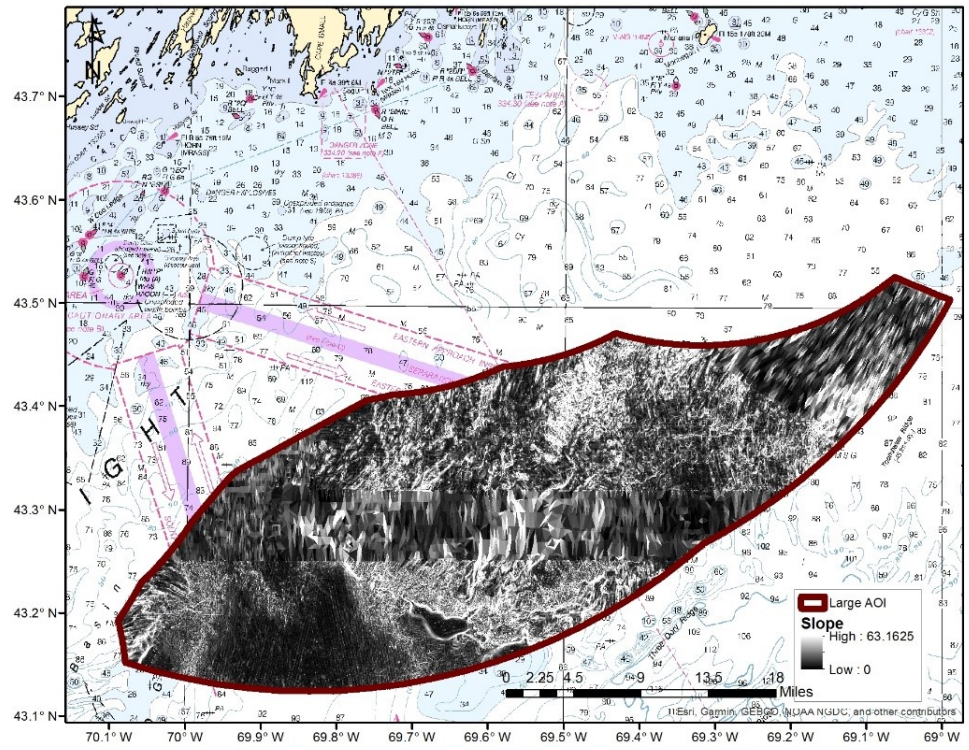

Figure 7: Slope within the Large AOI based on available bathymetry.

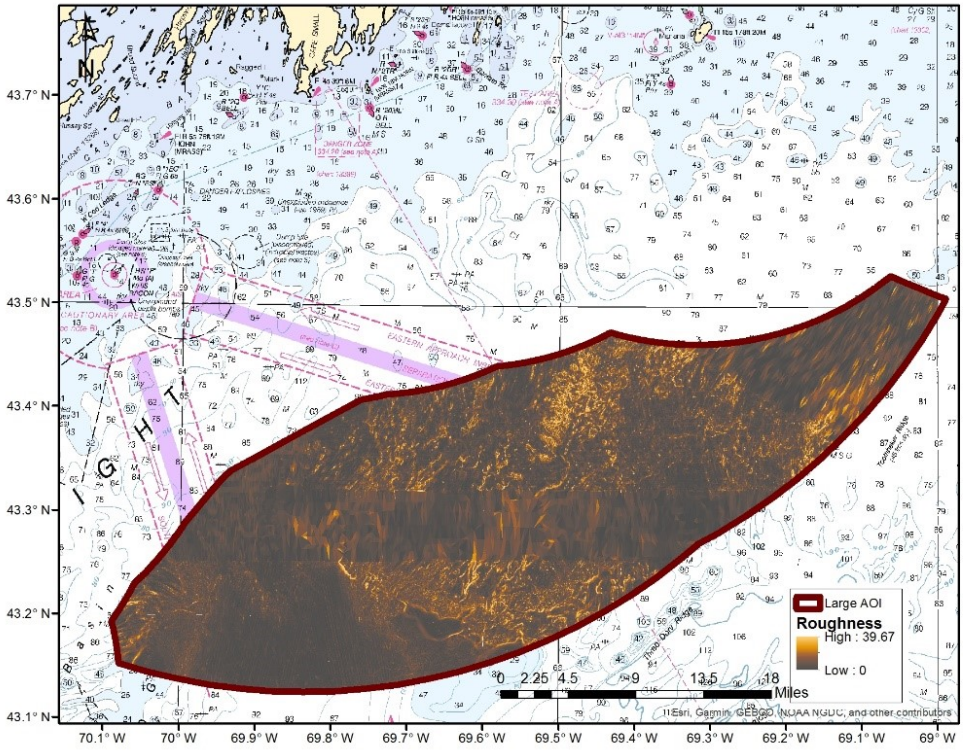

Figure 8: Roughness in the Large AOI based on available bathymetry.

5.2 Marine Mammals

Large baleen whales, including humpback, minke, and the endangered fin, sei, and North Atlantic right whales, are distributed throughout the Large AOI and the region broadly (Davis *et al.* 2020). Abundance densities of baleen whales have been derived using Duke University's MDAT models, which aggregate all the standardized data sources for sightings of these species in the region. Abundance of baleen whales is highest in the southwest portion of the Large AOI near Jeffreys Ledge and in the region of Platts Bank (Figure 9). The portion of the Large AOI with the lowest abundance of the baleen whale ecological group is to the northeast of Mistaken Ground. Species specific distribution patterns largely follow this overall group trend.

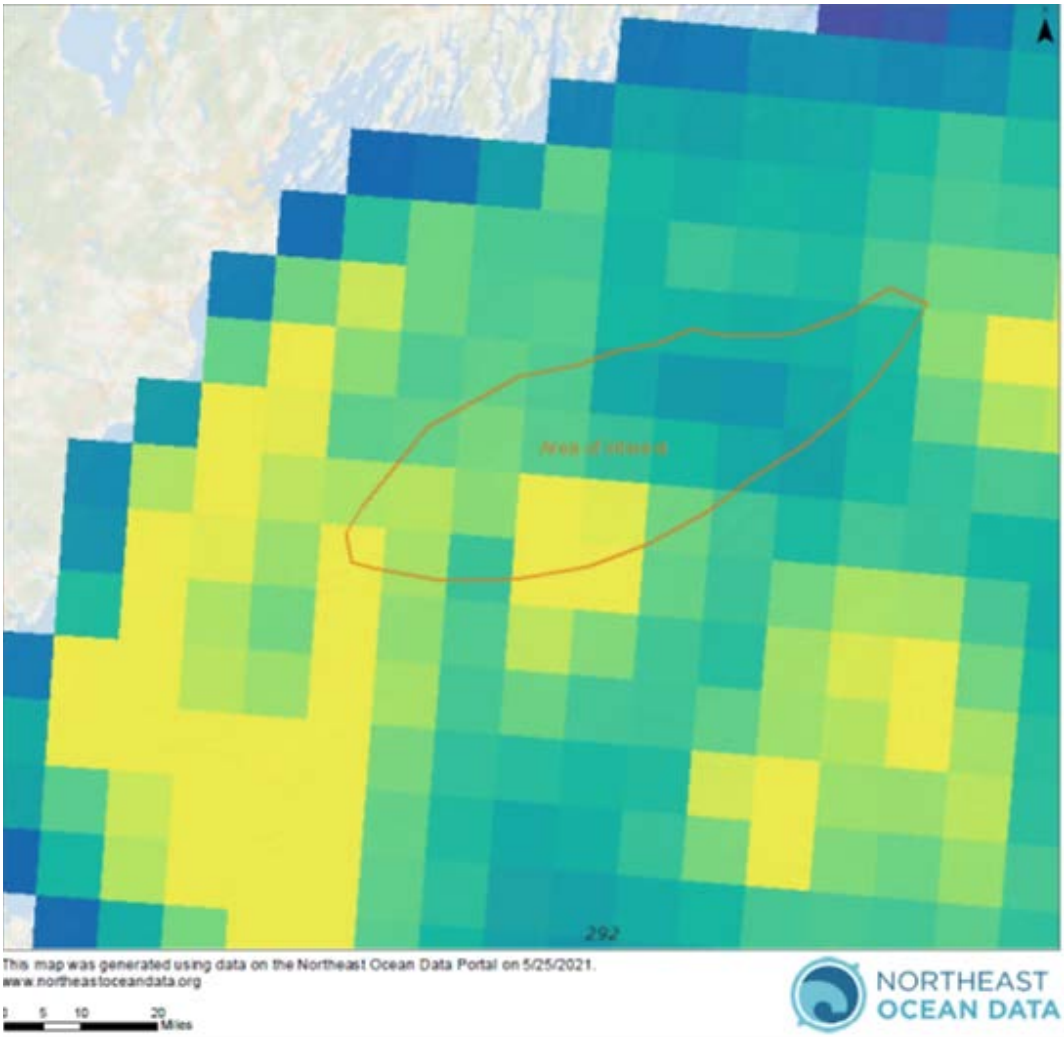

Figure 9: Baleen whale total abundance taken from the Northeast Ocean Data Portal as derived by Duke University MDAT models. Areas of higher abundance include the Southwest corner near Jeffreys Ledge and Platts Bank.

The baleen whale ecological group abundance pattern noted above is consistent with the specific habitat use pattern of the highly endangered North Atlantic right whale. Critical habitat for this species overlaps with the Large AOI, as it has been defined as the entire Gulf of Maine up to a nearshore exemption line mostly inside of Maine state waters. This broad region was identified

as right whale critical habitat due to the circulation patterns and existence of deep ocean basins within the Gulf of Maine that are drivers for the production and transport of the right whale's primary prey species, *Calanus finmarchicus* (Endangered and Threatened Species 2016). Areas of high productivity around these deep basins have already been identified within the Large AOI as areas of higher marine mammal abundance, including Jeffreys Ledge and Platts Bank. Largely, the occurrence of right whales throughout the Gulf of Maine tends to be more diffuse than feeding aggregations that occur in other regions such as Cape Cod Bay and south of Nantucket Island. Additionally, use of the Gulf and adjacent habitats, such as the Bay of Fundy, has been declining since 2010 (Ross *et al.* 2021, Davies *et al*. 2019, Record *et al.* 2019, Davis *et al*. 2017). Individual sightings of multiple large whale species obtained with permission from the Right Whale Consortium database through 2018 support both this pattern of use across the Large AOI, as well as the decrease in sightings after 2010 (see Figures 10 and 11).

Smaller cetaceans, such as large and small delphinids, have the potential to use the Large AOI broadly with no known high abundance areas. However, these species are likely to follow patterns of high productivity areas, as noted above, as they target schooling fish species as their primary prey source.

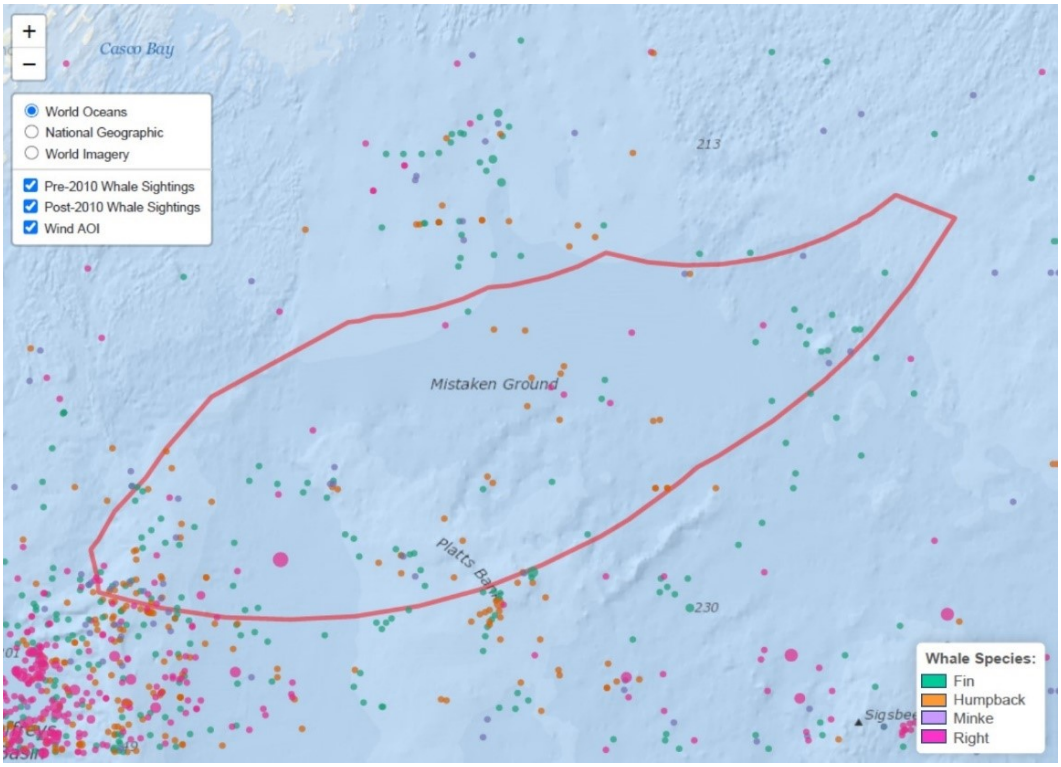

Figure 10: Sightings from the Right Whale Consortium Database through 2018 for fin, humpback, minke, and right whales in the Large AOI. These sightings are not corrected for effort.

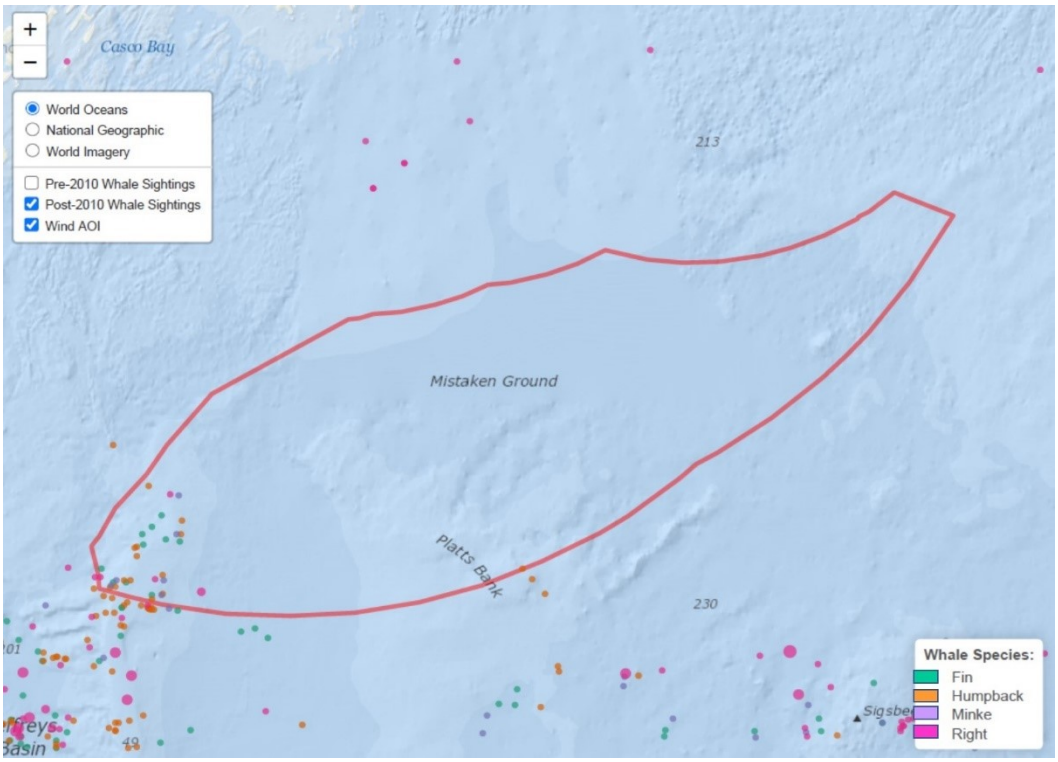

Figure 11: Sightings from the Right Whale Consortium Database from 2010-2018 for fin, humpback, minke, and right whales in the Large AOI. These sightings are not corrected for effort.

5.3 NEFSC Multispecies Trawl Survey Data

Duke University has created interpolations of species abundance using data from the Northeast Fishery Science Center (NEFSC) Trawl Survey as part of their Marine-Life Data Analysis Team (MDAT) model. These raster interpolations create a continuous map layer whose values can be extracted and summarized for various areas. It is important to note that these data do not cover the nearshore Maine area, as this area is not sampled by the NEFSC Trawl Survey, however they do cover the entire Large AOI.

Eight of the top ten species in abundance found in the Large AOI are similar in the Fall and Spring surveys. These include Spiny Dogfish, Acadian Redfish, Silver Hake, Atlantic Herring, Red Hake, American Plaice, Alewife and American Lobster. These species are representative of species accessible by survey trawls and consistent with patterns of distribution broadly within the Gulf of Maine (Table 1).

Table 1: Top 10 Species by Mean Abundance within the Large Area of Interest, NEFSC Trawl Survey.

Fall		**Spring**	
Species	***Log kg/tow***	***Species***	***Log kg/tow***
Spiny Dogfish	3.2	Acadian Redfish	2.18
Acadian Redfish	2.5	Silver Hake	2.15
Silver Hake	2.5	American Lobster	1.53
Atlantic Herring	1.9	American Plaice	1.49
Northern Shrimp	1.7	Haddock	1.37
Red Hake	1.7	Alewife	1.37
American Plaice	1.6	Atlantic Herring	1.32
Alewife	1.5	Spiny Dogfish	1.23
White Hake	1.4	Red Hake	1.15
American Lobster	1.1	Witch Flounder	0.79

6 Fishery Characterization within the Large AOI

The DMR developed a broader understanding of the fishery activity through analysis of publicly available data, direct surveys, and interviews with impacted fishermen. A diversity of fisheries pursues an equally diverse set of species within the Large AOI. Broadly, there are impacted fisheries in all areas of the Large AOI. The DMR was able to quantify areas that appear to have less conflict with the number of fishermen and the diversity of fisheries.

6.1 NOAA Fisheries Economic Data

The NOAA fisheries economic data provided to the DMR for the Large AOI identified the top five Fishery Management Plans (FMP) impacted by the large area of interest to be Atlantic Herring, Northeast Multispecies, non-Federal FMP, Monkfish, and American Lobster. The eleven-year

totals from 2008 through 2018 represent 54.2 million pounds of fish valued at $27.7 million (Table 2). Additional FMPs are impacted but at a lower level include All Others (limited by confidentiality), Bluefish, Highly Migratory Species, Jonah Crab, Mackerel, Squid, And Butterfish, Sea Scallop, Skates, Small-Mesh Multispecies, Spiny Dogfish and Summer Flounder, Scup and Black Sea Bass. These additional FMPs represent 1,009,000 pounds valued at $620,000.

Table 2: The eleven-year totals (2008-2018) for the top five impacted federal FMPs in the Large AOI.

FMP	Pounds	Value
Atlantic Herring	40,423,000	$15,539,000
Northeast Multispecies	11,289,000	$6,603,000
Non-Federal FMP	991,000	$627,000
Monkfish	806,000	$2,079,000
*American lobster***	*653,000*	*$2,833,000*
Totals	**54,162,000**	**$27,681,000**

** Reported lobster landings and value are significantly underestimated as a limited number of lobster vessels have permits that require VTRs to be submitted.

The top ten impacted species list is heavily influenced by the Atlantic herring landings, which exceed 75% of total pounds landed during the eleven-year reporting period, followed by pollock, white hake, cod and American plaice (dab), monkfish, spiny dogfish, American lobster, redfish and haddock roe. With respect to revenue, there is equitable distribution across species with Atlantic herring, pollock, white hake, cod and American plaice (dab), monkfish and American lobster all in excess of $2 million over the period (Table 3).

Table 3: The eleven-year totals (2008-2018) for the top ten impacted species in the Large AOI.

Species	Landings	Value
Atlantic Herring	40,423,437	$6,602,649
Pollock	5,727,901	$5,806,637
White Hake	1,486,658	$2,291,471
Cod	1,369,713	$3,011,353
American Plaice Flounder (Dab)	1,043,771	$2,054,177
Monkfish	808,231	$2,091,053
Spiny Dogfish	789,124	$153,814
American Lobster	655,609	$2,844,213
Redfish (Ocean Perch)	649,469	$381,440
Haddock Roe	518,779	$882,733
Totals	**53,472,692**	**26,119,540**

There are 26 ports in four states (Maine, Massachusetts, New Hampshire and Rhode Island) impacted by the Large AOI. Additionally, these ports represent an average of 202 vessels or 3,779 trips per year within the AOI. Portland and Rockland represent the two ports most impacted in pounds landed and value. Additional ports such as Gloucester, All Others (confidential ports),

New Bedford, Port Clyde and Boston all have landings in excess of 500,000 pounds of commercial species (Table 4).

Table 4: The eleven-year totals (2008-2018) for the top ten impacted species in the Large AOI.

Port	Landings	Value
Portland	30,174,528	$14,014,152
Rockland	10,292,020	$1,676,075
Gloucester (MA)	4,802,068	$3,226,107
All Others	3,620,826	$3,438,628
New Bedford (MA)	1,608,011	$503,352
Port Clyde	844,852	$759,013
Harpswell	748,848	$997,065
Boston (MA)	634,124	$872,820
Vinalhaven	398,247	$68,293
Cundys Harbor	391,649	$653,721
Cape Porpoise	369,645	$408,351
Portsmouth (NH)	365,830	$519,195
Kennebunkport	322,770	$364,246
South Bristol	203,942	$74,713
Friendship	132,199	$244,811
Boothbay Harbor	95,324	$224,947
Saco	71,939	$67,578
Sebasco Estates	40,740	$28,248
Bailey Island	31,400	$113,443
Rye (NH)	19,527	$31,470
Tenants Harbor	6,720	$20,373
Newington (NH)	4,309	$1,098
Sprucehead	2,193	$9,759
Scituate (MA)	1,030	$1,408
Cushing	539	$2,751
Bremen	508	$463
Totals	**55,183,788**	**$28,322,080**

The reported fisheries landings and economic data give a comprehensive look at the impacted activity within the Large AOI. Of note is the diversity of states (4) and ports (26) that have reported activity (Table 4). The area has a diverse suite of species harvested representing a broad range of FMPs and gear types.

6.1.1 Maine Lobster Fishery – Harvester Reports

The DMR believes the NOAA economic data reported above represents a six to seven-fold underestimate for landings and value for the Maine lobster fishery on an annual basis. Most other federal fisheries have reporting requirements through VMS and/or VTR, but federal permit holders that are designated as 'lobster only' are currently not required to report. Because of this

exemption, only 3% of Maine lobster license holders and 16% of the federal lobster trap permit holders are required to report through federal VTRs. These permits that are required to report also are not distributed uniformly across the coast. For this reason, the federal VTRs do not provide an effective way to characterize the Maine lobster fishery.

The State of Maine implemented 100% mandatory trip level Dealer Reporting in 2008. The Maine fishery typically completes more than 265,000 trips or transactions annually. The Harvester Logbook Program was initiated in 2008 but only at a 10% level due to the high cost of reporting incurred by the DMR. The selection of the licenses to report is not based on state versus federal permits. All federally permitted vessels that land lobster in Maine must also hold a state lobster license. Fishermen are categorized by their state license type and fishing zone and 10% of each license type and zone are randomly selected to provide daily harvester data through monthly logbooks. All Maine lobster license holders, except those chosen the previous year, are included in the annual random draw, including licenses that had no landings the previous year and permits that required federal VTRs. Permit holders that are required to submit VTRs do not submit duplicate reports to the Harvester Logbook Program and continue to report only through VTRs. To complete the dataset of all licenses selected, the VTR permits selected as part of the annual 10% process are added to the Maine Harvester Logbook dataset for any analysis.

Harvester Logbook reporting provides effort data, such as number of traps hauled and low-resolution spatial data. From 2008 through 2018, Maine's Harvester Logbook Program collected catch and effort data from a subsample of 10% of each Maine license type in each of Maine's seven fishing zones. In 2017, the Atlantic States Marine Fisheries Commission (ASMFC) Technical Committee evaluated the 10% assumptions and found that many latent licenses were required to report so the selection of vessels could be improved to target more of the active fishery. This report also found that while 10% can adequately characterize the fishery, this method has limitations for any fine scale spatial analysis (ASMFC, 2017). In 2018, the ASMFC passed an addendum to require 100% harvester electronic reporting by 2024, instituted requirements to report ten-minute squares for spatial data, and recommended that Maine shift to optimized selection of licenses. This shift to optimized reporting occurred in 2019 and currently the datasets have not been analyzed for continuity so only data prior to 2019 was considered.

Between 650 and 700 harvesters were chosen annually between 2008-2018. All reports were submitted on paper, fax, or email. The Harvester Logbook Program entered about 30,000 records annually. A record is a line of data for each trip or monthly "did not fish" entry. If a harvester was selected and did not submit the required logbooks, his license could not be renewed the next year.

To calculate the landings and value with the Large AOI, DMR used the estimated annual landings and value per square mile for each Zone E, D, F, and F/G overlap outside of 12 miles and the square mile area of the Large AOI for each zone. The estimates assume that the lobster landings are distributed uniformly. The Large AOI is estimated to provide 1.5 million pounds of lobsters

worth $7.3 million dollars annually (Table 5). This represents a six to seven-fold difference between landings and value through the two estimation methods on a yearly basis.

Table 5: Estimated annual pounds and value for lobster for the Large AOI expanding Dealer and Harvester data average over 2016-2018.

Method	Period	Pounds per Year	Value per Year
NOAA economic data (VTR and dealer)	2008-2018	59,601	$258,565
Maine DMR (harvester and dealer)	2016-2018	1,530,276	$7,321,477

6.2 DMR Online Survey

DMR released an online survey to all state licensed commercial harvesters that submit an email for contact in December 2020, following the first public informational meeting on the state's proposal for the research array. The survey received 159 responses in the first several days, after which responses dwindled, in part due to industry concerns about how the survey data would be utilized and subsequent recommendations from industry leaders that industry members should not respond. Survey respondents were asked basic questions to assess the impact of wind development on their fishing activity. The responses received were limited; however, 75 harvesters indicated they fished within the Large AOI, 49 of those indicated they were interested in follow-up discussions with the Department and 39 provided an email. Those 39 fishermen were contacted via email and staff connected with 17 for an interview. Some of those interviews led to more targeted people to call for specific areas, which led to interviews with a total of 30 people. Of those 30 interviews, 16 interviews provided spatial information about fishing activity within the AOI. The minimal number of responses relative to the size of the fisheries contacted would make descriptive statistics on these survey data unrepresentative.

6.3 Fishery Characterization – Interview Based

To gain a deeper representation of activity and provide needed context to the available data staff had detailed conversations with individuals and small groups impacted by the large area of interest. Universally, there was no support for OSW development in the Large AOI or more generally within the Gulf of Maine.

Interviews were conducted during the winter and early spring of 2021, when COVID-19 restrictions were fully in place. To that end, interviews were largely remote through video conferencing or phone calls. The online survey provided the source of many of these contacts, as described above. At the end of the site selection process, limited in person interviews were conducted in a socially distanced manner. It is highly likely that if interviews were able to be conducted without COVID-19 restrictions, greater participation might have been expected (Table 6).

The interviews were ad-hoc in nature but centered on using GIS maps of the Large AOI with layers including publicly available data including the NEODP vessel monitoring data, bathymetry, species abundance and distance from shore limits.

Interview participants were asked to describe their fishing activity within the Large AOI on an annual basis. For each fishery or sector, staff interpreted interview results mapping relative activity from zero (no data) to one (low activity) to two (medium activity) to three (high activity) on a one arc minute grid basis. A map was created for each interview and a composite map was created for each fishery or sector (except for groundfish described below).

Two Fisheries Work Sessions, five Lobster Zone Councils meetings and one Groundfish Sector meeting were held via webinar at the end of this period. General concepts based on the map layers for each stakeholder group were presented for comment. Meeting participants were given the opportunity to confirm or dispute DMR's general understanding of the use of the Large AOI.

Table 6: Number of interviews from each stakeholder group that provided spatial data.

Lobster	Rec Fish	Groundfish	Totals
13	8	5	26

A concerted attempt was made to include information for all areas within the Large AOI. This was not possible for every fishery, however; the sum of interviews indicated in a one arc minute grid would suggest that the entire area was covered during interviews (Figure 12).

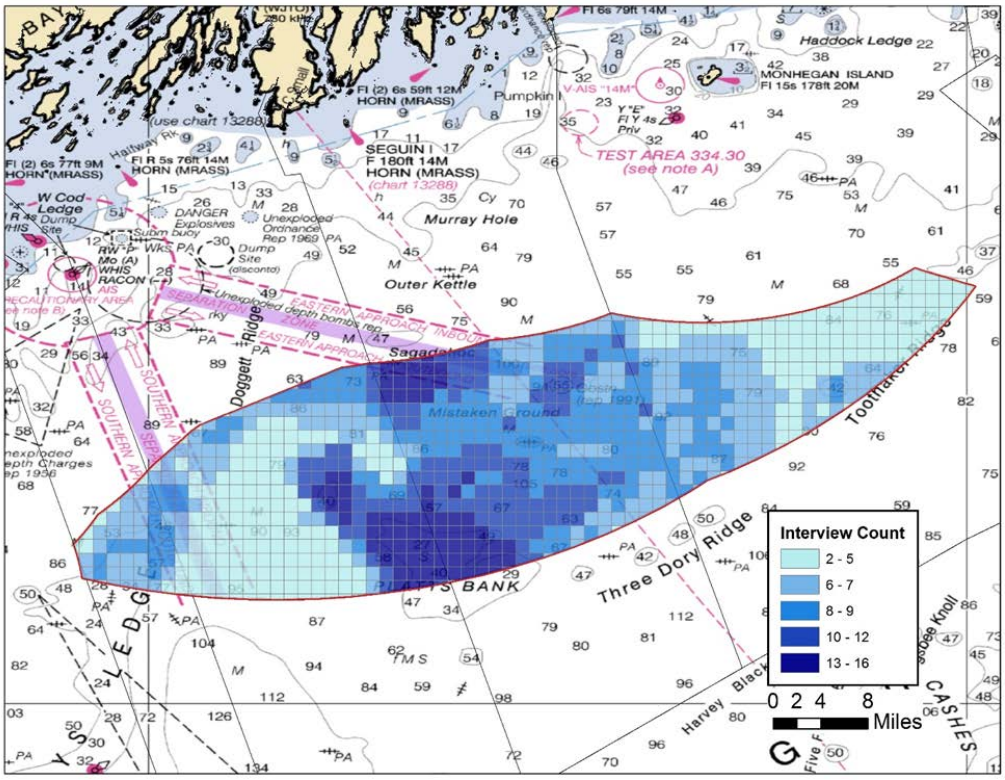

Figure 12: The number of interviews represented for each one arc minute grid within the Large AOI. The interviews were conducted during the winter and spring of 2021.

6.3.1 Lobster

The lobster fishery lacks much of the spatial data available for other federal fisheries data (limitations described above) and was therefore targeted for interviews. The interviews revealed several themes of activity that have application within the Large AOI. The area crosses Lobster Management Zones D, E and F. Zone E has a lower trap limit of 600 limiting potential displacement of fishing activity into, but not out of, the Zone. Zones D and F have 800 trap limits and fishermen are permitted to set 49% of their gear in another zone with the same trap limit.

The lobster fishery will generally target areas of high complexity (gravel, bedrock) and to a lesser degree, low complexity areas (sand, mud). Transitions between habitat types (edges) are favored. Areas of complex bottom were described, and confirmed by multibeam bathymetry, around the Mistaken Ground, the Eastern Approaches Shipping lane, Cusk Ridge, and a series of ridges east of Platts Bank.

Lobster fishing participation and intensity was higher in the far west, northern, and eastern portions of the Large AOI. Toothaker Ridge, Mistaken Ground, Cusk Ridge, Platts Bank and Jeffreys Ledge were described as having high fishing activity. Isolated areas of complex bottom are fished regularly but the size of the area will dictate how many fishermen set traps there.

Lobster fishing avoids areas of conflict with mobile fishing gear. Specifically, the deep channel between Platts Bank and Jeffreys Ledge, described as the 'Wilkinson Tow', was identified as an area of significant activity that should be avoided. There were no interviews with lobster trap fishing activity in this area.

Fishing activity in the Large AOI was described as increasing through the late summer and fall with highest fishing activity remaining through the spring. Fishing follows the migration and availability patterns of lobsters, from inshore to offshore areas and from shallower to deeper waters. In water depths greater than 90 fathoms (540 ft, 180 m), activity was described to be much lower (Figure 13).

Zone Council meetings were held for Zones D, E and F to provide information about the project, to present the maps used in the interviews, and to share the above generalities about the focus on structure and shallower 90 fathom for validation. There was general consensus about the characterization.

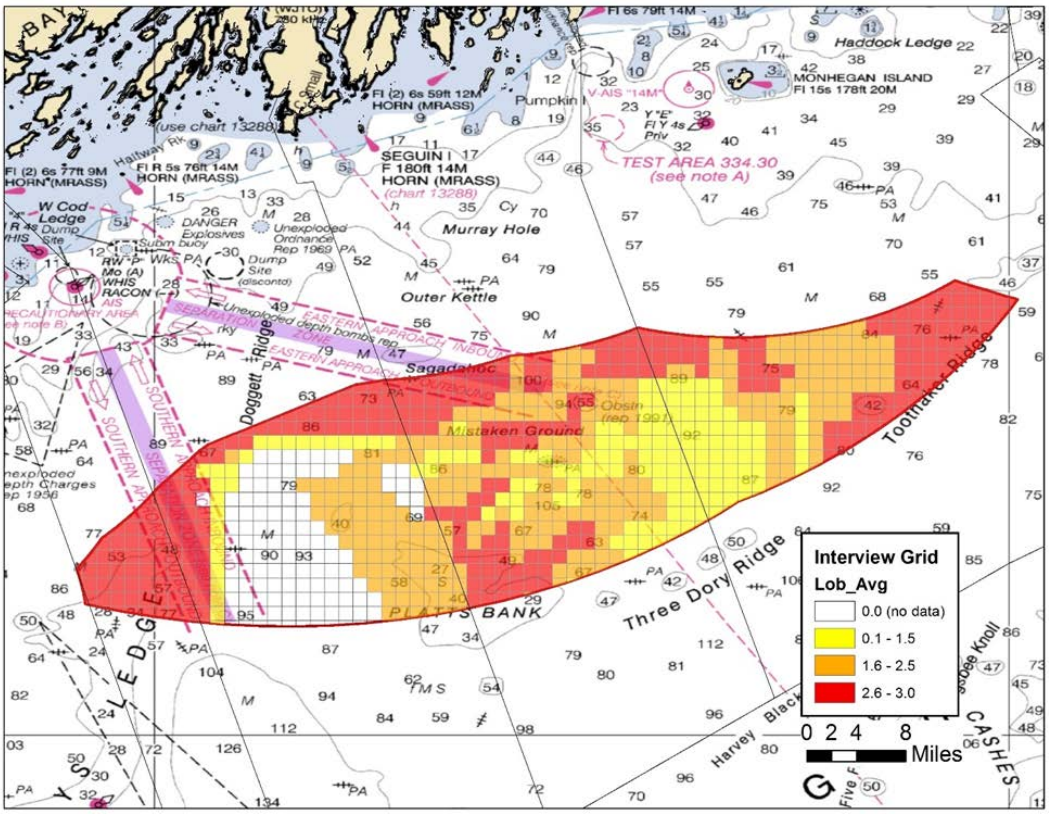

Figure 13: Combined fishing intensity of the Maine lobster fishery within the Large AOI as based on interviews. Intensity ranges from one (low, yellow) to three (high, red).

6.3.2 Groundfish

Unlike lobster, groundfish activity is extensively documented through VMS activity publicly available through the NEODP. These mapping products provide the spatial footprint of this fishery, but do not indicate the species composition, importance of particular species, seasonal distribution, influence of management measures on fishing activity, or economic importance of particular species. Interviews for this sector provided the context needed to better inform and confirm the VMS characterization.

An area of significant groundfish activity was identified as the 'Wilkinson tow' and lies in the western portion of the Large AOI in the greater than 90 fathoms (540 ft, 180 m) water between Platts Bank and Jeffreys Ledge. The highest fishing intensity abuts the eastern side of the Western Gulf of Maine groundfish closure. The tow begins in the Large AOI and extends south and east out of the area. This tow was described to be important to Maine, New Hampshire, and Massachusetts vessels of all sizes. The location of the 'Wilkinson tow' significantly impacts where fixed gear fishermen set gear, including trap and gillnet in this portion of the Large AOI.

Gillnet activity was described to target mostly Platts Bank, but activity is concentrated above the 80-fathom edge to avoid conflict with draggers. The areas further inshore, including the Sagadahoc, Mistaken Ground, and Cusk Ridge, that historically provided more gillnet opportunity were described to have been taken over by dogfish and therefore avoided.

The areas around the Eastern Approaches Shipping Channel, Mistaken Ground and Cusk Ridge were described as being important to small boats homeported in Maine. The eastern portions of the Large AOI activity around Toothaker Ridge was described in context to the connectivity to fishing areas outside of the Large AOI.

A traditional fishing area known to fishermen as the 'Winter bottom' was described to begin in the eastern third of the Large AOI and extends to the south and out of the Large AOI. This area is largely accessed during the summer months and by smaller inshore vessels. Deeper mud areas in the "Winter bottom" were described to be important flatfish areas (American plaice, witch flounder and monkfish).

The deep channel (>100 fathoms) running east from Platts Bank, named the "Canyon", has direct links to a large flat mud area named "Peterson grounds" or "Peterson mud" and the "Winter Bottom". This area of "Peterson mud" was described to be currently and regularly fished by day boats homeported in Maine.

Fishing intensity was interpreted from 2011-2014 VMS maps to represent groundfish activity in the Large AOI. During interviews with commercial groundfishermen it became clear that fishing activity varies from year to year in intensity and location. It was communicated that VMS activity from 2011-2014 provided a more representative picture of groundfish activity in the Large AOI than the 2015-2016 period. No VMS data was available after 2016. Fishermen noted that areas of importance are not always captured within the publicly-available VMS data due to management measures that have constrained effort in certain areas that have historically been important fishing grounds (Figure 14).

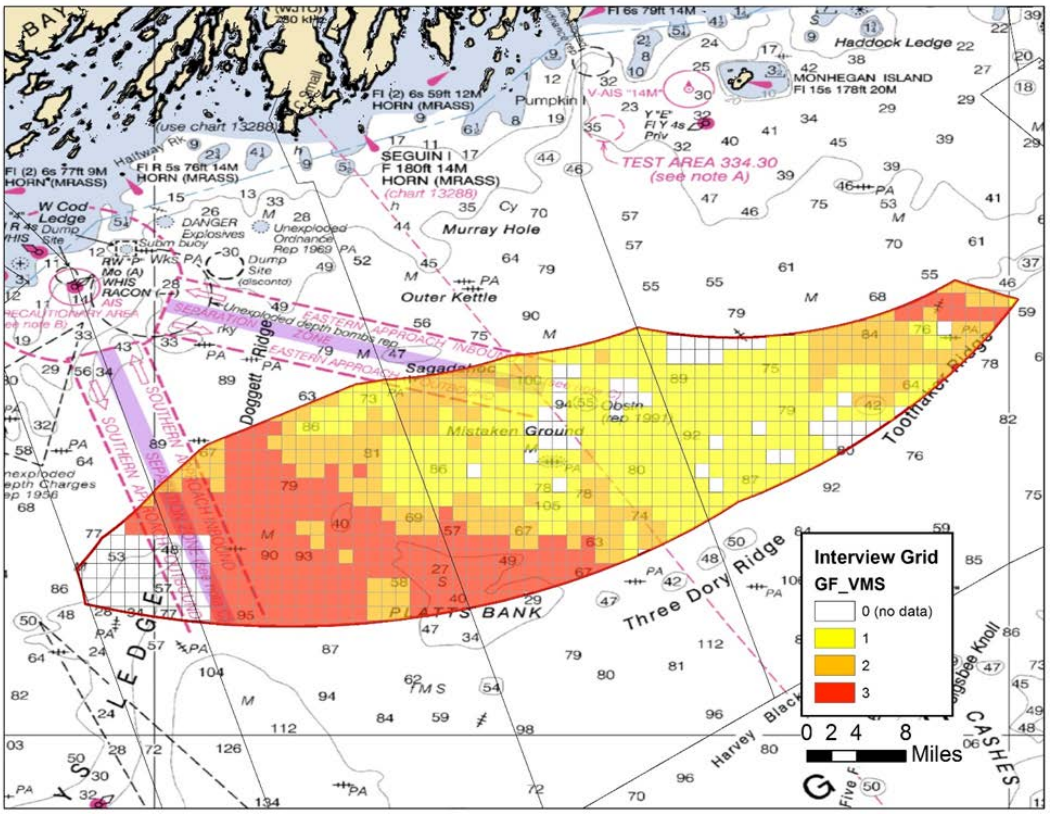

Figure 14: Combined fishing intensity of the Groundfish fishery within the Large AOI based on NEODP estimated VMS activity for the period of 2011-2014. Intensity ranges from one (low, yellow) to three (high, red).

6.3.3 Recreational Fishing and Commercial Tuna

Recreational fishing activity was identified within several areas encompassed by the Large AOI. Generally, recreational activity was described to favor complex bottoms less than 50 fathoms of depth (300 ft, 100 m). Targeted species include haddock, pollock, and cod. Some pelagic fishing activity was described for tuna and sharks (Figure 15).

The most important areas were clearly defined by all interviews to be Platts Bank and Jeffreys Ledge. Platts Bank is one of the few areas accessible to inshore boats for reliable recreational groundfish fishing opportunities in Maine. To a lesser degree, Jeffreys Ledge was identified as an area frequented. The complex bottom immediately to the south of the Eastern Approaches Shipping Channel was described to have additional fishing activity (Figure 15).

The areas north and east of Jeffreys and the Mistaken Ground were described to be an active recreational shark fishing area.

Commercial tuna fishing was described to focus on the edges of structure and shoal pieces of bottom, but also described as extending across the entire Large AOI for harpooners.

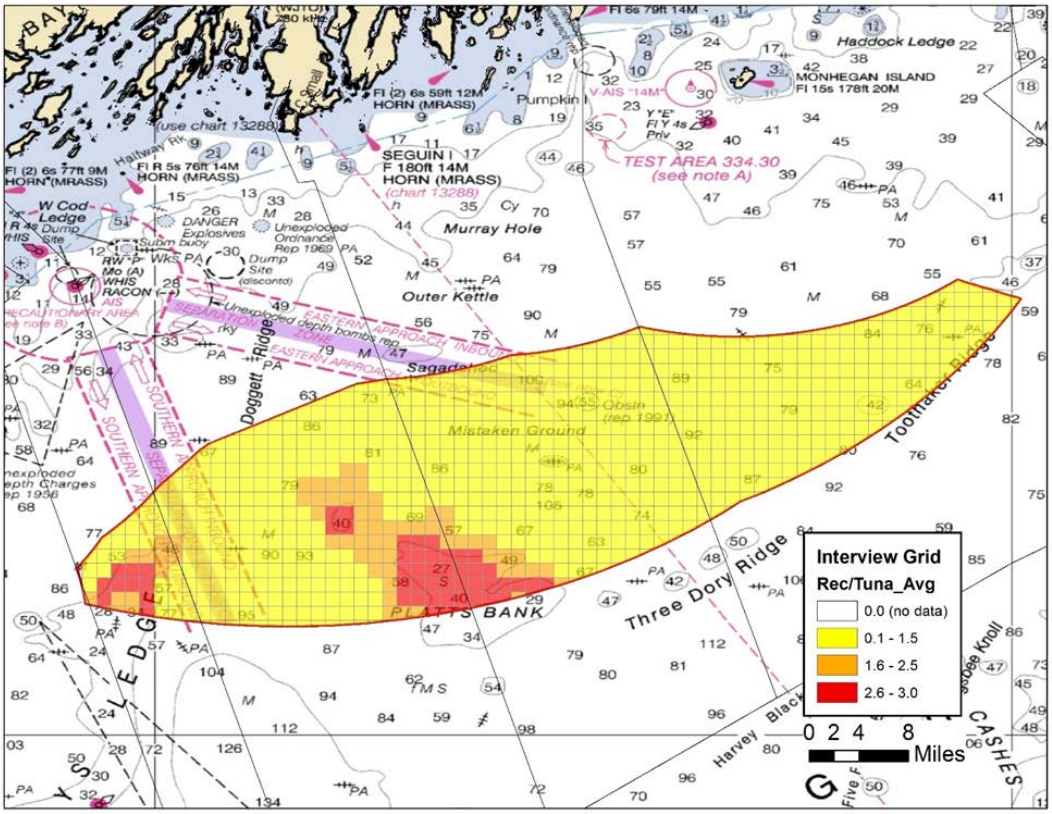

Figure 15: Combined fishing intensity of the Recreational fishery and Commercial Tuna fisheries within the Large AOI as based on interviews. Intensity ranges from one (low, yellow) to three (high, red).

6.3.4 Atlantic Herring

Second only to lobster in value, herring represents the largest fishery in volume and value in the Large AOI for the period of 2008-2018. Herring are caught using purse-seine and midwater trawling within the area. Herring fishing activity is captured by VMS activity. No interviews of herring fishing in the area were conducted. However, comments received during public forums indicated that the NEODP VMS maps were an accurate representation of the fishery.

Platts Bank was the area of highest activity in the Large AOI. Additional activity was reported near the Eastern Approaches Shipping Lane. This activity extends north, out of the area, and increases in intensity. Fishing intensity was interpreted from the 2011-2014 period from NEODP VMS maps to represent Atlantic herring activity in the Large AOI (Figure 16).

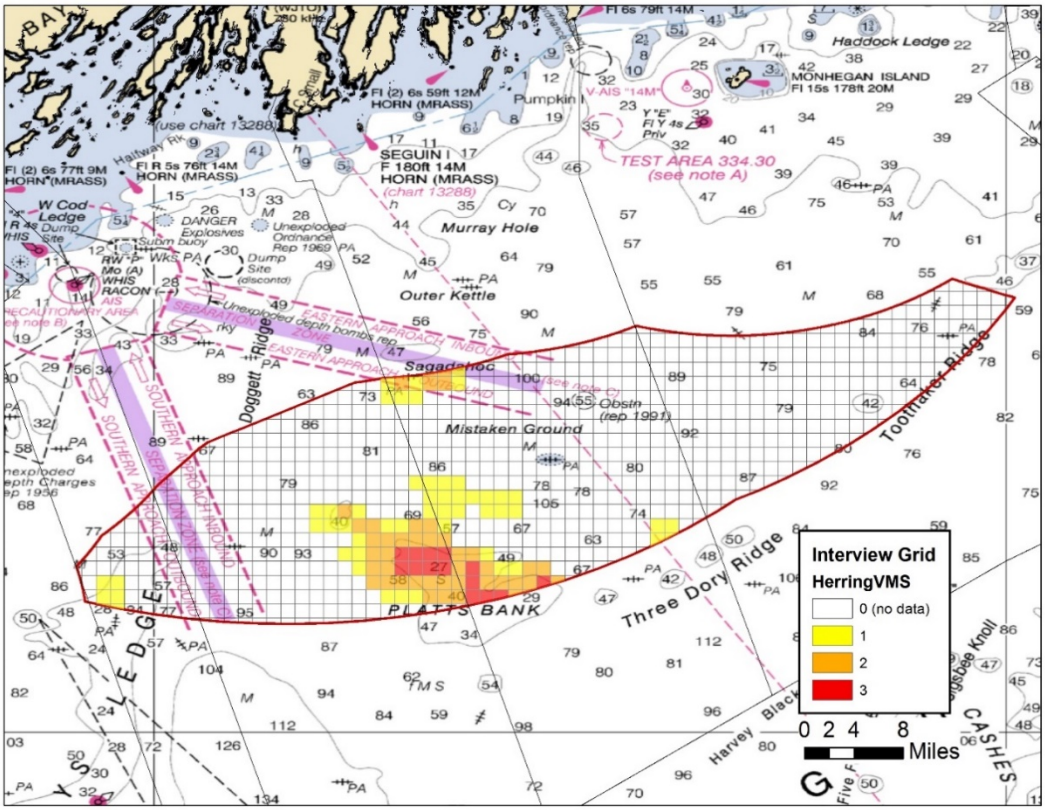

Figure 16: Combined fishing intensity of the Atlantic herring fishery within the Large AOI as based on NEODP estimated VMS activity from 2011-2014. Intensity ranges from one (low, yellow) to three (high, red).

6.3.5 Scallop

Scallop fishing activity is closely linked to Platts Bank contained within the Northern Gulf of Maine Management Area. This is a quota-monitored fishery, with the majority of fishing in recent years concentrated on Stellwagen Bank to the south of the area. VMS activity from 2011-2014 was limited to Platts Bank. A number of interviews confirmed this scallop activity on Platts Bank as a supplement to their target species of groundfish or lobster (Figure 17).

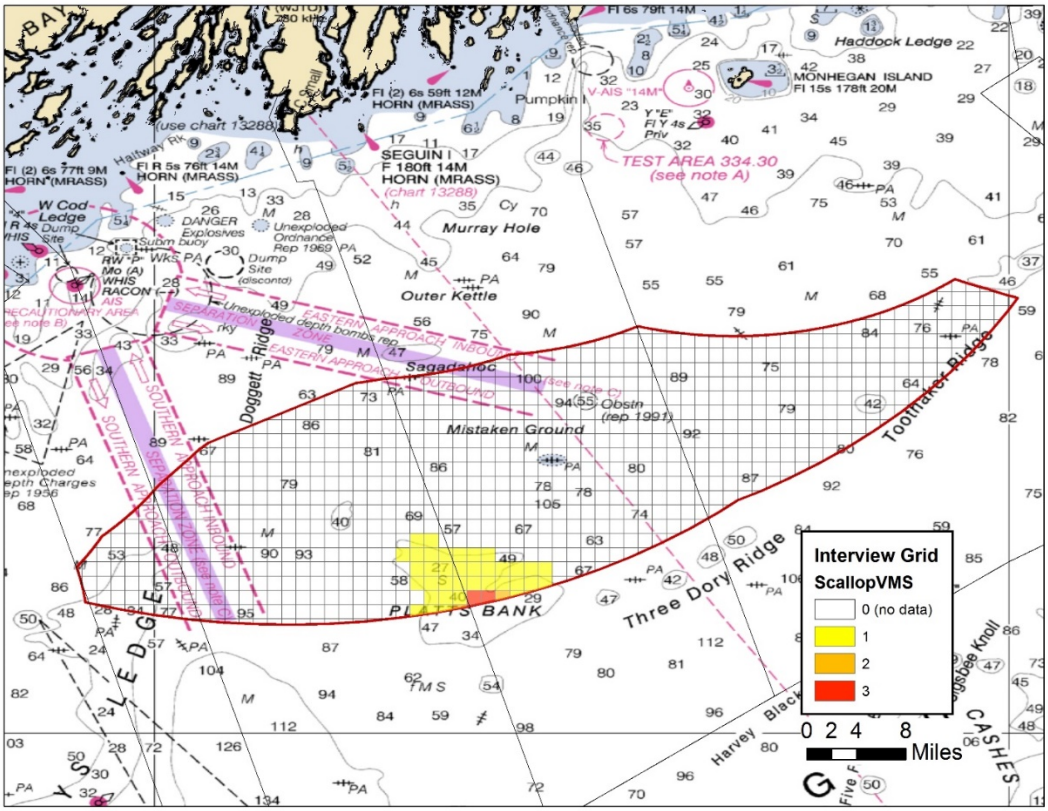

Figure 17: Combined fishing intensity of the Scallop fishery within the Large AOI as based on NEODP estimated VMS activity from 2011-2014. Intensity ranges from one (low, yellow) to three (high, red).

7 Fishery Characterization – Composite

A composite map was generated of impacted fisheries considered for this analysis including Lobster, Groundfish, Recreational fishing/Commercial Tuna, Atlantic Herring and Scallop. Groundfish, Atlantic Herring, and Scallop activity maps were created using 2011-2014 VMS data available through NEODP and standardized in to one arc minute grids with activity interpreted between one (low activity) to three (high activity) (Figures 14, 16, 17). Lobster and recreational/tuna fishing activity were based on the average reported activity from interviews. The average fishing intensity was then calculated across all fisheries for each one arc minute cell.

The composite fishery map displays the DMR's effort to characterize fishing activity across all fishing sectors. Fishing activity occurs in all areas of Large AOI. Patterns of high activity follow themes noted within individual fishery uses. Platts Bank remains the dominant feature within the area, with all fisheries identified using this area. Other areas of high activity were identified in the west around Jeffreys Ledges, in the north around the Mistaken Ground, and in the east around Toothaker Ridge (Figure 18).

The Large AOI spatial domain is defined by a minimum distance from shore (20 miles) and maximum distance (40 miles) from the two likely electrical interconnection points. This siting

criteria does not have any linkages with the Gulf of Maine ecosystem or the combined use of this area by commercial and recreational fisheries. However, it became readily apparent as our combined knowledge increased within the Large AOI that in fact there are important connections that link this area to adjacent areas and the Gulf of Maine at large. In many ways, the Large AOI represents a transition between inshore and offshore species in composition and fisheries. Lobstering is an inshore dominated fishery that extends into the area. In contrast, current groundfish activity in the area was often described as starting in the area and extending south out of the area based on season and targeted species. Bluefin tuna were described to use the area extensively with areas of structure likely holding fish that might otherwise swim through.

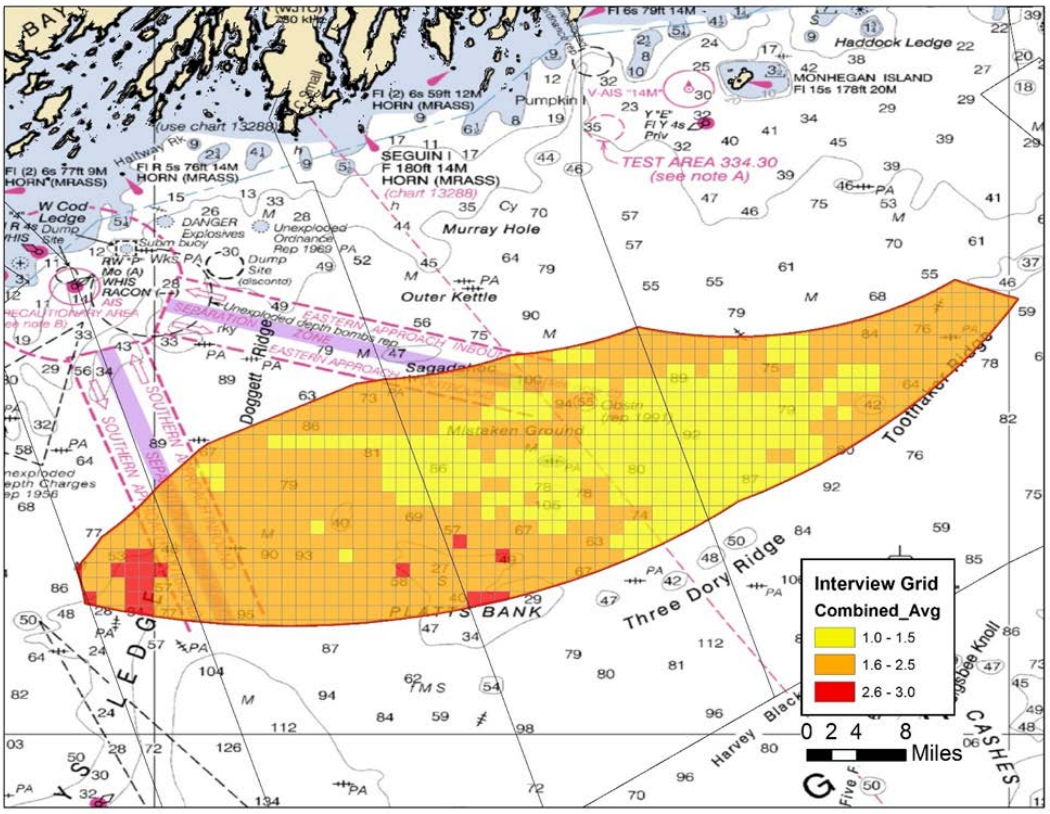

Figure 18: The combined fishing intensity within the Large AOI as identified by interviews (lobster, recreational fishery, commercial tuna) and VMS activity (groundfish, herring, scallop). Intensity ranges from one (low, yellow) to three (high, red).

8 Narrowed Area of Interest

The task of narrowing the area of interest was advanced by combining federal management areas with the composite fishing map developed above. The composite fishing map indicates an area starting approximately 14 miles east-northeast of Platts Bank that represents lower conflict within and between fisheries. This area is bounded by the DOD Offshore Wind Mission Compatibility Assessment area to the east. The area is at the edge of USCG Transit Buffer associated with the Eastern Approaches Shipping Lanes. The western extent is limited by a series

of ridges and valleys (referred to earlier as the Canyon) that extend eastward from Platts Bank. These ridges and valleys are characterized by high complexity and moderate fishing activity (Figure 19).

This area, hereafter called the Narrowed AOI, is approximately 54 mi^2 (41 nm^2, 34,596 acres). The mean depth is 93 fathoms (557 ft, 170 m). This area is generally characterized as flat with largely mud bottom. Areas of higher structure do occur on the edges. The southern portion of this area remains poorly mapped with bottom characteristics largely limited to existing NOAA nautical charts and fisherman's observations. The boundaries of this area are based on an interpretation of available data, defined by a one arc minute grid. Actual bottom characteristics and use of the area may not align precisely with this grid.

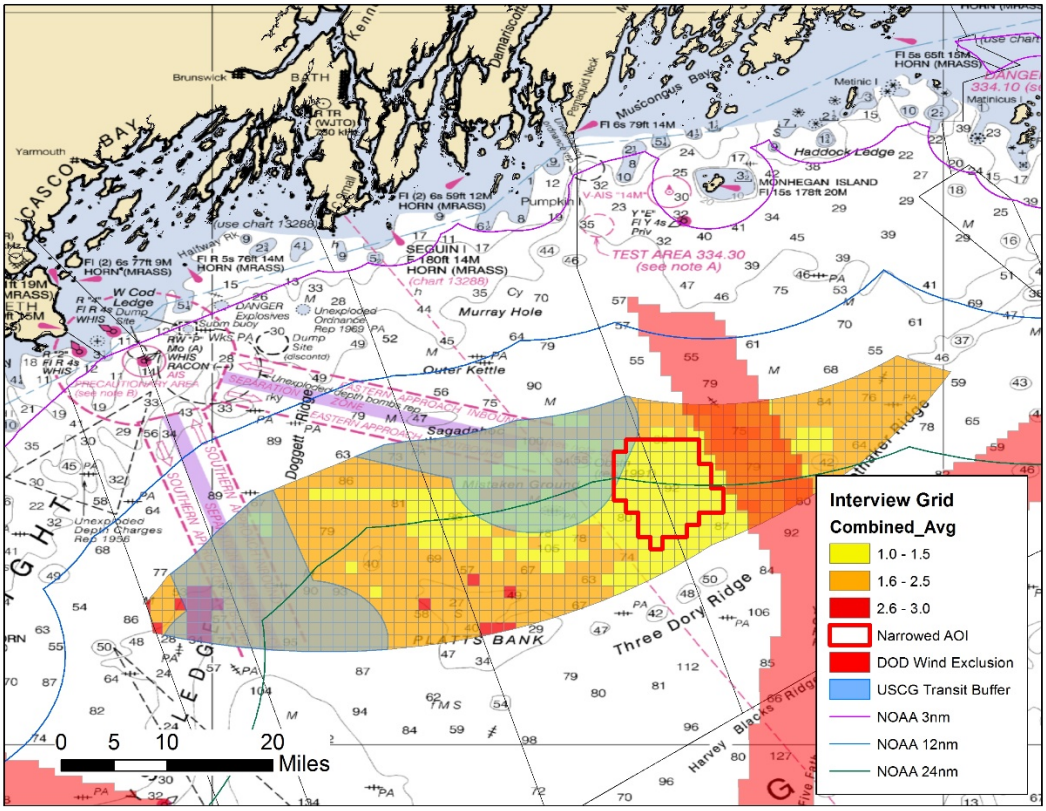

Figure 19: The Narrowed Area of Interest (red) defines the area identified to minimize the impacts on commercial and recreational fishing activity and existing federal management areas that may constrain or exclude wind development.

The Narrowed AOI will have impacts on most types of fishing activity. Of note is consideration of the inshore groundfish fleet which are reported to target flatfish (American plaice, witch flounder and monkfish) in this area. Higher fishing activity for groundfish and lobster are expected in the northern portion of this area. This area is regularly used by small groundfish vessels which have limited range for day fishing. Breaking up existing contiguous groundfish tows may impact small vessels' decisions for fishing activity if transit time across a development site is required or fishing

grounds are excluded. The NOAA fisheries economic data provided for the Narrowed AOI identified the top species with regard to landings and value for the period of 2008 through 2018. Atlantic herring represented the highest volume of landings but the ninth highest landings by value. Monkfish were the highest valued species, followed by American Plaice (Dabs), Pollock, and White Hake. The species composition of the reported catch of the Narrowed AOI, are consistent with conversations with fishing industry members. Overall, the catch within the Narrowed AOI represents less than 10% of any single species reported in the Large AOI. The reduced size of the Narrowed AOI and the relatively low fishing activity may limit the accuracy of these values (Table 7).

Table 7: Landings and value of VTR reported species in the Narrowed AOI as compared to the Large AOI (2008-2018).

Revised AOI 2008-2018			***Percent of Large AOI***		
Species	**Landings**	**Value**		**Landings**	**Value**
Atlantic Herring	120,374	$13,602		0%	0%
Pollock	44,468	$40,968		1%	1%
Redfish (Ocean Perch)	38,105	$21,250		6%	6%
American Plaice Flounder (Dab)	21,982	$46,239		5%	5%
Monkfish	20,280	$51,637		3%	2%
White Hake	19,159	$29,982		1%	1%
All Others	14,028	$4,249		9%	2%
Haddock Roe	12,209	$15,349		2%	2%
Witch Flounder (Gray Sole)	6,996	$14,932		1%	2%
Cod	6,274	$14,040		0%	0%
Totals	**303,875**	**$252,248**	**Average**	**3%**	**2%**

The seafloor in the Narrowed AOI is characterized by subdued relief and depths consistently between 90-100 fathoms (540-600 ft, 164-183 m) (Figure 20). The north eastern end of Three Dory Ridge is visible in the bottom of the figure. Mistaken Ground is to the west of the Narrowed AOI. The highest point is in the upper western portion and is an isolated high location of approximately 82 fathoms (492 ft, 150 m). The remainder of the area is generally smooth and relatively flat due to glacial sediments blanketing and subduing the bedrock relief. Recently acquired seafloor hardness data in a portion of this area show that surficial sediments here are likely mud. This large expanse would likely be dominated by annelids.

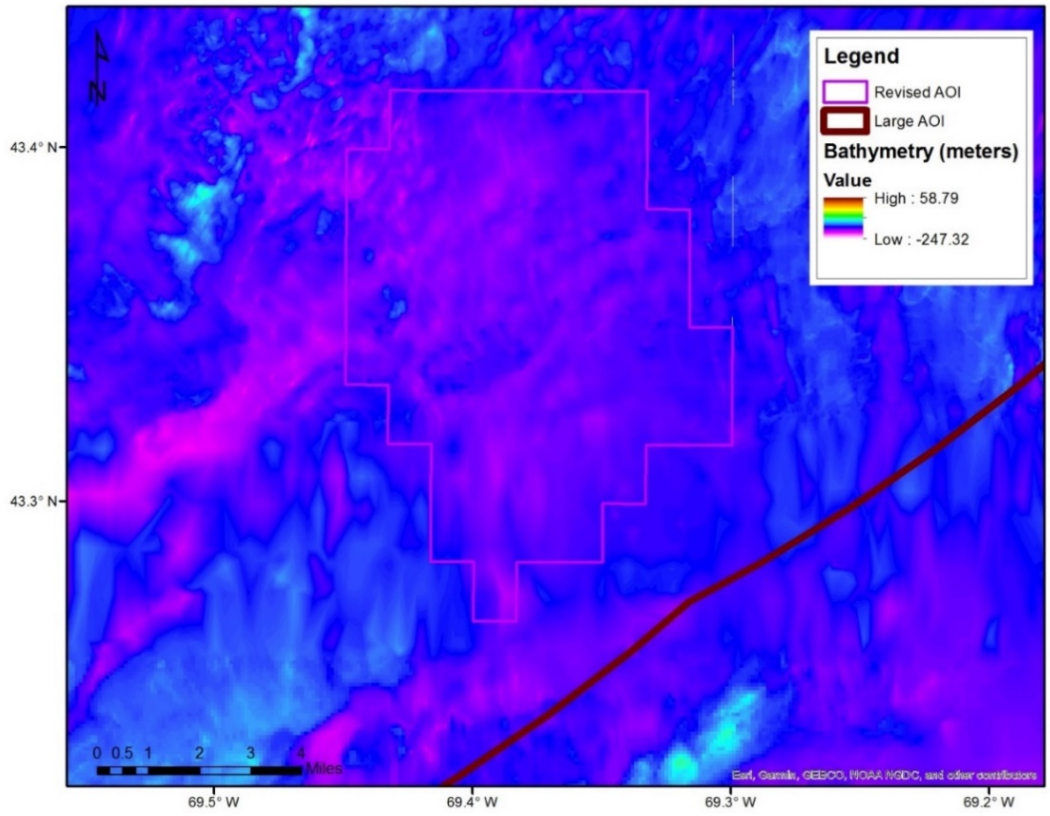

Figure 20: Bathymetry of the Narrowed AOI. The depths here range from approximately 90-100 fathoms (540-600 ft, 164-183 m).

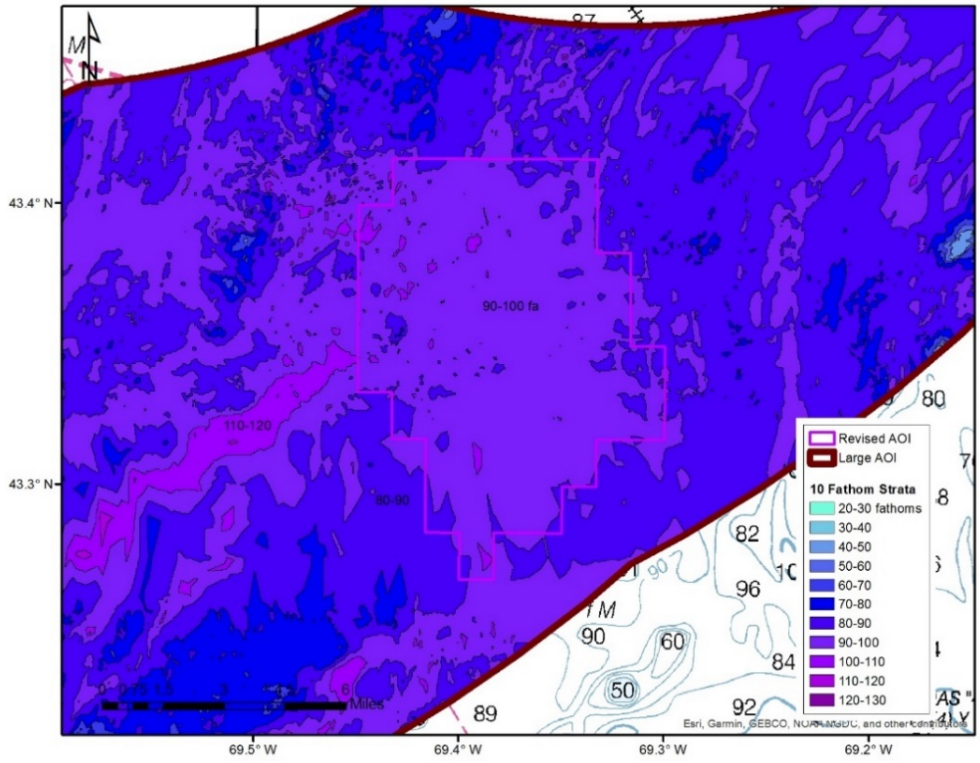

Figure 21: Depths as ten-fathom strata in the Narrowed AOI.

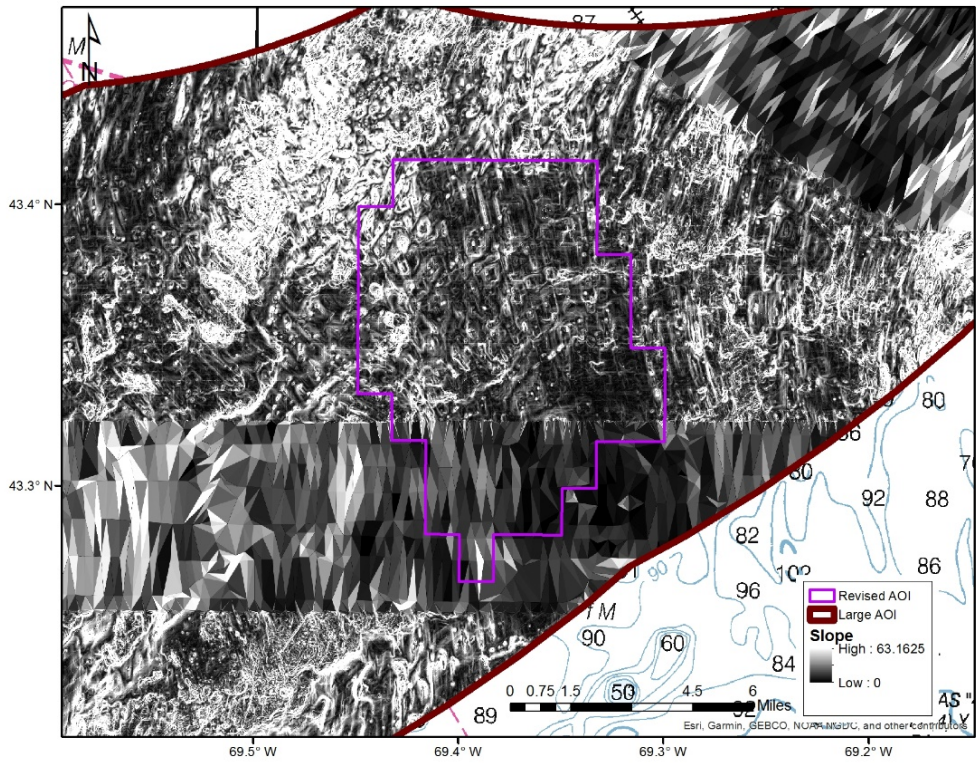

Figure 22: Slope within the Narrowed AOI based on available bathymetry.

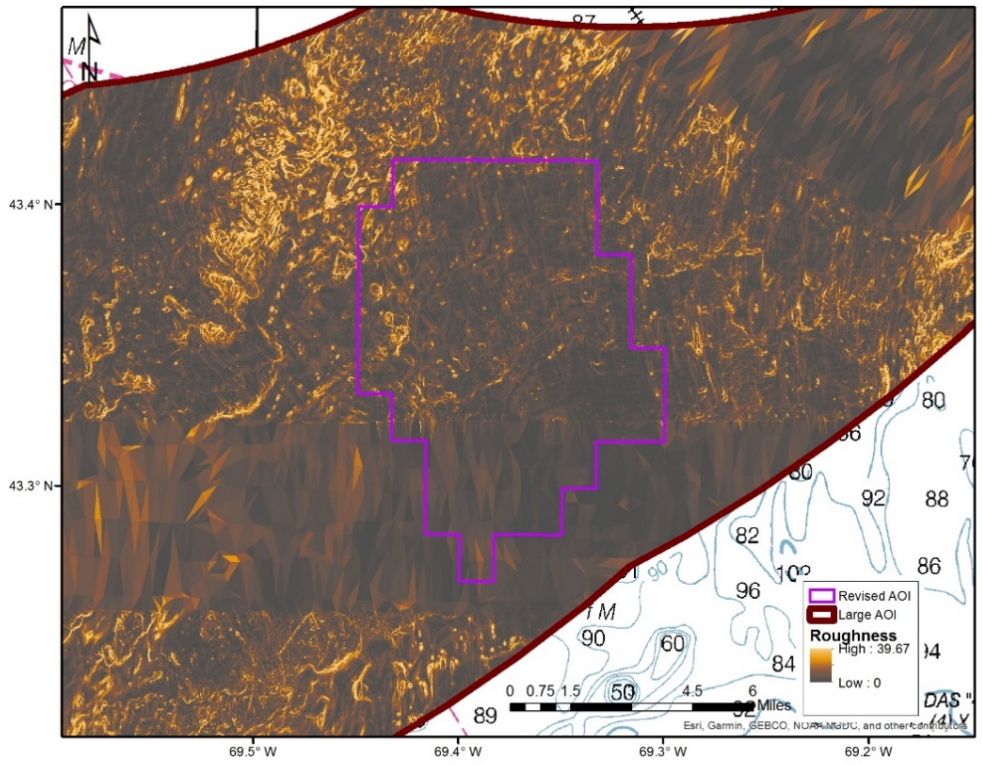

Figure 23: Roughness in the Narrowed AOI based on available bathymetry.

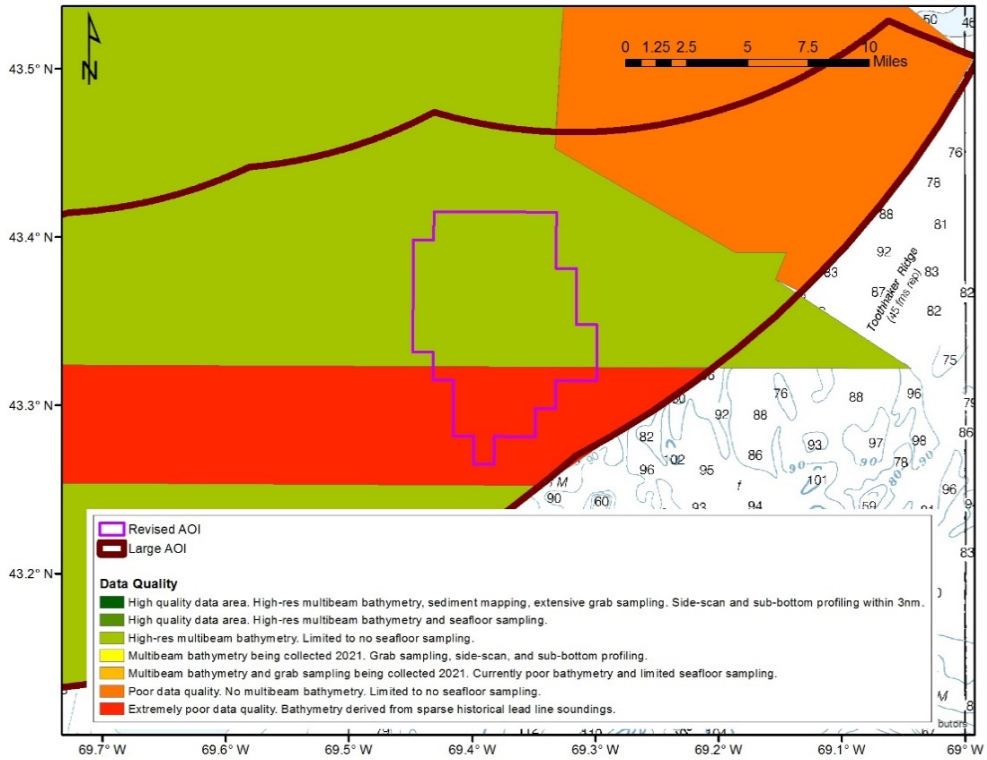

Figure 24: Seafloor data quality and availability in the Narrowed AOI.

Refined estimates of the NEFSC trawl survey abundance for the Narrowed AOI would indicate the Acadian Redfish and Silver Hake are the two most abundant species in the Spring and the Fall surveys. Haddock are present in the spring but absent in the fall. The density of actual survey locations is limited in this area, and interpretation of results should be used with caution. A higher density of survey tows is needed to accurately characterize the species abundance and distribution within the Narrowed AOI (Table 8).

Table 8: Top 10 Species by Mean Abundance within the Narrowed AOI, NEFSC Trawl Survey.

Fall		Spring	
Species	***Log kg/tow***	***Species***	***Log kg/tow***
Redfish	3.3	Redfish	2.58
Silver Hake	2.6	Silver Hake	2.21
Spiny Dogfish	2.5	Atl. Herring	1.46
N. Shrimp	2	American Plaice	1.42
Atl. Herring	1.9	Alewife	1.35
Red Hake	1.7	American Lobster	1.28
White Hake	1.6	Red Hake	1.25
American Plaice	1.5	Haddock	1.23
Alewife	1.4	Spiny Dogfish	0.96
Goosefish	1.1	Witch Flounder	0.87

To assess the relative abundance of species within the Narrowed AOI compared to the Large AOI, the proportion of the total abundance per species in the Narrowed AOI can be compared to the total abundance per species in the Large AOI. The Narrowed AOI is approximately 7% of the area of the Large AOI; therefore, any species with greater than 7% of its abundance within the Narrowed AOI can be considered to be more abundant within this area. DMR extracted values from the abundance layers for each trawl survey species for the Large AOI and Narrowed AOI. The Large AOI boundary was used as a denominator to represent total species abundance in Maine waters. Table 9 shows species with greater than 7% of their abundance for the fall and spring survey within the revised AOI and provides the percent species abundance for each survey

In contrast to the mean abundance estimates, the comparison of abundance in the Narrowed AOI to the Large AOI illustrates that the placement of the Narrowed AOI avoids the higher concentrations of commercially important groundfish found to the west on Platts Bank. The position of Atlantic Torpedo and Atlantic Halibut at the top of this list, in addition to the inclusion of several skate species, is likely due to the abundance of soft bottom favored by these species in the Narrowed AOI.

Table 9: Percent of Abundance in Narrowed AOI to Abundance in Large AOI, NEFSC Trawl Survey, for Species considered to be more abundant in the Narrowed AOI than in the remainder of the large AOI.

Fall		Spring	
Species	***% Abundance in Area***	***Species***	***% Abundance in Area***
Atl. Torpedo	23.5	Atl. Halibut	9.9
Scup	10	Barndoor Skate	8.8
Barndoor Skate	9.9	Atl. Mackerel	8.5
Redfish	9.2	Redfish	8.3
Smooth Skate	8.4	White Hake	8
Spotted Hake	8.1	Longfin Squid	7.9
White Hake	8	Atlantic Herring	7.7
N. Shrimp	8	Witch Flounder	7.7
Witch Flounder	7.9	Red Hake	7.6
Thorny Skate	7.8	Goosefish	7.6
Jonah Crab	7.5	Blueback Herring	7.3
Goosefish	7.4	Jonah Crab	7.2
Silver Hake	7.2	American Shad	7.2
Red Hake	7	Silver Hake	7.2

Marine mammals, including small delphinids and larger baleen whales, are highly mobile species and use this region of the Gulf of Maine across a broad scale. The Narrowed AOI makes an attempt to avoid some of the productive oceanographic features that may act to attract or concentrate these species during specific times of year, such as Jeffreys Ledge and Platts Bank. However, it is a high priority to set up monitoring surveys or passive acoustic arrays in this area prior to any impact to document the spatial and temporal trends of habitat use in this area, as well as record ambient noise levels to be able to monitor and assess the impact of construction and operation of the turbines.

9 Conclusion

Ultimately, DMR has determined that there is no location within the Large AOI that avoids impact completely, though the Narrowed AOI was selected because it appears to be an area of lower intensity of fishing activity, as compared to other areas of similar depth and bottom characteristics within the Large AOI. The initial constraint of siting in lower relief bottom with softer sediment for easier anchoring leads to greater impacts to mobile gear fleets. DMR's outreach effort indicates that the lobster fishery's activity in the Narrowed AOI is limited, though lack of fishery-dependent data that represents the lobster fishery's spatial footprint makes it difficult to know this with certainty. Select species are targeted within the Narrowed AOI, (such as American plaice, witch flounder and monkfish) by the groundfish fleet and interviews revealed the connectivity of the habitat within Narrowed AOI with those outside the Large AOI for these species. It would be a priority to initiate surveys and targeted studies to better understand distribution, abundance, and seasonal use of all species within the Narrowed AOI prior to any impact. Siting of this project will cause localized impacts that may be significant for those

fishermen most impacted. All fishermen are concerned about the impact of displaced effort from this project, and more importantly, about the potential for future developments of more significant scale. There may be potential to reduce these localized impacts by working closely with area fishermen on configuration and orientation prior to application submission or to consider alternative mitigation for loss of traditional fishing grounds.

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