MEMO

Fisheries, Wildlife, and Environment Data in the Gulf of Maine

September 26, 2022

Introduction

The Maine Governor's Energy Office (GEO) has requested the assistance of the Northeast Regional Ocean Council's Northeast Ocean Data Portal (Portal) team to identify and improve existing ocean ecosystem and ocean user geospatial data to inform Maine's planning for offshore wind in the Gulf of Maine (GOM).

This work is funded through the Maine Offshore Wind Roadmap and supports two components of the Maine Offshore Wind Initiative that are under way and will be strengthened by having this additional information as efficiently as possible:

- **The federal offshore wind leasing process.** At the May 19, 2022, meeting of the federal Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Intergovernmental Task Force on offshore wind leasing, a Gulf of Maine Engagement Approach timeline was presented. This timeline identified BOEM's intent to publish an offshore wind Call Area in the GOM in February 2023, and to designate a Wind Energy Area in the GOM in mid-2023.
- **Maine Offshore Wind Roadmap process.** Stakeholders have requested that the state efficiently work to fill data gaps to aid in the overall offshore wind planning effort as well as the federal leasing process. Specifically, the Fisheries Working Group and the Environment & Wildlife Working Group recommended mapping exercises that would identify known concentration areas for priority species, habitats, and fishing activities, as well as identify remaining data gaps.

To support these components, the Portal team collated existing, publicly available, geospatial data for the GOM and presented it in both a tabular, categorized format[1] and visually via a Draft Gulf of Maine Portal[2] at a workshop on June 14, 2022. The purpose of the workshop was to discuss with experts the areas of greatest potential concern for offshore wind energy development, environment, wildlife, and existing ocean users, and to identify geospatial data gaps that need to be filled to inform the state of Maine's offshore wind planning for the Gulf of Maine with respect to the two components and timelines described above. Workshop participants were asked to provide input specifically with respect to timeframes that relate to the federal offshore wind leasing and Maine Offshore Wind Roadmap processes:

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[1] https://airtable.com/shrOpVt62yzHvDBOJ
[2] https://gom.northeastoceandata.org [username: gomuser | password: nroc2022]

- Data that could be improved or added over the next 6-9 months and be available in time to inform the identification of a Wind Energy Area.
- Data that could be added and/or developed over the next 12-18 months to inform leasing within the Wind Energy Area. Additional resources would be required to add and/or develop these datasets.
- Data gaps that require longer timelines to fill

Workshop participants were split into three groups to review data and provide feedback: 1) Lobster fishery; 2) Non-lobster fisheries; and 3) Environment & wildlife. The rest of this memo is structured by these three topics.

The purpose of this memo is to describe potential analyses to improve existing data, new data that should be added to the Draft GOM Portal, and any new data products that could be developed over the longer-term to address gaps in the GOM.

1. Summary of Feedback from the Lobster Fisheries Group

The lobster fisheries group consisted of active fishermen, retired fishermen, lobster fishing industry representatives, NGOs, and state fisheries biologists and managers. The majority of the conversation centered around representation of the magnitude and footprint of the Maine lobster fishery in Federal Lobster Management Area 1 (LMA1). The Maine fishery has harvested an average of 108.6 million pounds of lobster in the last five years (2017-2021) from more than 5,760 state license holders of which roughly 1,400 are federally permitted. While improved reporting and vessel tracking for the Federal Fishery (greater than three miles from shore) may be coming in the near future, the immediate limitations of 10% harvester reporting greatly diminish the ability to characterize the current fishery beyond large management blocks. In Maine, fishing activity is reported by Lobster Management Zone (LMZ) and distance from shore (0-3, 3-12 and 12 plus miles from shore). Fishing activity largely follows bottom complexity in offshore waters, however this is not reflected in reporting and detailed publicly available bathymetric data is largely absent. The Department of Marine Resources licenses individuals and NOAA issues permits to the vessel. In order to land lobster in Maine, you must have a valid State of Maine license. Comparisons with other fisheries may be problematic, and there is a need to find metrics that represent all fisheries at the smallest spatial scale possible.

Key Takeaways

- Clip lobstering data to the Gulf of Maine RFI area, excluding other areas of New England including George's Bank
- Separate summer and winter landings, and provide context for the increasing importance of winter landings
- The fishery in LMA 3 is not well known in Maine. The majority of LMA3 fishing in the Gulf of Maine originates from the State of New Hampshire, Massachusetts, and Rhode Island. In general, Vessel Trip Reports should have greater representation of the LMA 3 fleet than the LMA 1 fleet.

- For LMA 1, use value and landings of 10% state harvester reporting and reported distance offshore to expand LMZ Dealer Data values to distance from shore (0-3, 3-12 and 12 plus nautical miles)
- "People fish with respect to features", such as hard bottom, shear areas, or areas with changes in slope
- Seafloor habitat can be a proxy for complexity, which is then a proxy for lobstering. Deep mud areas are lower lobster activity. Most of the offshore wind conflict may be with ground fisheries, because floating turbines will likely be deployed in areas with soft sediments.
- Use existing bathymetric layers, and backscatter data, to create a slope layer to serve as a proxy for complexity

Discussion
- The most granular lobstering data we have available at the moment are:
    - By Federal Lobster Management Areas (LMA), and NMFS statistical reporting areas.
    - In Maine 100% Dealer Reporting by port landed and 10% Harvester Reporting by Lobster Management Zones (A-G) and by distance from shore (0-3, 3-12 and 12 plus nautical miles)

- Lobster Management Areas, Statistical Reporting Areas, and VTR Data
    - The GOM planning area extends beyond LMA1. LMA1 is 90% of all US landings. Nearshore landings are incredibly high, but VTR coverage is low. Closer to shore we have less than 25%, and probably much less in actuality. This is a problem.
    - Offshore areas (LMA 3) have near 100% coverage of VTR
    - Statistical Area 515 looks like there would be less of an impact on the lobster fishery than inshore areas. That may be as granular a statement as we can say at this point. VTR data is decent in 515, we could query this with NOAA to get granularity.

- Vessel Tracking Data
    - NE Portal VMS map products follow the rule of 3, but there are still concerns surrounding confidentiality from intersection with other routes. There is also concern about using Eastern Maine VMS Declared Out of Fishery data, because of the low number of tracked vessels. VMS is not required for lobster, yet there are a very small number of vessels with VMS required other fisheries that dominate the DOF dataset with what appears to be lobstering activity, but this is not representative for the whole fishery. These data should not be used publicly to characterize the lobster fishery.
    - Lobster and groundfish fisheries stay away from each other. Just because there's no VMS in a certain area doesn't mean it's not fished, it can just mean that this is lobster area (which have very low VMS)
    - Lobster tracking data is still years out, so it will not be available for informing wind energy area identification and leasing

- Potential Analyses of Existing Data
    - The available lobster data presents problems with accurately representing the lobster fishery spatially, especially in LMA 1. These limitations make comparisons to other fisheries or inclusion of the lobster fishery in an overall fishing activity report problematic. Representation of all fisheries by NMFS statistical areas may be the only way to compare 'apples to apples'.
    - The group discussed getting greater granularity with existing 100% Dealer Data by looking at value by weight by LMZ. This can then be extrapolated for distance from shore based on % harvesters reporting.
    - There is some question of how to apportion landings within the overlapping Maine lobster management zones
    - We also need to separate offshore winter value by summer inshore landings to get a better sense of offshore areas. Summer values eclipse winter values, but the importance of winter landings needs to be more concrete. Also, the importance of federal landings vs state landings, but that can be difficult because federal permit holders also fish in state waters. But only federal permit holders can fish in federal waters.
    - Data further offshore, current and historic, is much more uncertain than nearshore data. There needs to be reference of multiple years of data. Currently, we're not capturing the evolution of the fleet to bigger boats and crews, which depends on success offshore in particular. Can we capture the segment of the fleet that's dependent on further offshore? Value may be able to get at this, something like proportion of income.
    - LMA1 tells the most important story. Slicing based on the data we have inside LMA 1 is dangerous because in some regions the numbers are lower, but the dependence is higher.
    - Displaying individual zone data may give the impression of lower/higher value areas, there was disagreement on if these differences should be displayed.
    - If development is only being considered in Federal Waters, then lobster information may need to be updated to only reflect these values. However, cable routing through state waters would require data on state fishing activity/value.
    - Siting and mitigation may look at only federal area and look at relative value of those areas.
    - We do not have time for interviews, but we can ID bathymetric features. Find harder bottom, anything that's broken. Find shear areas, change of slope areas, which are heavily trafficked.
    - No one here in this room has great knowledge of the LMA3 fishery. There are very defined areas of where they fish or don't fish.
    - LMA3 activity should be better understood, and "Maine" would need to reach out to partners in other State and Federal Agencies.
    - There were questions for how to capture the LMA 1 lobstering activity from states outside Maine that harvest in federal waters off Maine but because that harvest

returns to NH and MA and is not sold in Maine, it may not be captured in LMA 1 value using only Maine data.

- o Connecting dealer data and harvester data once we have 100% harvester data will be more useful. 2023 is the date for starting the 100% harvester reporting, this can't be moved up because it takes so much manpower and they need to hire and get the infrastructure set.
- o Mixed feelings about how we represent data from the 3 mile line to the LMA 1 & 3 border. Do we keep the zones? Average them?

Potential next steps that could be achieved within 6-9 months

The following activities are priorities that could be achieved within the next 6-9 months. Prioritization of this list and additional scoping of these activities may be necessary to achieve many of these outcomes in that timeframe.

- Maps representing lobster landings, value, and trips by ME lobster management zone are being staged on the Northeast Ocean Data Portal for public release and can be obtained from ME DMR. **Note: These data will be on the public Portal within the month.** Consider adding maps from ME DMR that show lobstering by distance from shore (0-3, 3-12, and 12+ miles). **Note: the Portal team will work with DMR to provide these data via the Portal.**
- Develop maps of all fisheries by NMFS statistical reporting area to enable comparisons of the lobster fishery to other fisheries
- Release maps showing the extent of reporting by statistical reporting area to be used as companions to any product that is derived from VTRs
- Use existing bathymetric, backscatter, and products from the Seascapes project to develop a map of potential hard and complex seafloor habitat
- While not discussed during the meeting on June 14, there is the potential in the next six to nine months to use the vertical line modeling products that are being developed to inform Right Whale management decisions.

2. Summary of Feedback from the Non-lobster fisheries group

The non-lobster fisheries group included representatives of the groundfish, monkfish, scallop, and herring fishing sectors. It also included staff from ME DMR, NOAA Fisheries, and the New England Fishery Management Council. The session started with a brief presentation of the types of data and map products that are publicly available via the Northeast Ocean Data Portal and other sources such as the NOAA National Marine Fisheries Service. This generally included maps showing fishery management areas and depicting fishing activity primarily derived from either the federal Vessel Monitoring System (VMS) or Vessel Trip Reports (VTR). The majority of the working session focused on a fishery-by-fishery review of the available VMS data, particularly draft VMS products for the period from 2015-2019, but also touched on the utility of VTR-derived products, such as the NOAA Fishing Footprints (FF – link: https://apps-nefsc.fisheries.noaa.gov/read/socialsci/fishing-footprints.php) and the Communities At Sea (CAS) data available on the Portals. The discussions also covered maps showing management

and closure areas and other contextual information that could be important to identifying fishing locations and discerning patterns. Participants were asked to provide feedback on the representativeness of the data, how it could be improved in the short-term to better represent Maine fisheries, and what additional analyses could be conducted to fill data gaps in the longer-term.

Important contextual and reference Information for fisheries mapping and footprint discussions

The group identified several map products and other information that could be used either as important contextual and reference information or as proxies or indicators of where fishing could possibly occur.

- Provide the NOAA navigational charts as a basemap in the Portal
- Provide maps of seafloor substrate, seafloor complexity, and bathymetry as context for fisheries discussions and potentially as indicators or inputs into analyses of where certain types of fisheries could occur
- Add layers with traditional place, feature, or fishing ground names, such as a map recently digitized by ME DMR depicting historical fishing grounds of the Gulf of Maine: https://dmr-maine.opendata.arcgis.com/maps/maine::mainedmr-fishing-grounds-of-the-gulf-of-maine-maps/explore?location=43.464941%2C-69.358878%2C9.95
- Develop a map representing LORAN-C navigation lines
- Show the management and closure areas for each fishery, including both seasonal closures and historical and previously considered/proposed management areas

General Comments

- All maps and data products will show recent and historical fishing areas; we need to have a discussion about where the fisheries may be located in the future and if and how to develop maps to represent potential shifts in each fishery
- Annual or five-year summaries may not show the cyclical nature of many fisheries; longer time series should be used where data are available
- Clip all fisheries data to the GOM planning area to potentially enable important GOM fishing locations to be more identifiable and not have the maps affected by activity in Southern New England and the Mid-Atlantic. Use the eastern, northern and southern boundaries of the planning area, but do not clip to the western/coastal boundary so that nearshore and state waters activity is not clipped out.
- Add or update VTR-based products on the Portal – new Fishing Footprint and Communities At Sea data products would show some fisheries and information that is not captured by VMS
- Instead of a map showing all VMS activity, develop a VMS-derived product showing just the primary non-lobster GOM fisheries, including multispecies, monkfish, herring, and scallop

GOM Shrimp

- The GOM shrimp fishery would show in the VMS Declared-Out-of-Fishery codes prior to 2013
- VTR-based products such as fishing footprints (FF) and communities at sea (CAS) data represent the fishery well

Multispecies and Monkfish

- A lot of GOM monkfish trips probably show up as multispecies trips in VMS; suggestion is to combine monkfish and multispecies to get an accurate representation of that fleet in the GOM
- Determine if it is possible to show trawl versus other gear types for these fisheries

Herring
- The Herring VMS maps from 2015-2019 look representative and accurate
- It would be helpful to develop a map of the entire previous decade instead of just the last five years

Scallop

- Adding VMS-derived products for scallops going as far back as 2006 would be helpful to see changes (VMS data for this fishery should go back at least as far as 2006)
- Create a single map of the entire time period (2006-present) and provide the ability to view the fishery in annual and five-year increments

Declared out of Fishery (DOF) VMS maps

- DOF from 2015-2019 may be showing some limited lobstering activity for those lobster boats with groundfish or scallop permits
- DOF from prior to 2006/2007 would show the whiting fishery off the coast of Maine; the 2015-2019 DOF maps may be showing some of the whiting fishery in the southern GOM
- DOF from 2006-2012 may show the GOM shrimp fishery

Detailed analyses

- Using the VMS data to conduct analyses of vessel heading or the orientation of tows could be helpful for showing patterns of certain fisheries, but the frequency of VMS pings may not be enough to capture some fisheries and gear types
- For most vessels in the GOM, especially vessels participating in the multispecies, 4 knots may be a useful cutoff to determine transit versus fishing and other activities

Potential next steps that could be achieved within 6-9 months

The following activities are priorities that could be achieved within the next 6 months with existing funding.

- Clip all 2015-2019 VMS data products to the GOM planning area boundary (only the offshore boundary, not the inshore boundary) *NOTE: This work is already in progress via NROC*
- Develop cumulative VMS maps: one for all GOM fisheries and one combined map of multispecies and monkfish **NOTE: This work is already in progress via NROC**
- Include five-year Fishing Footprint products on the Portal *NOTE: This work is already in progress via NROC and NOAA Fisheries*
- If possible, visualize VTR and VMS based products in the context of the management areas (note this may only be possible for the most recent years as historical management and closure area layers are currently unavailable – need to research NEFMC, NOAA Fisheries, and state agencies to determine if spatial data exist for historical management areas)
- Include historical fishing grounds, NOAA charts, place names, and sea bottom types and complexity as important contextual information on the Portal. **Note: NOAA charts and some maps showing bottom type are currently on the Portal. Additional work is necessary and could be completed in the 6-9 month time period to improve those maps and pull in additional data.**
- Explore the potential and need for more detailed analyses such as transit versus fishing, heading, or direction of tow **Note: Some maps currently on the Portal show fishing areas based on a speed threshold and the Portal team is drafting maps for the most recent five-year period where we show fishing versus transit, but only for those fisheries where a speed threshold was suggested during the meeting. More work would need to be done to develop methods for products depicting heading and direction of tow – this may fall into the longer time period of 12-18 months.**

3. Summary of Feedback from the Environment & wildlife group

The Environment and Wildlife group included scientists and experts specializing in Gulf of Maine wildlife and ecology from government agencies (including ME DMR, NOAA Fisheries, and USFWS), local consulting companies, eNGOs, and Maine academic institutions. The session started with a brief presentation of the types of data and map products that are publicly available via the Northeast Ocean Data Portal. This generally included maps of benthic and pelagic habitat and oceanographic features, modeled data products representing marine mammal, seabird, and fish distribution and abundance/biomass, as well as movement information data products for birds. Attendees described improvements to existing data products, additional existing data that could be obtained, and new data products that should be developed in each of the Environment/Wildlife categories of data products currently available on the Northeast Ocean Data Portal.

Important contextual information for environment and wildlife

The group identified several map products that could be used to better understand the magnitude of and trends associated with climate change (recently as well as in the future), that provide important contextual information when interpreting trends in wildlife, and/or may be used as proxies for taxa and processes for which data are lacking (e.g., forage fish aggregations). The group discussed the oceanographic data layers currently available on the

Portal and agreed that while informative, different metrics could more directly address the issues of recent and predicted climate changes, including:

- Include the metrics and datasets associated with the Gulf of Maine 2050 (GOM2050) downscaled climate model forecast
- Include GOM2050 climate model forecast anomalies data, especially for sea surface temperature and surface currents (compares present data to future predictions)
- Develop products representing phytoplankton and zooplankton anomalies from Ecomon data (i.e., most recent decade compared to 1970s)
- Mean surface current speed maps are needed as these are the most prone to change in the future
- Identify seafloor banks, which generate and drive primary/secondary productivity, perhaps by using bottom slope and topography

Each of the metrics above would require additional resources and time to develop, with the exception of the final two items: mean surface current speeds are already available via the Northeast Ocean Data Portal, and maps of seafloor banks will be produced by the NROC Seascapes project (noted and included in the section below on potential next steps that could be achieved within 6-9 months).

General Comments

The participants also discussed general data product needs and considerations that could apply to both short-term and long-term data development, including:

- Maps of bird coastal and island colony sites and bat activity in general continue to represent significant data gaps
- Continue to depict and improve presentation of observational and model uncertainty
- Consider standard methods for stacking, summarization, weighting multiple environment and wildlife datasets – within categories and/or across categories
- Develop methods to estimate future species distributions
- Use current and historical products with future projections to develop products that depict likelihood of future distribution/abundance change (e.g., difference surfaces, anomalies)

Potential next steps that could be achieved within 6-9 months

The following activities are priorities that could be achieved within the next 6-9 months. Prioritization of this list and additional scoping of these activities may be necessary to achieve many of these outcomes in that timeframe.

- The Seascapes product(s) should be completed and added to the Portal as soon as possible
- Add BOEM's megafauna hot spot data/analyses (by Tim White)
- Add existing Maine GIS data products with web services
  - Maine DMR Sea Run Fisheries – Atlantic Salmon Habitat

- o Piping Plover and Least Tern Essential Habitat
- o Roseate Tern Essential Habitat Layer
- o Seabird Nesting Islands
- o Shorebird Areas
- o Tidal Waterfowl and Wading Bird Habitat
- Add existing Duke MGEL North Atlantic right whale monthly products from previous model era 2003-2009 (2010-2018 products already on Portal)
- Add NCCOS avian distribution forecasts (contingent on NCCOS/BOEM timing) ***NOTE: This work is already in progress via NROC***
- Add context for current avian movement information products for Gulf of Maine – Surf scoters were captured sometimes in GOM (other species not), so surf scoter layers are most reliable, but others are biased by capture location
- Sea Duck Key Habitat Sites (Sea Duck Joint Venture) – add all Atlantic coast sites, including Coastal Maine key site
- Add Northeast Regional Habitat Assessment products (e.g., fish habitat suitability models) ***NOTE: This work is already in progress via NROC***
- Deep sea corals
    - o Add back the NEFMC coral protection area alternatives layers that were removed once the area was finalized
    - o Develop buffer around existing NOAA NCCOS coral suitability model outputs
    - o Add NOAA DSCRPT observations (point data)
- Include existing GOM bathymetry and (where available) backscatter
- Include existing Maine Coastal Program surficial sediment and benthic photos/IDs
- Include USGS/MACZM Massachusetts sediment characterization and benthic photos/IDs
- Include UNH/CCOM NH sediment characterization and benthic photos/IDs
- Include Maine Geological Survey overlaid by area specific to Maine Coastal Program sediment characteristics
- Isolate Banks as standalone layer from the NROC Seascapes data product
- Add Seabed Forms, Soft Sediments (TNC Marine Mapping Tool; MidA Portal) ***NOTE: This work is already in progress via NROC***
- Export select marine life analyses/products from TNC Marine Mapping tool – would need further work group input on which analyses/products to export and add
- While not specifically discussed, consider/scope clipping the existing distribution models for priority cetacean and bird species to the Gulf of Maine to identify areas of highest density or abundance.

Longer-term data development and synthesis projects that require additional funding and time (12-18 months)

The following activities are priorities that would require additional resources to complete. Many of them involve existing data that would need to be located, digitized, analyzed, and/or mapped prior to inclusion in any spatial planning exercise.

- Marine Mammals

- o Add maps of monthly overlap between great shearwaters and humpback whales, NARW in 2015, 2018 – Stellwagen Bank – Gulf of Maine (contingent on getting data products from [Exploring the Use of Seabirds as a Dynamic Ocean Management Tool to Mitigate Anthropogenic Risk to Large Whales](#))
  - o Add passive acoustic detections of marine mammals (existing products from [NEFSC PACM](#), including GOM inshore deployments)
  - o Obtain products pre-post 2010 (Davis et al.)
  - o Overlay a grid on PACM detections to query multiple species occurrences
  - o Map opportunistic marine mammal sightings from NARW Consortium, effort-corrected
  - o The group noted that it is possible that MA CZM has mapped opportunistic sightings for some species as part of their ocean planning process and perhaps associated with offshore wind planning in GOM as well.
  - o Map NARW dynamic management areas over time analysis (existing NOAA GARFO analysis)
- Seabirds, shorebirds, and bats
  - o Suggest mapping seabird colony size by species or months of importance – for example through a participatory GIS project with Linda Welch and other experts to map how birds "island hop" – stack each species layer
  - o Some of the best data is from a Stantec acoustic monitoring/nanotag project that developed maps of bat activity in GOM (Trevor Peterson/Stantec) – a decade old but the only bat data
- Fish
  - o Develop map of Atlantic salmon coastal use areas
  - o Develop map of Sturgeon migratory routes
  - o Develop map of juvenile Atlantic cod distribution (this was of great interest to NOAA during Monhegan transmission planning)
  - o Add Atlantic White Shark Conservancy habitat suitability models when they are released
  - o Maps from GMRI Graham Sherwood acoustic survey data
  - o Add Kevin Friedland's habitat suitability model products for forage species
- Biological habitat
  - o Explore UMaine Les Watling coral data for synthesis and data product development
  - o Doug Rasher has been collecting kelp data in GOM – can this be developed into maps/data products?
- Physical habitat
  - o Re-scale the habitat complexity layer to GOM (also consider nearshore, offshore)
  - o Paleocultural resource potential areas (low stand and slow stand bathymetry contours)
- Contextual/climate
  - o Include the metrics and datasets associated with the Gulf of Maine 2050 (GOM2050) downscaled climate model forecast

- Include GOM2050 climate model forecast anomalies data, especially for sea surface temperature and surface currents (compares present data to future predictions)
- Develop products representing phytoplankton and zooplankton anomalies from Ecomon data (i.e., most recent decade compared to 1970s)

Research Priorities

Several of the participants' recommendations involved effort-intense new field data collection or analyses that likely would require additional resources and longer than 12-18 months to scope and complete. These longer-term research recommendations are captured below:

- Cross-cutting
  - Develop species density models using different climatologies of the environmental covariates to estimate future distributions
- Birds & Bats
  - Antennas (Motus, acoustic?) on NERACOOS buoys owned by UMaine (there are 8) to detect birds and bats offshore
  - Need more capture/tagging to occur in GOM
  - Piping plover and red knot data
  - Sturgeon, Atlantic salmon EMF and cable interactions
  - Improve forage fish products (herring, hake, sand lance, menhaden) using stomach content analysis or menhaden/school counts and size from high-def aerial photos
- Fish
  - Passive acoustics detections of cod and haddock using NEFSC/PACM data